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CHILD MORBIDITY, HOUSEHOLD RESOURCES AND
CHILD HEALTH INTERVENTIONS:
A Case Study in Rural Egypt

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Doctor of Philosophy

by

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Abstract

Since the early 1980s, child health policies promoted by the international health community and national governments in the developing world have focused on a selective disease control approach which targets the leading causes of infant and child mortality through low cost medical interventions and their dissemination to the population through social marketing and mass media techniques. More recently, investment in maternal education has been increasingly addressed as an essential component of child survival strategies in the developing world following increasing evidence in national and cross-national surveys which demonstrates a positive relationship between maternal education and reductions in child mortality.

With respect to the impact of disease-specific interventions on child health and survival, numerous constraints to the impact of medical interventions have emerged as these interventions were transferred from clinical settings to field situations in the 1980s and 1990s. With regard to the role of maternal education in child health and survival, despite considerable research on this relationship at the aggregate level, there remain significant research gaps surrounding the pathways through which maternal education affects child health at the household level; these gaps have partially constrained the inclusion of maternal education as a fundamental component of child health policies at the implementation level. This thesis examines these issues concurrently in a sample of 401 households in rural Egypt.

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Abbreviations

PHC	Primary Health Care
SPHC	Selective Primary Health Care
HFA	Health For All by the Year 2000
MOH	Ministry of Health, Egypt
ORS/T	Oral Rehydration Solution/Therapy
NCDDP	National Campaign for Diarrheal Disease Project, Egypt
ARI	Acute Respiratory Infection
ARIP	Acute Respiratory Infection Project, Egypt
CSP	Child Survival Project, Egypt
CSRP	Child Survival in Rural Egypt Project
SRC	Social Research Center, American University in Cairo, Egypt
SPAAC	Social Planning and Administration Consultants, Cairo, Egypt
GHALC	Good Health at Low Cost Country Case Studies

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Introduction

This thesis is concerned with investigating two areas of child health and child health policy in Egypt. The first is the relationship between maternal education and child health and the mechanisms through which maternal education is hypothesised to affect child survival in developing countries. Despite extensive research at the aggregate level on the relationship between maternal education and child survival in the developing world, the mechanisms through which this relationship manifests itself at the micro level remain under-researched. Consequently, in spite of the emphasis placed on maternal education in current child survival strategies among the international health community, the wider literature on the determinants of child health suggests that significant empirical gaps continue to undermine the importance of maternal education in child health policies at the implementation level. This research represents an attempt to examine some of the pathways through which education enhances child health at the household level through a survey of 401 households in two villages in Lower Egypt.

The second, somewhat overlapping, concern of this research was to examine the implementation of population based disease-specific child survival interventions at the household level. This research concern is related to the fact that, since the early 1980s, child health policies in many developing countries have largely been characterised by disease-specific child survival

The research methodology of the thesis employed a combination of primary and secondary sources. Concerning the primary sources, the publications by the three case studies were utilised extensively and interviews with leaders and simple members were conducted. The strong emphasis on the case studies' publications was necessitated by the organisations' total lack of (e.g. autonomous feminist groups) or very restricted access to (e.g. the Federation) the daily press. Moreover, the organisations' publications provided the necessary information about the heterogeneous elements in the organisations' identity. The press presented a wide range of opinions, as well as specific issues generating intra-organisational conflicts. (e.g. *Bulletin* by the Federation). In addition, the coverage of the organisations' press (e.g. *Open Window* by the Union of Greek Women, 1979 -) over a long period of time illuminated the different stages in each organisation's course. This facilitated the demarcation of the various periods in the organisations' histories.

The primary material also includes interviews conducted with leaders or simple members of the organisations. The interviews gave access to the participants' views and strategies. The leaders highlighted the strategic dilemmas they faced, while the simple members outlined the subjective perceptions of the organisations' identity. Furthermore, the interviews conducted assisted the research by providing useful information about the organisations' nucleuses in the countryside. This information was usually not provided by the organisations' press, which focused on major events in urban cities.

Summing up, the primary sources assisted the comparative nature of the thesis. Comparisons were drawn up not only in regard to different case studies or countries but also in relation to variations in each organisation's course or identity.

The secondary sources enhanced the process of unifying fragmented information into a coherent framework. The research was obstructed by the absence of collective archives and the lack of a detailed historical account of the organisations or groups concerned. In some instances (e.g. the autonomous feminist groups) the non-existence of public or private institutions providing collective archives made access to personal records and contacts, the only means for obtaining information. In the absence, furthermore, of any history of the organisations or groups under question, the present accounts of the three case studies constitute original contributions to the subject.

policies and current approaches to disease-specific interventions in developing countries and in Egypt in Chapter 1, while Chapter 2 examines the literature on maternal education and child survival. This chapter attempts to draw out some of the empirical gaps in the literature on the maternal education-child survival relationship and outlines the empirical objectives of this survey with respect to the questions raised in this wider literature on the mechanisms through which maternal education is hypothesised to enhance child survival. These are further discussed in the methodology chapter, Chapter 3.

The empirical analysis is divided into two parts. Part I begins by examining the relationship between maternal education and maternal knowledge of the prevention and treatment of disease, primarily diarrheal disease and acute respiratory infection in Chapter 4. This chapter also examines the relationship between maternal education and maternal comprehension of mass media diarrheal disease campaign interventions. Chapter 5 examines the association between maternal education and the treatment and management of diarrheal disease and respiratory infection child morbidity in this sample. Part 2 of the empirical analysis is concerned with the relationship between maternal education, health-related household resources and the prevalence of child morbidity in this sample. It begins with an overview of intermediate risk factors associated with child morbidity in rural Egypt in Chapter 6; primarily water supply and sanitation and behavioral patterns related to their usage at the household level. Chapter 7 is concerned with the relationship between maternal

education and maternal knowledge of disease prevention, health-related household resources and child morbidity in this sample. Finally, Chapter 8 summarises the main findings of this survey and their implications for child health policies in developing countries.

1.1 Comprehensive Versus Selective PHC

Contemporary strategies for the promotion and protection of child health in developing countries began with the international commitment to Health for All by 2000, (HFA), and its cornerstone, Primary Health Care, (PHC), among representatives of 134 governments and international organizations at Alma Ata in 1978. At this international conference, organized by WHO and UNICEF, member states of the World Health Assembly, (WHA), redefined the concept of health, and the means of achieving it, from a disease-oriented curative approach to one which included, among its primary objectives, the promotion of health at the household level. Conceptualised in these terms, the 'process' of health development required investment in sectors beyond those traditionally the responsibility of the health services. Member states of the WHA then proceeded to endorse a list of eight essential PHC activities necessary for achieving HFA by 2000. These were:

- the promotion of adequate nutrition, water and sanitation services;
- the prevention and control of major endemic diseases;
- maternal and child health services, including family planning, (FP), and immunization against the major infectious diseases;
- appropriate treatment of common diseases and injuries, and the provision of essential drugs.

Member states of the WHA committed to the Alma Ata declar-

ation subsequently defined its chief pillar, PHC, as ' an integral part of both the country's health system of which it is the central junction and main focus, and an integral part of the overall social and economic development of the community,' (WHO / UNICEF, 1978: 3).

This policy transition from a largely curative/clinical approach to health towards a health development strategy simultaneously concerned with the determinants of health at the household level, was influenced by numerous factors. In the context of the wider development debate, this shift reflected a more general rejection of the modernization theories of the fifties and sixties which emphasised economic growth and 'trickle down' strategies for social development in favor of the 'basic human needs' approach to development which emerged in the 1970s, (Todaro, 1982; Streeten, 1981). In the specific context of health, this shift was influenced by contemporary interpretations of the health development experience of the developed world, (McKeown, 1976), which emphasised that, historically, the communicable diseases, which were the principle causes of mortality, were controlled before any major discoveries for their treatment were made. Health gains at the turn of the century were mainly due to better living conditions, including improvements in nutritional status, sanitation, and health behavior. Similarly, investments in curative / clinical health strategies would have a limited demographic impact in developing countries without parallel investments in socio-economic development and in strategies for the alleviation of

poverty.

Despite international commitment to the goals of HFA, the transition from policy to the implementation of a PHC strategy based on intersectoral investments in health and underscored by a commitment to equity was complex in both nature and scope. This was due to the fact that, 'when health services move from the curative component to the maintenance and promotion of health...The factors that can interact to influence the outcome are to be found in all major sectors contributing to socio-economic development,' (WHO, 1986: 14).

Parallel to growing concerns that the inter-sectoral investment requirements of the HFA strategy were considerably more complex than those of previous health strategies, was the more pressing question as to whether such investments would be economically feasible for the large majority of developing countries. For the international health community, the WHO Global Strategy represented: 'an ambitious and attractive vision. But to achieve its goals,... it still had to establish a clear and realistic link between the cost of activities for achieving outcome goals in relation to the estimated availability of resources,' (Patel,1986: 37).

The lack of detail with respect to the availability of resources for PHC was somewhat conducive to the emergence of an alternative strategy. Arguing that the Alma Ata declaration required substantial investments, an 'interim strategy for disease control' was proposed by Walsh and Warren in 1979. The authors argued that the concept of PHC had to be narrowed to allow planning for cost-effective programs and presented a specific methodology by which the most prevalent diseases in developing countries could be

identified and targeted at a cost within the range of available financial resources, (Walsh and Warren, 1980). This would form the scientific basis of a 'selective PHC' strategy, (SPHC), whereby priority and treatment would be allocated to diseases which had the highest prevalence, morbidity, mortality or risk of mortality and had the possibility of control in terms of effectiveness in method and cost of intervention; (Walsh and Warren, 1980).

In qualifying for all three of these conditions, child health interventions received priority in this 'selective PHC' strategy. Identifying the following diseases and interventions for their control globally: diarrhea, measles, malaria, whooping cough, neonatal tetanus and subsequently, acute respiratory infections, (ARI), the authors advocated that a mix of disease-specific interventions could be applied as a core of basic preventative care to which all types of SPHC could be subsequently added or subtracted on the basis of regional needs and new developments, (Walsh and Warren, 1980; Walsh, 1988; Warren, 1988). It was emphasised that 'until comprehensive PHC can be made available to all, effective services aimed at the few most important diseases may be the best means of improving the health of the greatest number of people,' (Walsh & Warren, 1980: 152).

SPHC caused considerable controversy in the health field. This controversy might have remained confined to an academic debate but for the 'Child Health and Survival Revolution,' (CSR), which was launched by UNICEF in 1982/83 and based on four technical/medical interventions; growth monitoring, (GM), oral

rehydration therapy, (ORT), breastfeeding promotion and immunization, (Cash, Keusch and Lamstein, 1987).

The UNICEF initiative was subsequently followed by widespread support for similar disease-specific child survival interventions by major international and bilateral agencies including; USAID, the World Bank, the Ford and Rockefeller Foundations; and, by accelerated research into selective medical interventions by major academic and research institutions such as the Centers for Disease Control and Prevention, CDD, (Unger & Killingsworth, 1986).

Launching the 'Child Survival Revolution', UNICEF emphasised that, although these interventions were not new, their implementation was accelerated by two developments in recent times: advances in social marketing and communication techniques and the economic recession which UNICEF was among the first to indicate was adversely affecting child health indicators in developing countries (Cash et al, 1987). The former facilitated the dissemination of such interventions to the wider population while the latter increased their necessity in order to alleviate the negative impact of rapidly diminishing resources at the household and health sector levels on child health indicators in the developing world.

Against this background, UNICEF was optimistic that the GOBI interventions would lead to dramatic reductions in the rates of infant and child mortality in the foreseeable future because: they could be described in terms simple enough for

parents to understand and act; they were inexpensive; they were universal in relevance and synergistic in their relationships, and were not dependent on profound changes in values or priorities, (Cash et al, 1987).

The widespread endorsement of SPHC by UNICEF and other development agencies throughout the 1980s was widely criticised by public health specialists. Opponents of this strategy emphasised the diversionary effects of SPHC on national efforts towards integrated, comprehensive PHC systems as defined at and since Alma Ata, (Gish, 1982; Smith & Bryant, 1988; Wisner, 1988). Others emphasised the weak scientific rationale on which SPHC was based and the biological and social constraints which would hinder the mortality impact of this approach in general, and that of specific child survival interventions in particular, (Berman, 1982; Unger & Killingsworth, 1986). The latter criticisms were later further highlighted as the interventions, and demographic research into their efficacy, were extended from controlled clinical trials to community settings in national programmes. Initially, however, opponents of SPHC emphasised the negative repercussions of a disease-control approach on PHC infrastructures and for meeting the essential goals of equity, access and acceptability which were established at and since Ama Ata, (see, for example, Berman, 1982; Unger & Killingsworth, 1986; Smith & Bryant, 1988; Wisner, 1988).

At the core of the criticisms of SPHC however, were the underlying issues identified by Rifkin & Walt as a fundamental difference in the definition of health between the two approaches. In the selective PHC strategy, health is defined as the absence of

disease and the usefulness of any health intervention is determined by the extent to which it is 'replicable and repeatable because it is based on science and technology and seen to be applicable universally,' (Rifkin & Walt, 1986: 562). This approach was diametrically opposed to the objectives of HFA which represented a health development strategy based on the removal of factors contributing to ill health, beyond the scope of medical interventions, (Rifkin & Walt, 1986).

Given the empirical weaknesses, methodological problems and conceptual difficulties of SPHC, some reasons for its widespread adoption among international donors, according to its critics, were that it provided readily measurable program results and placed little constraints on national health budgets in a period of economic recession, (Unger & Killingsworth, 1986).

In the second half of the 1980s, the diametrically opposing positions of the policy debate surrounding SPHC and CPHC were somewhat theoretically reconciled through two initiatives: the 'Good Health at Low Cost' country case studies sponsored by the Rockefeller Foundation in 1985 and the 'Intersectoral Action for Health' policy agenda published by WHO. The following section examines the policy implications of these initiatives briefly.

The Good Health at Low Cost country case-studies, (GHALC), represented an effort to define a prioritized health development strategy based on four experiences in the developing world where significant gains in health status were achieved without prior economic growth and wide-spread affluence. These were the health

development experiences of China, Costa Rica, Sri Lanka and Kerala State in India.

Despite their socio-economic and political differences, the authors argued that the case studies established the essential elements of a 'Southern' paradigm of health development in which public health measures, in addition to socio-economic development, play an important role in promoting improvements in health indicators in contrast to the 'Northern' paradigm which emphasised living standards over and above public health measures per se, (see for example, McKeown, 1976, cited in Halstead, Walsh & Warren, 1985: 246). The main elements of this Paradigm were:

1. Political and social will;
2. Education for all with an emphasis on primary and secondary schooling;
3. Equitable distribution throughout the urban and rural populations of public health measures and PHC;
4. Assurance of adequate caloric intake for all, (Halstead et al, 1985).

The authors of the GHALC case studies emphasised that, although, 'It was not possible to distinguish the separate contributions to mortality decline of the individual components of these simultaneous programs,' as indicated above, 'political and social will' were considered fundamental pre-conditions for establishing equitable access to education, nutrition and health based on this 'Southern' paradigm for achieving HFA, (Halstead et al, 1985: 244). Unfortunately however, the extent to which these health gains were achieved, and could be maintained, at low cost became increasingly doubtful in the case-study areas which subsequently experienced difficulties in meeting the recurrent costs

of previous investments in health and health-related sectors, i.e. Sri Lanka and Cost Rica, (Abel-Smith, 1985; 1989). Even the authors themselves acknowledged that the long-term investments of financial and human resources made by these countries were substantial.

Despite these limitations however, the GHALC case studies, in demonstrating the health impact of intersectoral linkages, effectively addressed a problem WHO had faced since the Alma Ata conference: This was the fact that countries were slow to implement the PHC strategy for reaching HFA partially because the intersectoral linkages for PHC were not well clarified at Alma Ata. WHO addressed these issues in its 'Intersectoral Action for Health' policy agenda and specified areas for investments in health including; education, agriculture, food and nutrition interventions and disease-control interventions. At the same time, the GHALC case studies provided concrete examples of intersectoral linkages which WHO presented as country-specific examples of the chief components of successful intersectoral strategies for achieving HFA, (WHO, 1986).

Thus in the mid-eighties, the GHALC studies and WHO's 'Intersectoral Action for Health' agenda somewhat reconciled the wider debate between selective PHC and comprehensive PHC, (CPHC). At the same time, however, these documents also presented increasing evidence of the negative impact of recession on health and social sector spending. In Sri Lanka, for example, diarrheal disease morbidity and mortality were increasing among the under-5's and this was partially related to the fact that only 50% of the

population had access to safe water, and 30% to sanitary latrines, (Halstead et al, 1985). WHO stressed that it is in these times of economic recession that intersectoral investments in health were particularly necessary for protecting the vulnerable. Away from the conference proceedings however, the cost of intersectoral investments in health appeared to exceed national health budgets in many parts of the developing world.

In the area of child health in particular, evidence from the field suggested less enthusiasm for the simultaneous implementation of selective and comprehensive approaches to PHC, or at least, that the two approaches would have to be applied sequentially with selective disease control interventions receiving priority in the order of things. This order of priorities was reflected as early as 1983 when experts in the health community, despite expressing concern over the vertical campaign nature of SPHC, concluded that, 'while overall development, the fulfillment of basic needs and improvements in the standard of living are essential to a sustained improvement in health, much can be achieved by the determined application of appropriate technology for the control of specific diseases even while the slow process of rising living standards is taking place,' (Ramalingaswami, cited in Warren, 1988: 897).

Against this background, the World Bank, UNICEF, WHO, UNDP and the Rockefeller Foundation established a task force for child survival for tackling the immunizable diseases in 1984. At the second task force for child survival in 1985, family planning and diarrheal disease were added as high priority interventions. Indeed as early as 1983, WHO and Rockefeller produced a consensus

report which stressed that 'the strengthening of an infrastructure which is capable of responding to priority problems offers a strategy for bringing us closer to the goals of HFA,' (Warren, 1988: 892). The Director General of WHO similarly noted that: 'The question is one of appropriate stewardship of scarce national and international resources. No simple formula exists for selecting priority programs but governing considerations are based on the major disease problems, and possibilities for prevention, control and treatment,' (UNICEF, 1982; cited in Warren, 1988: 892).

At the same time, others emphasised that the 'the economic recession has resulted in cuts in health budgets and public expenditure as a whole and reductions in per capita income; little of this reduction of total resources was envisaged at the time of Alma Ata. It poses a major change of context within which the goals of Alma Ata still need to be pursued if progress is to be made,' (Taylor & Jolly, 1988: 971). It was further emphasised by UNICEF that the major barrier to progress 'is the lack of awareness among parents and communities to use the new techniques to ensure better health for their children,' (Cash et al, 1987: 20). Thus despite the controversy created by the SPHC approach:

'the worldwide commitment to reducing infant and child mortality in the developing world has been driven by recognition that technologies and information are at hand that could virtually eliminate many of the major childhood diseases... Resources are limited [and these] have been focused on combating those diseases that are most commonly counted as direct causes of death such as diarrhea, (5 million deaths per year) and respiratory infection, (2.9 million),' (Mosley & Becker, 1991: 228)

Thus in the 1990s, particular emphasis by major donor agencies

has been given to immunization and oral rehydration therapy, and, more recently, acute respiratory infection programmes, ARIP, as the key underpinnings of this strategy. By 1991, national diarrheal disease control programs, (DDC), with the priority of implementing ORT were operational in 100 countries, and, by the end of 1990, 47 countries had functioning programs for the control of ARI based on WHO's standard case management strategy, (SCM), while a further 54 had prepared plans of operation for ARI control programs, (WHO, 1991, cited in Jamison, Mosley, Measham and Bobadilla, 1993).

However, following this widespread implementation of disease-specific child survival interventions throughout the 1990s, it became increasingly evident that, 'while the direct interventions proved to be highly efficacious and cost-effective in more controlled clinical settings, their large-scale implementation in communities appears to be less so,' (Gadomski, Black & Mosley, 1990; 235). 'With time, the constraints to the application of these interventions have become evident and their implementation in the field has turned out to be a much more involved process than anticipated. The application of 'easy' technologies has revealed the complexity of the problems that must be solved,' (Gadomski, et al, 1990: 242). These constraints added a new dimension to the CPHC vs SPHC debate and the following section examines these issues more closely.

1.2 Disease-Specific Child Survival Interventions

As the implementation of disease-specific child survival interventions expanded throughout the late 1980s and early 1990s,

empirical evidence from the field pointed to biological and social constraints to their individual and combined demographic effects on child mortality. Some of these constraints were originally forecast in the SPHC vs CPHC debate examined above, (Unger & Killingsworth, 1986; Rifkin & Walt, 1986) while others emerged as interventions were transferred from clinical settings to field situations, in the implementation phase. The latter included social constraints to the effective and sustained usage of interventions at the household level and biological constraints to their mortality impact at the population level. Thus in the 1990s, public health specialists began to stress the limitations of disease-specific interventions when these are 'delivered under diverse field conditions, on larger scales and with fewer resources than in pilot or experimental settings,' (Gadomski et al, 1990: 235).

For clarification purposes, these issues are divided into two areas in the discussion which follows; biological/technical constraints and social constraints. It is important to note however, that these constraints are often interactive in field situations.

Biological/Technical Constraints:

According to Mosley, demographic models of child survival indicate that the SPHC approach is fundamentally flawed in failing to incorporate a field based understanding of the biological determinants of child mortality in developing countries, (Mosley & Becker, 1991). This is due to the fact that although 'the arguments ar

scientifically sound based on an understanding of the biological processes of a specific disease in an individual,' (Mosley & Becker, 1991: 219), they fail to recognize that child deaths in developing countries are the result of prolonged exposure to multiple or competing risks simultaneously and sequentially, (Mosley & Becker, 1991). The policy-implications of a 'competing risks' child health strategy are that 'survival following any disease-specific intervention is conditioned not only by the effectiveness of the intervention, but also by the burden of all other diseases in the population. Because competing risks can substantially reduce the effectiveness of disease-specific technologies, one is forced to re-evaluate the appropriateness of selective intervention strategies in high mortality populations,' (Mosley & Becker, 1991: 220). [For evidence on 'competing risks' from longitudinal research in developing countries see Mata, 1978; Matorell & Ho 1984; Rowland, Cole and Whitehead, 1977, cited in Mosley & Becker, 1991]. Mosley therefore emphasises that:

'In selecting priority disease problems for intervention programs, one must not only consider the disease's direct contribution to death but also its indirect contribution to mortality related to the production of frailty among survivors. When this is done, the priorities shift towards highly prevalent chronic conditions which make large contributions to frailty, since these increase case-fatality rates from other diseases,' (Mosley & Becker, 1991: 221).

Thus, the second policy implication of a field-based understanding of child mortality emphasised in the literature is that certain preventative interventions which reduce the risk of some high incidence acute diseases can be expected to show a greater demographic impact than implied simply by counting diseases directly

attributable to deaths. This is because of the joint effects of reducing frailty and mortality, i.e. reducing the incidence of measles not only reduces deaths from measles but also deaths from other causes. Consequently, interventions which have a multiplier effect are more cost-effective than disease-specific interventions such as tetanus toxoid which are at risk of cancellation by competing risks. [For further discussion of empirical evidence on competing risks, see Greenwood, B.M., cited in Gadomski et al, 1990].

Furthermore, 'life-saving curative interventions which do not diminish morbidity associated with the disease, (i.e. ORS), are likely to be ineffective in promoting child survival as well as being an inefficient use of resources if the disease is recurrent, (for instance diarrhea,)' (Mosley & Becker, 1991: 221). [For evidence on the relative ineffectiveness of specific curative interventions see Mata, 1978; Cole & Parkin, 1977; and Rowland et al, 1977, cited in Mosley & Becker, 1991). Consequently, broad preventative measures, for example, in water programmes, personal hygiene and breastfeeding promotion which 'reduce risks of multiple diseases simultaneously, can show a substantial impact on overall survival, even if the direct effects on individual diseases are modest. This is because of the combined impact of reducing both frailty and competing risks,' (Mosley & Becker, 1991: 221-222; see also; Briend, et al, 1988; DaVanzo, 1988; Esrey, et al, 1988 and Winikoff, 1980, cited in Mosley & Becker, 1991).

According to Mosley, recognition of these factors forces a

reconsideration of the appropriateness of single-disease curative measures in high mortality settings as well as drawing attention to the potential benefits of selective interventions that can diminish competing risks by reducing exposures and that can prevent deaths from many diseases by reducing frailty, (Mosley & Becker, 1991; see also Briscoe, 1987, and Gadomski et al, 1990). Such interventions, however, have been accorded low priority largely because, looked at in isolation, the direct effects of these health interventions on individual diseases are relatively modest according to Mosley. Furthermore, despite the fact that epidemiological research to date, 'indicates that the most effective interventions for the control of diarrheal disease are programs to interrupt the transmission of infectious agents inside the home,' (Mosley, 1984: 6). According to Mosley, there is very little research in this area while 'dozens of studies pour forth from medical centers in the developing world testing minute gradations in the electrolyte content of a rehydration fluid that is already almost 99% effective in clinical settings,' (Mosley, 1984: 6).

In addition to these general biological constraints to the demographic impact of the SPHC approach to child survival however, there remain significant constraints which hinder the mortality impact of particular technologies according to the health literature. In view of the extensive resources allocated to DDC programmes in recent years, these constraints have been widely addressed with regard to ORT, initially hailed by UNICEF as 'potentially the most important medical discovery of this

century,' (Henry, Briend & Fauveau, 1990: 229).

Intervention-Specific Biological Constraints

According to the epidemiological literature on diarrheal disease, the life-threatening diarrheas are made up of acute watery cases, persistent cases, dysenteric cases, and complicated cases (those with accompanying problems such as measles, malaria, or respiratory infection). ORT has its effect almost exclusively on the acute watery episodes of diarrhea. However, the distribution of life-threatening cases among these four types is not well documented. Studies in Bangladesh show that in the 1-4 age group, 7% of deaths were found to be associated with watery diarrhea whereas 27% were due to dysentery in association with malnutrition. 'In contrast, persistent diarrhea associated with malnutrition was associated with 63% of all diarrhea deaths and 34% of all deaths in the 1-4 age group,' (Henry et al, 1990: 228). The Bangladesh data therefore suggest that 'vertical diarrhea control programmes which focus on ORT are unlikely to reduce mortality due to diarrhea substantially, ... and, a broader and more balanced strategy is essential to improve child survival in Bangladesh since most diarrhoeal deaths occur in malnourished children with prolonged diarrhea, mainly dysentery,' (Henry et al, 1990: 229).

Martines et al similarly argue that the emphasis of both international efforts and national programs in the field of diarrhea control has been almost exclusively on ORT. 'It has been widely

claimed that, because dehydration is a primary cause of death in children with acute watery diarrhea, ORT programs can greatly reduce diarrhea mortality rates, and, because diarrhea accounts for 20-40% of all child deaths, ORT programs will also have a significant effect on overall child mortality rates. With a decade of accumulated experience it is time to question these assumptions,' (Martines, Phillips & Feachem, 1993: 110). The authors therefore emphasize that, 'The policy conclusions are clear: namely, much more emphasis should be placed on primary prevention and on more comprehensive case management that would encompass all life-threatening episodes, including those that are persistent, dysenteric and complicated,' (Martines, Phillips & Feachem, 1993: 111; eds: Jamison et al, 1993).

According to Gadomski et al, 'each of the direct interventions face similar biological constraints with slightly different permutations that arise from the specifics of each technology,' (Gadomski, et al, 1990: 236). Even the EPI schedule, according to Henry et al, has serious limitations which raise doubts over the cost-effectiveness of 'channeling large amounts of scarce resources,' (by development agencies), 'to a single activity such as EPI when it is unlikely to make a major impact on neonatal deaths, which account for most of the mortality in infants,' (Henry et al, 1990: 232).

With respect to growth monitoring, (GM), considered by UNICEF as possibly the most essential step towards the eradication of child mortality in our times, the challenge, according to UNICEF, is 'to

create mass awareness of the growth problem and the factors causing growth faltering in children and mass demand for its solution in the community using the most modern media techniques,' (Nabarro & Chinnock, 1988: 944). However, promotion efforts have rarely been met with the response or revolutionary outcome that UNICEF predicted. This is because, apart from the widely documented technical constraints to this strategy, 'growth monitoring is not useful if those who identify growth faltering cannot correct the condition in disadvantaged conditions and where adequate follow-up of children is lacking,' (Nabarro & Chinnock, 1988: 946).

Apart from the intervention-specific biological constraints outlined above however, more recently, the large-scale application of disease-specific child survival interventions has illustrated that other factors, primarily social constraints, may also affect the demand for, and appropriate usage of, home-based interventions, particularly with regard to diarrheal disease and ARI interventions. These social constraints, increasingly regarded as potentially important obstacles to the efficacy of child survival interventions, have frequently been illustrated in field-based experiences with ORS.

Social Constraints

In controlled clinical trials and pilot projects, ORS proved to be a highly cost-effective means of treating dehydration associated with diarrhea leading to substantial increases in survival and cost-savings relative to previous experiences with

intravenous rehydration. However, in controlled settings the 'clinical efficacy and efficiency of ORS is maximized since it is administered by qualified health workers attending children with moderately severe disease. In large-scale community settings or national application, ORS... is passed on to community health workers or child caretakers. The effective use of the intervention is then commensurate with the level of training or education attained by these individuals,' (Gadomski, et al, 1990: 236). These considerations are particularly crucial in determining the success of home-based interventions where the effective use of the intervention by the recipient requires specific behavioral changes. Since the mother is responsible for the implementation of these interventions inside the home, the importance of social support factors, such as maternal education, which may affect maternal ability to effectively and judiciously implement home-based care, is further underscored as a determinant of the success of child survival interventions. For example, a mother who has received an ORS packet will have to recognize the threat of dehydration in the child, understand the purpose of ORS is a therapy for dehydration and not diarrhea, obtain water and mix it correctly. With regard to the ARI control programs which are currently also based on a case-management strategy, the mother is required to diagnose and distinguish symptoms of pneumonia from common cold and to respond promptly to dangerous symptoms when they occur. Pneumonia, diarrhea and malaria interventions which rely on home-based care, therefore, require that the mother both diagnose and perform effectively as

primary caretaker.

In view of the fact that the life-saving potential of ORS may already be threatened by competing risks in community settings, the social constraints to the effective and appropriate usage of ORS in field situations become particularly problematic. Thus, as Gadomski et al argue, the social and economic factors which predispose families to the risk of disease may be the same factors which constrain the effective usage of interventions in community settings. 'This is not to say that ORS is not a valuable technology, but that the costs and efforts needed to establish its effective use on a large scale were vastly under-estimated and its potential impact overstated,' (Gadomski et al, 1990: 236). These constraints are further examined in the chapters which follow.

In spite of increasing recognition of the limitations of selective child survival interventions, however, supporters of this approach emphasised that 'the pneumonia-diarrhea complex, the six diseases targeted by EPI, especially measles and neo-natal tetanus and the synergism of malnutrition and common infections have almost universal priority,' (Taylor & Jolly, 1988: 972) These diseases therefore constitute a cluster of similar health problems which should have high priority. 'The community is usually aware of these health problems but do not know that solutions are available or can be mobilised,' (Taylor & Jolly, 1988: 972). Furthermore, 'at a time when health budgets are being cut, a 300% increase in mainstream components of PHC is remarkable,' (Taylor & Jolly, 1988: 973-974).

Similarly, even some critics argued that prior to the SPHC concept, 'much of what was done under the guise of CPHC involved recruiting low level field workers ... by highly centralised institutions,' (Mosley, 1988: 908). With the introduction of SPHC, health programs and interventions 'had to be population-based and effectively reach every family with the related information and technology. This meant that the most peripheral worker had to be specially trained... and program performance continually monitored at the population level,' (Mosley, 1988: 908). According to Mosley, UNICEF has recognised these key concepts and has added another key element that is essential to any effective PHC strategy, namely; 'the mobilisation of communities and individuals, through the use of mass media, to take a more active role in promoting health rather than to rely passively on the government health system,' (Mosley, 1988: 908).

More recently, an overview of PHC and HFA strategies has questioned the notion that SPHC would lead to a polarisation of resources away from PHC and argues that 'the identification of two incompatible paradigms is not a useful one for describing the implementation of national-level PHC programs,' (Kendall, 1988: 17). For example, in Honduras, the DDC program is an SPHC intervention implemented within an integrated health sector with donor support, (Kendall, 1988).

Despite these arguments, in 1993 the World Bank initiated a new international health agenda with the aim of ensuring the compatibility of selective and comprehensive

approaches to PHC. Its wider aims were to accelerate the long awaited 'phased progress' towards intersectoral PHC and to simultaneously promote selective interventions while acknowledging the potential constraints to their impact.

The World Bank initiative was significant for a number of reasons; the first was related to the fact that, because adjustment policy is the dominating economic preoccupation for setting the frame and constraints within which all other development issues have to be considered, (Cornia, Jolly & Stewart, 1987), what the Bank, (and its affiliates in the international community), have to say about investments in health in the 1990s could have significant policy implications for much of the developing world. Correspondingly, the Bank's increased involvement in health at this time, (see Walt, 1994), represents an effort to redress criticism of the impact of its adjustment policies in developing countries by UNICEF in 1987, and by national governments reluctant to undertake the Bank's painful remedies for economic crises. Equally, the Bank's direct involvement in health at this time implies a recognition that the minimum 'safety nets' advocated by UNICEF in the late 1980s to protect the health of vulnerable groups from the negative repercussions of adjustment policies may have been somewhat insufficient. In this respect, this latest proposed agenda for achieving HFA is particularly significant in that it brings to the forefront, once again, the intersectoral policy concerns established in the original HFA agenda while, at the same time, advocating a 'mix' of selective disease control interventions which acknowledge some of the technical constraints

to the mortality impact of these interventions. The following section of this chapter will briefly examine this initiative and its implications for child health and survival policies in developing countries.

1.3 Intersectoral Investments in Health and Disease-Specific Interventions

The World Bank's 'three-pronged' approach to government policies for improving health calls on governments to:

- Foster an environment that enables households to improve health. This follows from the recognition that household decisions shape health but these decisions are 'constrained by the income and education of household members,' (World Bank, 1993: 6);
- Improve government spending on health, and, finally,
- Increase investments in scientific advances since 'increased scientific knowledge has accounted for much of the dramatic improvement in health that has occurred in this century,' (World Bank, 1993: 6).

In advocating more than minimum 'safety nets' for protecting child health, this latest agenda for reaching HFA further stresses that, 'since economic growth, particularly poverty-reducing growth, and education, are central to good health, governments need to pursue sound macro-economic policies that emphasise the reduction of poverty. They also need to expand basic schooling, especially for girls, because the way in which households, particularly mothers, use information and financial resources, to shape their dietary, fertility, health care and other lifestyle choices has a powerful influence on the health of household members,' (World Bank, 1993: 6-7).

The World Bank's emphasis on household income and maternal education, in addition to representing a return to the Alma Ata concerns for preventative and promotive health, represents a related important recognition of recent developments in the literature on the social determinants of child health and, in particular, on the role of maternal education and household income in this equation. A brief historical overview of this literature indicates that, in the 1950s-60s health care and sanitation were thought to be the key to rapid infant mortality decline seen in countries at very different levels of development and economic growth, (Davis, 1956, Stolnitz, 1965, cited in Mosley, 1984). More recently, however, studies by Preston, (Preston, 1978, cited in Mosley, 1984), demonstrated that both socio-economic development and technology played important roles, each contributing approximately 50% to the over-all mortality decline in the post World War II period. This decline was expected to be both steady and irreversible. In 1980, however, 'data by Gwatkin suggested that the pace of improvement in the late 60s and 70s had slowed considerably,' (Gwatkin, 1980, cited in Mosley, 1984: 11), and, following this evidence, it became increasingly clear that public health measures could affect some of the endemic causes of child deaths but it was doubtful that these could 'sustain the momentum of mortality decline in the absence of broad social and economic progress... This prompted a more critical consideration of the connections between development, medical technology and mortality change aimed at a fuller understanding of their interrelationships

for health policy and programming purposes,' (UN Population Division, 1983, cited in Mosley, 1984: 11).

In recent years, major studies which contributed to this body of literature on the determinants of health include the World Fertility Surveys, (WFS), and the Demographic and Health Surveys (DHS), in addition to various regional surveys, such as the Pan American Health Survey and the Pan Arab PAPCHILD surveys.

In spite of the limited variables available for study in classical macro-level demographic research, 'the macro-approach has proven invaluable in defining some of the major determinants of mortality trends and differentials in populations, often yielding findings that have major policy implications,' (Mosley, 1984: 11).

With respect to income and education, Preston's analysis of 52 countries indicated that it was the economic capability of the family that is important to the survival of their children, while, at the same time, showing, 'the independent contributions of female education and per capita calorie availability in mortality differentials,' (Preston, 1980, cited in Mosley, 1984: 11). In Latin America, Palloni also noted the strong influence of literacy, particularly in high mortality countries where major medical causes of death were respiratory infection and diarrheal diseases, (Palloni, 1981). These findings also suggested that in poor social settings, uneducated mothers were at a far greater risk than educated mothers, as has similar research in Kenya by Mosley, (Mosley, 1983), and in Haiti by Carvajal & Burgess, (Carvajal & Burgess, 1978, cited in

Mosley, 1983).

With respect to micro-level research on the impact of maternal education in particular, on child health, perhaps the most significant evidence of the importance of maternal education was provided by Caldwell in 1979 who, based on Nigerian survey data, demonstrated that maternal education was the most important single determinant of child mortality, (Caldwell, 1979). This conclusion held true even when controlling for other variables such as paternal education and occupation, maternal age and occupation, area of residence, type of marriage and access to health facilities. Thus although maternal education had been treated as a proxy for socio-economic status prior to this, Caldwell's analysis presented a strong case for education having a more direct effect on child mortality through improved child care, (Hobcraft, McDonald & Rutstein, 1984). Caldwell's data also suggested that the impact of education may be more important than income factors and access to health facilities combined, (Caldwell, 1979; Caldwell & McDonald, 1981; Caldwell, Reddy and Caldwell, 1983). The role of education has not been as definitive in other settings however. In Bangladesh, research showed that increasing household income was a prerequisite for other attempts to improve nutritional status, (Bairagi, 1980, cited in Cornia, 1984). At the same time, however, in Haiti, an illiterate mother with a higher income appeared less able to utilise her resources than a literate mother, (Carvajal & Burgess, 1978; see also, Smith et al, 1983, cited in Cornia, 1984).

The study of the specific relationship between income and child survival is limited due to the usual constraints associated with income indicators in developing countries. These are further examined in Part 2 of the empirical analysis of this thesis. Nevertheless, a few experts have attempted to examine the relationship between income distribution and child mortality, most notably, Flegg. Using data from 47 developing countries and controlling for literacy, fertility and per capita availability of doctors/nurses, Flegg confirmed the importance of income equality, and by extension, class, assets and entitlements, as determinants of infant mortality, (Flegg, 1982).

While aggregate data has proven useful for describing trends in mortality differentials in the developing world, such data only points to positive statistical correlations and does not examine cause and effect. The Mosley/Chen child survival research framework has recently provided important tools for examining the determinants of child survival from this perspective. In separating the socio-economic determinants of child health from intermediate or proximate determinants, this framework has combined the epidemiologists' concern with the biological sources of disease with the social scientists' concern for their social origins, (Mosley & Chen, 1984). Research at the household level based on this conceptual framework has also provided further scientific evidence of the underlying role of the depletion syndrome and multiple risks and stressed the importance of addressing the determinants of child mortality in this wider context as opposed to addressing the epidemiological

origins of specific diseases. (These household studies are examined more extensively in the empirical chapters of this thesis.)

The acceleration of research into the determinants of child survival, again, although only demonstrating positive statistical correlations and not proof of cause and effect, has produced a general consensus among the health community concerning the determinants of child survival. This consensus is summarised by Cornia as such; 'Apart from the five demographic factors singled out as particularly accurate predictors of under-5 mortality; (birth interval and order, sex, age of mother at time of confinement, and multiplicity of birth), ... Few are the general conclusions that can be drawn by surveying the literature as to which factors are the most important for the achievement of higher levels of child welfare... It is worth recalling however, that while specific medical and public health interventions appear to be successful in controlling epidemics and contagious disease-related mortality, improvements in family education and economic position appear necessary for further progress since such improvements would make it possible to tackle not only the immediate causes of mortality and morbidity but also their underlying causes,' (Cornia, 1984: 23).

In sum, in recognizing the need to address the underlying causes of child mortality, and increasing evidence of the importance of maternal education and household income in this equation, the most recent strategy for reaching HFA initiated by the World Bank has included maternal education and household income as

important areas for intervention in national efforts to return to the original Alma Ata concerns for the promotion of health at the household level. However, although these intersectoral policy directions represent an important attempt to re-establish concern with the social causes of disease, the agenda for their implementation is essentially no more than a call on governments to accept growth-oriented adjustment policies as a necessary prerequisite for poverty alleviation and a recognition that this strategy, together with improvements in female education, is essential for health development. In contrast, the World Bank's agenda for selecting disease control priorities is far more significant in specifying the future direction of disease-specific interventions. Towards these efforts the World Bank sponsored a major collaborative initiative with participation from WHO, the Rockefeller Foundation, the Centers for Disease Control & Prevention and leading international experts in disease-specific interventions. The following section examines this agenda and its implications for child health in developing countries.

The World Bank Agenda and Child Survival Interventions

Broadly speaking, the international health community's agenda for disease-specific child survival interventions in the 1990s was established in the declaration and plan of action adopted at the World Summit for Children in 1990. The health goals of this summit's plan of action included:

1. the achievement and maintenance of at least 90% immunization coverage of one-year old children, and the eradication of polio by 2000;
2. a halving of child deaths caused by diarrhea and a one-quarter reduction in the incidence of diarrheal disease;
3. a reduction by one-third in child deaths caused by acute respiratory infections;
4. access to prenatal care and a reduction in the incidence of low birth weight to no more than 10%, (World Bank, 1993: 15).

In line with these general objectives, the purpose of the World Bank review was to 'reassess the cost-effectiveness of interventions to allow judgements to be made on priority interventions for child survival by combining technical analysis (epidemiological and clinical) with economic considerations,' (Jamison, et al, 1993:3).

Despite its similarity to SPHC in several important areas, the World Bank agenda for disease control priorities differs significantly from its predecessor, SPHC, in recognising that 'the mix of interventions promoted, and the health system's capacity to deliver them, must be addressed iteratively rather than sequentially,' (Jamison et al 1993:4). In promoting 'economically sensible delivery systems' with these factors in mind, this latest approach to child survival interventions avoids many of the shortcomings of the original SPHC approach which was criticised for overlooking the health systems already in place, or for perceiving health care systems in the developing world as a *Tabula Rasa*, (Gish,1982).

Secondly, this latest international agenda for selecting

disease-control priorities takes into account the limitations of previous child survival interventions which emerged with field-based experiences during the previous decade. These include the biological/clinical constraints to mortality impact previously discussed, in addition to input constraints at the health sector level i.e. in educating health-care providers to correctly diagnose and treat diarrheal disease and ARI and in correcting the over-use of antibiotics.

Thirdly, although, social marketing and mass media continue to constitute the primary policy instrument for implementing all of the child survival interventions, the World Bank strategy acknowledges that the difficulties in maintaining the effective and appropriate usage of home-based interventions in field situations are not well understood. With these considerations in mind, the following section examines the main elements of the World Bank agenda for child survival, focusing on diarrheal disease control and acute respiratory infection programmes in view of the epidemiological significance of these diseases in the developing world in general and in Egypt in particular.

1.4 Disease Control Priorities: The World Bank Agenda

According to WHO, the number of infant and child deaths declined substantially during the previous two decades. 'In large part, this decline has been attributed to the rapid improvement in immunization coverage since the mid-1980s. By contrast, relatively little change has occurred in the other principle causes of child

death, diarrheal disease and ARI,' (Jamison et al 1993: 679).

Thus although the immunizable diseases continue to require major efforts, programs for the control of diarrheal disease and respiratory infection will continue to predominate given their epidemiological significance. At the same time, as indicated previously, the decade of international experience with diarrheal disease control programs has illustrated important constraints to the efficacy and cost-effectiveness of DDC programmes with important implications for current efforts to control ARI at the household and health sector levels. This section focuses on contemporary evaluations of diarrheal disease control interventions and their implications for the future while the section which follows focuses ARI programmes.

1. Diarrheal Diseases Control:

A. Prevention

With respect to the prevention of diarrheal diseases, a systematic study initiated by the DDCP of WHO in 1982 concluded that, out of a total of 18 preventative interventions, the following interventions demonstrated evidence of adequate effectiveness and feasibility, (Feachem et al, 1987, cited in Martines et al, 1993: eds: Jamison et al 1993). These were:

1. Breastfeeding: For a discussion of the literature on the reduced risk of diarrheal morbidity and mortality associated with breastfeeding see: Mahmood et al, 1989; Victora et al, 1987; Briend et al, 1988; Clemens et al, 1986, cited in

Martines et al, 1993: eds: Jamison et al 1993.

2. Improved Water Supply and Sanitation: For a discussion of the literature on the reduced risk of diarrheal morbidity and mortality associated with improved water supply and sanitation see Martines et al, 1993: eds: Jamison et al 1993.
3. Improved Domestic Hygiene: For a discussion of the literature on the reduced risk of diarrheal morbidity and mortality associated with improved personal hygiene of food handlers and storage of food, see Feachem, 1984, cited in Martines et al, 1993, eds: Jamison et al 1993.

Despite identifying the potential impact of the above preventative interventions, the World Bank review concludes that, 'There is still a long way to go before behaviors associated with lower diarrheal incidence and reduction of severity are widespread and before the necessary improvements in water and sanitation and food preparation utilities are available to most families. Therefore, an optimal preventative strategy should focus on the promotion of improved weaning practices and hygiene practices although the latter may be constrained by water availability,' (Martines et al, 1993: 103; eds: Jamison et al 1993.)

B. Curative Care and Secondary Prevention

With respect to the elements of a case management strategy for the prevention of diarrhea-related deaths through ORS, the World Bank study suggests that there are indications of a decline in diarrhea mortality in recent evaluations of national DDC programmes: including a sharp reduction in diarrhea mortality rates in Egypt with improved diarrheal case management by

mothers and doctors (El-Rafie et al, 1990, NCDDP, 1988, cited in Martines et al, 1993; eds: Jamison et al 1993); and in Thailand, Brazil, Cuba, and Costa Rica, (Phonboon et al, 1986; Benicio et al, 1987; Riveron-Corteguera, et al, 1982; Mata, 1981, cited in Martines et al, 1993; eds: Jamison et al 1993). Nevertheless, the study emphasises that uncertainty as to the accuracy of mortality statistics may indicate the need for caution in the evaluation of these results, (Martines et al, 1993; eds: Jamison et al 1993). (The Egyptian National Diarrheal Disease Control Programme, the NCDDP, is further examined in later chapters).

Despite difficulties in measuring the mortality impact of programme interventions, theoretically, the cost-effectiveness of ORS-based DDC programs is related to the fact that, as indicated earlier, the cost of ORS is low and its effectiveness in preventing dehydration-related deaths is high, and, the fact that: ORT can be provided at the lowest level facility or in the home, as can the clinical diagnosis required both to distinguish watery from other diarrheas and the degree of severity of dehydration hence leading to reduced in-patient costs. (For further evidence on hospital cost-savings following the introduction of ORT programmes, see evidence from Malawi, Heyman et al, 1990; The Philippines, WHO, 1988; Mexico, Phillips et al, 1989 and India, WHO, 1988, cited in Martines, et al, 1993; eds: Jamison et al 1993).

At the same time, it is important to note that these expected

benefits are based on an 'optimal' case-management strategy. At the individual level, this requires, at a minimum, the effective education of the mother in the following areas:

1. to carry out ORS therapy effectively;
2. to continue feeding during and after diarrhea and recovery;
3. to avoid antidiarrheal drugs and to use antimicrobials correctly if recommended;
4. to identify signs of severity of the disease for rapid referral to health services, and;
5. to prevent further diarrhea episodes through breast-feeding, measles immunization, improved personal and domestic hygiene and improved weaning practices, (Martines et al, 1993; eds: Jamison et al 1993).

In view of these conditions, numerous factors affect cost-effectiveness in the case management approach to diarrheal disease and hence the potential mortality impact of DDC programs. At the individual level, these are related to the fact that treatment is normally prepared in the home. Inadequate and incorrect use of ORT and incorrect dietary management of diarrhea contribute to the continuing high levels of death from diarrhea, even in countries with established DDC programmes, according to Martines et al, (Martines et al, 1993; eds: Jamison et al 1993). (The gaps between 'optimal' and 'actual' case management in DDC programs at the individual and health sector levels are examined with respect to the Egyptian NDDCP in later chapters).

The policy conclusions of this review of over ten years of international experience with diarrheal disease control are: firstly, to put in place in all developing countries an effective system of case management for all diarrheas going beyond the focus of ORT to embrace nutritional management and correct use of drugs. 'Education of parents and training of health personnel will be key

elements in any national program,' according to Martines et al (Martines et al, 1993: 111; eds: Jamison et al 1993). 'Secondly, the vigorous implementation of the available cost-effective preventative interventions,' (Martines et al, 1993: 111; eds: Jamison et al 1993). In order of priority, these include measles vaccination and promotion of breastfeeding; promotion of improved hygiene and weaning practices; and finally, improved water and sanitation facilities and 'the delivery of new vaccines as they become available,' (Martines et al, 1993: 111; eds: Jamison et al 1993).

For research, the priority is to support the programme priorities described above. In particular, the 'effective use of ORT in the home and hospital remains a poorly documented problem. Research resources to date have focused on the development of technologies for diarrhea prevention and treatment. Additional attention needs to be given to the means of application of these technologies... The research challenges can only be met from a strongly multi-disciplinary perspective', (Martines et al, 1993: 111; eds: Jamison et al 1993).

2. Acute Respiratory Infection Programs:

A. Prevention

Among children under-5 in developing countries, 4 million deaths annually are ascribed to ARI, most of which are due to pneumonia. Thus of the 15 million deaths occurring each year among

children under-5, 25-30% are due to ARI. Furthermore, as the cause of approximately 4 million deaths annually among this age group alone, ARI often surpasses diarrhea in importance as a cause of mortality according to the World Bank, (Stansfield & Shepard, 1993; eds: Jamison et al, 1993).

Factors related to ARI incidence include:

- nutritional status; indoor and outdoor pollution; crowding; low birth weight; lack of breastfeeding; incomplete immunization; vitamin A deficiency and swaddling, (Stansfield & Shepard, 1993; eds: Jamison et al 1993).

Factors related to increased case-fatality include:

- low socioeconomic status; lack of maternal education; crowding; poor nutritional status; low birth weight; reduced access to health care; underlying chronic disease; lack of breastfeeding and age less than two, (Stansfield & Shepard, eds: Jamison et al, 1993).

Given the limited scope for preventative measures, the current international agenda for the control of ARI concludes that 'although research must continue to improve preventative technologies for the primary causes of ARI mortality, ARI control programs in the near future will rely principally on improved case management,' (Stansfield & Shepard, 1993: 78; eds: Jamison et al, 1993). WHO has taken the lead in this area, promoting correct case management as the central strategy in national programs for the Control of Acute Respiratory Infections. The following section examines this strategy more closely.

B. Curative Care

The main elements of ARI programs require that, at the

household level, mothers be educated to identify signs of pneumonia in children and to bring children with cough or difficult breathing to a health facility quickly. This involves the design and communication of culturally appropriate and effective health education for family recognition of suspected pneumonia. At the clinical level, intervention involves training in appropriate antibiotic treatment of pneumonia in young children for whom case fatality is high. Finally, secondary objectives of WHO's ARIP include the reduction of the inappropriate use of antibiotics and other drugs in the treatment of ARI and reduction in the incidence of pneumonia.

Studies recently reviewed by WHO to test case management in an operational setting in several developing countries (India, Tanzania, Pakistan, Philippines and Nepal) conclude that 'taken as a whole they represent strong evidence of the effectiveness of case management by peripheral health care workers. Despite simultaneous interventions, these studies indicate that ARI-specific mortality declined by an average of 41.6% whereas overall mortality was reduced in the same 5 study areas by an average of 22%,' (WHO, 1988 cited in Stansfield & Shepard, 1993: 78; eds: Jamison et al 1993). Stansfield and Shepard conclude that 'these studies confirmed the feasibility and effectiveness of providing case management of pneumonia through peripheral health workers with limited training,' (Stansfield & Shepard, 1993: 79; eds: Jamison et al, 1993).

However, as with the diarrheal disease control programmes,

theoretical calculations of the expected effectiveness of ARI case management interventions are based on an optimal case-management setting whereby health workers achieve 80% diagnostic accuracy; a correct treatment rate of 90%; 80% patient compliance with the medication regimen, and 80% access to appropriate treatment. Therefore, 'appropriate case management requires that each of many difficult conditions be met, including effective health education; prompt presentation to an effectively trained and carefully supervised health worker; correct diagnosis and selection of treatment; development and maintenance of reliable logistical systems to ensure adequate supplies of antibiotics, and finally; family compliance with appropriate instructions for care and access to competent care as required. These prerequisites for effective case management of pneumonia are intrinsically inextricably linked to the basic infrastructure for PHC... Strengthening of systems to reduce pneumonia mortality therefore requires a more comprehensive approach to improving access and quality of care,' (Stansfield & Shepard, 1993: 79; eds: Jamison et al, 1993). Thus despite WHO's successes, health planners emphasise that the 'intrinsic complexity of the management of ARI will present great challenges in the implementation of programs. The significance of operational problems encountered in immunization and DDCP for example, are likely to be dwarfed by the obstacles to the successful implementation of an ARI control program,' (Stansfield & Shepard, 1993: 79; eds: Jamison et al, 1993). (These issues are further examined in later chapters with respect to the Egyptian ARIP.)

Despite these difficulties, the World Bank review concludes that 'there is no technical justification in delaying any further the expansion of ARI control programs as an essential component of child survival efforts and with the same priority as that attached to the EPI and the DDC programmes... In view of the effectiveness of vaccines and of antibiotic therapy for pneumonia, it is probable that more than half of ARI deaths could be averted through use of only the currently available technologies for immunization and improved case management,' (WHO/ ARI, 1988, cited in Stansfield & Shepard, 1993: 80; eds: Jamison et al 1993).

1.5 Health Paradigms and the Economic Crises

The previous sections have attempted to trace the evolution of child health policies in the developing world. Tracing these policies through 'international paradigms of health' provides an essentially narrow perspective, both geographically and historically, as a basis for understanding the origins and evolution of health development in the developing world. This is because there are countries whose health development strategies were based on the guidelines established at Alma Ata prior to, and irrespective of, these international conferences, (i.e. China, Kerala State, Sri Lanka, Costa Rica and Cuba); and there are even countries where important components of the HFA strategy, such as community health workers, were established in the previous century. In the 1800s for example, the Ottoman Viceroy of Egypt, Mohamad Ali, trained

women health workers to staff rural health centers and to address the high rate of infant and child mortality. These CHW's were not only ahead of their time in terms of HFA, but also in relation to the development of auxiliary health workers in Europe. Similarly, in the 1940s, the issues of equity and access to health-related resources formed fundamental components of Egypt's heated public health debates. There are no doubt extensive examples in pre- and post-colonial Asia, Africa and Latin America where health was addressed among both informed opinion, and the population at large, in similar HFA terms.

In the current economic atmosphere, however, it is possible that international paradigms of health assume more significance. Resource constraints necessitate choices between options and, throughout much of the developing world, these are diminishing, (Abel-Smith, 1989), with significant implications for child health. In the current economically constrained environment, therefore, the resources allocated to tackling the underlying causes of ill-health are perhaps less related to the level of country-specific political and social will as to an economic crises which is equally affecting diverse countries throughout the developing world.

Egypt is one such country. Its impressive and indigenous experiments with health development historically are in sharp contrast to its current economic 'predicament' and, following the accumulation of debts over two decades, all health-related investments in this country have been severely constrained by what became,

in the 1990s, one of the highest external debts in the developing world. In light of this debt, which has preoccupied policy makers for almost two decades, (Amin, 1995), and, in light of the geopolitical atmosphere of the New World Order which has further reduced its economic and political options, (including a long-established resistance to IMF remedies), Egypt has joined the large majority of developing countries where adjustment policy has become the dominating economic preoccupation for setting the frame and constraints within which almost all development issues have to be considered, (Cornia et al 1987), (1). Consequently, in the area of child health, despite its commitment to HFA and to CPHC, in recent years, donor-funded, disease-specific interventions have come to play an important role in Egypt's child health and survival strategies, starting with the EPI, the National Campaign for Diarrheal Disease Control Program, (NCDDP), the Acute Respiratory Infection Program, (ARIP), and the Maternal & Child Health Programme (MCHP). The following section examines these policies more closely.

1.6. Child Health and Survival Policies in Egypt (2)

Egypt has been committed to the HFA strategy since signing the Alma Ata declaration and, since the early 1980s, to addressing the high infant and child mortality rate in particular, through disease-specific interventions. Recently published archival research indicates however, that, historically, the nation's experience with strategies for the promotion of child health occurred as far back as the nineteenth century under the reign

of Mohamad Ali, who developed a provincial health service; established a corps of women health auxiliaries concerned with maternal and child health, and initiated the rural populations' first experience with disease-specific interventions in the form of small-pox vaccination. The second milestone event in the development of Egypt's health sector occurred in the 1940s and 1950s when policy-makers and opposition alike called for concrete measures to tackle the social causes of endemic and epidemic diseases and the high national infant and child mortality rate. This archival research also indicates that the comprehensive vs. selective PHC debate has, in fact, been a recurring theme historically in Egypt, (3).

In the contemporary context, however, strategies for the promotion of child health and survival in Egypt began with Egypt's wider commitment to HFA by the Year 2000 and its cornerstone, PHC, which are examined in the following section.

PHC Services in Egypt

With respect to HFA strategies in Egypt, the Egyptian government's health policy aims to achieve the level of health care among its population that conforms to the goals of Health for All by the Year 2000 as rapidly as possible. Towards these efforts, PHC, has been defined as the principle strategy for attaining HFA by 2000 in Egypt. PHC is defined by the MOH as comprising basic health services provided to all members of society and as the population's first contact point with the

health services. PHC is envisaged as comprising promotive, preventative, curative and rehabilitative services. The main objectives of the national health policy in this context are defined in the First and Second Five Year Plans, (the latter, representing the second cycle of a long-term planning process to be completed by 2000, re-emphasised Egypt's commitment to the goals of HFA by the Year 2000 and to the concept and practices of PHC). National health policy objectives include the following:

- to provide health care to all citizens, particularly those in rural areas;
- to improve the quality of PHC facilities, including MCH centers and rural health units;
- to strengthen preventative services with an emphasis on communicable diseases;
- to integrate curative, preventative and promotive services at the local and regional levels and to expand coverage by medical insurance systems to achieve cost recovery;
- to reduce mortality in general and infant mortality in particular to a level of 23 per 1000 by 2007 and to immunize children against the six target diseases;
- to improve environmental health and community development by increasing the production and economic utilization of water;
- to increase waste water drainage capacities and to incorporate community health education as an integral component in all such programmes;
- to develop health education through mass media and face to face contact;
- to reduce illiteracy among the 17 million illiterate Egyptians in 10 years and to upgrade the system of basic compulsory education, and;
- to increase the productivity of the local pharmaceutical industry, (MOH, 1983; UNICEF, 1988; DHS, 1993).

----- Against this wider health strategy, with respect to health

facilities, the MOH provides free health care at all levels, primary, secondary, and tertiary, through an extensive network of health centers and through general and district hospitals, according to the MOH. In spite of the availability of physical and human resources however, the health delivery system has not functioned at its full potential. Thus the MOH initiated two projects to improve PHC infrastructure in the late 1970s. These were the Strengthening Rural Health Delivery Systems Project, (SRHDS), 1976-1985 and the Urban Health Delivery Project, (UHD), 1979-1986. With respect to MCH services, the two projects aimed at strengthening maternal and child health services, health education, home visiting by nursing staff, in/pre-service training and supervision and monitoring, (4).

In the 1980s and 1990s, the Egyptian government began to focus more specifically on child health and survival and on the expansion of MCH services. MCH services are mainly provided by health care units in urban and rural areas. Their aims include:

- the provision of PHC to married women at the following four stages: pre-conception; pregnancy; delivery and post-natal care;
- the provision of comprehensive medical care to children under-5, including; preventative and curative care as well as health education and continuous monitoring of the physical and psychological development of pre-school children, (MOH, 1983).

Despite these commitments to child health, slow progress in child health indicators continue to be a cause of concern for health planners in Egypt. The following section briefly examines current child health indicators and differentials. This is

followed by a discussion of contemporary health strategies for the promotion of child health and survival in Egypt.

1.7 Determinants and Differentials in Infant and Child Mortality in Egypt

The primary sources of data on infant and child mortality at the national level for Egypt are:

- the Demographic and Health Surveys (DHS, 1989;1993);
- the Egypt Maternal and Child Health Surveys (EMCHS, 1993, part of the Pan Arab Project for Child Development, PAPCHILD);
- the Egypt Fertility Surveys (EFS, 1983, the EFS data is primarily used for mortality indicators prior to the DHS and EMCHS), and;
- national civil registration data from the Central Agency for Population Mobilisation and Statistics, (CAPMAS).

In addition to the above, numerous large-scale surveys on child survival in rural Egypt have been conducted throughout the 1980s and 1990s, such as the Child Survival in Rural Egypt Project, (CSRP), which provide estimates of retrospective and prospective infant and child mortality in rural Egypt, (Child Survival in Rural Egypt Project, 1992; 1993; 1994).

Both the DHS and EMCHS data demonstrate substantial declines in infant and child mortality in Egypt since the late 1970s. The DHS demonstrates that child mortality decreased by 55% in the period between 1978-1982 and 1988-1992, (El-Zanaty, Sayed, Zaky and Way; DHS, 1993). These findings further suggest that the most rapid decline occurred since the late 1970s and that

child mortality declined more rapidly than infant mortality which declined by 43% during the same period. The EMCHS indicates that 'non-infant child mortality dropped by almost 73% from 91 deaths per 1000 in the period 1971-1976 to 24 deaths per 1000 in the 1986-1991 period,' (Abdel Azeem, Farid & Khalifa: 1993; 211, EMCHS).

These estimates also correlate closely with those of the CSRP survey in Lower Egypt. Retrospective mortality indicators in this survey suggest a rapid decline in under-5 mortality from 190 per 1000 births in the late 1970s to approximately 70 in the late 1980s. The probability of dying by age five (under-5 mortality) fell by approximately 75% in 15 years from 200 per thousand to 50 per thousand live births. This decline appears to have been particularly rapid in the late 1970s and in the mid-1980s. Prospective mortality, although higher than the retrospective figures, also shows large declines. The 1979-1980 survey in Menofia estimated the 1-4 mortality rate to be 67 per 1000 and the IMR to be 115 per 1000. In the 1990-1991 survey, the non-infant mortality rate (1-4) was estimated to be 18 per 1000 and the IMR was 42 per 1000, (Langsten & Hill, 1992).

Despite these improvements in the previous decade, infant and child mortality remain high in Egypt. The child mortality rate (1-4) is 7.4 per thousand (a survival ratio of 87.1) and infant mortality is 60 per 1000. Both infant and child mortality remain relatively worse in Egypt than in most other countries in the Middle East & North Africa (MENA) region (World Bank, 1991). However, various factors affect mortality rates in Egypt including bio-demographic

factors, in addition to regional factors and education which are examined in the following section.

1. Residential/Regional Differentials in Child Mortality (5)

In addition to bio-demographic factors, (birth order, sex, maternal age, birth spacing and length of the preceding birth interval), regional and residential factors feature prominently in disparities in child mortality. According to the EMCHS and DHS findings, non-infant child mortality is approximately 53% lower in urban than in rural areas; (a similar pattern emerges for the infant mortality rate and the total fertility rate).

2. Educational Differentials in Child Mortality

In addition to regional/residential factors, education features prominently among the determinants of mortality differentials in Egypt. Mortality differentials according to levels of maternal education show a strong association between a mother's education and the survival of her children according to the DHS and the EMCHS surveys. Children born to women with no schooling have the lowest chances of surviving: nearly one in ten had died in the first five years of life according to mortality rates in the five years preceding the EMCHS survey, (Abdel Azeem et al, EMCHS, 1993). Furthermore, non-infant child mortality decreases significantly among mothers with post-primary education. Thus, the chances of survival improve progressively with the level of maternal education and among children whose mothers have at

least secondary education, the odds of dying in the first five years of life falls to just 1 in 29, (Abdel Azeem et al, EMCHS, 1993). Against this background, the following section examines the leading causes of infant and child mortality in Egypt and national efforts to reduce infant and child mortality in recent years.

Child Health Policies and Disease-Specific Interventions in Egypt

Although there is less agreement across surveys as to the exact proportions, the DHS, the EMCHS and the CSRP all indicate that the leading causes of infant and child mortality in Egypt are diarrheal disease and acute respiratory infection. With respect to morbidity, the EMCHS and the DHS, estimating two week and 24 hour prevalence of diarrheal disease and ARI, indicate a prevalence rate of 12% and 5% respectively, (Abdel Azeem et al, EMCHS, 1993) and for the DHS sample, 13% and 6% respectively, (El-Zanaty et al, DHS, 1993). The CSRP data in Menofia indicate a 19% prevalence rate for both diarrheal disease and respiratory infection, (Langsten & Hill, 1992). The following section examines Egyptian child survival interventions which have attempted to reduce the rates of infant and child mortality, focusing on the diarrheal disease and acute respiratory infection programmes.

1. The National Campaign for Diarrheal Disease Control Program (NCDDP)

In 1977, the MOH adopted the WHO recommended ORS formula and began distributing ORS to health centers and, in 1978, the Chemical Industries Development Company began producing ORS

for the private sector. Despite these early experiments, it was not until 1980, when the Strengthening of Rural Health Services Delivery Project, funded by USAID, studied the effects of providing ORS at the household level and, finding a marked reduction in mortality, laid the foundations for a national programme.

In 1981 a five-year grant was signed between USAID and the Egyptian Government towards establishing the NCDDP which subsequently began operations in 1982. USAID provided \$36 million for the project, with an additional \$9 million provided by the Egyptian Government, over the project's life-span. The NCDDP received additional support from UNICEF which provided ORS packets for the first two years and provided raw materials for their production to cover the needs of the public sector, and from WHO which provided training programmes, modules, materials and fellowships, (6) (NCDDP, MOH, 1991).

The organizational structure of the NCDDP consisted of a Steering Committee chaired by the Minister of Health and comprised of representatives from the Ministries of Information, Education and Social Welfare, chairmen of Pediatrics at major medical schools, representatives from related MOH departments and from the ORS production company, (NCDDP, MOH, 1991). The aims of the NCDDP were:

- to reduce diarrhea-related mortality in the under-5's by 25% within 5 years;
- to increase awareness of ORS to 90% of mothers and their understanding of appropriate use to 75%, and;

- to ensure that the health system treats more than 50% of its serious cases with ORS, (NCDDP, MOH, 1991).

These goals were to be achieved through three project activities. At the health sector level, the project aimed to:

- Ensure the production and distribution of ORS in sufficient quantities for the public and private sectors, and;
- Provide training programmes in the use of ORS and in the management of acute diarrhea for all categories of health workers in the public sector. Training strategies involved the establishment of 47 regional training centers; training in record keeping to improve reporting of diarrhea cases in 21 MOH facilities in 7 governates; educational materials for different categories of health workers; and KAP studies of health providers to evaluate the impact of training in case management, (NCDDP, MOH, 1991).

At the individual level, the project aimed to educate the public, particularly mothers, on what to do when a child gets diarrhea: use ORS for acute diarrhea, continue feeding (using recommended foods) and to seek medical help when a case is severe or persists, (NCDDP, MOH, 1991). The NCDDP related its health education campaign to the general public through multi-media which included television, radio, newspapers, magazines, newsletters and posters. This included 63 television spots which were aired at prime time for numerous consecutive years.

A total of 3,408 ORT centers/corners were established during the project's lifetime and 1,460 were renovated. Research and evaluation reports on the Project's activities were prepared regularly and included research on: the epidemiology of diarrheal diseases in Egypt; diarrheal morbidity and mortality in Cairo and in eight governates, four in Upper Egypt and four in Lower Egypt and unpublished research on the impact of various

interventions on diarrhea such as, personal hygiene, health education, breastfeeding, vitamin A supplementation, measles vaccination and water sanitation. Furthermore, KAP studies of mothers were conducted between 1984-1987 and again in 1990 and 1991, while the mortality impact of the NCDDP was evaluated primarily through analysis of mortality data from the civil registry of CAPMAS for each year between 1982 and 1989, (NCDDP, MOH, 1991). These are examined more extensively below.

During the final year, the Project conducted a comprehensive internal evaluation of training activities and impact; a detailed cost analysis study and the WHO/CDD health facility survey. These programme assessments suggested that there were difficulties with the transfer of the diarrheal diseases control project to the MOH and with the phasing out of foreign assistance. As a result of these difficulties with the integration of the project into the MOH, in addition to difficulties in the budgetary burden on the MOH; inefficiencies in the system of supervision and in monitoring and reporting, the final year comprehensive evaluation raised concerns over the sustainability of the NCDDP's achievements, (CSP, MOH, 1993).

2. The ARIP

In 1985 the MOH, with USAID support, developed a national programme for child survival. The Egypt Child Survival Agreement was signed with the purpose of improving the health of mothers and children through three vertical interventions: the Expanded Programme of Immunization (EPI), (7), the Acute Respiratory

Infection Programme (ARIP), and the Child Spacing and Nutrition Programme, (CSP, MOH, 1993). The project faced major administrative delays, however, and project agreements were amended several times. Thus the CSP's activities only began in 1990, a five year delay, at which time the project was funded with \$67 million with an ending date of August 1995; it received additional resources from UNICEF and WHO, (CSP, MOH, 1993), (8). The following section briefly examines the ARIP component of the Child Survival Project.

The Acute Respiratory Infection Project:

According to the MOH, 'By taking advantage of the extensive PHC network and the proven capability of the mass media system to affect the health practices of mothers, the MOH judged that an ARI program could have a dramatic impact on child mortality. With the CSP, the MOH has taken the first steps towards establishing a national programme to reduce ARI-related infant and child mortality,' (CSP, MOH, 1993: 37).

The objectives of the national program are to :

- reduce mortality from ARI;
- reduce the severity and complications of acute upper respiratory infections;
- decrease the inappropriate use of antibiotics and other drugs for ARI;
- reduce the incidence of acute lower respiratory infections, in particular, pneumonia, (CSP, MOH, 1993).

At the health sector level, since 1992, the ARIP has

concentrated its efforts towards increasing SCM to reach all MOH facilities whereby all district health officers are trained in SCM, and at least one doctor from every PHC facility has been trained in SCM. The project also aims to educate up to 60% of private doctors and pharmacists about the ARIP and how to subsequently educate mothers in home care and recognition of ARI symptoms. It is expected that private doctors and pharmacists may reach mothers not reached by MOH providers according to the CSP.

At the population level, like the NCDDP, the ARIP aims to reduce ARI-related mortality through mass media and 'interpersonal communication'. The education objectives of the ARIP are to increase the percentage of mothers who recognize and respond promptly to signs of severe ARI to 80% and to increase to the same level the proportion of mothers who know and follow the standard rules for home care of ARI, (Langsten & Hill, 1992). Thus the ARIP aims to:

- Provide standardised and routine education to mothers in home care and recognition of severe symptoms at PHC facilities through staff in the 27 governates. The four areas covered in relation to home care of ARI include; food, fluids, soothing the throat and when to seek care, and;
- Disseminate appropriate knowledge, awareness and practices in ARI to 70-80% of the population through mass media, primarily TV and radio, (CSP, MOH, 1993). [However, due to delays in the completion of training in SCM to ensure mothers had access to appropriate treatment in ARI at health facilities, the second phase of the project, educating mothers through mass media, was considerably delayed and, in 1995, the full launching of the mass media campaign had still not taken place].

Despite delays in the implementation of the mass media campaign, however, the following studies were conducted to enhance

its efficacy upon implementation by providing basic information for the formulation of media messages:

- KAP surveys in ten governates covering 3,600 mothers and 400 health providers and 'influentials', i.e. TBA's. These indicated that very few mothers knew the signs of severe ARI and pneumonia although a high 70% sought help, (CSP, MOH, 1993).
- Ethnographic surveys to ascertain local beliefs and practices related to ARI and the relationship between signs and symptoms of ARI recognised by mothers and clinical signs. Clinical signs of severity were not recognised as serious symptoms according to these ethnographic studies, (CSP, MOH, 1993).

Finally, the Johns Hopkins/USAID/AUC Child Survival Research Project in Menofia also contributed important baseline information on treatment practices for use by the program 'which, from its inception, has emphasised research along with services as an integral part of the program,' (CSP, MOH, 1993: 40).

In the wider context of the CSP, despite the Programme's achievements, a mid-term evaluation of the CSP in 1992 by a team of expatriate consultants and local experts concluded that a number of major obstacles and constraints have hindered the impact of the CSP on infant and child mortality in Egypt, namely;

- Sustainability: a major concern is the Government of Egypt's ability to sustain Project-initiated child survival activities after the Project ends. Financial and institutional resources for sustaining the activities of the CSP have not been designated or planned and project activities have not been integrated into the MOH as initially intended;
- Recurrent Costs: The mid-term evaluation further states that the GOE is not meeting its full share of cash-contributions. Meanwhile, the Project has engendered a series of new recurrent costs for vaccines, drugs and consumables which the GOE will have to finance if these child survival activities are to be

maintained without outside support. Thus financial constraints to the feasibility of project sustainability once donor assistance ceases were further compounded by recurrent costs;

- Coordination and Capacity: The Project is not providing adequate support and flexibility in management, supervision, and planning at the Governate and District levels to assure quality service;
- Management Information Systems: Project and MOH information systems are not fully coordinated and the Project, through its need for data, has added to the burden of reporting at the point of data collection, (CSP, MOH, 1993).

Against these constraints, the following section examines contemporary evaluations of Egypt's experience with diarrheal disease and ARI-specific interventions.

1. The NCDDP and Diarrhea-Related Child Mortality:

As indicated previously, there is generally widespread consensus across all surveys conducted at the national and regional levels in Egypt that infant and child mortality have declined significantly over the past two decades, particularly during the late 1970's and early 1980s, (El-Zanaty et al, DHS, 1993; Abdel Azeem et al, EMCHS, 1993; CSRP, 1992). There is less agreement as to the cause of this rapid decline in infant and child mortality, however. According to the DHS and the EMCHS, this decline in mortality may be partially attributed to the successful implementation of national child survival interventions. Bearing in mind the well-documented difficulties in measuring the mortality impact of health interventions, (Jamison et al, 1993; Kaufmann & Cleland, 1994; and, with respect to the

NCDDP, Rashad, 1992), this section examines the data from a number of recent surveys and their assessments of the impact of selective child survival interventions in Egypt, primarily the NCDDP, which aimed to address the leading cause of infant and child deaths in Egypt, diarrheal disease.

The DHS and EMCHS interpretations of mortality decline are based on NCDDP evaluations of the mortality impact of the diarrheal disease program which, in turn, are derived from cause of death data from the civil registry, CAPMAS. Although as indicated previously, the DHS and EMCHS suggest that the rapid decline in infant and child mortality during the past two decades may be partially attributed to the impact of disease-specific interventions, numerous studies indicate serious inaccuracies with respect to the cause of death data in civil registration data in Egypt, (as in many developing countries), from which such evaluations have been directly or indirectly derived. These issues are examined more closely below.

Verbal autopsies obtained by the CSRP in Menofia indicate that diarrhea accounts for more than twice as many infant and child deaths as any other cause in Egypt, the second most important cause being respiratory infection, (Langsten & Hill, 1992). In 1979-1980 when the first Menofia survey was conducted, the proportion of deaths due to diarrhea among children under 5 was 50%. By 1990-1991, when the first round of the second Menofia survey was conducted, approximately 6 years after the NCDDP commenced, this proportion had declined to 41%. An

independent survey conducted in the same 12 villages in Menofia between 1987-1988 found that diarrhea accounted for 38% of child deaths. Thus cause of death data from all three surveys indicate that diarrhea accounts for more than twice as many deaths as any other single cause, the second most important cause being respiratory infection, (SPAAC, 1989; Langsten & Hill, 1992). Furthermore, while the Menofia data show a disproportionate decline in diarrhea-related mortality, they also show that deaths from all identified causes have declined, in many cases very dramatically, while diarrhea remains the main cause of death at the end of all three survey rounds.

The findings of the CSRP and the SPAAC survey are in sharp contrast to the findings reported by the NCDDP which suggest that mortality from diarrhea has declined sharply while mortality from other causes remains nearly constant following the implementation of the NCDDP, (Hirschhorn & Greenough, 1991, cited in Langsten & Hill, 1992; El-Rafie, Hasouna & Hirschhorn, 1990; NCDDP, 1988). According to Langsten, these assertions are largely based on analysis of unreliable national civil registration data. The national civil registration data indeed indicate a large and persistent decline in diarrhea-specific mortality, particularly for infants, while the rate for all other causes combined is unchanged, (Hirschhorn & Greenbough, 1991, cited in Langsten & Hill, 1992). However, the CSRP data and the SPAAC 1987-1988 survey in Menofia both found almost no consistency between the cause of death determined from verbal autopsy and the cause of death reported in the civil register.

According to the 1987-88 survey, the majority of deaths in the civil register were classified as ARI, followed by 'heart failure and respiratory difficulties,' (13.9%) and congenital malformation, 10%. Diarrhea, according to the civil registry, is responsible for only 2.2% of all infant and childhood deaths in the 12 month period. However, only two deaths diagnosed as caused by diarrhea have been registered correctly in the civil registry; over one half of diarrhea-specific deaths, 57.7%, were registered as deaths caused by respiratory infection.

Attempts to identify prospective deaths in the CSRP with the same death in the civil register also reveal almost no consistency between the cause of death determined in the verbal autopsies and the cause attributed in the civil register. Fifteen out of sixteen neo-natal deaths and 24 out of 94 under-5 deaths were absent from the civil register. Only 7 of the 38 prospective deaths attributed to diarrhea and 9 of the 17 prospective deaths attributed to respiratory infection appear in the same category in the civil register. According to Langsten, these surveys demonstrate that cause-specific data from the civil registers are highly inaccurate, (Langsten & Hill, 1992). The SPAAC verbal autopsies, administered by trained medical doctors and later verified by an expert panel, also found that diarrhea was the main direct cause of death in 38% of cases followed by respiratory diseases, 14%, and nutritional deficiencies, 13%.

The findings of the Menofia surveys on the mortality impact of the NCDDP are further confirmed in other surveys including a

national cluster sample double round household survey and a survey in Dakahlia governate, Lower Egypt. These studies show similar declines in diarrhea-specific deaths; 79% over 11 years in Menofia, 65% over 6 years in Dakahlia and 49% over 2 years in the national double round survey, (El-Rafie et al, 1990). However, like the Menofia surveys, these studies also indicate that diarrhea remains the main cause of death in the final year of research: 41% of deaths in Menofia in 1990-1991; 60% in Dakahlia and 50% in the national sample, the latter two conducted in 1986, (Langsten & Hill, 1992).

According to Rashad, the intuitive explanation for the mortality decline observed in the previous decade 'is the NCDDP effects in promoting the effective and sustained usage of ORS. The existence of a national programme for diarrheal disease control has led to the feeling that the programme has shown its effects on mortality. The fact that association does not imply causation is not always welcome for donors who want to see the effects of their interventions,' (Rashad, 1989: 112-113). Rashad concludes that, although the evidence does not disprove the demographic effect of the programme, in order 'for the conclusions to be expressed more positively, it is necessary to eliminate some major flaws. A proper evaluation of the success of any health intervention programme should cover its functioning, production of the expected effect, and finally, demographic change. Furthermore, an evaluation of the success of a programme should show not only the occurrence of a certain improvement, but also the sustainability of this improvement in the ability of the

health system, a) to replicate the envisaged effect for other cohorts in future years when the initial impetus of the programme fades, and, b) to carry over this effect to older ages so that life-saving is not a short postponement of death,' (Rashad, 1989: 112-113).

In sum therefore, although almost all of these studies indicate a significant and disproportionate decline in the diarrhea-specific death rate in recent years, these surveys show less consensus as to how much of this decline in diarrhea deaths is due to the NCDDP and how much would have occurred without the intervention. However, both mortality indicators and process indicators, (acceptance and appropriate usage), suggest that NCDDP claims that diarrhea is no longer the leading cause of registered infant and childhood death in Egypt, having been replaced by respiratory infection, are not supported by the data. These indicators will be examined more extensively in later chapters.

2. The Impact of the ARIP: Training of Service Providers

The mortality impact of the ARIP has not been assessed given that the program has only recently been initiated. Numerous studies have, however, examined the impact of the ARIP in training health practitioners at the clinical level. In a five-governate survey in 1992, where 246 doctors had received a course on SCM of ARI and 60% of health facilities had an antibiotic regimen for the treatment of children with ARI, it was found that 69% of children without pneumonia had inappropriately received antibiotics, and that

other medications were greatly over-used. Thus having taken the course in SCM did not appear to substantially improve the rate of correct diagnosis and treatment of children with ARI.

Furthermore, most mothers did not receive instructions on the duration of therapy prescribed or when to bring the child back for reassessment, (Harrison et al, 1992; cited in Langsten & Hill, 1994).

More recently, the CSRP has provided more extensive data on the impact of the ARIP training on SCM, covering 5005 episodes of respiratory infection in three survey rounds in rural Lower Egypt. The training consisted of teaching doctors to accurately distinguish incidence of severe pneumonia, pneumonia, and simple cold & cough, and to subsequently prescribe appropriate treatment based on this evaluation. Appropriate treatment based on WHO's recommended SCM consisted of antibiotics for all cases of suspected pneumonia (often combined with antipyretic) and for some upper respiratory infections, i.e., streptococcal pharyngitis. For simple cough and cold, doctors were trained not to prescribe antibiotics and to advise home care which involves keeping the child warm, ensuring adequate nutrition, increasing liquids, relieving throat symptoms with traditional liquids and watching for any changing signs which would require a return visit to the doctor. Thus ARI training of doctors and nurses in Menofia aimed at improving pneumonia case identification and, once identified, at improving case management, (Langsten & Hill, 1994).

The data of the CSRP suggest however, that treatment, 'at best, improved only modestly by the training program,' (Langsten & Hill, 1993). Thus the project evaluation concluded that treatment was not sought early enough and that brief training in proper diagnosis and appropriate treatment did not ensure that respiratory infection was properly treated.

Other studies in Egypt have also shown that both diagnosis and treatment were frequently flawed even after doctors have been trained in SCM. Health facility surveys in five Egyptian governates in 1991 for example, found that antibiotics were overused and that the performance of trained physicians was somewhat better than those without training in both classifying and correctly treating sick children but the differences were not statistically significant, (Harrison et al, 1992; El-Mougi, 1990; Bermawy et al., 1992; cited in Langsten, 1994).

Conclusion

In the wider international context of child health strategies, the current agenda for the promotion of child health, examined in the first part of this chapter, represents an effort to promote the application of medical technologies at the population level, while, at the same time, promoting intersectoral investments in health, among which maternal education has received priority. It is important to reiterate, however, that the impact of two essential aspects of current

child health strategies remain poorly understood, according to the health literature. The first is the intersectoral emphasis on maternal education and the mechanisms through which this variable enhances child survival. The second is the SPHC emphasis on home-based interventions where knowledge of the determinants of effective and sustained usage of such interventions remains vague and, as the evaluation of the diarrheal disease control program in Egypt indicates, poorly researched at the household level. The following chapter is concerned with these two components of current priorities for child health, namely; the current intersectoral emphasis on maternal education, and the impact of population-based disease-specific interventions at the household level.

Notes

(1) For further information on the impact of adjustment policies on the poor in Egypt see: Karima Korayem, 1987; and the proceedings of the Cairo University conference / Economics and Political Science Department on 'The Economic Reform and its Distributive Impact,' 21-23 November, 1992.

(2) Egypt occupies the northeastern corner of Africa. The total area of Egypt is 1,002,000 sq.km. However, ninety-four percent of this land area is desert, and, as a result of the extreme scarcity of cultivable land, over 97% of Egypt's population, 55 million in 1992, are concentrated on less than 6% of the total land area of one million square miles. Given the scarcity of cultivable land, Egypt's high population growth rate (2.8% during the inter-census period between 1976-1986) and density represent an important feature of Egypt's contemporary situation and development constraints: (According to the 1986 census, average household size for Egypt as a whole is 4.9 persons; for urban areas, this average is 4.6 and reaches 5.3 persons in rural areas.) Fertility levels have traditionally been high in Egypt with almost half of all Egyptian women in their childbearing years, marriage nearly universal, and, as of 1986, only 30% of married couples practiced contraception according to UNICEF. In rural areas the traditional reproductive pattern is characterised by early childbearing, short birth intervals which are only lengthened by prolonged breastfeeding, and by an ultimately high parity. According to UNICEF, high infant, child and maternal mortality all feature significantly in this process, (UNICEF, 1988).

(3) For a fascinating insight into Egypt's health development experience and achievements historically, see Kuhnke, L. *Lives at Risk: Public Health in Nineteenth Century Egypt*, 1990, and, Gallager, N. *Egypt's other Wars: Epidemics and the Politics of Public Health*, 1990.

(4) Official documentation on the implementation and achievements of these two projects was found to be extremely limited. Indeed the only documents available to the researcher on these projects were an enormous pile of questionnaires stored in a derelict building at the Nutrition Institute in Cairo.

(5) For administrative purposes, Egypt is divided into 26 governates which are frequently combined into four geographical divisions. These are:

- The urban governates of Cairo, Alexandria, Port Said and Suez;
- The Lower Egypt governates of the Nile Delta, north of Cairo;
- The Upper Egypt governates including Giza, Fayoum and governates on the Nile south of Cairo;
- The Frontier governates of the Red Sea, New Valley, Matrouh, North Sinai and South Sinai, all of which are sparsely populated, (UNICEF, 1988).

(6) The grant covered three phases: In Phase I which covered 18 months, project activities included a pilot study testing approaches to reach mothers with the intervention; increasing ORS production; identifying governate co-ordinators; training health care providers; and gathering baseline data. In Phase II the Project undertook the actual implementation of the national re-hydration campaign strategy. In 1987 the project was extended to 1990 based on the recommendations of an external evaluation. Phase III sought to address weaknesses in key areas and a final year was added to the Project in 1991 with the aim of institutionalising programme activities within the MOH, (NCDDP, MOH, 1991).

(7) The Egyptian EPI is managed by the Communicable Diseases Department, (CDD) of the MOH and follows the established international guidelines on childhood immunizations which call for all children to receive a BCG vaccination, 3 doses of DPT vaccine; 3 doses of polio vaccine and a measles vaccination. The Egyptian government recently added the hepatitis vaccine to its child immunization program. Despite the fact that the project had completed training in 1992 and reached 80% coverage by 1992 however, difficulties remain with the EPI including: inadequate supervision of peripheral health units; logistical problems in vaccine distribution; transportation; cold chain maintenance; inaccurate reporting; and insufficient coordination between the national, governate and district levels, (CSP, MOH, 1993).

(8) Access to information and to officials at the Child Survival Project in Cairo was extremely difficult to obtain. Persistent efforts through formal channels (the SRC at the American University in Cairo who were involved in research on the CSP for USAID) and informal channels (friends working for the project), to interview project officials and to obtain documentation on the project's achievements, proved relatively unsuccessful. Access to officials and information at the USAID offices in Cairo was even more difficult to obtain.

Introduction

The importance of maternal education in child survival has been well established and widely accepted for nearly a decade, 'yet our understanding of the mechanisms of influence remain no better today than ten years ago. The reason for our ignorance is the dearth of studies which have been designed explicitly to study the relationship between education and survivorship,' (Cleland and van Ginneken, 1988:1365).

Although empirical study of the association between maternal education and child survival has increased somewhat since Cleland made this observation at the end of the previous decade, in a more recent article, the author again stresses that: 'The demographic evidence points to a consistent and pervasive, monotonic decline in infant and child mortality associated with increasing education of mothers; (a 2-5% decline with each year of maternal schooling)... It is not clear, however, why education should apparently have such a universal effect on the risks of child death nor what constitute the vital ingredients of this powerful relationship,' (Kaufmann & Cleland, 1994: 196). Thus, 'while the statistical picture on the quite dramatic universally negative, relationship between maternal education and child mortality needs no further sophistication to be validated, the actual behaviors or attitudes or abilities that lie behind the

statistics are another matter all together. In spite of much effort to distil the more important of these behaviors, attitudes and abilities, the conclusions reached are far from dramatic or even universal,' (Basu, 1994: 207).

At the aggregate level, educational differentials in child survival associated with maternal education have been demonstrated in data from diverse regions of the developing world including; Latin America, (Behm, 1976, Haines & Avery, 1978; cited in Cleland and van Ginneken, 1988), Africa, (Caldwell, 1979; Farah & Preston, 1982; cited in Cleland and van Ginneken, 1988), and Asia, (Caldwell & McDonald, 1981). [See also: Cochrane et al investigating evidence from 33 countries, 1980, and Rutstein et al investigating data from 41 countries, primarily WFS surveys, 1984; cited in Cleland & van Ginneken, 1988].

Although the amount of education necessary to produce mortality reductions varies, in some areas, the maternal education-child mortality relationship has been found to be almost totally linear, suggesting that maternal education exerts an effect on child mortality even at very low levels of education, (Caldwell, 1979; also in Hobcraft, McDonald & Rutstein 1984). At the same time, following Caldwell's pioneering research in Nigeria, where, after controlling for intervening variables, uneducated mothers were two and one half times more likely to experience a child's death, (Caldwell, 1979), the inverse relationship between child mortality and maternal education has been found in some settings to be independent of other socio-economic resources, while, in

other settings, the effect transcends access to modern health services, i.e. Bangladesh, Ecuador and Peru, (Cleland & van Ginneken, 1988). However, despite considerable evidence on the positive association between maternal education and child health at the aggregate level, there is general consensus in the literature that, for policy-making purposes, more effort is needed to identify the precise mechanisms through which maternal education influences child survival at the household level, (Caldwell, 1994; Kaufmann & Cleland, 1994; Ewbank, 1994; Ware, 1984).

Conceptual Overview

At the conceptual level, educated mothers are hypothesised to enhance child health through one or more of the pathways listed below:

1. By accepting and using modern preventative and/or curative health services;
2. By practicing effective preventative care through domestic hygiene and nutritional care which reduce exposure and susceptibility to disease;
3. By managing illness episodes effectively when they do occur through one or more of the following ways:
 - a. by seeking medical assistance promptly;
 - b. by interacting effectively with medical practitioners;
 - c. by comprehending health education messages in illness management accurately;
 - d. by accepting and effectively utilising home-based health interventions such as ORS.

According to Caldwell, the first of the above three pathways, the acceptance and usage of preventative and/or

curative health services, can be quantitatively examined, even if the causal factors remain somewhat unclear. It is the second and third mechanisms, the prevention of disease at the household level and the effective management of illness episodes at the household level once they occur, which are largely reflected in home caring behavior and therefore difficult to quantify empirically. According to Caldwell, 'We have been less successful in researching this area, not necessarily because it is quantitatively less important but because much of it cannot be quantitatively researched, except perhaps as a residual effect,' (Caldwell, 1994: 228).

With these empirical constraints in mind, this chapter will examine the three pathways involved in the maternal education-child survival relationship described above. The discussion in section 2.1 is concerned with the linkage between education and the acceptance and usage of preventative and/or curative health services. It begins with a brief overview of the evidence on this relationship. This is followed by a discussion of some of the analytical weaknesses in contemporary explanations of the relationship between education and the acceptance and usage of modern health services. The discussion here focuses on the role of knowledge of disease causation, female autonomy and fatalism which dominate in contemporary interpretations of the linkage between education and the use of health services.

In section 2.2, this chapter examines the findings

on the relationship between education and the prevention of disease through domestic behavior. The discussion focuses on three issues: education and hygienic practices; education and child nutrition and the impact of education in eliminating sex differentials in nutritional care.

In section 2.3, this chapter examines the final pathway through which education is hypothesised to enhance child health, that is, effective illness management. This section focuses on four components of this relationship. The first is the linkage between education and the timing of medical intervention. The second component examined here is the impact of education on interactions with health practitioners. The third area examined in this section relates to the impact of education on the comprehension of health education messages. Finally, the fourth component examined in this section relates to the impact of education on the acceptance and appropriate usage of home-based medical interventions. The discussion here focuses on both the ability of educated mothers to comprehend IEC materials in diarrheal-disease control programmes and their ability to subsequently implement health education messages in this disease-specific context. The discussion focuses on anthropological research in this area and then proceeds to examine evidence on the determinants of effective usage of home-based diarrheal disease interventions in Egypt and the role of education in this context.

2.1 Maternal Education and the Acceptance and Usage of Health Services

A. Evidence on the Impact of Education on the Use of Health Services

The positive correlation between maternal education and the use of health services has been widely documented in large scale quantitative surveys in West Africa, the Middle East, Asia and in five WFS surveys in Latin America where, 'even after adjustment for maternal age, parity, rural-urban residence and husband's occupation, differences according to maternal education in the utilization of maternal and child health services remained large,' (Cleland & van Ginneken 1988: 1361). The strongest correlation between maternal education, the utilisation of modern health services and child survival, however, was first conclusively demonstrated in Caldwell's pioneering research in Nigeria in the mid-1970s. This research demonstrated that the availability of health services improved child survival by 20%; while maternal education in the absence of health services was associated with a 33% improvement. The joint effects of maternal education and health services however, resulted in an 87% improvement, (Caldwell, Reddy & Caldwell, 1985). Based on these and other findings in the health literature, much of the effect of female literacy on child survival has been hypothesised to operate through the availability and use of medical services, (Caldwell, 1986; Cleland & van Ginneken 1988; Basu, 1994).

B. Analytical Weaknesses in Causal Explanations of the Relationship between Maternal Education and the Use of Health Services

While the empirical evidence points to a positive correlation between maternal education and the use of modern health services, explanations as to why education should exert such a strong influence on the use of health services are less conclusive and have rarely been substantiated with supporting empirical evidence. This section examines some of the analytical weaknesses in contemporary explanations of the relationship between education and the use of health services. It focuses on three aspects of this linkage in particular; maternal education and female autonomy; maternal education and fatalism; maternal education and knowledge of disease causation.

Contemporary causal interpretations of the positive relationship between education and the acceptance and usage of health services, initially proposed by Caldwell and later re-emphasised in subsequent research on the maternal education-child mortality relationship, suggest that education enhances:

1. Greater responsiveness to novel ideas and services and greater identification with the outside world;
2. Greater autonomy and more social confidence at handling officials i.e. an enhanced ability and willingness to take action and obtain the attention of medical staff;
3. Greater decision-making power on health and other matters; i.e. education leads to a change in the balance of family relationships which ensures a greater share of available resources are allocated to children;

3. Stronger belief in the efficacy of medical treatment which positively affects treatment-seeking behavior, (Caldwell, 1979).

In addition to the above, other related maternal attributes have been cited in the literature as qualities which develop with increased education and encourage the acceptance and usage of health services. The health literature suggests that, compared to the uneducated, educated mothers:

- a. attach a higher value to the health and welfare of their children; i.e. children are awarded higher priorities in terms of care and consumption than in traditional societies, (Caldwell & McDonald, 1981);
- b. are less fatalistic about disease and death: i.e. education leads to a reduction in fatalism, resignation and endurance with a shift towards protective responsibility and an emphasis on carefulness; (Caldwell, 1979);
- c. are more likely to be knowledgeable about disease prevention and cure; (Caldwell, 1979).

The explanatory value of Caldwell's theses and later similar explanations of the impact of maternal education on child health, however, were considerably undermined by the fact that few of these studies attempted to empirically test the causal pathways through which education was argued to affect child survival. Empirical evidence that education 'moves people in varying degrees to identify with the whole modern system' or that it 'leads to a change in the balance of family relationships which favors resource re-allocation to children,' (Caldwell, 1979; Caldwell & McDonald, 1981), for example, would require

culturally-informed intensive investigation at the micro level. Although some of these assumed consequences of schooling are more measurable than others, caution is rarely exercised in the presentation of less verifiable explanations in the health literature. Frequent claims that educated mothers 'attach a higher value to the health and welfare of their children' and that they have 'greater autonomy and decision-making power on health and other matters,' (Caldwell, 1979; Caldwell & McDonald, 1981; Cleland & van Ginneken 1988) are particularly problematic. This is largely due to the fact that these variables represent general, abstract concepts; their empirical manifestations vary and may be difficult to isolate statistically from the culture-specific determinants of maternal behavior. For example, it would be difficult to define the higher value attached to the health and welfare of children among educated mothers as a psychological, emotional or intellectual attribute, much less to define empirical indicators for measuring educational disparities in this attribute and to further demonstrate that these disparities explain the increased usage of health services among educated mothers. More importantly, however, the assumption that educated mothers attach a higher value to the health and welfare of their children overlooks the economic value and future security which children represent for poorer mothers, who are invariably less educated in developing countries.

Maternal Education and Female Autonomy

With respect to the relationship between maternal education

and increased female autonomy which is widely proposed as one of the mechanisms through which maternal education enhances child survival, few of the authoritative studies which emphasise the role of increased female autonomy actually measure indicators for this variable (Caldwell, 1979; Caldwell & McDonald, 1981; Cleland & van Ginneken 1988; Mosley, 1984). Doan and Bisharat, measuring female autonomy and maternal education in low income squatter settlements in Amman, stress the difficulties in measuring this variable; appropriate empirical indicators of the abstract concept of autonomy must be relational, i.e., 'must measure the position of the person relative to others in the household or network and must reflect an independence to seek information, make decisions and to act on that information,' (Doan & Bisharat, 1990: 788). Interestingly, this study found that low female autonomy in extended family households relative to others did indeed discourage mothers from taking initiative and sometimes amounted to passivity. However, although low female autonomy was found to have a negative impact on child nutritional and health status in extended family households, this effect did not appear to diminish with maternal education.

Similar studies in South Asia demonstrate that 'educated women are, if anything, less autonomous than their uneducated counterparts,' (Zeitlyn & Islam, 1993, cited in Kaufmann & Cleland, 1994: 197; similar results are cited in Jeffery & Jeffery, 1993). In these studies it was found that 'it is the less educated women who are forced to become independent decision-makers because of their difficult

social circumstances,' (Zeitlyn & Islam, 1993; cited in Kaufmann & Cleland, 1994: 197). These findings lend support to Ware's observation that 'outside observers often underestimate the power of women in traditional societies and overestimate their power in educated households that appear to be somewhat influenced by Western values and cultures,' (Ware, 1984: 196).

Maternal Education, Fatalism and Health Behavior

In addition to increased female autonomy, education is widely hypothesised to enhance child survival by reducing the level of fatalism which, in turn, increases the acceptance and usage of health services. The association between maternal education, reduced fatalism and the usage of health services has rarely been empirically tested, (Caldwell, 1979; Caldwell & McDonald, 1981). Although the findings of this survey in rural Egypt on these linkages are more extensively examined in the empirical chapters which follow, these findings illustrate some of the empirical and conceptual gaps relevant to this discussion in demonstrating that the relationship between fatalism, (widely assumed to be a characteristic which hinders the acceptance and usage of health services among the uneducated) and health care practices, has been somewhat over-simplified in the literature. For example, educational disparities in causal explanations of disease found in this research did not have any effect on treatment-seeking behavior: both mothers who were illiterate and attributed fatalistic explanations to disease and those who were educated and responded with medically relevant causal explanations,

resorted to modern Western medical facilities. Similarly, in terms of the usage of health services for preventative care, this research, like other research in Egypt, did not find any educational disparities in immunization coverage. A very high rate of immunization coverage has been achieved in Egypt in general, almost 90%, among both educated and uneducated mothers, (Langsten & Hill, 1992; DHS, 1993; EMCHS, 1993).

Discussing vaccination coverage, Das Gupta emphasises that; 'Having an infant immunized requires a considerable degree of active participation on the part of the parents, in knowing and remembering when to have the child immunized, and, in being convinced enough of the benefits of modern health care to put up with the distressing side-effects of immunization...for the sake of the less tangible benefits of preventative care,' (Das Gupta, 1990, cited in Ewbank, 1994: 216). These are attributes generally associated with maternal education in the health literature, and in some settings, educational disparities in the use of preventative care have been significant, (Jain, 1994). However, the Egyptian success with immunization coverage where female literacy is low indicates that this relationship is more consistent in some settings, for example, India, than in others. Thus although the correlation between exposure to formal schooling and the propensity to resort to Western medicine is described as 'clear-cut' by Cleland and other authors in the health literature, (Kaufmann & Cleland, 1994: 1361; Caldwell, 1994), with respect to both curative and preventative care, the Egyptian data indicate that this relationship is not as clear-cut

as the literature suggests.

Maternal Causal Explanations of Disease and Treatment-Seeking Behavior

The analytical and empirical shortcomings of research on the mechanisms through which education enhances child health outlined above underscore Ewbank's cautionary observation that, in interpreting this relationship, it is generally preferable to stick to intermediate variable models 'which indicate the behaviors through which education affects mortality without attempting to explain the motivations for that behavior,' particularly since 'motivation-based' interpretations of the maternal education-child mortality relationship emphasise individual decision-making processes and attributes which are unrepresentative of extended family realities in the developing world, (Ewbank, 1994: 218-222; also discussed in Good, 1994, Nichter, 1990, & Coreil, 1994; cited in Ewbank, 1994). Thus Ewbank emphasises, 'We are often tempted to move beyond intermediate-variable models which merely describe behavior rather than explaining it. Unfortunately, this often leads us to draw conclusions that focus on specific elements of what is in fact a very complex web of factors,' (Ewbank, 1994: 222). This observation is particularly relevant to this research setting, Menofia, where the villages are neither totally rural nor urban, but transitional with rural characteristics and urban influences. This is reflected in the high usage of modern health care facilities even when maternal explanations of disease causation are fatalistic or based on traditional, non-scientific

explanations as the empirical chapters which follow demonstrate, (1).

The implications of underestimating the 'complex web of factors' to which Ewbank refers are further demonstrated by examining the linkage between education, causal explanations of disease and treatment practices. In this context, it is fitting to contrast anthropological findings on the treatment of diarrheal disease in Kenya with the findings of this research in the transitional villages of Lower Egypt, (see Chapters 5 and 6). In Kenya, Patel et al found a strong coherence between culturally-based models of disease causation and the usage of traditional therapeutic regimes to cope with diarrheal illness which are consistent with these cultural beliefs among unschooled mothers, (Patel, Eisomon & Arocha, 1988). In contrast, as indicated above, unschooled mothers with similar causal explanations of disease processes in this sample in Lower Egypt did not resort to therapeutic practices consistent with their beliefs and instead chose modern health care options. For example, 'hot breastmilk' is regarded as a primary cause of infant diarrhea among unschooled mothers in Kenya and among illiterate mothers in the 401 households examined here. However, whereas in Kenya the treatment regime for this type of diarrhea is based upon the advice of village elders and involves removing heat from the child's body through certain cooling foods such as sheep fat and boiled bark, in this sample in Lower Egypt, an unschooled mother with the same causal explanations for diarrheal disease sought the advice of a pharmacist or medical practitioner on

the required treatment.

These contrasting health practices among uneducated rural mothers in two diverse settings suggest that, in claiming that one of the pathways through which education enhances child health is by reducing fatalism, which, in turn, increases the usage of modern health services, Caldwell and others may have oversimplified the linkages given that, in certain settings, illiterate and fatalistic mothers are as inclined to use health services as their educated and non-fatalistic counterparts. Furthermore, the contrast in treatment regimes adopted by unschooled rural Kenyan and Egyptian mothers, inspite of the striking similarities in their causal explanations of diarrheal disease, illustrates the complexities involved in interpreting the maternal-education-child survival relationship in transitional societies which are increasingly more representative of rural areas in the contemporary developing world, (Ewbank, 1994). These findings also perhaps further suggest that, in societies where access to health facilities is generally widespread, educational disparities in health sector usage may diminish and other factors may become more significant determinants of educational differentials in child mortality. These include the causal pathways identified earlier; namely, domestic preventative care and/or more effective illness management. This chapter will now examine these pathways in the maternal education - child survival relationship.

2.2 Maternal Education and Disease Prevention

According to Cleland, 'In so far as urban areas are better endowed with health services, the similarity of maternal education effects in both urban and rural sectors suggests that educated mothers maintain their advantage, regardless of access to health services,' (Cleland & van Ginneken 1988: 1362). This, in turn, 'suggests that domestic health care practices may be a major intervening mechanism,' (Cleland & van Ginneken 1988: 1363). At the same time however, while it may be possible that domestic behavior is the key to the enhanced survivorship of children born to educated mothers, the precise mechanisms of this association remain vague, (Cleland & van Ginneken 1988). This may be partly because empirical investigation of education effects on child survival through domestic preventative practices is limited due to the difficulties in finding an adequate sample where the educated are not also the relatively wealthy. This constraint, which affects efforts to control for intervening variables, is further examined in Part 2 of the empirical analysis.

Theoretically, however, education is hypothesised to enhance the prevention of disease because educated mothers are presumed to provide greater protection from infection through improved hygienic practices and to reduce susceptibility to infection by ensuring the nutritional requirements of infants and children are met. With respect to nutritional requirements, education is also expected to reduce sex differentials in nutritional status

among infants and children. This discussion begins by examining the relationship between education and domestic hygiene practices. This is followed by a discussion of the relationship between education and nutritional care and the related issue of sex differentials in nutritional care.

Maternal Education and Domestic Hygiene Practices

In the health literature, it is widely hypothesised that educated mothers may be more aware of preventative practices which leads them to assume greater protective responsibility and to be less fatalistic. Despite these assumptions however, the relationship between maternal education and the nature of beliefs concerning disease causation has been studied surprisingly infrequently according to Cleland and Ware, (Cleland & van Ginneken 1988; Ware, 1984).

At the aggregate level however, recent analysis of data from the DHS found that education did not make mothers better hygienists, (Boerma et al, 1991, cited in Kaufmann & Cleland 1994). This raises the question as to whether, in the absence of health-related resources to effectively implement maternal knowledge and skills, the prevention of disease remains a significant mechanism in the relationship between maternal education and child survival, (Cooksey, Casterline & Ismail, 1986; Deeb, 1990). This hypothesis will be further examined in the literature review of Part 2 of the empirical findings which follow.

At the household level, studies on the relationship between maternal education and domestic preventative care, demonstrate both positive and negative results. In a low-income settlement in Cairo, the presence of piped water supply, disposal facilities and soap were positively associated with higher incomes and these higher income households were also more likely to have educated mothers. Nevertheless, the prevalence of soap was found to be higher in the homes of educated mothers independent of levels of income or the availability of piped water supply. The author significantly concludes that, underlying the lower incidence of diarrheal disease among educated mothers in this sample, controlling for levels of income and the presence of sanitary facilities, is better control of the hygienic aspects of home life (Tekce, 1990). More general research in Bangladesh by Lindenbaum et al found that the major differences between educated and uneducated mothers was the greater emphasis on cleanliness by the former. This research indicated that hygiene may be an important discriminant of child survival chances between educated and uneducated mothers in this setting, (Lindenbaum, Chakraborty & Elias, 1985, cited in Cleland & van Ginneken 1988).

As stated previously, difficulties in finding an adequate sample where educated mothers are not also relatively wealthy however, has made the role of maternal education in prevention difficult to confirm in similar research elsewhere. The exception frequently cited in the health literature is a unique, controlled case study in Jordan, where research was conducted prior to and

following the introduction of water and sanitation facilities. The author found that prior to the introduction of water and sanitation facilities, maternal education was a significant determinant of child survival. Once conditions improved however, educational differentials in child mortality diminished and the use of soap (used as an indicator of hygiene in the household in numerous surveys), was not associated with education in this sample, (Deeb, 1990). (The findings of these studies are further examined in Part 2 of this thesis). The following section examines the literature on the relationship between maternal education and reduced susceptibility to infection through nutritional practices.

Maternal Education and Infant and Child Nutrition

Maternal education is hypothesised to reduce susceptibility to infection because educated mothers are hypothesised to be more aware of the nutritional requirements of infants and children than uneducated mothers. Again empirical confirmation that educated mothers invest more resources and time to ensure that the nutritional requirements of their children are met, is limited.

In Egypt, educated mothers have been found to introduce solid foods into their children's diets significantly earlier than uneducated mothers who continued to breastfeed far beyond the minimum period necessary for healthy growth during infancy. 'Whereas there are uneducated mothers still waiting to introduce solid foods at 17 months, well into the second year of life, there is not a single

educated mother who has not given solid foods after the age of 9 months,' (Tekce, 1990). The author concludes that earlier supplementation with solid foods among children of educated mothers would contribute to better growth in view of the critical importance of good diet during periods of rapid growth and high nutritional requirements. The growth consequences of inadequate diet to meet increasing biological requirements among children of uneducated mothers, coupled with the nutritional consequences of recurrent morbidity which is higher among this group, invariably leads to increased susceptibility to infection according to the author, (Tekce, 1990).

Similar findings were demonstrated in Amman where maternal education reduced the mean duration of breastfeeding. This research also demonstrated that children not receiving food according to the recommended regime, were generally of lower weight-for-age and weight-for-sex in this sample, (Tekce & Shorter, 1984). Furthermore, nutritional status in this study declined with age indicating the cumulative, reinforcing effects of inadequate diet and recurrent infection. Again however, evidence on the relationship between maternal education and infant and child nutrition is fragmentary and studies in Bangladesh have shown only a minor effect of maternal education on the quality of food intake or nature of diet, (Cleland & van Ginneken 1988).

Maternal Education and Sex Differentials in Infant and Child Nutritional Status

Maternal education is also hypothesised to reduce susceptibility to infection by reducing sex differentials in nutritional status. Considerable research has been dedicated to investigating sex differentials in nutritional status, partially as a result of evidence of sex differentials in child mortality, which are hypothesised to diminish with increased maternal education, (Caldwell & McDonald, 1981). Again however, empirical evidence that sex differentials in nutritional status diminish with increased maternal education is both inconsistent and difficult to confirm. Intensive research in Bangladesh and Punjab for example, demonstrates that the nutritional disadvantage to daughters associated with lack of education indeed worsened among better educated mothers and resulted in pronounced mortality differentials, (Cleland & van Ginneken 1988). In Punjab 'educated mothers deploy their skills selectively in favor of children of the desired sex,' (Das Gupta, 1987, cited in Cleland & van Ginneken 1988: 1364) and in Bangladesh, a number of studies have failed to demonstrate diminishing mortality and nutritional sex differentials among children of educated mothers, (Cleland & van Ginneken 1988).

Similar results were observed in an intensive study of nutritional status and child health in a sample of 300 households in Egypt. The study concludes that 'the attribute of the child which is related to growth failure after infancy is sex...and the male advantage does not appear to be related to the educational

attainment of mothers. The children of educated mothers tend to survive better but the male children have standardized weights that are 3% higher than female children regardless of educational level. The female disadvantage remains even when income differences between educated and uneducated mothers are taken into account,' (Tekce, 1990: 939).

These results were again repeated in the Amman study where the strongest determinant of overall child growth was found to be the sex of the child, followed by housing quality and finally, maternal education, (Tekce & Shorter, 1984). Finally, WFS data from ten Asian and Arab countries found no indication of narrowing sex differentials in child mortality among more educated mothers, (Cleland & van Ginneken, 1988). In contrast, however, in Nepal, the number of living children was found to be positively related to the use of health care facilities, even after controlling for the sex of the child. The author concludes that 'this is an important finding because it is believed that children of different sexes are treated differently... This is not supported by the study... which found no systematic differentiation of treatment for sons and daughters,' (Niraula, 1994: 161-163).

The discussion above indicates that the literature on the role of maternal education in reducing exposure and susceptibility to infection at the domestic level through domestic hygiene and nutritional practices, is quite fragmentary. The persistence of a strong influence of maternal education on

child survival, regardless of the proximity or effectiveness of government health provision, however, suggests that these variables may represent important mechanisms in the maternal education child mortality relationship. At the same time, the fact that evidence at the domestic level is so limited perhaps reflects the difficulties in measuring educational disparities in domestic hygienic practices and nutritional care. The evidence on the final pathway through which maternal education is hypothesised to improve child survival: illness management, is slightly more comprehensive.

2.3 Maternal Education and Illness Management

Educated mothers are hypothesised to manage illness episodes more effectively than uneducated mothers because they are hypothesised to:

1. Interact more effectively with health practitioners thereby extracting a higher quality of care;
2. Seek medical assistance promptly in the face of child illness and eliminate sex differentials in the timing of treatment;
3. Comprehend health education messages accurately on the basis of which they subsequently engage in health practices;
4. Accept and efficiently utilise home-based medical or technical interventions following exposure to these through IEC materials and/or interaction with health practitioners, for example, in national diarrheal disease control programmes.

In addition to the above, educated mothers are further expected to adhere to medical advice with greater persistence; act when there is no improvement in the child's health and to perform effectively in the dietary management of illness

episodes.

The above pathways through which education is hypothesised to enhance maternal performance in illness management in the literature are examined in the following sections. The discussion begins with an examination of the linkage between education and health interactions.

A. Education and Interactions with Health Practitioners

In the health literature, education is widely hypothesised to enhance illness management because educated mothers are likely to be better service users than uneducated mothers (Cleland & van Ginneken, 1988; Caldwell, 1994). Education is expected to enable mothers to acquire health information and to interact effectively with medical personnel on the basis of which they subsequently engage in health care practices. A recent comparative study which sought to determine whether literacy predicts health interactions which encouraged positive health practices has revealed significant findings in this respect. The study was conducted in Mexico, Nepal and Zambia, areas where educational disparities in health risks had previously been demonstrated, (LeVine, Dexter, Velasco, LeVine, Joshi, Stuebing & Tapia-Urbe, 1994).

The authors argue that, although there is a 'good deal of evidence indicating associations between maternal schooling and health care, suggesting that maternal use of health and contraceptive services, as well as domestic sanitary and dietary practices may be involved,...this still leaves unknown the processes by which

attending school during childhood and adolescence affects maternal practices during the childbearing years,' (LeVine et al, 1994: 186). The authors therefore stress that demographic and health surveys which have shown robust associations between school attendance and child survival without clarifying the intervening variables that might connect them are empirically weak, (LeVine et al 1994).

Using a more specific measurement of literacy skills, the LeVine et al research focused on the relationship between literacy and health interactions and measured both literacy skills and health skills, including the mother's ability to report information fully in a medical setting. The strength of this research further lies in the empirical definition of literacy which was utilized by the researchers. Literacy was defined in terms of cognitive and language skills which make it possible to participate in literate discourse and communication, (LeVine et al, 1994). The research focused on oral literacy which 'represents the language of the classroom, the clinic and other bureaucratic settings and it appears that its acquisition by schoolgirls in childhood makes them better able to use bureaucratic health services as mothers,' (LeVine et al 1994: 191).

With respect to whether literacy skills are retained in adulthood, the authors found that, although reading performance was below the level at which mothers left school, 'perhaps indicating an exaggeration of the level reached or that the quality of schooling was poor,' (LeVine et al 1994: 189),

the findings in all three settings demonstrated that literacy skills were indeed retained in adult life. More years of schooling resulted in better performance on literacy tasks in all three settings, (LeVine et al 1994).

In relation to whether literacy predicts health interactions, the LeVine et al findings indicate that 'more effective interaction with a health practitioner is positively correlated with school attendance and to literacy skills,' (LeVine et al, 1994: 190). Thus the research demonstrated that literacy in adulthood did indeed enable mothers to interact more effectively with health professionals, (LeVine, et al 1994). Furthermore, the results of this comparative anthropological survey demonstrate that the acquisition of decontextualised language skills, 'oral literacy,' is achieved even in low quality schools and increases with years spent in school. This lends some support to the findings of 'numerous demographers who have demonstrated that even a little schooling of future mothers in poor rural schools with undereducated teachers has an impact on child survival and that the impact of education seems to vary little between areas with good schools and those with poor ones,' (Caldwell, 1994: 225).

Further evidence that educated mothers interact more effectively with health practitioners was demonstrated in a study in Nigeria where it was found that 'educated patients and their children received better treatment than their illiterate counterparts although neither group paid for the service. This did not

simply mean that the educated did not have to join the general queues; it also meant that diagnoses were more specific and more often backed up by tests,' (Maclean, 1974 cited in Ware, 1984: 200). In Nepal, Niraula found that women who had been to school were more likely to use the health center than those who had not because of 'the glaring status differences between the service providers and receivers which creates communication gaps and hinders the quality of services obtained by uneducated mothers,' (Niraula, 1994: 160). In South India, Caldwell found that the more educated the mother, the longer the time she spent with the doctor and, when the treatment failed to improve the child's condition, the educated mothers were much more likely to report this back to the clinic, (Caldwell, 1994). The more educated mothers spent a longer time with the doctor;

'because the doctor expects to understand the educated women and he expects them to understand him. Inevitably, the doctor is more likely to be right about his diagnosis and the mother is more likely to be able to carry out the treatment accurately,' (Caldwell, 1994: 226).

This may be a slightly simplified view of disparities in the treatment received by educated and uneducated mothers since in Menofia, as the following chapters indicate, the quality and accuracy of the doctor's diagnosis was more significantly related to whether the child was being treated privately or at the health unit. Both educated and uneducated mothers in this sample stressed that their preference for private doctors was due to the more intensive examination their children received by private doctors in comparison to the oral diagnosis received by doctors at the health unit who, paradoxically, appear to be the same doctors

functioning at different facilities and different times of the day according to the CSRP, (Langsten & Hill, 1992).

Nevertheless Caldwell goes on to stress that:

'It was very different among the unschooled illiterates who believed that they did not understand these institutions and that the institutions were not for them... When treatment failed, ... the uneducated just shake their heads, say the doctor has done his best, and assume, often correctly, that the clinic would shelve responsibility by accusing the mother of irresponsibility and of not having followed the prescribed treatment,' (Caldwell, 1994: 227).

Similarly, literate patients were found to receive better treatment for their children at government hospitals and health centers than illiterate mothers in Nigeria, particularly through more specific diagnosis according to Caldwell, (Caldwell, 1979).

B.1. Education and the Timing of Treatment

The health literature also suggests that, in addition to the increased propensity of educated mothers to extract a higher quality of care through more effective health interactions, it is likely that they do so with greater timeliness, and adhere to advice with greater persistence, (Cleland & van Ginneken, 1988). Given the value of prompt medical attention in preventing death from otherwise fatal illnesses, timely usage of the health system is a strong determinant of the outcome of illness episodes. Unfortunately, as Jain emphasises, 'very few studies present information on the effect of maternal education on the type and timing of care,' (Jain, 1994: 205), the exception being a study in Mexico which demonstrated that literate mothers were more likely to take sick children for treatment within

3 days of the onset of symptoms than illiterate mothers, (LeVine et al, 1987, cited in Jain, 1994).

B.2. Education and Sex Differentials in the Timing of Treatment

The timing of treatment for illness episodes is further hypothesised to reflect sex differentials which are expected to diminish with increased maternal education. Although most studies demonstrate that the severity of an illness episode is the strongest determinant of how soon professional help is sought regardless of sex, there is some evidence to indicate that, in the case of simple diarrheal disease episodes, for example, mothers are more likely to seek professional care more promptly for males than for females, (Tekce, 1990). In Menofia, girls are slightly less likely to be taken to a private physician than boys regardless of episode severity, and are somewhat more likely to receive no treatment according to the CSRP, (Langsten & Hill, 1994). Despite these findings however, empirical proof that sex differentials in the timing of care diminish with education is extremely limited. Furthermore, the possibility that maternal education may increase sex differentials as educated mothers employ their superior skills in health care in favor of males, as Das Gupta demonstrated in Punjab, cannot be discounted.

B.3. Maternal Education and Adherence to Medical Advice

Maternal education is also expected to enhance child

allow technology to be general. Both versions share the following framework. Production takes place over two periods, denoted $t = 1, 2$. There is a single production input which we can think of as managerial or worker "effort" or labour, L_t . The enterprise's personnel suffer (von Neumann-Morgenstern) additively separable disutility of the form $U(L_1, L_2) \equiv U(L_1) + U(L_2)$, where $U' < 0$, $U'' < 0$. The enterprise faces a binding production target Y^T for total production over the two periods. This target must be fulfilled or the enterprise suffers utility of $-\infty$.

Production in each period is subject to a stochastic shock ϵ , i.e. $F(L_t) + \epsilon = Y_t$. The shock ϵ is assumed to have the very simple bimodal point distribution

$$\begin{aligned} \epsilon &= e \text{ with probability } 1/2 \\ &= -e \text{ with probability } 1/2 \end{aligned} \quad \text{where } e > 0$$

We assume e to be "small" (small enough, at any rate, to make Taylor approximations legitimate).

The sequence of events is as follows:

1. ϵ_1 realised
2. L_1 allocated, Y_1 produced
3. ϵ_2 realised
4. L_2 allocated, Y_2 produced

Thus in analysing the optimal plan of the enterprise, we can ignore ϵ_1 and start with no. 2 in the sequence of

critical role in facilitating the spread of health information, which subsequently enhances health behavior. This relationship is more specifically discussed in the context of diarrheal disease control programmes in section D of this chapter.

In the wider context, however, according to Kaufmann & Cleland, 'by seeking an explanation in terms of the higher quality of care and maternal persistence in implementing medical advice among educated mothers, it becomes possible to explain why the difference in child survival related to maternal education persists in urban areas where there is much greater availability of health services,' (Kaufmann & Cleland, 1994: 198).

More recently, however, the role of 'passive education' in promoting child survival in urban areas has been suggested as a possible explanatory factor in observed regional differentials in child mortality. Passive education refers to, 'modern identities, occupational, childrearing and communication skills and to reproductive and child health knowledge and beliefs imparted outside of primary and secondary schools through prolonged exposure to, and absorption of, information from print, radio and television media and through interaction with modern individuals... and with modern institutions, including health facilities... Presumably, passive reception of ideas and messages is facilitated by lifelong residence in large urban centers,' (Brockerhoff & De Rose, 1994: 194). In a re-interpretation of DHS data from fifteen countries, Brockerhoff and De Rose find important evidence to indicate that,

'uneducated women who are exposed to modern media, marry educated or professional husbands or experience the moderate fertility patterns and modern household facilities characteristic of modernizing cities, enhance their children's survival chances to the level conferred by formal education,' (Brockerhoff & De Rose, 1994:194).

It is important to note, however, that these arguments are not new and were previously examined by Rosenzweig and Schultz who emphasised that the public information component of health services often acts as a partial substitute for the superior knowledge or skills of better educated mothers and further argued that educational differentials in child mortality tend to be smaller in the presence of a good health programme, (Rosenzweig & Schultz, 1982, cited in Cleland & van Ginneken, 1988). These issues are also analogous to the view that strong family planning programs can reduce socio-economic differentials in contraceptive use and fertility patterns.

More recently, the wide-spread implementation of population-based child survival interventions has been based on the promotion of 'passive education' through mass media and social marketing techniques, (see Chapter 1). Thus home-based disease-control interventions, such as the diarrheal disease and acute respiratory infection programmes, are essentially an attempt to reduce educational and other differentials in child mortality by changing the attitudes, preferences or treatment practices of mothers.

At the same time, the hypothesis that passive education enhances child survival to the level conferred by maternal education conflicts somewhat with the view which holds that one of the important mechanisms through which education improves child health is by facilitating the comprehension and subsequent implementation of health messages, (Preston, 1985). The most recent examination of educational disparities in the comprehension of health messages, the comparative study by Levine et al described above, supports this theory.

Furthermore, in the wider context of contemporary child survival interventions, these contrasting positions underscore the need for disentangling the mechanisms through which education enhances child health for policy purposes in view of the possibility that the lack of education may represent an important constraint to the effective usage of home-based interventions such as those promoted in DDC and ARI programmes, (see Chapter 1). Thus for policy purposes it is increasingly important to understand to what extent education enhances the ability to retain information accurately from IEC materials not only in order to measure the significance of this pathway in the maternal education-child survival relationship, but also in order to understand to what extent education represents an important factor in the acceptance and usage of home-based interventions.

The following sections of this discussion now examine this pathway in the maternal education-child survival relationship; namely, to what extent the acceptance and usage of health

interventions represents a significant pathway of influence in the maternal education-child health relationship. The discussion focuses on ethnographic research on the household management of diarrheal disease in general and on the findings of KAP and other surveys in Egypt which attempted to evaluate maternal performance in the treatment and dietary management of diarrheal disease after nearly a decade of exposure to the health education messages of the Egyptian NCDDP. Since averting the nutritional and mortality consequences of diarrheal disease requires considerable skills, this provides an opportunity for examining the extent to which education enhances maternal comprehension of health messages and subsequent acceptance of home-based interventions. At the same time, this provides an opportunity for examining the extent to which the lack of education may represent an important social constraint to the mortality impact of child survival interventions as postulated in the health literature, (Mosley, 1984).

D. Maternal Education and the Acceptance and Effective Usage of Home-Based Medical Interventions

This discussion focuses on the impact of education on the acceptance and effective usage of disease-specific interventions. It examines the household management of diarrheal disease based on the anthropological medical literature. In the second part of this section, the discussion turns more specifically to the impact of the NCDDP on the household management of diarrheal disease in Egypt and on the role of education in this context.

The anthropological literature indicates that mothers practice a variety of positive and negative practices in the treatment of diarrheal disease. The main inputs of diarrheal disease control programmes, as seen in Chapter 1, essentially involve teaching mothers positive practices through IEC materials by promoting:

- 1- awareness and skills in recognising the symptoms of dehydration and its potentially fatal consequences;
- 2- acceptance and sustained usage of ORS in the treatment of diarrhea and dehydration;
- 3- early home-based intervention with ORS and;
- 4- appropriate dietary management of diarrhea episodes, (Martines et al, 1993; Langsten & Hill, 1992).

In the wider health literature, one of the ways through which education is hypothesised to enhance maternal performance in the household management of diarrheal disease is by enhancing the comprehension of health messages as seen in the previous section. This, in turn, is expected to enhance the acceptance and appropriate usage of such home-based interventions.

The following sections examine these issues in the context of the DDC in Egypt and with reference to the wider findings from the anthropological literature on diarrheal disease management where relevant. Because other factors, such as the severity of diarrhea episodes and the health facility consulted, often influence the household management of diarrheal disease, the discussion below also examines the significance of these factors in relation to the role of maternal education.

The Treatment of Diarrheal Disease and DDC Programmes

Although the Egyptian NCDDP, 'the first large scale experience with diarrheal disease control interventions,' has been described by its promoters as one of the most successful DDC programs in the developing world, (Hirschhorn, 1989), the accuracy of previous evaluations of this program have been increasingly questioned as seen in Chapter 1, (SPAAC, 1989; Rashad, 1989; Langsten & Hill, 1992). The most recent evaluation of the impact of the NCDDP by the CSRP, while confirming improvements in knowledge and usage of ORS and correct dietary management, nevertheless demonstrates that effective and early usage of ORS and correct dietary management of diarrhea episodes are far from universal, (Langsten & Hill, 1992: also in Rashad, 1989; SPAAC, 1989). Thus the CSRP, while recognising 'many of the KAP process achievements of the NCDDP, questions the alleged link made between process indicators and reduced child mortality,' by the Egyptian NCDDP (Langsten & Hill, 1992: 35).

According to the anthropological literature, three components of diarrheal disease control programmes which are particularly crucial for reducing case fatality emerge as problematic at the population level. These include the fact that:

- 1- ORS is frequently administered only after consultation and prescription from a medical practitioner;
- 2- ORS is administered inconsistently and prepared incorrectly in many cases and medical practitioners do not provide mothers

with instructions on how to prepare the solution, how frequently or how long to continue giving ORS to the child;

- 3- Mothers are frequently unable to identify the dangerous symptoms of dehydration and to understand the importance of rehydration, and finally;
- 4- The dietary management messages of diarrheal disease control programmes are not adopted as standard procedure in the household dietary management of diarrheal disease episodes, (Weiss, 1988).

Ethnographic research in diverse regions including Kenya, Haiti and Egypt, suggests that the typical response to diarrhea episodes in the field frequently involves the use of multiple antibiotics for a single episode; and for chronic diarrhea, of erratic administration of different types of treatment and antibiotics obtained from a variety of formal and informal sources of care at the same time, (Bentley, 1988). In the majority of these diarrhea episodes, ORS on its own and correct dietary management would have been sufficient, particularly for non-dysenteric diarrhea which does not require antibiotic therapy. Anthropological research in other settings demonstrates that, at the household level, the determinants of effective and early usage of home-based interventions such as ORS and the correct dietary management of diarrhea episodes are indeed complex and multi-factoral.

The following sections examine the wider literature on the determinants of the acceptance and appropriate usage of diarrheal disease interventions at the household level, including the comprehension of health messages and the role of maternal education in this context.

The Comprehension of Health Messages and ORS Usage/ Anthropological Findings

The most crucial determinants of the usage of ORS according to the anthropological literature appear to be maternal comprehension of the purpose of ORS; the medical facility consulted and episode severity, (Bentley, 1988; Langsten & Hill, 1992, 1993). Ethnographic research in North India for example, found that among mothers who believed ORT intervention was not useful, '80% said it doesn't stop or help the diarrhea,' (Bentley, 1988: 82). Significantly, 88% of mothers who understood the rehydration function of ORS thought it was helpful during diarrhea while 62% of mothers who did not understand the rehydrating function of ORS believed the intervention was not useful. According to Bentley, this data supports the hypothesis that user-satisfaction is positively related to knowledge of the function of ORS, (Bentley, 1988: 82). In Haiti, mothers who understood the concepts of dehydration and fluid replacement were more likely to use ORS compared to mothers who held a curative-theory model of ORS. Thus user-satisfaction and sustained usage of ORS were strongly related to maternal knowledge of its function, (Coreil & Mull, 1988).

The implications of low maternal comprehension of the function of ORS are summarised by Bentley as such: 'mothers were frequently heard to complain of the failure of ORS to stop or decrease diarrhea... a significant portion of mothers were attributing antidiarrheal qualities to ORT and did not understand what it was meant to do; replace bodily fluids lost from stool

output... Many mothers did not plan to use ORT again because it had failed to cure or ameliorate the diarrhea episode,' (Bentley, 1988: 82).

The Impact of Maternal Education on the Acceptance and Usage of ORS/ Anthropological Findings

While the above studies demonstrate that ORS usage is positively related to maternal comprehension of its purpose, they do not examine the extent to which maternal comprehension displays educational disparities. Anthropological research by Patel et al in Kenya reveals interesting findings in this respect, (Patel, et al, 1988). This case-study of 20 unschooled mothers and 40 schooled mothers revealed similar educational disparities in maternal knowledge of causation to those found in this research in Menofia, examined in the following chapter. While unschooled mothers attributed a series of irrelevant causes to diarrhea such as bad spirits, with schooling, new concepts of causation emerged; these being dirt, dirty feeding utensils, dirty unboiled water, contamination, flies and uncooked food. Causal reasoning and suggested treatment were positively correlated for both groups of mothers. While the unschooled mothers recommended using purgatives to remove the bad spirits from the body, (60%); stopping food intake, (40%); and using herbal medicines to cool the heat from the body, (50%), the schooled mothers recommended using a mixture of water, salt and sugar, (70%); and boiled water, (30%); while only 10% suggest stopping food

intake and only 5% recommended the use of purgatives. However, despite the superior knowledge and skills of schooled mothers in the treatment of diarrheal disease, 'the continuation of diarrhea after the ORS mixture is administered is frequently viewed by schooled mothers as a failure of Western medicine because schooled mothers, despite their faith in scientific causes and consequent resort to Western therapeutic practices, have failed to understand the rehydrating role of ORS,' (Patel, et al, 1988: 1285).

Although anthropological research demonstrates that mothers who understand the function of ORS in fluid replacement are more likely to be long-term users and, elsewhere, the literature suggests that maternal education increases the likelihood that mothers will comprehend and retain this information more accurately from campaign interventions, few studies examine the three dimensions of this relationship concurrently: maternal education, comprehension of health messages and appropriate and sustained usage of health interventions. The findings of this research in Menofia which attempted to further examine these linkages are addressed in the following two chapters.

The Impact of Education on Appropriate and Effective Usage of ORS/ Anthropological Findings

The anthropological literature also suggests that the acceptance and usage of an intervention such as ORS, which is

almost entirely dependent on maternal performance, is frequently different from effective or appropriate usage, and anthropological studies have examined and revealed important educational disparities with respect to this variable. One of the most important indicators of effective usage of ORS is timing since early home treatment of diarrhea episodes with ORS is vital for preventing dehydration-related deaths. This discussion will now examine the determinants of effective usage of ORS.

With respect to the impact of education on the effective usage of ORS, anthropological research in North India demonstrates that mothers with some education were much more likely to give ORS immediately, compared to mothers with no education. In addition, mothers who were aware that a child may die from diarrhea were 5 times more likely to administer ORS appropriately early and educated mothers were more likely to score positively in understanding the mortality consequences of diarrhea, (Bentley, 1988).

At the same time, despite the fact that early usage of ORS inside the home prior to seeking professional help is one of the main features of diarrheal disease control programmes, considerable research indicates that ORS is often administered only after medical consultation, irrespective of maternal education, and that the overwhelming determinants of seeking medical treatment for diarrhea are episode severity and duration. The literature further suggests that this pattern is persistent among both educated and uneducated mothers.

In a stepwise logistic regression to investigate the determinants of medical treatment for 50 diarrhea episodes in India which constituted 62% of cases, the only explanatory variable was the duration of the episode. Episodes of shorter duration were less likely to be those for which medical treatment was sought and older mothers were more likely to delay medical treatment, (Bentley, 1988).

This chapter will now examine the determinants of the acceptance and effective usage of home-based interventions in Egypt, focusing on the NCDDP. The discussion begins by examining treatment patterns and dietary management of diarrheal disease episodes. It focuses on the factors which affect the acceptance and appropriate usage of ORS. The discussion then examines the limited evidence on the impact of maternal education on the acceptance and appropriate usage of ORS in Menofia.

The Treatment and Dietary Management of Diarrheal Disease: Egyptian Data

In Menofia, where this research was conducted, the CSRP found that mothers sought help from an outside source for more than 70% of all diarrhea episodes. This figure rises to 90% for children with severe diarrhea and to 95% for children perceived to be dehydrated, (Langsten & Hill, 1992; 1993).

The high percentage of mothers seeking professional care for dehydrated episodes of diarrhea in Menofia indicates two issues with respect to the achievements of the NCDDP mass media campaign. Firstly, it demonstrates that mothers have generally comprehended the potentially fatal consequences of dehydration and are able to recognise the symptoms of dehydration following extensive exposure to the NCDDP's mass media campaign. This is confirmed in data from KAP surveys in Upper and Lower Egypt and in Cairo, (SPAAC, 1985; 1986; 1987; 1988; 1991). At the same time however, the high percentage of mothers seeking professional care for children perceived to be dehydrated demonstrates that one of the most crucial messages of the NCDDP, early home treatment of diarrhea with ORS before medical consultation, has not been widely adopted by mothers. The latest findings for this process indicator in twelve villages in Menofia found that more than 92% of mothers waited until after a visit to a health care provider before giving ORS, (Langsten & Hill, 1992; 1993). In the 1985-86 KAP survey evaluations of the NCDDP, conducted approximately three years after the initiation of the diarrheal disease campaign, ORS was given as a first action by only 11% and 8% of mothers respectively, (SPAAC, 1985; 1986). Almost six years after the NCDDP began, the CSRP found that ORS was given as a first action by only 15% of mothers. Similarly, consulting a physician was reported as the first action at the onset of diarrhea by 53% of mothers in the 1985-6 surveys; while 90% of mothers reported that if dehydration symptoms occurred they would consult a physician with the majority responding that they would seek a private physician. Only 5% recommended using ORS to

treat the dehydration.

In 1992, the CSRP found that the situation had not changed significantly; mothers sought help from an outside source for more than 70% of all diarrhea episodes. Private physicians were the most frequently used source of care, constituting 52% of those who sought care and 38% of all episodes while only 17% of those who sought medical advice resorted to government health facilities, (Langsten & Hill, 1992).

Given that almost all mothers waited until after medical consultation before administering ORS, the source of care emerges as a significant determinant of the type of treatment received and the likelihood of using ORS in Menofia. Although this aspect of the NCDDP is beyond the scope of this discussion, it is important to note that, according to the CSRP survey, there is considerable under-use of ORS among medical practitioners and extensive over-use of unnecessary antibiotic therapy. Significantly, government clinics are more likely than private doctors and pharmacies to prescribe ORS and the latter two sources of care are more likely to prescribe antibiotics and antidiarrheals. ORS is used in 73% of episodes in children taken to a government health facility, and ORS alone, generally the most appropriate treatment, is used in half of these cases. Among private physicians, ORS alone is prescribed in only 10% of cases even when the diarrhea is acute and ORS is the only treatment required, (Langsten & Hill, 1993). The most common treatment is other medication such as anti-diarrheals in 78% of cases and antibiotics in 65% of cases while ORS is used in only 59% of cases among private physicians. Thus

despite the adoption of WHO guidelines by the NCDDP, treatment with antibiotics and other drugs was considerably high years after training in SCM commenced. In fact, antibiotics were as frequently used as ORS while other medicines were more commonly given than ORS. Furthermore, although 90% of diarrhea episodes in Egypt are of the acute watery type which does not require antibiotics, only a small proportion of acute diarrhea episodes are treated appropriately with ORS alone, (Langsten & Hill, 1992; 1993). These findings underscore Mosley's points with respect to input constraints in educating health practitioners which may be as difficult to overcome as social constraints to educating the public in population-based interventions, (Mosley, 1984).

With respect to treatment practices at the household level, the CSRP emphasises that it is important to distinguish between 1) knowledge and use of ORS and correct dietary management of diarrheal disease and, 2) appropriate treatment of diarrhea. The CSRP concludes that with regard to the former, longitudinal research between 1979 and 1992 supports all previous evaluations of the NCDDP which demonstrate that knowledge and usage of ORS greatly increased in the 1980s and early 90s and that the dietary management of diarrheal disease has improved. For the period between 1979 and 1992, the percentage of women who had ever used ORS increased from only 20% to 81% while approximately 91% of mothers knew how to mix ORS.

These findings are consistent with other evaluations of the NCDDP in Menofia and at the national level covering Upper

and Lower Egypt and Cairo. In 1989, 99% of mothers in Menofia had heard of ORS; four-fifths of the sample had reported ever using ORS and 93% of mothers reported knowing how to mix ORS. Furthermore, 86% actually mixed the ORS correctly while 90% reported using the whole packet and used the correct amount of water. Similar results were obtained in the 1984, 1985, and 1986 KAP evaluations of the NCDDP: knowledge of ORS was between 94 and 99%; ever used was between 50% and 68%; and knowledge of how to mix ORS correctly increased from 53% in 1984 to 81% in 1986, (SPAAC, 1985; 1986).

Appropriate Usage of ORS in Egypt

With respect to appropriate usage of ORS, the CSRP found that usage corresponds with the perceived severity of the episode with 66% of severe cases and 89% of dehydrated cases receiving ORS following medical consultation. Cases with perceived dehydration were also more likely to be given ORS promptly, and to be given more solution per day and for a greater number of days. Furthermore, 53% of mothers commenced treatment with ORS within 24 hours, an increase from 44% in 1989, and 80% within 48 hours of the onset of the diarrhea episode following consultation with a medical practitioner. Nineteen percent of mothers used ORS for one day; 31% for 2 days; and 23% and 27% for three and four days respectively, according to the CSRP. This suggests some improvement since 1989 when only 15% of dehydrated children received ORS for more than three days and since the earlier KAP surveys which found that 32% of mothers used ORS for only one day, (SPAAC, 1989). Furthermore, the mean number of packets used per day for dehydrated children

indicates an average of 2.7 packets which comes close to the recommended intake of 3-5 packets per day for mild to moderate dehydration and indicates significant progress since earlier KAP surveys between 1984-1986 when 20% of mothers who used ORS used only one packet for one day. Thus, in comparison to earlier data, household survey data indicates significant increases in knowledge and usage of ORS during and at the end of the NCDDP's media efforts, (SPAAC, 1989; Langsten & Hill, 1992; 1993).

Appropriate Dietary Management of Diarrheal Disease in Egypt

With respect to the dietary management of diarrhea episodes, results from surveys conducted in 1979-1983 indicate that between 51% and 65% of mothers discontinued breastfeeding at some period during a diarrhea episode and between 34% and 65% of mothers reported that they discontinued solid food, (Gadallah, Nosseir, Richardson & McCarthy, 1983, cited in Langsten & Hill, 1992). By 1990, approximately six years after the diarrheal disease campaign began, just 2% of mothers reported stopping breastfeeding and 12% reduced the amount of breastmilk; 25% of mothers reduced the quantity of other milks, from goats or water buffalo; and 29% of mothers stopped or reduced the amount of solid/semi-solid food given to the sick child, (Langsten & Hill, 1992; 1993). Stopping or reducing the amount of milk, liquids and other foods tended to be more common when the child was perceived to be dehydrated or the diarrhea perceived to be severe. This is consistent with evidence from the anthropological literature in

general which indicates that mothers withhold food only in a desperate attempt to stop the diarrhea after a chronic episode, (Bentley, 1988). Finally, about 21% of all children were given more non-milk liquids when sick, such as tea and herbal ingredients, with this increase being more common when the child was dehydrated, (Langsten & Hill, 1992; 1993).

The above findings demonstrate that both knowledge and usage of ORS and appropriate dietary management of diarrheal disease have improved according to nearly all evaluations of the NCDDP and that the diarrheal disease control programme in Egypt has made considerable progress with respect to important process indicators through the dissemination of health education messages. At the same time however, the CSRP's survey data, in addition to other surveys, also indicates that the programme effect is much smaller than has been claimed by the NCDDP and demonstrates that diarrhea remains the main cause of death in Egypt accounting for more than twice as many infant and child deaths as any other single cause, (Langsten & Hill, 1992; 1993; see Chapter 1).

Against these findings, the CSRP concludes that treatment patterns for diarrheal disease are far from satisfactory. At the individual level, this is reflected in the fact that few mothers practice early home treatment with ORS even after almost a decade of exposure to the NCDDP's health education messages. According to the CSRP, therefore, the 'primary obstacle for eliminating diarrheal deaths is not knowledge and usage of ORS,

which have increased substantially, but appropriate treatment of diarrhea,' (Langsten & Hill, 1991: 36). Since mothers rarely use ORS before seeking professional care, the CSRP concludes that, 'the education messages were more successful in improving knowledge than practice... Only 40-50% of children ill with diarrhea received ORS. This means that 50-60% of children receive no ORS,' (Langsten & Hill, 1991: 36). Thus 'there is too little ORS used and use is initiated too late while the use of antibiotics, anti-diarrheals and other drugs is much too high, particularly in cases of mild diarrhea. Both of these problems are related to the source of care chosen according to the CSRP.

Again, it is important to note in this context that, although physicians at government health facilities come close to following the advice of the NCDDP to use ORS for all cases of diarrhea, the preferred source of treatment however, is the private physician particularly for severe diarrhea or when the mother perceived the child to be dehydrated, (Langsten & Hill, 1992). In fact, even no care or pharmacy consultation are preferred to the health unit. Private physicians are, however, the least likely to prescribe ORS and to treat the diarrhea appropriately, and, among private doctors, ORS appears to be used as a curative measure after dehydration has set in. 'It is significant that the over-use of antibiotics and other drugs remains a serious problem years after the NCDDP began trying to change treatment patterns,' (Langsten & Hill, 1992: 38). Furthermore, 'It is not clear whether this pattern is demand driven since the overwhelming concern of mothers is for the diarrhea to stop, but it is evident that this

pattern of diarrheal disease treatment is more prominent among private practitioners than among doctors at the health unit who, paradoxically, appear to be the same doctors operating in different facilities at different hours of the day,' (Langsten & Hill, 1992: 39).

Equally significant, however, is the fact that the use of ORS for diarrhea episodes in the two weeks prior to each of the three survey rounds conducted by the CSRP was only 39%. These findings suggest very low usage of ORS in the treatment of diarrheal disease in Egypt. They also confirm that one of the most important passive education messages of the diarrheal disease program, early home treatment with ORS, has not been achieved. The following section examines the limited findings on the significance of maternal education in this context.

Maternal Education and the Usage of ORS in Menofia

Although the CSRP survey in Menofia did not examine maternal comprehension of the function of ORS in relation to maternal education, the CSRP hypothesised that maternal education would be a significant determinant of sustained usage of ORS in its sample. The CSRP's analysis predicted that 'mothers who were younger, better educated, wealthier and who watched more television would be more likely to have ORS at home, to know how to mix it and to have used it in the past,' (Langsten & Hill, 1992: 30). The likelihood of experiencing diarrhea-specific mortality was, in turn, predicted to be lower among this group in

comparison to mothers who scored poorly on these process indicators, (Langsten & Hill, 1992). Interestingly, however, maternal education did not emerge as an independent and consistent predictor of ORS usage in Menofia and other factors, primarily the source of treatment, were more important determinants of this process indicator, (Langsten & Hill, 1992).

Controlling for the effects of maternal age, household wealth, and hours of television viewing, women with primary education were not significantly different from better educated women in the likelihood that they would have ORS at home while women with no education were 35% less likely to have ORS at home than women with more than primary education. Yet diarrhea-related mortality was slightly higher for children of mothers who reported having ORS in the home than for other children. 'It is very unlikely that having ORS in the home is actually a risk factor for diarrhea mortality. There must be some other mechanism that underlies this association that we have failed to control for,' (Langsten & Hill, 1992: 34). More conclusively however, the CSRP found that the children of mothers who knew how to mix ORS at the baseline were half as likely to die of diarrhea over the course of the research year than other children, net of other predictor variables. There were no significant educational disparities in knowledge of how to mix ORS. Paradoxically, however, mothers who watched the most television were the least likely to know how to mix ORS, and the least likely to have used it. 'Since television was the main medium for disseminating information about dehydration and ORS, this is hard to understand,' (Langsten & Hill, 1992: 31).

Thus according to the CSRP, multi-variate analysis on the impact of education on the acceptance and usage of ORS emerged as inconclusive and often contradictory.

However, treatment with ORS was found to vary positively with the duration of the episode and with the mother's perception of its severity and symptoms; 58% of children with persistent diarrhea, 66% of those whose diarrhea was reported to be severe, 50% of those with watery diarrhea, 54% of those whose stool contained blood and/or mucus, and 90% of those perceived to be dehydrated by the mother were given ORS, (Langsten & Hill, 1993). Thus, although overall, 21% of children with diarrhea received neither ORS nor any other medicine, the figure is lower for children perceived to be dehydrated and/or those viewed as seriously ill. Against these findings, maternal education had no consistent, independent effects on ORS usage and episode severity and duration, in addition to the source of care, emerged as more crucial determinants of the treatment of diarrheal disease in Menofia according to the CSRP. Furthermore, the source of care in this sample as in many other samples, was, in turn, related to episode severity and duration: the preference for private doctors, the least likely to prescribe ORS, was particularly significant when the diarrhea was severe. Finally, educational differences in the choice of practitioner for the treatment of diarrhea were significant only when the severity of the illness had been controlled for, (Langsten & Hill, 1992).

With regard to the dietary management of diarrhea, the

CSRP did not examine educational disparities in this variable; interestingly, however, seeking care from a private physician increased the risk that the mother would withhold breastmilk by a factor of 3 and almost doubled the risk that she would withdraw solid food in comparison to cases who saw neither public nor private sector care while attendance at government clinics had no significant effect on feeding practices. At the same time, the CSRP concludes that, although feeding practices during diarrhea episodes have improved, withdrawal of breastfeeding, termination of other liquids and the withdrawal of solid foods is still practiced for some period of time during a diarrhea episode.

Summary

The above overview of the most recent assessment of the NCDDP by the CSRP in twelve villages in Menofia demonstrates that early home treatment of diarrheal disease with ORS and appropriate dietary management of diarrhea episodes which formed a crucial component of the education messages of the NCDDP in Egypt, have not been achieved despite nearly a decade of exposure to the programme's mass media campaign messages. These findings have been supported by numerous other surveys in Egypt. While there is almost universal knowledge of ORS and to a lesser extent, of the symptoms and severity of dehydration, few mothers initiate treatment prior to seeking professional help, where the use of ORS remains low at the preferred source of care, the private doctor. Diarrhea remains the main cause of under-5 deaths in Egypt according to numerous surveys; ORS usage in the last

diarrhea episode low and more significantly, the percentage of mothers who recommend ORS treatment for diarrheal disease increased to only 20% in recent surveys, (2).

In relation to the wider maternal education-child health debate, in demonstrating that other factors may be significant determinants of the acceptance and usage of home-based interventions, such as the duration and severity of illness episodes, the Egyptian data may suggest that, in emphasising the increased propensity to utilise medical interventions as one of the crucial mechanisms through which education affects child health, the literature may have over-simplified matters. The empirical chapters of this thesis attempt to examine these linkages more closely.

Concluding Comments

This chapter has attempted to examine the pathways through which education has been hypothesised to positively influence child health in the health literature. A summary of these variables is presented below.

Maternal Education	->	Preventative Practices	->	Child Health
Maternal Education	->	Treatment/Therapeutic Practices	->	Child Health
Maternal Education	->	Illness Management: Timing of Treatment Effective Health Interactions Comprehension of Health Messages Acceptance of Health Interventions	->	Child Health

The chapter has also attempted to examine the numerous empirical gaps which constrain our understanding of the mechanisms through which education enhances child survival. At the same time, it has indicated that 'the search for answers to the question as to why children of educated mothers are exposed to lower risks of morbidity or mortality than those with little or no education is guided by academic as well as programmatic interests,' (Jain, 1994, p.199).

With respect to programmatic interests, the literature suggests that the possibility that there could be short-term policy implications involved in the maternal education-child survival relationship was somewhat influenced by the Mosley and Chen child survival research framework in the early 1980s and by Preston's unanticipated findings on the role of maternal education in the health development experience of the developed world.

According to the Mosley-Chen framework, all social and economic determinants of child survival must operate through more proximate determinants, or intermediate variables, to affect child survival. These include nutrition, personal illness control, preventative and curative care, and contraception. Maternal education is widely expected to operate directly on the proximate determinants of child health by enhancing greater protection against infection, primarily by improved hygiene; by reducing susceptibility to infection, primarily through nutrition and immunization; and/or by enhancing recovery from infection through

more effective illness management. Possible explanations for this association which were addressed in this chapter include the hypotheses originally put forward by Caldwell; including a shift in power relations within the household, a general transformation in the social value of women, a change in the value of children, and a reduction in fatalism. The anthropological literature, on the other hand, stresses a change in beliefs about disease causation and prevention. By extension, the anthropological literature therefore also suggests that, 'if female education is effective because it transmits certain ideas and skills such as knowledge of germs or sanitary food handling practices, than one might hope to implement programs to teach these matters specifically without having to provide eight years of schooling for all potential mothers,' (Ware, 1984: 199; also in Trussell & Hammerslough, 1983; Preston 1978, cited in Ware, 1984).

This hypothesis is supported by the Mosley/Chen child survival framework which stresses that one of the most powerful influences of formal education is the transmission of concepts of modern scientific medicine. When the mother is exposed to such information, it can transform her preferences so as to significantly improve child survival often without investment of additional economic resources, according to Mosley, (Mosley, 1984). At the same time, Preston's model of mortality reduction supports these hypotheses in demonstrating that maternal education was not a significant factor in the mortality experience of the developed world, (Preston, 1989, cited in Levine et al, 1994). Numerous analysts suggest that this may have been because

of the primitive state of medical knowledge at the time. Conversely, Preston's findings suggest that maternal knowledge of disease causation and prevention may be significant factors in contemporary educational differentials in child mortality in the developing world thereby lending support to the possibility of short-term interventions which increase the knowledge and skills of mothers in specific child care practices with positive implications for child health. On the other hand, if, as numerous authors postulate, 'the positive effect of education on women's care for their children manifests itself less in direct changes in domestic behavior, but more in a general transformation of women's social value,' (Kaufmann & Cleland, 1994: 198), then the impact of maternal education on child survival would appear to be less amenable to direct intervention except in the long term promotion of female education.

Despite its significant implications for policy purposes, however, the continuing controversies raised in the maternal education-child survival relationship reflect the difficulties in measuring this relationship. Indeed, according to Caldwell, even research at the anthropological level has had significant limitations, in that it has 'traditionally been limited to investigating the concrete results of behavior as opposed to the study of behavior which determines events that do not happen, such as the elements in maternal care which explain why children did not get sick,' (Caldwell, 1994: 223).

Against these empirical weaknesses, it is important to note that recent research at the household level suggests that the significance of maternal education in depressing child mortality

may have been exaggerated. In some settings, including Egypt, when the nature and level of health-related household resources are controlled for, education effects as independent determinants of child survival have been found to diminish, (Deeb, 1990; Cooksey et al, 1986). The suggestion that educational disparities in child health may become less significant following improvements in the standard of living and health-related household resources has important policy implications, particularly in light of the recent emphasis on maternal education in the latest international agenda for achieving HFA by 2000, (World Bank, 1993).

Research Objectives

Acknowledging that this type of investigation is hindered by numerous empirical constraints, three issues emerge from the literature which merit further investigation. (A summary of these can be found in the outline of research objectives at the end of this chapter.)

The first issue to emerge as meriting further investigation is the rarely measured association between maternal education, maternal knowledge of disease causation and prevention, and child morbidity. Numerous experts have argued that because uneducated and educated mothers hold similar views about the causes, prevention and treatment of disease, it is unlikely that maternal knowledge is the key ingredient in this relationship

and that educated mothers are more successful at preventing the death of their children because of 'school-derived knowledge or their increased openness to non-familial learning,' (Kaufmann & Cleland, 1994: 197; also in Caldwell, Reddy & Caldwell, 1983; Lindenbaum, Chakraborty & Elias, 1985; Zeitlyn & Islam, 1993; Basu, 1993). This conclusion somewhat undermines anthropological findings which suggest that maternal knowledge of disease causation and prevention are important determinants of treatment practices and that educational disparities with respect to these variables have been significant in some settings. Aggregate-level data has not been conducive to examining the linkages between maternal education and maternal knowledge and the latter's impact on the prevention and treatment of disease at the household level. Therefore, one of the empirical objectives of this research was to examine the relationship between education, knowledge, and the prevention and treatment of disease episodes. The empirical chapters in this thesis therefore first examine the relationship between maternal education and maternal knowledge in this setting, (Chapter 4), and then move on to examine to what extent these variables influence the treatment of illness episodes at the household level, (Chapter 5). Thus the research objectives with respect to the association between maternal education and health-related knowledge and behavior were to examine:

1. The relationship between maternal education and maternal knowledge of disease causation and prevention, focusing on the major diseases responsible for child morbidity and mortality in Egypt: diarrheal disease and acute respiratory infections;
2. The impact of education on diarrheal disease and respiratory

infection child morbidity, and;

3. The impact of maternal knowledge of disease causation and prevention on child morbidity.

The research objectives with respect to the relationship between maternal education and treatment/therapeutic practices in this survey were to examine:

1. The impact of maternal education on the treatment and management of diarrheal disease and respiratory infection child morbidity;
2. The impact of maternal knowledge of diarrheal disease causation on the treatment and management of diarrheal morbidity;
3. The impact of maternal education on maternal knowledge of disease processes, including the identification of disease symptoms and the potentially fatal consequences of specific diseases.

(These variables are described further in the translation of the questionnaires in the following chapter).

The second question raised by the literature on the mechanisms through which education affects child survival is whether poor but educated mothers are able to significantly prevent disease prevalence and recurrent morbidity relative to their equally poor but uneducated counterparts. Although this survey was primarily concerned with the first question which is examined in Part 1, an attempt is made to measure the interaction between conditions, (household-level variables), and behavior, (maternal education), in the Mosely/Chen framework and their interaction with child morbidity. With respect this research objective, more extensively discussed in Part 2, the survey attempts to examine to what extent maternal education

and knowledge of disease prevention affect child morbidity at various levels of intermediate household resources. The wider literature on this relationship and the methodological difficulties in its measurement are discussed in Part II of the empirical analysis of this thesis.

As seen in this chapter, the health literature further suggests that one of the other mechanisms through which education may improve child health practices is by enhancing the comprehension of health messages and, subsequently, the effective usage of health interventions.

Although the LeVine et al study described above demonstrated significant educational disparities in the comprehension of health messages, it did not examine to what extent these affected health behavior. Thus, despite increasing recognition in the health literature of the complexity of the relationship between exposure to health interventions and their subsequent usage, the significance of educational differentials in the effective and sustained usage of child survival interventions remain under-researched, (Martines et al, 1993, see Chapter 1).

One of the research objectives of this survey was therefore to measure to what extent educated mothers comprehend health education messages accurately and subsequently implement these at the domestic level. In this context, Egypt's experience with the NCDDP is regarded as particularly suitable for in-depth

investigation of these variables because numerous studies have confirmed extensive exposure to the diarrheal disease control campaign which makes it possible to proceed beyond basic KAP evaluations to examining the impact of education on the effective and sustained usage of child survival interventions at the household level. Despite extensive exposure to the NCDDP messages, however, in 1986, a KAP evaluation of the NCDDP reported that the 'association between diarrhea, dehydration, symptoms of dehydration and rehydration through compensating loss of fluids is not well comprehended yet by the majority of mothers; the situation has not improved since 1985,' (SPACC, 1986). The final research objective of this thesis was to examine the impact of education on maternal knowledge of the association between the above four variables, (which were important determinants of early and sustained ORS usage in other research settings according to the anthropological literature), and to what extent maternal education and maternal comprehension of the diarrhea campaign messages affected treatment patterns. Firstly, however, the following chapter describes the research setting and the methods used in this case study more extensively.

Outline of Research Objectives

The research objectives of this survey were to examine the following:

I. The Impact of Maternal Education on:

1. Disease Prevention
2. Illness Management and Curative Care
3. Comprehension of Health Messages
4. Acceptance and Appropriate Usage of Home-Based Health Interventions

II. The Association Between Maternal Education and Maternal Knowledge of:

1. Disease Causation
2. Disease Prevention
3. Symptoms of Severity
4. Health Education Messages

III. The Impact of Maternal Knowledge on:

1. Prevention
2. Illness Management

IV. The Extent to which both Education and Knowledge affect Disease Prevalence Independently of Household Resources, in Particular, those Resources which the Literature Suggests are Direct or Indirect Determinants of Diarrheal Disease and/or Acute Respiratory Infection Child Morbidity in Rural Egypt.

NOTES

(1) It is interesting to note in this context indeed that, despite the high incidence of illiteracy in the two villages studied in this research, there were only two cases of reported use of traditional healers among the sample of 401 households and an equally low percentage among the larger CSRP sample, (Langsten & Hill, 1992).

(2) In the wider context of child survival strategies in Egypt, the fact that usage of ORS was found to be so low in the CSRP data, (39%), despite the mass media campaign, raises concerns with respect to the potential impact of an ARIP campaign: at the individual level, in efforts to improve maternal performance in the treatment and management of respiratory infection through passive education and, at the health sector level, in efforts to increase appropriate standard case management among health practitioners.

With respect to educating health practitioners, like the NCDDP, the ARIP in Egypt does not address drug use in its mass media campaign aimed at mothers, focusing instead on symptoms: therefore, there are no effective mechanisms to monitor and enforce responsible performance in SCM of ARI. According to the CSRP, this is particularly disturbing since 'the similarities in antibiotic use for diarrhea and respiratory infection are striking; 45 and 46% respectively, of treated children were given antibiotics. For both illnesses, private physicians were the preferred source of care and were substantially more likely to prescribe antibiotics than were the doctors in the government health clinics,' (Langsten & Hill, 1992: 39). Thus with regard to the second most important cause of early child mortality in Egypt, the increased use of antibiotics among private physicians following training in SCM of ARI is particularly disturbing given that only approximately 15% of treated children are taken to government health clinics; even pharmacies are more frequently used sources of care than government clinics, (Langsten & Hill, 1993: 1994). The CSRP therefore concludes that treatment patterns for ARI display significant similarities to diarrheal disease case management with cough medicine used largely in the same way as ORS and considerably more effort must be made towards maintaining appropriate SCM of ARI through extensive education at the health sector and population levels, (Langsten & Hill, 1992; 1993; 1994).

Introduction

The previous chapter demonstrated that the role of maternal education has been increasingly recognised as an important determinant of child health and, more recently, as an essential component of child survival strategies in the developing world, (Chapters 1 & 2). Despite considerable research on this relationship at the aggregate level however, there remain significant empirical gaps surrounding the mechanisms through which maternal education affects child health at the household level, as seen in the previous chapter, (Ware, 1984; Mosley, 1984; LeVine, 1994).

Against these empirical constraints, the persistence of a strong influence of maternal education on child survival, independent of income and often irrespective of effective health service provision in some settings, suggests that domestic child care practices may be a major intervening factor, (Cleland & van Ginneken, 1988). As the literature in the previous chapter indicated, possible pathways of influence at the domestic level include the prevention of disease and the effective management of illness episodes through external and domestic health care practices.

Despite the potential importance of domestic health care practices suggested in the literature, major empirical gaps remain at the micro level, in particular, concerning the

relationship between maternal education and:

1. Maternal knowledge and beliefs about disease causation and how these affect the prevention of child morbidity;
2. Maternal knowledge and beliefs about disease causation and symptoms and how these affect treatment practices;
3. Maternal comprehension of health education messages and subsequent usage of health interventions: although maternal education has been positively linked to the comprehension of health messages, previous surveys have not proceeded to examine how this knowledge subsequently affects health practices.

In addition to these empirical gaps, recent literature questions to what extent education affects child health independently of household resources, (Deeb, 1990). Finally, the literature suggests that without more intensive investigation of the precise mechanisms through which this relationship works, the policy implications 'remain so general as to be of little use,' (Cleland & van Ginneken, 1988:1366). This is particularly the case with respect to the role of knowledge and skills in domestic childcare practices since, if education affects child survival by enhancing the latter, than presumably there could be short-term policy implications to this association, (Ware, 1984).

This case-study of 401 households in rural Egypt represents an attempt to investigate some of the mechanisms through which maternal education enhances child health at the domestic level. The broader conceptual approach of this research is based on the Mosley/Chen child survival research framework, (Mosley, 1984), which, in turn, is based on research methods used in the epidemiology of chronic as opposed to acute diseases, since child mortality in the developing world has characteristics similar to

those of chronic diseases in that it is:

- multifactoral in causality;
- displays long latency periods between disease exposure and manifestation, and;
- is powerfully influenced by lifestyle and socio-economic circumstances, (Mosley & Chen, 1984).

As mentioned in the previous chapter, the framework separates independent socio-economic variables, including maternal education, from the proximate, or biological determinants, of child mortality through which they operate to ultimately influence the risk of disease and the outcome of disease processes (the dependent variables). The proximate determinants of child survival with which this survey was concerned include conditions and behavior which influence disposition to disease, (susceptibility); the transmission of disease agents, (exposure); and the course of disease, (therapy), (Mosley & Chen, 1984).

The socio-economic determinants of child survival which operate through these proximate determinants to affect child health are divided into household-level variables and individual-level variables. Household-level variables include income/wealth resources which determine access to: food, housing, water and sanitation, fuel and energy; hygienic practices and preventative care; sickness care and access to information through media on nutrition, hygiene, contraception, and immunizations. These represent the 'conditions' variables in the Mosley/Chen framework.

Individual-level variables include individual skills, particularly maternal skills, which are typically determined by the

educational level of the mother and which operate directly on the proximate determinants of child health. These represent the behavior variables in the proximate determinants of child survival described above.

Within this wider framework for investigating the determinants of child survival, this survey was concerned with examining the association between maternal education and the prevention and treatment of disease and with examining some of the pathways, in particular the role of maternal knowledge and skills, through which this relationship operates. As such, it is primarily concerned with the factors which influence the behavior variables in this equation while recognising that behavior and conditions may be intrinsically related variables in the proximate determinants of child survival.

Because the research was concerned with investigating to what extent maternal education influences child health practices by directly enhancing maternal knowledge and skills in relation to the proximate determinants of exposure, susceptibility and therapeutic practices, a household survey for measuring maternal knowledge and perceptions in these areas was considered the appropriate choice of method for this research. An in-depth investigation of these variables at the household level would provide some insight into the pathways through which maternal education enhances child health at the domestic level. Thus, in order to examine the linkages between maternal education and child health, it was considered necessary to measure maternal knowledge.

and perceptions among a sample of ever-married women through a household questionnaire. Finally, a household questionnaire which focused on open-ended questions in particular, was believed to be necessary for addressing the empirical gaps raised by macro-level research (see previous chapter); for measuring the role of maternal knowledge and skills in this equation in particular; and for identifying the potential policy-implications of this important association in the determinants of child survival. Therefore, a questionnaire consisting of open-ended and, to some extent structured questions, was administered on a sample of 401 ever-married women with children in the 3-6 age group. The following sections describe the research setting, sample and the questionnaires further.

3.1 Research Setting and Sample Selection

The household survey was conducted in two villages, Al Dubaiba and Bekhiety, in the Governate of Menofia in Lower Egypt. The sample of 401 ever-married women with a child between 3-6 years of age for this case-study was selected from a larger household survey implemented in Menofia Governate for the Child Survival Research Project (CSRP) and conducted by the Johns Hopkins University and the Social Research Center (SRC) of the American University in Cairo (AUC) in the early 1990s. The CSRP was itself rooted in an earlier study conducted by the AUC in Menofia between 1979 and 1983 as part of an 'action research' project which included the provision of ORS and FP on a house-to-house basis in 12 villages, (Gadallah, et al, 1983). This earlier survey aimed to evaluate change in KAP of diarrheal

disease control and FP and the mortality impact of ORT services the project had been delivering.

The purpose of the current CRSP survey from which the sample for this research was chosen was to return to the same twelve villages using similar questionnaires to obtain comparable data in the early 1990s. Its objective was to evaluate the impact of the NCDDP and components of the CSP and, at the same time, to provide baseline information on disease prevalence, disease-specific mortality, and treatment practices against which the efforts of the CSP could be compared in coming years, (Langsten & Hill, 1991). Three rounds of survey data collection were conducted at six month intervals to provide a total one year follow-up period. The CSRP survey collected basic background information on fertility levels; contraceptive use and pre-natal care; attendance at birth and feeding information. With respect to child health, the survey investigated various aspects of child health and nutritional status including; morbidity and treatment patterns; immunization; anthropometry and retrospective and prospective measures of child mortality in addition to cause of death data for the one year prospective period based on verbal autopsy. An independent study on disease-specific mortality in the same twelve villages was also conducted in 1987-1988, (SPAAC, 1989). Thus the CSRP findings provided preliminary background information on child mortality, anthropometric indices and usage of health facilities in this research setting which was beneficial for eliminating irrelevant factors from the household questionnaire and, with respect to health sector usage, for providing baseline

information against which the reliability of data received in this survey, could later be checked. Therefore, Menofia was chosen for this research because it represented a rare opportunity to examine the variables of interest in a setting where previous and on-going research could provide valuable background information. Furthermore, in addition to the larger household surveys conducted in Menofia, numerous anthropological studies had been conducted in these villages which provided valuable ethnographic information relevant to this research, in particular, on behavioral factors associated with the intermediate determinants of child health which were considered too sensitive for this survey; for example, observation of the hygienic standards of latrines which might have jeopardized the relationship with respondents. Finally, epidemiological studies had been conducted to investigate environmental risk factors associated with child morbidity in some of these delta villages which provided further baseline information useful for the concerns of this survey, particularly in Part II in relation to diarrheal disease pathogens in rural Egypt; for example, risk factors associated with water storage and water sources in rural Egypt.

The empirical objectives of the case study required the selection of a sample of children between 3-6 years of age and the Johns Hopkins Team generously provided an opportunity for identifying 401 such households in Menofia. The focus on this age group was based on the investigation's concern with examining the impact of maternal education on child health which required elimination of the anti-infective protective role of breastfeeding

and ensuring that the sample had been completely weaned. Household resources become more important determinants of child survival and the way in which mothers control those resources, particularly in relation to the prevention and treatment of disease, become increasingly crucial to child survival at this age, (Tekce, 1990). Thus age three was considered sufficient for ensuring that the impact of maternal factors had diminished and the impact of environmental factors and maternal knowledge and skills in their control had become more significant.

The sample was also selected to allow adequate variation of the dependent variable, child morbidity, on the basis of morbidity prevalence in the CSRP data. Thus one half of the sample of 401 households consists of households which had high diarrheal disease and/ or respiratory infection incidence in two to three of the three CSRP survey rounds, and the other half of households with low incidence of child morbidity; i.e. diarrheal disease or respiratory infection in only one or none of the CSRP's three survey rounds.

In addition to facilitating the selection of an appropriate age group for this sample survey, the selection of households from the CSRP's survey data for the purposes of this case study was also useful for avoiding the extensive difficulties in obtaining a sample from the government agency responsible for issuing this data, the Central Agency for Population Mobilisation and Statistics (CAPMAS) in Egypt. It was also hoped that an informal affiliation with the CSRP would facilitate the task of obtaining the research permission from CAPMAS which all researchers are required to obtain

before embarking on field research in Egypt. Unfortunately, this was not the case. There are severe restrictions on household survey research in Egypt and in seeking to obtain this permission, as in all bureaucratic procedures in Egypt, the researcher who is not officially connected, faces the ultimate test in patience. As a result of extensive difficulties in obtaining permission to conduct this survey, the commencement of fieldwork was delayed by seven months. In the interim, ministry officials at CAPMAS insisted permission could only be issued when the MOH approved the questionnaires and officials at the MOH responded that permission could only be given once CAPMAS approved the questionnaires. After seven months of rotating between the two ministries tracing what had now become an enormous file of documents and an equally enormous list of required signatures, there seemed little hope of obtaining permission. Another researcher with 'important connections' had recently been refused permission and one researcher who had decided to by-pass these official procedures and conduct fieldwork without the necessary documents abruptly left soon after: [the former was interested in investigating urban poverty while the latter, a male anthropologist from Johns Hopkins, was attempting to research sexual practices among rural Egyptian women no less, and, not surprisingly, encountered difficulties with the community and the authorities]. When the catch 22 nature of this situation was pointed out to officials at the relevant ministries, permission was duly promised pending a series of further interviews with responsible officials who were invariably 'unavailable'. In the seventh month after initiating the permission process, permission to conduct the fieldwork in Menofia was unexpectedly issued,

simultaneously, by CAPMAS, by the MOH (and by divine intervention!)

As with most household survey research permission in Egypt, this was based on the condition that Egyptians must conduct the interviewing. Although this seemed like an obstacle at the time, it turned out to be advantageous in the long run. Local interviewers from the villages in Menofia had been extensively trained by the CSRP and had participated in their three rounds of data collection. Two of the interviewers who were considered particularly skilled by the Johns Hopkins/AUC project team accompanied the researcher in the fieldwork to satisfy the Ministry's condition that interview questions must be conducted by Egyptians. Although this further delayed the commencement of fieldwork by approximately 2-3 months and later prolonged the duration of fieldwork by another 3 months to a total of 9 months, as it was not possible to conduct interviewing on a daily basis, it nevertheless facilitated the researcher's access to households and the willingness of household members to respond to numerous questions without suspicion of the intentions of the survey. This is because the respondents were familiar with the interviewers and with their affiliation to the CSRP. Although the Egyptian people are an exceptionally open and hospitable people, (the rigidity of government officials being a rare phenomenon confined to the government bureaucracy), peasants throughout the world have traditionally viewed queries into their economic conditions with suspicion. Therefore, it was particularly useful to have the interviewers with whom the women interviewed were familiar and who were from the local area, accompany the researcher.

3.2 The Questionnaires

The questionnaires consisted of open-ended and structured questions and were administered by the above-mentioned two Egyptian assistants since this was a condition of the Ministry's permission, with the researcher present. The questionnaires were administered through oral interviews and were first pilot tested on a sample of 40 households. As indicated previously, the respondents consisted of 401 ever-married women with a child between 3-6 years, one half of which had high diarrheal disease or respiratory infection morbidity in the CSRP survey rounds and the other half, low morbidity.

The survey consisted of three questionnaires: a household questionnaire; a child's questionnaire and a women's questionnaire. As indicated previously, the questionnaire structure consisted largely of open-ended questions to allow maximum spontaneity of results. Open-ended and structured questions are specified in the translation of the questionnaires at the end of this chapter.

3.3. Data Analysis

The data was first coded and then entered using FoxPro software. The FoxPro program allows the researcher to conduct range and consistency checks to ensure that identities in the three questionnaires; the household, child and woman questionnaires, matched. The programmes for data entry and cleaning

were generously provided by the Johns Hopkins Team at the SRC as were computer facilities and technical guidance in data coding, data entry and data management. The data was subsequently analysed using SPSS software. Unfortunately, due to the fact that the questionnaires consisted of extensive open-ended questions, the coding, entry and analysis of data turned out to be a more lengthy task than predicted in the initial design of the questionnaires.

3.4. Research Constraints

There are numerous constraints to the accurate measurement of the relationship between maternal education and child survival and these are further addressed in the chapters which follow. However, it is important to note here that while research on any of determinants of child health is a difficult task, measuring the relationship between maternal education and child health is especially difficult because it is concerned with behavior as opposed to the more tangible 'conditions' in the determinants of child survival framework. Secondly, with respect to the dependent variable in this sample, child morbidity, the constraints to the measurement of the relationship between maternal education and child morbidity are well-documented and include the fact that educated mothers may be more accurate in reporting child morbidity than uneducated mothers, (Brockerhoff & De Rose, 1994). Although there is no way of judging to what extent these constraints affected this research, it is important to note that the respondents in the Johns Hopkins survey demonstrated accurate knowledge of the severity of disease symptoms in general and that maternal perceptions of

severity corresponded with actual symptoms of severity, (Langsten & Hill, 1991). Secondly, the findings of this survey demonstrated that educational disparities in maternal knowledge of dangerous and potentially fatal symptoms for the two diseases with which this survey was concerned, diarrheal disease and ARI, were not significant. The third area with which the data analysis was concerned, the relationship between maternal education, intermediate health-related household resources and child morbidity, is hindered by a common constraint in research on maternal education, that is that the distribution of educated mothers with respect to inferior household resources is limited, (see Ware, 1984). These constraints are further highlighted in the empirical analysis in Part II.

With respect to the reliability of the data received through the questionnaires, extensive efforts were made to ensure that the responses would be as accurate as realistically possible in survey research. Numerous questions were presented in both open-ended and structured form to allow the researcher to check for consistency in responses. The questions were presented in colloquial Egyptian dialect by the interviewers who spoke with the same accent as the women respondents and the vocabulary used consisted of local taxonomies of disease.

With respect to two important variables, diarrheal disease and ARI prevalence rates, and to a lesser extent treatment facility consulted, the reliability of the data was checked against the findings of the CSRP. The data on medications, duration and

severity of illness episodes was also checked against the findings of the CSRP. With respect to maternal KAP in the prevention and treatment of disease and in the comprehension of health messages, the data was checked by presenting as many KAP questions on diarrheal disease and respiratory infection in both open-ended and structured form as possible. Among the variables which were presented in more than one form were: knowledge of disease causation; prevention; dangerous symptoms; health education messages and maternal evaluations of treatment facilities.

In retrospect, conducting an open-ended household survey on ever-married women, (one half of whom reported high child morbidity and the other half low morbidity in the previous CSRP surveys), was an appropriate methodology for contrasting child health practices among educated and uneducated mothers because it allowed the researcher to examine the gaps raised in the wider literature on the mechanisms through which education affects child health at the micro-level, and to measure the role of maternal knowledge and skills in this association. Furthermore, the open-ended questions were exceptionally insightful and it is believed that a more structured questionnaire might not have elicited such extensive, in-depth information. Thus, although open-ended data is extremely difficult to collect, code, clean and analyse and is considerably demanding for a single researcher to implement, the open-ended format, nevertheless, allowed the researcher to extrapolate the type of information necessary for investigating the pathways of influence in the maternal

problems of access to and quality of treatment and visit the same polyclinics and hospitals with the same facilities that are very often out-of-date. Health services suffer from the lack of equipment and medication, many of them are in need of major renovation. There are regions where a patient will not be admitted to hospital without his/her own medication, food and sometimes even bed linen. Due to widespread poverty the majority of population cannot afford to pay for private medical treatment. Mandatory periodical screening is not carried out.

The latest available official data on occupational health centres is for the end of 1993. At that time there were 757 health centres, 791 doctor's stations and 17,000 paramedic's stations with about 70,000 doctors working in them.

The 1993 Presidential decree and relevant decisions of the Ministry of Health drew a line between health centres open to local population and those inaccessible to it. "Open" health centres are not subject to privatisation and should be transferred to local health authorities. "Closed" health centres providing health services for the employed only can be privatised with the approval of employees.

One of the decisions of the Ministry of Health was aimed to adjust the system of enterprise health centres to the environment. Their main objectives remained as they were before: to provide specialised medical care to patients, to control working conditions, to decrease the level of general and occupational illness and occupational injuries, to reduce absenteeism due to illness and injuries. The four options as to their status stipulated in the decision are given in Table 7.4.

considerably more time-consuming than initially predicted and it must be said that in retrospect, the emphasis on qualitative data could have been planned more efficiently.

The empirical findings which follow are divided into two parts. Part I examines the relationship between maternal education, maternal knowledge and the prevention and treatment of child morbidity. Part II examines the association between maternal education, maternal knowledge and disease prevention within the context of health-related household resources. Throughout the empirical chapters, statistical significance refers to the 95% significance level, indicated with an asterisk next to the tables and analysis which follow.

List, Household, Child, & Woman's Questionnaires:

List

1. Household Members - relationship to head of household, age, sex, under-5's, education
 - occupation - sector, location, regularity
 - agricultural sector-
 - land ownership status

Household Questionnaire

2. Housing Variables - type & ownership status
 - infrastructure & housing conditions
 - no. of rooms, usage, ventilation
 - cooking location, toilet location
 - animal breeding location
 - animal ownership
 - t.v. / radio ownership
3. Water & Sanitation Variables
 - water source, distance, collection & storage methods & frequency
 - cleanliness of water source area
 - water costs
 - sewage & garbage disposal - method, location & frequency & costs
 - toilet type & access to water
 - food storage
 - Open-Ended - experience any difficulties in access to water and garbage disposal facilities
 - Open-Ended - wish to improve what aspect of living conditions most urgently if opportunity arose

Child Questionnaire

1. Diarrheal Disease Morbidity 24hr-2wks Reference Period
 - episode length, symptoms, severity
 - number of bowel episodes, feeding & fluid intake

Open-ended - first action
- treatment facility consulted,
costs,
- satisfaction, other consultation
- medication started after no. of
days, for no. of days, recovery
- if given ORS only, was this
sufficient according to mother
- Health Unit - examined by whom,
waiting time, costs of visit &
medication
- mother's assessment of health
facility consulted

Open-ended - for mothers who by-passed the
Health Unit, reason for seeking
other source of care
- mother's assessment of other
source of care

Open-ended - cause of diarrhea, according to
mother

2. Diarrheal Disease Morbidity Last Episode Excluding Above Cases

- last episode, severity
- treatment facility consulted
- assessment of health facility
consulted

Open-ended - cause of diarrhea, according to
mother

3. Respiratory Infection Morbidity 24hr-2wks Reference Period

- episode length, symptoms,
severity
Open-ended - first action
- treatment facility consulted,
costs,
satisfaction, other consultation
- started treatment after no. of
days, for no. of days, began
recovery

Open-ended - for mothers who by-passed the Health
Unit, reasons for seeking other source
of care
- assessment of health facility
consulted

Open-ended - cause of respiratory infection,
according to mother

4. Respiratory Infection Morbidity Last Episode Excluding Above

Cases

- last episode, symptoms, severity
- treatment facility consulted
- assessment of health facility consulted
- costs
- Open-ended - cause of respiratory infection, according to mother

5. Vaccination

6. Feeding

Woman's Questionnaire: Health Knowledge and Health Behavior

1. Diarrheal Disease - Maternal Knowledge of Disease

- > Causation
- > Prevention
- > Dietary Management
- > Dangerous Symptoms
- > Fatality

- Causation

- Open-ended - cause of diarrhea / general
- cause of diarrhea / infants
- Structured - cause of diarrhea / most important source

- Prevention

- Open-ended - prevention of diarrhea

- Dietary Management / Dangerous Symptoms / Fatality

- Structured - knowledge of appropriate dietary management of diarrhea episode
- awareness of dangerous symptoms of diarrhea episode which require medical assistance
- knowledge of mortality consequences of diarrhea and dehydration

2. Diarrheal Disease Campaign Message

- Open-ended - source of diarrheal disease message
- knowledge retained by mother

3. Respiratory Infection - Maternal Knowledge of Disease

- Open-ended -> Causation
- Open-ended -> Prevention
- Structured -> Dangerous Symptoms

Structured -> Fatality

4. Respiratory Infection Education Message
5. Other Childhood Diseases
 - Maternal Knowledge of
 - Open-ended - Vaccine preventable diseases
 - Fatality
6. Retrospective Mortality
 - sex, age
 - cause of death, according to mother
7. Health System Usage
 - Public Health Sector
 - Private Health Sector
 - Pharmacy Consultation
 - Traditional Healer Consultation
 - Public Health Sector
 - last visit, individual's id, illness, costs
 - assessment of visit, willingness to return
 - Private Health Sector
 - last visit, individual's id, illness, costs
 - assessment of visit, willingness to return
8. Health System Assessment
 - Open-ended - Health Unit improvement - general
 - Open-ended - Health Unit improvement - child health specific
 - willingness to pay
 - knowledge of opening hours
9. Pharmacy & Traditional Healers' Consultations
10. Maternal Literacy

Women's Questionnaire contin...
Economic Resources

1. Economic Resources Variables
 - Landownership status
 - Crops subsistence & marketing
 - Maternal participation in agricultural work & childcare practices while working in agriculture
2. Occupation Variables
 - occupation head of household

- other occupation
- regularity of employment
- seeking additional employment
- agricultural labour seasonal
 - head of household & mother
 - no. of days worked, wage per day
- female employment (other than agricultural sector)
& childcare

3. Income & Regularity of Income

4. Debts - resorts to what resource action in time financial difficulties
- current debts : cause & amount

PART I Empirical Findings: Maternal Education, Maternal Knowledge, and the Treatment and Prevention of Child Morbidity

Chapter 4 Maternal Education, Maternal Knowledge and Health Education Messages

Introduction and Conceptual Framework

Based on the causal pathways outlined in the Mosley/Chen child survival research framework, (see Chapters 2 & 3) maternal education enhances child survival by improving maternal performance in preventative care; in therapeutic practices which influence the course of disease; and in treatment and sickness care practices which influence the rate of recovery, (Mosley, 1984). Thus, the awareness and skills which a mother gains directly or indirectly through the process of education operate directly on the proximate determinants of child health to influence the rate of disease incidence, recovery, growth faltering and, ultimately, child mortality.

The Mosley/Chen framework for investigating the role of maternal education in child health has succeeded in shifting the focus away from mortality outcomes as the dependent variable in this equation towards 'specific disease and nutrient deficiency in a surviving population as the biological expression of the proximate determinants of child survival,' (Mosley & Chen, 1984:

27). As such, and in contrast with aggregate data, it succeeded in focusing attention on domestic child-care practices as the research setting within which the maternal education - child mortality relationship could be more precisely and hence, usefully examined. However, as indicated in Chapter 2, although the literature suggests that education operates through more proximate determinants to affect child health as a direct or indirect result of the knowledge and skills with which it equipped mothers, few studies on the determinants of child survival examine disease-specific variation in knowledge and skills between educated and uneducated mothers while others have concluded that maternal knowledge of disease processes does not reflect significant educational disparities, (Caldwell & Reddy, 1983; Basu, 1993; Chakraborty & Elias, 1985; Zeitlyn & Islam, 1993, cited in Kaufmann & Cleland, 1994).

The theory that education enhances performance in child health practices by improving maternal skills would seem to require empirical evidence of variation in actual knowledge and skills between educated and uneducated mothers. Furthermore, although numerous authors emphasise that the education-mortality relationship is related to educated mothers abandoning fatalism and traditional belief systems, few studies actually examine whether traditional belief systems and related knowledge are replaced through education by medically or scientifically relevant causal explanations of disease, which, in turn, might affect child health outcomes through preventative measures or treatment practices. As seen in Chapter 2, anthropological

research on diarrheal disease in Kenya, for example, found that among educated mothers, traditional belief systems and fatalism were replaced by a 'series of quasi-medical facts with little relationship to each other or consistency between facts,' (Patel et al, 1988: 1285). In other settings education has been found to influence preventative practices but not necessarily treatment practices. Survey research in Cairo, for example, found that while neither income nor education were related to whether professional help was sought during illness, the severity of episodes being a stronger determinant of treatment-seeking behavior, effective control of infectious diseases was very strongly determined by education. The risk of diarrheal illness was considerably lower among children of educated mothers and remained so even when income and availability of sanitary facilities were controlled for: the survey found 25% less diarrhea among children of educated mothers, (Tekce, 1990). Thus while education had a clear and determining role in the prevention of disease, it was not an important determinant of treatment patterns. These findings conflict somewhat with a recent review of DHS data by Hobcraft who finds 'fairly clear evidence of differentiation according to the level of mother's education in the prevalence, but more especially in the treatment of childhood diseases,' (Hobcraft, 1993 cited in Brockerhoff & De Rose, 1994: 193). These findings also underscore Brockerhoff & De Roses' arguments that, with respect to the pathways of influence in the maternal education - child health association, 'the evidence is far from clear,' (Brockerhoff & De Rose, 1994: 193). According to Ware, the continuing research gaps in this area of child survival reflect

the little grasp we have of the link between maternal education, domestic behavior and increased survivorship, (Ware, 1984).

The empirical gaps examined in Chapter 2 also reflect the limits to survey research in that variables must be pre-selected and the proforma is structured. In contrast, anthropological research approaches, have been more specifically concerned with domestic child care practices and the management of disease episodes at the micro level. As such, ethnographic research attempts to take the Mosley/Chen research framework one step further by relating the proximate determinants of disease susceptibility, exposure and therapeutic practices to illness knowledge and concepts; explanatory models; patterns of distress and help-seeking behavior.

Against the above empirical strengths and weaknesses in the maternal education-child survival debate, the primary objectives of this chapter are: firstly, to measure whether educational disparities in maternal knowledge of disease causation and prevention, and in disease processes are significant in this sample in order to establish to what extent maternal knowledge represents an important intermediate mechanism in the association between maternal literacy and child health, and, secondly, to examine whether educational disparities in the comprehension of health education messages are significant in this case study. Thus section one of the empirical discussion which follows examines variation between educated and uneducated mothers in:

1. Knowledge of disease causation – diarrheal disease and respiratory infection;
2. Knowledge of disease prevention – diarrheal disease, respiratory infection and immunizable diseases;
3. Knowledge of the dangerous symptoms of diarrheal disease and respiratory infection and knowledge of the potentially fatal consequences of these and vaccine-preventable diseases;
4. Maternal expectations of health facilities, health practitioners and child health services.

Section two is concerned with the passive education effects of campaign-messages and the extent to which maternal comprehension of health education messages reflect educational disparities in this case study. The variables measured here focus on maternal knowledge and skills in the four areas which were directly related in the NCDDP's mass media campaign and which are crucial in determining the mortality impact of diarrheal disease control interventions according to the literature, (Martines et al, 1993).

These are:

1. Maternal knowledge of ORS;
2. Maternal knowledge of dangerous diarrheal disease symptoms;
3. Maternal knowledge of the correct dietary management of diarrhea episodes – feeding and fluid replacement during diarrhea episodes and;
4. Maternal knowledge of the potentially fatal consequences of diarrhea-related dehydration.

In the chapter which follows, Chapter 5, the impact of the above variables on the actual treatment and management of diarrheal disease morbidity is examined. The chapter focuses on the impact of education; causal explanations of diarrhea;

maternal knowledge of oral rehydration therapy and maternal knowledge of the correct dietary management of diarrheal disease, on treatment practices in the household management of diarrhea.

For reasons of statistical clarification, the empirical findings presented here and throughout the thesis focus on the maternal literacy variable rather than the educational distribution of the sample. It should be emphasised however, that when crosstabulations were conducted on all of these variables using the education variable, the statistical significance of the results was largely unchanged. The distribution of literacy rates in this sample of 401 households is as follows: literate 86 / illiterate 315. As indicated in the methodology chapter, the proforma used in this research was both open-ended and closed to allow maximum spontaneity of results. Open-ended questions are specified here and throughout the empirical chapters.

Survey Findings

Section One: Maternal Education and Maternal Causal Explanations of Disease; Knowledge of Prevention & Knowledge of Disease Processes

4.1 Maternal Education and Maternal Knowledge/Causal Explanations of Diarrheal Disease

1. Cause of Diarrhea-General: (open-ended)

The objective of this section of the survey was to determine whether and to what extent literate mothers were more likely to respond with scientifically / medically relevant causal explanations of diarrheal disease and illiterate mothers more likely to respond with fatalistic ('refer to God') and 'don't know' responses.

The survey findings indicated that a significantly higher percentage of illiterate mothers gave 'fatalistic' and 'don't know' responses than literate mothers when asked about the cause of diarrhea in general; 21% in comparison to 3.5% among educated mothers (.00068)*; (see Table 4.1.1).

Table 4.1.1 Maternal Education and Maternal Knowledge of Diarrheal Disease Causation

	Responded	Don't Know	Refers to God
Literate	97%	3.5%	-----
Illiterate	79%	18.1%	2.9%

(.00068)*

The specific breakdown of responses is presented below;

(These are multiple responses to an open-ended question so that more than one cause could be cited by an individual mother):

A. Contamination - General / includes responses referring to dirt, microbes, contamination and lack of cleanliness:	Literate	54%
	Illiterate	33%
		(.00070)*
B. Food Cleanliness	Literate	39%
	Illiterate	22%
		(.00095)*
C. Insects on Food	Literate	20.2%
	Illiterate	9.2%
		(.00484)*
D. Flies - General	Literate	12%
	Illiterate	5%
		(.02980)*

(Child cleanliness was mentioned by a very small percentage of mothers.)

The findings presented above indicate that literate mothers

were significantly more likely to attribute scientifically-medically relevant causes to diarrheal disease than illiterate mothers. Educated mothers in this survey were significantly more likely to mention contamination, (.00070)*; food cleanliness, (.00095)*; the presence of insects on food (.00484)*; and to a lesser extent, flies in general, (.02980)*, as causes of diarrhea. While uneducated mothers responded more frequently with 'neutral' responses such as certain food items or with negative responses, i.e. 'don't know' or fatalistic responses, i.e. 'from God'. Although some educated mothers attributed neutral causes to diarrhea in addition to medically correct responses, such as combinations of food and water, specific food items, or drinking cold water in hot weather, the survey findings, nevertheless, demonstrated a statistically significant positive correlation between maternal education and medically/scientifically relevant causal explanations of diarrheal disease.

2. Cause of Diarrhea-Infants (open-ended)

The survey findings with respect to the cause of diarrhea in infants in particular, showed similarly significant literacy-education disparities between mothers regarding causal explanations of diarrheal disease in infants. The responses were categorised into:

- A. Positive - contamination and cleanliness variables;
- B. Neutral - hot breastmilk and climate;
- C. Negative - fatalistic and 'don't know' responses.

Educated mothers were significantly less likely to respond with negative or neutral responses than uneducated mothers, (11% in comparison to 31% among illiterate mothers) and more likely to respond with positive or scientifically-medically correct causal explanations of diarrhea in infants, (see tables 4.1.2A and 4.1.2b). Thus with respect to maternal knowledge of the cause of diarrhea in infants, these findings suggested a positive relationship between maternal education and medically accurate knowledge of diarrheal disease in infants.

Table 4.1.2A Maternal Education and Disease Causation-Infants

	Responded	Don't Know	Refers to God
Literate	78%	11%	-----
Illiterate	61%	29%	2%

Table 4.1.2b Maternal Education and Disease Causation-Infants

	Positive	Neutral	Negative
Literate	57%	9.2%	34%
Illiterate	36%	8.6%	55%

(.00045)*

3. Cause of Diarrhea- Most Important Cause (structured)
Yes/No responses to a list of eight factors

The purpose of this section of the survey was to measure whether schooled mothers were more likely to indicate that contamination, sanitation and water sources were among the most important causes of childhood diarrhea and unschooled mothers more likely to mention neutral responses such as specific food items and the evil eye, as the most significant causes of diarrheal disease morbidity among children. The distribution of neutral-negative responses was as follows:

A. Neutral/Negative Responses

i. Weather	Literate	92%
	Illiterate	85%
ii. Food Items	Literate	57%
	Illiterate	42%
Specific		34%
Foods, i.e. fats;		26%
iii. Evil Eye	Literate	16.3%
	Illiterate	19.4%

The distribution of positive responses was as follows:

B. Positive Responses

i. Water Source:	Literate	73.3%
	Illiterate	52%
	(.00036)*	
ii. Cleanliness of Cooking/Toilet area:	Literate	90%
	Illiterate	79%
	(.02346)*	

iii.	Presence of Animal	Literate	98%
	Waste/Insects	Illiterate	92%
		(.05588)	

The above findings indicate that when respondents were asked to stratify a list of potential causes of diarrhea in order of importance, a higher percentage of literate mothers responded positively to 'source of water' and 'cleanliness of cooking area/toilet area,' as the most important potential causes of diarrheal disease than illiterate mothers. Although an equally high percentage of educated mothers also attributed irrelevant or neutral causes to diarrhea, a higher percentage responded positively to medically-scientifically relevant causes of diarrhea and the findings reflect significant educational disparities, particularly with respect to water sources, in maternal perceptions of the most important causes of diarrhea.

4. Cause of Diarrhea - Incident-Specific / (open-ended)

When a subsample of 182 respondents whose child had diarrhea in the last 24hrs-2wks were asked the cause of the diarrhea episode, the results do not show such significant disparities between literate and illiterate mothers. It is believed that this is because mothers are reluctant to attribute contamination and food cleanliness factors to their own child's diarrhea episode as this may reflect poorly on their performance as mothers. However, 'fatalistic' responses were generally very few, even when the

response 'on its own' is included in this category. Nevertheless, the responses, when divided into positive, neutral and negative, based on the stratification above, showed that literate mothers were more likely to give positive responses such as dirt and contamination factors and neutral responses, such as teething, and less likely to give negative responses (don't know and fatalistic responses) than illiterate mothers. However, these differences were not statistically significant.

The same type of responses were found when mothers were asked about the last episode of diarrhea; this category includes mothers who did not report an episode of diarrhea in the 24 hour / 2 week reference period examined above from the total sample of 401. Illiterate mothers were more likely to give negative responses, although this pattern was not statistically significant. Again, this suggests that mothers are hesitant to attribute factors which reflect poorly on their levels of cleanliness to their own child's diarrhea episode and preferred to give 'neutral' responses such as 'mixing food' or 'hot food and water'.

Summary: Maternal Education and Causal Explanations of Diarrheal Disease

The findings of this survey showed a positive relationship between medically correct causal explanations of diarrheal disease and maternal education. While uneducated mothers in this sample were more likely to attribute food types, combinations of food, and teething to diarrheal disease, educated mothers were more

likely to respond with medically correct causal explanations of diarrheal disease. Maternal explanations of the causes of diarrheal disease in infants also show a statistically significant correlation between literacy and medically relevant knowledge of the causes of diarrheal disease. This significance declines when specific child diarrhea episodes are referred to, indicating the mother's hesitancy to attribute contamination and lack of cleanliness factors to her own child's illness episode.

In addition to the significant educational disparities in maternal knowledge of diarrheal disease causation demonstrated in this sample, it is interesting to note two factors in relation to maternal causal explanations of diarrheal disease among the uneducated mothers in this study. Firstly, the responses are very similar to those found in a study conducted in the same villages nearly a decade previously indicating that maternal knowledge of the cause of diarrheal diseases has not progressed much during this period or since the diarrheal disease campaign began. Although the causes of diarrhea were not specifically addressed in the NCDDP's mass media campaign, the prevention of diarrhea, which addressed contamination and cleanliness factors, was targeted in the first phase of the programme. Secondly, there are significant similarities in causal explanations of diarrhea among uneducated mothers in this study and the findings of ethnographic research on diarrhea in both Africa and Asia. The most significantly recurring responses in these studies and in the present research are: 'hot breastmilk,' 'teething,' 'fatty foods,' and 'combinations of certain foods with water,'

(Patel, et al, 1988; Bentley; 1988).

4.2. Prevention of Diarrhea (open-ended)

This section of the survey was concerned with measuring whether the literacy disparities in causal explanations of diarrheal disease demonstrated above extend to disparities in maternal knowledge and awareness in the prevention of diarrheal disease between educated and uneducated mothers.

In response to if, and what, preventative measures a mother could take to prevent diarrhea and/or to protect her child from diarrhea episodes, these findings again indicate a statistically significant correlation between knowledge of diarrheal disease prevention and literacy. The results were further categorised according to:

- A. Positive Responses: intervention or action-orientated preventative measures such as food cleanliness, hygiene or contamination control, and;
- B. Negative and Fatalistic Responses: 'don't know' and 'refers to God' responses.

The findings again indicated statistically significant differences between literate and illiterate mothers in maternal knowledge of the prevention of diarrheal disease, (see table 4.2.1). A significantly higher percentage of illiterate mothers responded that they didn't know what measures to take for preventing diarrhea; 26% as compared to only 4.7% among literate mothers. Similarly, 92% of educated mothers cited medically

correct preventative measures in comparison to 68% among un-
 educated mothers; (.00004)*. These findings therefore indicate
 that maternal knowledge of diarrheal disease prevention was
 significantly associated with maternal education in this sample.

Table 4.2.1 Maternal Education and Knowledge of Diarrheal
 Disease Prevention

	Positive	Don't Know	Refers to God
Literate	92%	4.7%	1.2%
Illiterate	68%	26.3%	2.2%

(.00004)*

4.3 Maternal Education and Maternal Knowledge of Respiratory Infection: Causal Explanations, Prevention and Symptoms

This section presents the survey findings on maternal
 knowledge of the causes and prevention of respiratory infection.
 It is specifically concerned with measuring to what extent educated
 mothers were more likely to respond with scientifically-medically
 relevant causal explanations of respiratory infection and uneducated
 mothers more likely to give fatalistic ('refer to God') and 'don't
 know' responses; and, secondly; to determine whether maternal
 knowledge of appropriate preventative measures reflect educational
 disparities with respect to acute respiratory infection.

Although educational disparities in causal explanations of respiratory infection were not significant in this sample, maternal knowledge of the prevention of respiratory infection was significantly related to maternal education in this sample: 31% of illiterate mothers responded that they didn't know what preventative measures to take in the control of respiratory infection while only 4.7% of literate mothers gave this response. 'Refer to God' responses were 2.2% and 1.2%, respectively.

Maternal knowledge of vaccine-preventable diseases was very high and revealed no educational disparities in this sample. The exception was measles, however, and literate mothers were found to be more knowledgeable of measles vaccination than illiterate mothers, a significant number of whom responded that there was no way of preventing measles. Vaccination coverage for the EPI diseases was high however, and also revealed no educational disparities in this sample as in other survey research in Egypt, (Langsten & Hill, 1992). This suggests that the immunization education campaigns of the EPI in Egypt have had a significant impact and that both knowledge and usage of these preventative interventions are not significantly related to maternal education.

4.4 Maternal Education, Health Education Messages and Health Facilities: Survey Findings

1. Diarrheal Disease Campaign Messages: Open-ended

In relation to diarrheal disease, as seen in Chapter 1, the major contributing factors which leave a child susceptible to recurrent infection, and finally death, are dehydration and malnutrition, (Mosley & Becker, 1991). An understanding of dehydration and recognition of signs and symptoms associated with the disease is therefore expected to aid mothers in the appropriate treatment and dietary management of diarrheal disease. The aims of the NCDDP in this context were to promote maternal understanding of these factors and thereby to reduce the rate of diarrheal disease morbidity and mortality in Egypt. The following section examines whether literacy disparities in the comprehension of diarrheal disease campaign messages exist in this sample and, in particular, in the accuracy of knowledge retained from the campaign and, if so, to what extent education represents an important determinant of process indicators in the following areas addressed in the NCDDP's mass media campaign:

- A. Knowledge of dehydration and the use of ORS, (open-ended);
- B. Appropriate, timely and frequent usage of ORS in the treatment of diarrheal disease, (open-ended);
- C. Correct dietary management of diarrheal disease, (structured);
- D. Knowledge of the dangerous symptoms of dehydration and their potentially fatal consequences, (structured).

When mothers were asked whether they had heard any public information concerning diarrhea or ORS, the survey findings indicate, as numerous other studies have, a very high degree of exposure to the diarrhea campaign in Egypt: 93% among educated mothers and 73% among uneducated mothers. Again, however, literacy differentials are evident. Twenty percent of uneducated mothers had not heard any campaign messages in comparison to only 2.3% of educated mothers.

Of those who replied that they had heard the campaign messages, 99% of literate and 94% of illiterate mothers were able to specify what they had heard. The breakdown of responses is summarised below:

- Literate and illiterate respondents were equally likely to reply that 'ORS is good'; to describe some positive aspect of ORS; and to describe preparation methods;
- When responses were grouped together into 'positive' or 'neutral' responses; respondents were equally likely to give positive and neutral responses and literacy disparities were not significant;
- Very few mothers gave a response related to either the prevention of diarrhea or contamination aspects and this was not influenced by the education variable.

However, there were significant differences between literate and illiterate mothers in relation to three crucial areas of the diarrhea campaign:

- A. The understanding of dehydration and the role of ORS in rehydration;
- B. Knowledge of appropriate feeding during diarrhea;
- C. Knowledge of appropriate usage of ORS.

With respect to understanding the purpose of ORS in rehydration, maternal comprehension of the concept of dehydration and the role of ORS in its correction are regarded as significant determinants of the sustained usage of ORS in the anthropological literature, (Bentley, 1988). The results of this survey show that a significantly higher percentage of educated mothers in this sample understood the concept of dehydration and the rehydrating function of ORS; 21% as compared to only 3% among uneducated mothers, (.00000)*.

Maternal knowledge of the correct dietary management of diarrheal disease is equally vital for the impact of DDC programmes and was extensively addressed in the programme in Egypt as seen in Chapter 2. The results of this survey however, demonstrate that educated mothers understood the messages on correct dietary management of diarrheal disease more accurately than uneducated mothers, with 37% of educated mothers responding that a mother should increase liquids during diarrhea episodes. In comparison only 2% of uneducated mothers gave this response and 25% replied that they did not know what action to take with respect to food and fluid intake during diarrhea episodes compared to only 3.4% of educated mothers, (see table 4.3.1).

Finally, appropriate usage of this intervention requires immediate and frequent administration of ORS without which the possibility of averting deaths from dehydration is significantly reduced. Although educational disparities in the comprehension of this aspect of the campaign are not very significant, it is important to note that 14% of educated mothers recommended imm-

mediate usage of ORS at the onset of diarrhea in comparison to only 3% among uneducated mothers, (.00005)*. Thus in the open-ended question on what precisely they had heard from the diarrheal disease media messages, a higher percentage of educated mothers qualified their statement concerning the need for ORS intervention with 'frequently', (7% as compared to 3%) or 'immediately,' than uneducated mothers, (14% as compared to 3%).

It is important to note that the three 'outcome' indicators found here to display educational disparities represent perhaps the most crucial determinants of the success of a diarrheal disease control programme in terms of mortality impact. Since these disparities reflect open-ended responses to a question asking the mother to describe exactly what she heard in the diarrheal disease campaign, these findings appear to support the findings of Levine et al which demonstrated that maternal literacy in their comparative study increased the ability of the recipient to comprehend health messages, (LeVine et al, 1994).

Table 4.3.1 Maternal Education and Maternal Knowledge of Appropriate Dietary Management of Diarrheal Disease

	Decrease Feeding/ Breast-Feeding	Increase Feeding- Breast-Feeding	No Change	Don't Know	Increase Liquids
Literate	14%	8.1%	37.2%	3.5%	37.2%
Illiterate	16%	6%	51.4%	24.8%	2.2%

(.00000)*

With respect to the dietary management of diarrheal disease which represents a crucial component in the household management of diarrheal disease and in national programmes for the control of diarrheal disease, the high percentage of literate mothers responding that a mother should increase liquids during diarrhea episodes is even more significant when taking into consideration that this response was not an option given to the mother in the interview. Respondents were cited a list of options on the dietary management of diarrhea and a high 37% of educated mothers qualified their response with the statement that the mother should increase liquids in particular, following the onset of a diarrhea episode. When compared with knowledge retained from campaign messages, this confirms that literate mothers are more aware of the dehydration effects of diarrhea, the rehydrating role of ORS and the importance of liquids in the dietary management of diarrheal disease.

With respect to the last two variables with which the NCDDP's campaign was concerned, namely; teaching mothers to identify dangerous symptoms of diarrhea and dehydration and awareness of the potentially fatal consequences of dehydration, this survey attempted to measure whether educated mothers were more aware of, and able to identify, dangerous symptoms associated with diarrhea and dehydration and more aware than uneducated mothers that dehydration could be potentially fatal.

The survey found that literacy differentials were not so significant with respect to mothers' ability to identify dangerous symptoms of diarrhea. The danger of diarrhea-related dehydration

as a potential cause of death also did not reveal differences between literate and illiterate respondents.

4.5. Treatment-Health Sector Variables

As seen in the previous chapter, one of the major ways in which education is expected to have a positive impact on child survival in the literature is in affecting both treatment-seeking behavior and the quality of care received. In relation to both of these performance variables, educated mothers are hypothesised to perform better than their uneducated counter-parts; to have higher expectations of health services and health practitioners and to express their needs more specifically. This research examined numerous aspects of treatment-seeking behavior. In an effort to determine whether educated mothers had different or higher expectations from health facilities and whether they could specify those expectations and their needs with respect to child health services in particular, mothers were asked numerous open-ended questions to evaluate health facilities. Mothers were asked to evaluate the treatment they received for episodes of diarrhea /respiratory infection in the last 24-hrs/2wks and for the last episode without a reference period. All mothers were asked to evaluate the treatment they received following their last visit to a health practitioner for any episode of illness in general; the nature of the illness and consultation and travel costs; diagnosis and treatment. For mothers who by-passed the health unit and resorted to other sources of care, primarily the

private doctor, these were asked why this was so. Finally, all mothers were asked what aspects of the health unit needed improvement in general, and in relation to child health services in particular. The following section examines the responses to evaluations of the health unit which were open-ended and revealed the most significant findings in this regard. The survey questions here attempted to ascertain whether;

- A. Educated mothers had higher expectations of the health unit and would be more specific in defining their needs than uneducated mothers;
- B. Educated mothers were more aware of child health services and would be more specific in stating their needs with respect to child health services.

1. Health-Unit Needed Improvements: (open-ended)

In response to what could be improved at the health unit, uneducated mothers were more likely to state free 'distribution of medication' (63%) than educated mothers, (38%), as necessary improvements in the health unit in this sample, (.00004)*. However, illiterate mothers were equally likely to mention improvements in the quality of medical examination as literate mothers: 19.3% and 18% respectively, and in the quality of care, while literate mothers were more likely to mention improvements in doctor availability and access: 20.2% and 8.5% respectively, (.00141)*.

In relation to child health services in particular, again illiterate mothers were more likely to mention free medication; 55% and 27% respectively (.00001)* but were also equally likely

to mention improvements in the quality of examination and care. These results may indicate that literacy-education factors were not so important in determining expectations from treatment facilities. Although illiterate mothers were more concerned with the distribution of free medication than literate mothers, they were also equally concerned with the quality of care received at government health facilities.

Conclusion

The survey findings presented above revealed significant disparities between educated and uneducated mothers in the two areas of child health practices with which this chapter was concerned, namely;

- the extent to which maternal education affects knowledge and skills in relation to disease causation, prevention, and treatment, and;
- the extent to which maternal education increases understanding and accuracy in the comprehension of health education messages.

Despite the more accurate knowledge of educated mothers in causal explanations of diarrheal disease and in preventative measures, with respect to both diarrheal disease and respiratory infection, educational disparities in child morbidity were not statistically significant in this sample. Among educated mothers, which constituted 86 women, there were 60 cases of child morbidity in the 24 hour and 2 week reference period and among the 315 uneducated mothers interviewed, there were 301

cases of child morbidity in this sample, (1). The absence of a strong relationship between maternal literacy and child morbidity is interesting given that maternal literacy was a significant determinant of positive knowledge of disease causation and prevention. Further examination to determine whether there was a direct relationship between maternal knowledge of disease causation and preventative measures and morbidity rates demonstrated that maternal knowledge was not related to child morbidity in this sample. Thus although maternal education increased maternal knowledge in this area which would be expected to operate through more proximate determinants of child health to enhance child survival, the findings of this survey indicated that enhanced knowledge and awareness of disease prevention did not result in greater protection against infection among this sample of 401 households in Menofia.

There are extensive empirical difficulties in determining the association between maternal education and child morbidity; (Brockerhoff & De Rose, 1994). These include the possibility of better reporting of disease incidence by more educated mothers which may account for the generally weak relationship between educational attainment and child morbidity in larger DHS surveys. The observed education-morbidity relationship may also be attenuated if children of uneducated mothers are more likely to die from disease episodes and therefore be excluded from the calculation of disease prevalence, (Brockerhoff & De Rose, 1994). However, in the larger CSRP survey, education was related to prospective mortality. Thus multi-variate analysis in the CSRP's

sample which demonstrated independent education effects on child mortality, when combined with the insignificant relationship between disease prevalence and maternal education found here, could suggest that maternal education plays a more significant role in the treatment of disease than in its prevention. The following chapter examines this relationship and its implications for child survival policies more extensively. At the same time, to the extent that diarrheal disease and respiratory infection morbidity were not directly related to maternal literacy, it can be assumed that other intervening factors, such as household resources, may be more important determinants of morbidity patterns among this sample and these will be examined in Part II of the empirical analysis. Firstly however, the following chapter examines the impact of maternal education and maternal knowledge on treatment practices.

Notes

1. These findings include diarrheal disease and respiratory infection combined and were not statistically significant.

Introduction

In the previous chapter which examined the relationship between maternal education and health-related knowledge, the survey findings demonstrated that educated mothers were:

1. More consistent in attributing medically-relevant causes to disease incidence and prevention and less fatalistic, and;
2. More likely to have accurately comprehended the crucial messages of the diarrheal disease control campaign including;
 - the purpose of ORS and the relationship between dehydration and diarrheal disease;
 - the correct dietary management of diarrheal disease, and;
 - the appropriate usage of ORS including the necessity for early intervention with fluid replacement in the treatment of diarrhea.

Educational disparities in knowledge of disease causation and prevention were not, however, significant determinants of diarrheal disease or respiratory infection prevalence in this sample. Thus, despite their superior knowledge and skills in preventative measures, educated mothers were not able to significantly affect the prevalence of disease episodes. In Part II of this thesis, the extent to which household resources represent a significant constraint to the capacity of educated mothers to implement their knowledge

in the prevention of disease is examined.

This chapter is concerned with investigating how educational disparities in health-related knowledge and skills affected treatment practices in Menofia. It is therefore concerned with the second mechanism through which educated mothers are hypothesised to improve child survival chances, namely; through the timely and appropriate treatment and management of illness episodes. It further attempts to examine whether the more accurate knowledge of educated mothers in disease causation and in the comprehension of health education messages, have a direct impact on the treatment and management of child morbidity at the household level.

As seen in Chapter 2, the hypothesis that educated mothers may perform better than their uneducated counter-parts in the treatment of illness episodes has become increasingly central to the maternal education-child survival debate as more experts question the extent to which educated mothers can affect disease prevalence in the absence of adequate household resources, (Deeb, 1990; Cooksey et al, 1986).

However, empirical investigation of direct associations between maternal education and illness management is hindered by numerous intervening factors which affect the ability to identify the direction of causation and hence outcome in terms of child health indicators, the dependent variables. For example, as the findings of the CSRP surveys in Menofia demonstrate, the more severe an illness episode the more likely it is that a private doctor is consulted where, based on maternal evalu-

ations of health services in Menofia, the mother will be more likely to receive superior care in comparison to the brief, cursory consultation obtained at the health unit, (Langsten & Hill 1994). The CSRP's findings were also confirmed in this survey where mothers indicated that the preference for private doctors, irrespective of their educational levels, was largely due to the higher quality of care received, including time spent on thorough examination of the child, and the more extensive dialogue with mothers which private doctors provide in comparison to the quick, frequently aggressive oral examination received at the health unit. Mothers were universally found to express more faith in the diagnosis and prescription of the private doctor and little faith in the oral examination of the health unit where the child was not physically examined and the diagnosis was based on the mother's description of the condition. Presumably, mothers may also be more convinced of the diagnostic abilities of the private doctor and may be more willing and able to follow his clearer instructions consistently. Since the severity of illness episodes is a stronger determinant of the use of superior private sector treatment than maternal education in this setting, it is difficult to determine whether maternal efficiency and efficacy in managing an illness episode is, in fact, a true reflection of educational disparities or whether it simply reflects the quality of source of care received and disparities therein.

These empirical difficulties in measuring the association between maternal education and illness management, however, are outweighed by the consistently positive association between

maternal education and child mortality in Menofia (Langsten & Hill, 1992) on the one hand, and the equally significant absence of a positive association between maternal education and child morbidity on the other hand. Given that one of the mechanisms through which educated mothers are hypothesised to enhance child survival is by ensuring that illness is soon brought under control, (Caldwell, 1994), an accurate study of the link between maternal education and child mortality requires indicators on the treatment and management of disease episodes while acknowledging the difficulties in 'disentangling cause and effect' in this area of the determinants of child health, (Ware, 1984).

This chapter first attempts to examine educational disparities in treatment practices which the literature suggests have been under-researched, (Jain, 1994); the timing of treatment and, to a lesser extent, consistency in its administration, (section 5.1). The analysis attempts to control for episode severity according to maternal perceptions of severity which represent the rival hypothesis in this equation (based on the CSRP data which demonstrate that severity is a crucial indicator of treatment-seeking behavior in Menofia).

Section 5.2 examines whether the educational disparities in maternal knowledge of disease causation observed in the previous chapter have a direct impact on the treatment of diarrheal disease episodes. This represents an effort to obtain a more precise evaluation of the role of maternal knowledge and skills in determining the course and outcome of illness episodes. The associations examined in this section include the impact of

maternal knowledge of diarrheal disease causation on the treatment of diarrheal disease episodes.

Section 5.3 examines the impact of health education messages on the treatment and management of diarrhea episodes at the household level. It seeks to determine whether the educational disparities observed in the comprehension of health messages in the previous chapter, have a direct impact on the treatment of diarrheal disease. The empirical indicators in this section focus on one of the key areas for ensuring the success of diarrheal disease control at the household and national levels addressed in Egypt's National Control of Diarrheal Diseases Project; that is: the appropriate and prompt usage of oral rehydration therapy. As seen in Chapter 2, the CSRP and other surveys demonstrate that a very low percentage of mothers initiate treatment with ORS prior to seeking medical attention. Therefore, despite their superior knowledge of the purpose of ORS, and the need for immediate rehydration, it is not expected that educated mothers will initiate treatment with ORS prior to seeking professional aid. Consequently, the timing of care is used as an indicator for measuring disparities in treatment practices between mothers who comprehended the health education messages to implement early and prompt treatment and those who did not.

The chapter then briefly examines how treatment related variables affect accompanying symptoms of severity in section 5.4.A and in section 5.4.B, the relationship between education and child health outcomes is further examined. Finally, section

5.5 examines the association between maternal education and the source of care and how the health facility consulted affects treatment and recovery.

Survey Findings

As with most survey research, the empirical findings of this research are subject to limitations with respect to the distribution of the sample. Although the total number of households in this survey is 401 households, the number of diarrhea episodes in the 24hr-2wk reference period is 182 and for respiratory infection 179. The statistical conclusions presented in this analysis are therefore hindered by the smaller numbers of educated women in the sample in relation to the incidence of child morbidity and treatment-related variables. The total number of educated mothers for both of these indicators does not exceed 60 cases. Finally, the total number of diarrheal disease and respiratory infection cases without a reference period, i.e., the last episode excluding the above cases, is 219 and 222, respectively. Due to recall error however, the variables examined among this latter group were limited to treatment facility consulted, satisfaction, episode severity and costs. However, in an effort to overcome some of the limitations in the distribution of the sample with respect to the treatment and management of diarrheal disease and respiratory infection, the findings of this research are compared with the larger CSRP

survey conducted in Menofia with respect to case severity and the source of care variables.

5.1.A. Maternal Education and the Timing of Treatment for Diarrheal Disease and Respiratory Infection.

Although the timing of treatment for illness episodes is widely hypothesised to be positively influenced by maternal education in the health literature, it remains a significantly under-researched variable in the maternal education - child survival debate. This survey attempted to examine whether educated mothers commenced treatment for diarrheal disease and respiratory infection more promptly after the onset of illness than uneducated mothers in order to ascertain whether the timing of treatment represents an important mechanism in the relationship between maternal education and child health in this sample.

With respect to the relationship between the timing of treatment for diarrheal disease and maternal education, the findings do not indicate significant educational disparities with educated mothers only slightly more likely to seek and begin treatment on the same day the diarrhea began, than uneducated mothers, 85% as compared to 76%: or between one to four days after diarrhea symptoms began, 14% and 24% respectively.

The timing of treatment for respiratory infection differs however, although this was not very statistically significant. Educated mothers were more likely to begin treatment on the same day the illness began, 74% as compared to 52% among uneducated

mothers and less likely to wait until the child has been ill for 1 to 4 days, 26% as compared to 47% among uneducated mothers. Thus only 22% of educated mothers waited for one or two days after the respiratory infection began before seeking and commencing treatment while 45% of uneducated mothers delayed the commencement of treatment for one or two days after respiratory infection symptoms began, (.05089; see table 5.1.1). The less significant disparities in the timing of treatment for diarrheal disease in comparison to ARI may indicate the positive effects of the diarrheal disease campaign in promoting awareness of the dangerous symptoms of diarrheal disease.

Table 5.1.1 Maternal Literacy and the Timing of Treatment For Respiratory Infection:

	Literate	Illiterate
same day	74.1%	52.6%
1-4 days	25.9%	47.4%

(.05089)

An accurate evaluation of the effect of maternal education on the treatment of illness episodes however, requires information on the severity of sickness given that case severity and the timing of treatment are hypothesised to be positively related in the health literature. Unfortunately, disentangling the direction of causation with respect to these variables has

turned out to be a difficult procedure in this survey, as the following section indicates.

5.1.B. Maternal Education, Illness Severity and the Timing of Treatment

Treatment patterns among the sample as a whole indicate that the majority of simple diarrhea and respiratory infection episodes are treated on the same day the illness began, (88% and 72% respectively,) while a significantly high percentage of severe episodes are treated 1-2 days later (38% and 55% respectively).

Controlling for literacy, this survey indicates that among the literate, the relationship between episode severity and the commencement of treatment is not significant. Thus among the literate, approximately 90% of simple cases of diarrhea were treated on the same day the illness began, and an equally high percentage of severe cases were treated on the same day illness began, 85.7%. These findings therefore indicate that educated mothers were equally likely to respond promptly to both simple and severe cases of diarrhea.

Among the illiterate, however, the situation differs. Eighty-seven percent of simple cases received treatment on the same day the diarrhea episode began while only 58% of severe cases were treated on the same day. A high percentage of illiterate mothers began treatment of severe cases 1-2 days after symptoms began,

42%, (.00644)*. Thus, while only 14% of educated mothers waited one or two days after diarrhea symptoms began before seeking treatment for severe episodes, a significantly higher percentage, 42%, of uneducated mothers delayed treatment of severe diarrhea for one or two days after diarrhea symptoms began, (.00644)*.

With respect to respiratory infection, the survey findings demonstrate a similar pattern in the timing of treatment. Among educated mothers, 76% commenced treatment for simple cases on the same day the illness started and for severe episodes 67%. For simple cases, a larger percentage of educated mothers waited until one or two days after the respiratory infection began than was the case with simple diarrhea, 24%, (as compared to 11%); however, the majority of cases were seen to on the same day the illness started. Thus these findings again suggest that educated mothers were equally likely to respond promptly to both simple and severe episodes of respiratory infection.

Among illiterate mothers, however, only 40% of severe cases were given treatment on the first day of illness while the majority, 61%, waited for 1 or 2 days after the respiratory infection began before commencing treatment. Furthermore, the percentage of mothers who delayed treatment for severe respiratory infection was higher than that found in the treatment of severe diarrheal disease; 61% as compared to 42%. For simple cases of respiratory infection, 70% of illiterate mothers began treatment on the same day the illness began and 24% waited until one or two days after the illness began, (.00004)*.

In the wider health literature, educational disparities in the timing of treatment for simple episodes are expected to be more significant than for severe episodes of child morbidity. This is because there may be a threshold in terms of severity below which all mothers will seek whatever care is necessary to ensure the survival of their child. It is below this threshold where educational disparities are hypothesised to be significant, i.e. in the treatment of simple episodes, (Jain, 1994). In contradicting these expectations, these findings suggest that what were initially simple episodes of diarrhea or respiratory infection became severe because of delays in seeking medical attention. It is therefore difficult, if not impossible, to establish the direction of causation in this respect. This task is further constrained by the distribution of educated mothers with respect to severe respiratory infection episodes since these constituted a very small percentage.

The survey findings presented above nevertheless suggest significant educational disparities in the timing of treatment for child morbidity since educated mothers, unlike uneducated mothers, respond equally promptly to all episodes of diarrhea and respiratory infection, regardless of severity. Among uneducated mothers, it is unlikely that these mothers delayed treatment for severe episodes and responded promptly to simple episodes of child morbidity. It is more likely that what were initially simple illness episodes became severe because of the delays in treatment.

It is important to re-emphasise in this context that this survey did not find educational disparities in identifying symptoms of severity or in maternal knowledge of the potentially fatal consequences of diarrheal disease and respiratory infection. Furthermore, the CSRP's data indicate maternal accuracy in definitions of severity associated with diarrhea, including, dehydration; vomiting; blood in stool and sunken eyes. This is an important finding in that it lends strong support to the possibility that income effects are more significant determinants of the postponement in seeking medical assistance among uneducated mothers than the lack of health awareness.

With these factors in mind, a number of potential conclusions can be drawn from the above findings. Firstly, the fact that educated mothers respond equally promptly to simple episodes of diarrheal disease and respiratory infection as they do to severe episodes may indicate an increased awareness of the need for prompt medical attention for all cases of illness, regardless of the severity of symptoms, among this group. Alternatively, this may indicate that, despite the fact that uneducated mothers are equally able to recognise the severity of symptoms, they are less inclined to seek medical treatment promptly.

Indeed it is possible that the delays in seeking medical treatment among uneducated mothers could be the result of the high degree of fatalism previously demonstrated among this group in their causal explanations of disease. In contrast, educated mothers, who demonstrated scientifically-medically accurate knowledge of disease causation in this sample, (as seen in Chapter

4) may have more faith in the efficacy of medical intervention and are therefore more inclined to seek it promptly as suggested in the anthropological literature. This hypothesis is examined more extensively below in the findings on the relationship between knowledge of disease causation and the timing of treatment of illness episodes. However, it is important to note that, given the high rate of usage of the health sector in this sample (confirmed in the CSRP's findings,) it is questionable whether the significant delays in medical intervention among uneducated mothers for severe illness episodes are the result of a lack of faith in curative medical interventions. It is more likely that the widespread preference for private doctors among both educated and uneducated mothers has an impact on the timing of treatment and that uneducated mothers are forced to delay medical consultation for as long as possible, due to the lack of resources to cover the costs of the private doctor. As Ware points out, 'here again one faces the problem that these innovative choices are not without financial costs that can usually be more readily met by the educated,' (Ware, 1984: 163).

5.1.C. Maternal Education and Duration of Medication

One of the other mechanisms through which maternal education is hypothesised to enhance recovery from infection in the health literature is through maternal adherence to medical advice. Educated mothers are expected to administer the prescribed

treatment correctly and for the required period of time, or until the child has fully recovered, and to seek a second consultation when progress has not been made in the recovery of the child (1).

The relationship between maternal education and the performance of mothers in following medical advice is difficult to establish. The length of time the mother continued giving the sick child the prescribed medication is quite an unsatisfactory indicator since the duration of administering medication can be positively related to the severity of the episode and to the type of medication prescribed which, in turn, is related to the latter, in addition to the rate of recovery. Recovery rates may equally be related to the child's nutritional status at the start of illness and to dietary interventions during the illness, particularly for diarrheal disease.

Unfortunately, more accurate information on maternal adherence to medical advice requires intensive participant observation of maternal performance during an illness episode at the anthropological level. Even at this level, however, maternal performance is likely to be influenced, often positively, by the presence of the researcher. Thus the relationship between maternal education and maternal adherence to medical advice is difficult to ascertain in both household survey research and anthropological research. With these constraints in mind, an effort was made to measure educational disparities in the length of time the mother continued medication for diarrheal disease and respiratory infection.

The findings of this survey indicated that, among both educated and uneducated mothers, severe illness episodes were more likely to be treated for a longer duration of time than simple episodes. Crosstabulations between the duration of medication and maternal education, controlling for episode severity, indicate that for simple cases of diarrheal disease, 84% of literate mothers and 64% of illiterate mothers continued medication for 1-4 days and for severe episodes 57% of literate mothers and 30% of illiterate mothers continued medication for 5-15 days. Thus for simple diarrhea, the duration of medication was similar for both groups of mothers while for severe cases of diarrhea, a larger percentage of educated mothers continued medication for a longer period of time than uneducated mothers; 57% as compared to only 30% among uneducated mothers.

For respiratory infection, educational disparities were difficult to measure due to the limited number of cases of severe respiratory infection among educated mothers. Treatment patterns for simple episodes however were similar for both educated and uneducated mothers: 62% and 60% administered medication for 1-4 days, respectively. For severe episodes of respiratory infection, 40% of uneducated mothers administered medication for 5-15 days in comparison to only 5% among simple episodes.

However, the most important determinant of the duration of treatment in this sample, in addition to the severity of symptoms, was the rate of recovery. The data indicate that the duration of

treatment among uneducated mothers is related to the slower rate of recovery. In sum therefore, the most significant determinant of the duration of treatment for both diarrheal disease and respiratory infection is the rate of recovery, (.00000)*, irrespective of maternal education.

5.2 Maternal Causal Explanations of Diarrheal Disease; Knowledge of Diarrheal Disease Campaign Messages and the Timing of Treatment for Diarrheal Disease Episodes

Essentially, the main concern of this part of the survey findings was to ascertain whether educational disparities in knowledge of disease causation and the high rate of fatalism found among uneducated mothers in this sample, influences the timing of medical treatment for illness episodes.

The survey findings indicate a statistically significant relationship between knowledge of disease causation and the timing of treatment. Among mothers who responded with scientifically-medically correct causal explanations of diarrheal disease, 87% commenced treatment on the day the illness began and only 11% commenced treatment 1-2 days after the diarrhea began. In comparison, only 58% among those who gave negative or fatalistic explanations of the cause of diarrhea began treatment on the day the diarrhea began while 42.1% of negative respondents waited 1-2 days after the illness began before seeking medical attention, (.00065* : see table 5.2.1). The relationship between maternal knowledge of disease causation and the duration of treatment was

not significant.

Table 5.2.1 Timing of Treatment and Knowledge of the Cause of Diarrhea

	Positive	Neutral-Negative
Same day	87.3 (69)	57.9(22)
1-2 Days	11.4 (9)	42.1 (16)
3-5 Days	1.3 (1)	---
	(.00065)*	(missing 284)

Research at the anthropological level indicates that causal explanations of disease are important determinants of treatment and therapeutic practices in illness management. In the health literature, causal explanations of disease are hypothesised to improve with education and fatalism is expected to diminish. The previous chapter indicated that this was indeed the case among educated mothers in this sample and this survey attempted to establish the link between maternal knowledge and maternal skills in ensuring that illness is soon brought under control in an effort to ascertain whether maternal knowledge indeed represents a significant pathway of influence in the maternal education - child health relationship.

As indicated above, the findings of this survey demonstrated significant educational disparities based on knowledge of disease causation in the timing of treatment for diarrheal disease suggesting that mothers who attributed fatalistic explanations

to disease causation were more likely to delay seeking treatment while mothers who were more accurate in attributing scientifically-medically correct causal explanations to disease were more likely to seek prompt medical assistance and to commence treatment early. Again, however, it is important to emphasise the fact that education was positively related to income in this sample and that the positive association between maternal knowledge and the timing of treatment demonstrated above may simply be an indirect reflection of income effects.

5.3 Maternal Education and the Comprehension of Health Messages

This survey also examined whether educational disparities in the comprehension of diarrheal disease campaign messages demonstrated in the previous chapter have direct implications for the performance of mothers in the treatment and management of diarrheal disease episodes. It was hypothesised that mothers who accurately comprehended the health education messages and, in particular, the relationship between dehydration and diarrhea and the necessity for early intervention, would seek medical care significantly sooner than mothers who did not comprehend these crucial messages in the NCDDP's mass media campaign. (Given that few mothers initiate ORS treatment before seeking help, the treatment-management variables here relate to when the mother sought medical care).

The positive relationship between maternal education and the comprehension of diarrheal disease campaign messages was equally

reflected in a more direct association between maternal comprehension of campaign messages and maternal performance in the timing of treatment for diarrheal disease. Mothers who scored positively in the comprehension of campaign messages were more likely to seek prompt medical assistance and to commence treatment early in this survey, (see table 5.3.1).

Table 5.3.1 Timing of Treatment and Knowledge of Diarrhea Disease Campaign

	Positive	Neutral	Negative
Same day	82.8 (24)	82.2 (60)	46.7 (7)
1-2 Days	17.2 (5)	16.4 (12)	53.3 (8)
3-5 Days	---	1.4 (1)	---
	(.02680)*		(missing 284)

Summary

Although establishing the direction of causation has proven difficult in this survey, the timing of treatment was found to be positively related to maternal education and, in turn, to maternal knowledge of disease causation and campaign messages in this sample. For severe cases of diarrheal disease and (to a lesser extent) respiratory infection, educated mothers were more likely to seek prompt medical attention than uneducated

mothers. The relationship between maternal education and the duration of treatment was less significant, recovery status being the main determinant of this relationship.

The relationship between maternal knowledge of disease causation and the timing of treatment was also significant with mothers who gave positive causal explanations of disease significantly more likely to commence treatment promptly than uneducated mothers and mothers who gave fatalistic or negative explanations of disease causation, more likely to delay treatment for diarrheal disease. Since educated mothers were more likely to respond correctly to disease causation, this may suggest a direct association between maternal education, maternal knowledge and the timing of treatment, and, for uneducated mothers, a direct association between the lack of education, fatalistic or inaccurate explanations of disease and delays in seeking treatment.

The relationship between maternal knowledge of campaign messages and the timing of treatment was also positive with mothers who scored positively on knowledge of campaign messages also more likely to commence treatment early. Conversely, mothers who scored neutrally or negatively on knowledge of campaign messages were more likely to delay treatment for diarrheal disease. Despite the policy-implications of these findings, however, it is important to re-emphasise again the overwhelming preference for private doctors in these communities and the fact that education and knowledge related disparities in the timing of treatment may

simply be a reflection of the capacity of educated mothers to obtain such treatment given their families' higher incomes. The following section examines to what extent early initiation of treatment, influences the rate of recovery.

5.4.A. Maternal Education, the Rate of Improvement from Illness Episodes and Accompanying Symptoms

This section briefly examines how treatment related variables affected the rate of recovery and symptoms of severity. As expected, for both diarrheal disease and respiratory infection, children of educated mothers began to show signs of improvement significantly sooner than the children of illiterate mothers in this sample. For diarrheal disease, 77.8% of children of educated mothers began to show signs of improvement after the first two days of illness. In comparison only 30% of children of uneducated mothers began to show signs of improvement during this time while 37% showed signs of improvement between 3-20 days later in comparison to only 11% among children of educated mothers, (.00569)*. For respiratory infection, signs of improvement were also reported sooner among children of educated mothers; 63% reported signs of improvement in the first two days as compared to 26.9% among children of illiterate mothers and only 18% of educated mothers reported signs of improvement after the third day of illness as compared to 46% among uneducated mothers, (.00750)*. Finally, although the above findings indicate a positive relationship between education and recovery, it must be re-emphasised that the possibility that

income effects are more significant determinants of these disparities in recovery status cannot be discounted.

When the relationship between maternal education and the rate of improvement is examined while controlling for episode severity, the survey findings indicate that among simple cases of diarrhea, 89% of children of educated mothers showed signs of recovery within 1-2 days after the episode in comparison to 57% among uneducated mothers, and, 23% of children of uneducated mothers began showing signs of recovery between 3-20 days after the episode began while only 5% of children of educated mothers took this long to begin recovering from what the mother considered a simple episode of diarrhea. These results were not, however, statistically significant (.08184). Among severe cases of diarrhea, the percentage of children showing signs of improvement within 1-2 days is 43% among literate mothers and 18% among illiterate mothers and the percentage of children showing signs of improvement within 3-20 days is 29% and 61%, respectively. However, although signs of recovery from severe diarrhea were considerably faster among children of educated mothers, these findings were not statistically significant due to the fact that some mothers reported no improvement at the time of interview.

For simple cases of respiratory infection, the percentage of educated mothers reporting signs of improvement between 1-2 days was 67% and among uneducated mothers, 38%. Only 19% of educated mothers reported improvement between 3-20 days later in comparison

to 30% among uneducated mothers (.13850). Furthermore, 30% of uneducated mothers reported no improvement at the time of interview in comparison to only 10% among educated mothers. For severe cases of respiratory infection, although there were few cases among children of educated mothers, 50% of educated mothers reported signs of improvement within 1-2 days of the onset of illness while only 13% of uneducated mothers reported progress at this stage. Similarly, 17% of educated mothers reported improvement between 3-20 days later, in comparison to 63% among uneducated mothers; (.02093)*.

In sum, the results of this survey suggest that the children of educated mothers showed signs of recovery sooner than the children of uneducated mothers for both simple and severe episodes of diarrheal disease and respiratory infection.

The survey results also demonstrate a significant relationship between knowledge of disease causation and the rate of improvement from diarrheal disease. Fifty-two percent of respondents who scored positively on knowledge of disease causation reported that their child showed signs of improvement within 1-2 days of illness in comparison to 42% of neutral-negative respondents and only 24% of positive respondents reported signs of improvement within 3-20 days in comparison to 47% among neutral-negative respondents. Thus, mothers who demonstrated scientifically-medically accurate knowledge of diarrheal disease causation also reported speedier recovery from diarrheal disease episodes in comparison to mothers who gave fatalistic or incorrect explanations of diarrheal disease causation, (.03997)*.

Although the relationship between knowledge of diarrhea campaign messages and recovery rates was not as significant, a larger proportion of mothers who scored poorly on knowledge of campaign messages, (mainly uneducated mothers; see Chapter 5), also reported slow recovery rates of between 3-20 days; 47%, in comparison to only 24% among positive respondents. Similarly, a large proportion of positive respondents (who were mainly educated mothers), reported recovery within 1-2 days of illness, 55%, in comparison to only 33% among negative respondents. However, these results were not statistically significant due to the fact that a significant percentage of respondents reported no improvement at the time of interview.

While these findings indicate a possible linkage between maternal education, maternal knowledge of disease causation and campaign messages and the rate of recovery, at the same time, it is not possible to determine precisely to what extent the earlier signs of improvement among the children of mothers in these categories is related to the fact that their mothers are considerably better off and could therefore ensure adequate dietary intake and treatment. Nevertheless, it appears that for both respiratory infection and diarrheal disease, earlier signs of recovery are partly related to the early initiation of treatment among educated mothers. For diarrheal disease, for example, among mothers who began treatment on the same day the illness started, 51% reported signs of improvement within 1-2 days of the start of illness and 27% reported signs of improvement between 3-20 days after the

diarrhea episode began while only 27% of mothers who commenced treatment promptly reported signs of improvement between 3-20 days after the illness episode began, and 40% of mothers who delayed treatment indicated that their child took this length of time before showing signs of improvement. Due to the fact that some mothers reported no improvement at the time of interview, however, these findings were not statistically significant.

5.4.B. Maternal Education and Child Morbidity Symptoms

It is frequently hypothesised in the health literature that illiterate mothers may experience more prolonged and severe child morbidity, both in terms of accompanying symptoms and loss of appetite, as a result of poor performance in the treatment and dietary management of the illness episode; delays in seeking medical attention and in commencing treatment, and inconsistencies in administering the prescribed medication.

The frequencies for diarrheal disease and respiratory infection episodes in this sample indicate that the average length of diarrhea episodes is 3-9 days and for respiratory infection the same, and, that the length of diarrheal disease and respiratory infection episodes is not significantly affected by maternal education.

With respect to the relationship between maternal education and the severity of symptoms, these findings indicate that the presence of potentially dangerous symptoms accompanying diarrhea.

episodes is not significantly related to maternal education. However, the most common symptom indicating severity in this sample was vomit, and, among the illiterate, this symptom was relatively high. Similarly, the number of stool episodes per specified period of time, (recently used as an indicator of episode severity by WHO), did not indicate statistically significant educational disparities although the number of diarrhea episodes per hour was higher among children of illiterate mothers than among children of literate mothers.

The loss of appetite is also regarded as an indication of severity and dehydration in diarrheal disease episodes. The findings here indicate that this symptom did not reflect educational disparities. Finally, episode severity, based on maternal assessments, did not display educational disparities in relation to diarrheal disease. Respiratory infection, however, does display slight differences between literate and illiterate mothers, with 38% of uneducated mothers indicating the episode was severe in comparison to only 19% among educated mothers and 59% indicating that the episode was simple in comparison to 81% among educated mothers, (.06333). Thus in sum, these findings demonstrated no educational disparities in the symptoms accompanying child morbidity, including, loss of appetite and the length of episodes for both diarrheal disease and respiratory infection, and demonstrated only slight educational disparities in relation to the severity of respiratory infections according to maternal perceptions of severity which, according to the CSRP, are consistent with actual symptoms of severity in this setting.

5.5.A. Maternal Education, Treatment Facilities and Treatment Patterns

The CSRP data suggest that the source of care is among the most important determinants of the treatment of diarrheal disease and the likelihood of ORS usage in Menofia and that the likelihood of obtaining ORS at the health facility consulted is, in turn, significantly related to the severity of the episode, (see Chapter 2). The final sections of this analysis examine the relationship between maternal education and the source of care and how the health facility consulted affects treatment and recovery status.

Like the CSRP data, frequencies for medication prescribed for diarrheal disease suggest that ORS on its own is under-prescribed and that combinations of antibiotics and other medications are over-prescribed; frequently without ORS. There are only 9 cases of ORS-Only prescriptions for diarrhea, and there are more cases of prescriptions excluding ORS than prescriptions with ORS: 56% (66) verses 36% (43) in this sample. For respiratory infection, 3% of episodes were treated with cough medicine only; 12% with cough medicine in combination with antibiotics or other medication and 11% with antibiotics or other medication and no cough medicine.

With regard to the relationship between maternal education, treatment facility and the usage of ORS, these findings indicate

that there is no relationship between maternal education and medication and no significant relationship between education and the likelihood of using ORS. For respiratory infection, again the relationship between medication and education is not significant although uneducated mothers were slightly more likely to be given 'other medicine' (24%), than educated mothers, (4%), and educated mothers were slightly more likely to be prescribed antibiotics, 22%, in comparison to 15% among uneducated mothers; or combinations of antibiotics, other pills and cough medicine, 30%, in comparison to 22% among uneducated mothers. These findings were not however statistically significant (.09393).

With regard to the relationship between medication and maternal knowledge of diarrheal disease causation, this relationship was only slightly significant with 42% of positive respondents using ORS in combination with other medication in comparison to only 26% among neutral to negative respondents and 52% of positive respondents using other medication with no ORS in comparison to 63% among neutral to negative respondents. However, a higher percentage of neutral-negative respondents used ORS alone, 11%, in comparison to only 6% among positive respondents.

The relationship between knowledge of campaign messages and the likelihood of ORS usage indicates that 20% of respondents who scored negatively on knowledge used ORS alone in comparison to only 7% and 6% among positive and neutral respondents, respectively, who were slightly more likely to use ORS in combination with other medication, 38% and 43%,

respectively, (.06000). At the same time, however, a higher percentage of negative respondents were more likely to use other medication with no ORS, 73%, in comparison to positive and neutral respondents, 55% and 52%, respectively. Finally, the usage of ORS was not related to maternal knowledge of the dietary management of diarrheal disease and the need to increase liquids.

In sum, the findings of this survey demonstrate that medication for diarrheal disease and respiratory infection were not significantly related to maternal education. Maternal knowledge of diarrheal disease causation and campaign messages were also not related to the treatment used to cure diarrhea episodes. Most significant, however, is the fact that ORS usage was not found to be related to maternal education or to maternal knowledge of the diarrheal disease campaign. This finding is particularly significant given that educated mothers comprehended the treatment and dietary management of diarrheal disease and the necessity for ORS intervention from the NCDDP's campaign more accurately than uneducated mothers and were therefore expected to be more likely to use ORS than uneducated mothers.

According to the health and anthropological literature, maternal education is widely hypothesised to facilitate the spread of health information, (LeVine et al, 1994), and the usage of ORS intervention is widely hypothesised to be positively related to maternal comprehension of its function, (Bentley, 1988). This research, while confirming the first hypothesis, indicates that,

despite the more accurate comprehension of health messages among educated mothers, maternal education and the superior knowledge of campaign interventions which was positively related to education, did not have a significant impact on the usage of ORS in the treatment of diarrheal disease. According to the CSRP, the source of care and episode severity were the most crucial determinants of treatment and ORS usage in Menofia.

In this context, the survey found that, with respect to the relationship between source of care and treatment for diarrheal disease, no private doctors prescribed ORS alone and only 7% of doctors at the health unit prescribed ORS alone to treat diarrhea while a higher percentage of pharmacists (20%) gave mothers ORS only than health unit and private doctors. An equal percentage of private doctors and health unit doctors prescribed ORS in combination with other medication 40%, while 60% of private doctors and 53% of health unit doctors gave other medication with no ORS. Among mothers who went to the pharmacy, 20% were given ORS in combination with other medication while a higher percentage of pharmacy consultees were given other medication with no ORS, 60%. Thus private doctors were the least likely to prescribe ORS on its own or in combination with other medications or antibiotics. At the same time however, more than half of doctors at the health unit treated diarrhea with antibiotics and other medication, with no ORS. This is consistent with the findings of the CSRP and indicates substantial failure on the part of the NCDDP in changing treatment practices despite the fact that considerable resources were allocated to training in SCM among health

practitioners.

In relation to recovery, these findings are equally disturbing given that private doctor consultations are positively related to the severity of the case. Although the CSRP found there was a slightly increased likelihood of receiving ORS from the health unit than from private doctors, this research suggests that doctors at the health unit are only 7% more likely to prescribe ORS alone than private doctors and equally likely to prescribe ORS in combination with other medication as private doctors.

The CSRP data indicate that treatment patterns, despite these shortcomings, were related to symptoms of severity. These findings indicate that with respect to diarrheal disease, the likelihood of using ORS was not related to the duration of the episode or to its severity as defined by the mother. A similar percentage of mothers who described the diarrhea as simple were prescribed ORS alone, 10%; ORS in combination with other medication, 36%; and other medication with no ORS, 55% ; as mothers who described the case as severe, 3% of whom were given ORS alone; 38% of whom were given ORS in combination with other medication and a high 60% of whom were prescribed other medication with no ORS. Thus among severe cases of diarrhea, the majority of cases, 60%, were given other medication and no ORS.

Treatment patterns were similarly unrelated to the duration of diarrhea episodes. Due to the size of this sample, the presence of dangerous or dehydration-related symptoms was very limited; there were only 40 cases of diarrhea with accompanying vomit,

for example. However, like the CSRP findings, there was a statistically significant relationship between the presence of any symptoms of severity combined and medication with 51% of those with dangerous symptoms being prescribed ORS in combination with other medicine in comparison to only 28% among those with no symptoms. However, although the presence of dangerous or dehydration-related symptoms combined increases the likelihood of being given ORS, at the same time, 51%, and 64% of those with no symptoms were given other medication with no ORS, and a large percentage of mothers who reported any of these symptoms were given only antibiotics and other medication and no ORS, 42%. These findings contrast sharply with the training received by health practitioners based on WHO's SCM strategy.

Furthermore, the usage of ORS was not related to loss of appetite. Among those who reported loss of appetite, only 34% were given medication with ORS and 59% were given medication with no ORS. Thus a high percentage of mothers, 59%, who reported loss of appetite were not given ORS. Among those who reported no loss of appetite, 38% were given medication with ORS and 54% were given medication with no ORS.

With respect to respiratory infection, the relationship between medication and episode severity was significant with a higher percentage of simple episodes receiving cough medicine alone, 19% as compared to only 2% of severe episodes, and a higher percentage of severe episodes receiving cough medicine in combination with other medicine, 59% as compared to 36% among

simple episodes. At the same time however, 45% of simple episodes received other medication with no cough medicine compared to 39% of severe episodes.

In sum, with respect to the relationship between health facility consulted and the likelihood of using ORS for diarrheal disease, this survey found ORS is significantly under-used at both the government health facility level and in the private sector.

5.5.B Source of Care, Timing of Treatment and Recovery

This final section of this chapter examines, more closely, how the source of care affected the timing of treatment and the rate of recovery in this sample. It seeks to determine whether these variables reflect health facility disparities in that mothers who used the private sector were more likely to commence treatment promptly, continue with the medication for a longer duration of time and to report early signs of recovery than mothers who sought government health facility care.

The relationship between the timing and duration of treatment, recovery status and health facility consulted, is difficult to establish. For example, although it may be expected that the more specific diagnosis and clearer instructions received at the private doctor will encourage mothers to administer medication for a sufficient duration of time, it is equally possible

that the use of more 'potent' medications characteristic of private doctors has an effect on the rate of recovery and therefore leads mothers to administer medication for a shorter duration of time than those who sought public health sector care.

Nevertheless, with these constraints in mind, it is interesting to note that, despite the preference for private doctors and mothers' universal faith in the latter's diagnostic abilities, the survey findings indicate that the timing of treatment was not related to health sector usage for diarrheal disease nor was the duration of treatment. For mothers who went to the private doctor, 83% began treatment on the same day, and, for health unit patients, 73%. Seventeen percent of mothers who went to the private doctor began treatment 1-2 days later in comparison to 23% among mothers who went to the health unit and 3% began treatment 3-5 days later while no mothers who went to the private doctor waited 3-5 days before starting treatment (.87841). The duration of treatment for diarrheal disease among mothers who went to the private sector was 64% for 1-4 days, and 53% among mothers who went to the health unit while 15% of private sector patients continued treatment for 5-15 days and for health unit patients, 17%, (.01583)*.

Disparities in the rate of improvement based on health sector usage are significant however. The percentage of improvement in 1-2 days for private sector patients was 64% and for health unit patients, 33%. The percentage of private doctor patients who took 3-20 days to improve was 21% and for health unit patients 40%. Finally, the percentage of private doctor patients who reported no

improvement at the time of interview were 11% and 23% for health unit consultees, (.01756)*. Thus the timing and duration of treatment for diarrheal disease was not related to health sector usage while the rate of recovery was significantly related to health sector usage with a larger percentage of mothers who went to the private doctor 64%, reporting improvement in the first 2 days in comparison to only 33% among mothers who went to public health facilities. At the same time, only 11% of mothers who went to the private doctor reported no improvement at the time of interview in comparison to 23% among mothers who went to the health unit.

For respiratory infection the timing and duration of treatment were not related to health sector usage while the rate of recovery was related although somewhat less than for diarrheal disease. Forty-one percent of private doctor patients reported signs of improvement within 1-2 days compared to only 27% among health unit patients. Although the percentage of mothers who reported slower improvement of between 3-20 days was similar for private doctor and health unit patients, the percentage of private doctor patients who reported no improvement at the time of interview was slightly less, 15%, than mothers who consulted the health unit, 31%, (.06403).

CONCLUSION

The fact that education and knowledge-related disparities in child morbidity were not significant in this sample while educational disparities in child mortality were significant in the larger CSRP sample suggested that the treatment and management of illness episodes through effective domestic and external health care among educated mothers may represent an important mechanism in the relationship between maternal education and child mortality in Menofia. According to the wider literature, because child mortality is rarely the outcome of a single disease episode and frequently the result of recurrent morbidity and its nutritional consequences, the rate of recovery from infection and its relationship to maternal education are considered important variables in disentangling the mechanisms through which maternal education enhances child survival.

In the health literature, maternal education is widely hypothesised to enhanced recovery from child morbidity because, in comparison to uneducated mothers, educated mothers are expected to:

- seek medical attention with greater timeliness;
- extract a higher quality of care from medical practitioners;
- adhere to medical advice with greater persistence and consistency;
- perform better in the dietary management of illness episodes, and;
- acquire health information and interact more effectively with health practitioners on the basis of which they

subsequently engage in health practices; (see Chapter 2: Caldwell, 1994; Cleland & van Ginneken, 1988; Levine et al, 1994).

Despite the widely hypothesised positive impact of education on timely intervention, there is little evidence in the health literature on the relationship between maternal education and the timing of care and its relationship to recovery from illness episodes. Furthermore, while 'very few studies present information on the effect of maternal education on the type and timing of care,' (Jain, 1994: 205), there is even less evidence on the effect of maternal causal explanations of disease and knowledge of health education messages on the timing of treatment.

In addition to attempting to examine to what extent education positively influenced treatment practices, this chapter also sought to examine the linkage between maternal knowledge and therapeutic practices. It further sought to examine to what extent the 'passive' reception of health education messages enhanced the performance of educated mothers in health practices. The survey findings indicated that, although educated mothers were equally likely to respond promptly to simple and severe episodes of diarrheal disease and respiratory infection, educated mothers commenced treatment for severe diarrheal disease and, to some extent, respiratory infection earlier than uneducated mothers and that their children began to show signs of improvement from illness episodes significantly sooner than the children of uneducated mothers. These educational disparities were more significant in the timing of treatment for severe respiratory

infection, however, than in the timing of treatment for severe diarrheal disease, perhaps suggesting that the diarrheal disease campaign messages have diminished educational disparities in the timing of treatment for severe diarrheal disease episodes.

It has been hypothesised in the health literature, and in the anthropological literature in particular, that maternal causal explanations of disease are related to treatment patterns and, consequently, to the rate of recovery. The survey findings suggested that mothers who demonstrated scientifically or medically correct knowledge of disease causation were also more likely to seek prompt medical attention and to commence treatment significantly earlier than mothers who demonstrated fatalistic or negative explanations of disease causation. Thus the positive relationship between maternal education and the timing of treatment was also demonstrated in a more direct relationship between knowledge of disease causation and the timing of treatment.

The chapter then sought to determine whether mothers who accurately comprehended the purpose of ORS and the education messages which addressed the necessity for immediate intervention extensively, would commence treatment sooner than mothers who did not retain accurate knowledge from the diarrheal disease campaign messages. The survey found that mothers who scored positively in the comprehension of campaign messages, sought treatment sooner than mothers who scored negatively. Thus the positive relationship between maternal education and the timing of treatment was also positively related to maternal knowledge of the diarrheal disease campaign messages and to the educational disparities reflected

therein in this sample. These performance variables in turn, affected the rate of recovery as did maternal knowledge of disease causation and campaign messages, although not as significantly as education alone. Signs of recovery from both simple and severe episodes of respiratory infection and diarrheal disease were faster among children of educated mothers and among mothers who displayed accurate knowledge of disease causation, (3). Thus, in relation to whether the superior and more accurate knowledge of educated mothers in disease causation and in the comprehension of health education messages demonstrated in the previous chapter had a direct impact on the treatment, management and outcome of child morbidity, the findings of this survey suggested a positive association between these variables.

Finally, this survey found that although maternal education was significantly related to the comprehension of the diarrheal disease campaign messages, education was not a significant determinant of the usage of ORS in the treatment of diarrheal disease. The comprehension of diarrheal disease campaign messages was also not a significant determinant of the usage of ORS. Thus although these two variables affected the timing of treatment for diarrheal disease episodes, particularly through prompt treatment for severe episodes, maternal education and maternal knowledge of the campaign messages did not lead to early intervention with ORS prior to seeking professional help as intended. The most significant determinant of ORS intervention was the source of

care where ORS intervention was positively related to the presence of dehydration and related symptoms. These findings are similar to those of the CSRP although the likelihood of using ORS did not increase for health unit patients as significantly as it did in the CSRP's finding. Therefore, although the NCDDP's training of doctors in SCM for diarrheal disease recommended ORS intervention for all cases of diarrhea, the majority of cases, approximately 66%, received no ORS. Again, these findings are consistent with those of the CSRP which found considerable under-use of ORS and over-use of unnecessary antibiotics and anti-diarrheals among medical practitioners in Menofia at the end of the NCDDP's programme efforts, (Langsten & Hill 1992).

As the CSRP concludes, the fact that the likelihood of obtaining ORS through health facilities is related to the presence of dehydration and related symptoms indicates progress, (Langsten & Hill 1992). However, a significant proportion of cases with dehydration-related symptoms are not given ORS and very few cases of diarrhea without dehydration-related symptoms are given ORS. Thus there is significant under-usage of ORS at the health sector level and, therefore, at the individual level, despite the extensive training in SCM conducted by the NCDDP which stressed universal usage of ORS in the treatment of diarrhea. At the individual level, despite the extensive exposure to campaign messages teaching mothers immediate and early usage of ORS for all cases of diarrhea prior to seeking professional help, early usage of ORS has not improved even among more educated mothers who comprehended the purpose of ORS accurately. ORS is used in less than half of all

diarrhea episodes and this may partially explain why, according to the most recent studies, diarrhea remains the most important cause of child mortality in Egypt despite a decade of exposure to the diarrheal disease control campaign, (Langsten & Hill 1992; Rashad, 1989; SPAAC, 1989).

With respect to selective disease control interventions and the impact of passive education, this research, like the comparative study conducted by Levine et al examined in Chapter 2, has demonstrated that: Firstly, educational disparities exist in this setting in the comprehension of health messages with respect to the function of ORS in fluid replacement and the necessity for prompt ORS intervention in the treatment of diarrheal episodes. As indicated above, however, this knowledge did not increase the acceptance or usage of ORS among educated mothers. The most important determinant of ORS usage was the health facility consulted where the presence of dehydration-related symptoms determined whether or not a mother used ORS. At the same, the survey found that, although educated mothers commenced and continued treatment for severe diarrheal disease sooner than uneducated mothers and for a longer duration of time, educational disparities in the timing of treatment for severe diarrheal disease were not as significant as those demonstrated in the timing of treatment for severe respiratory infection. This may suggest that the diarrheal disease campaign has improved the timing of treatment for severe diarrheal disease relative to the timing of treatment for severe respiratory infection among uneducated mothers. Equally, however, the fact

that educational disparities in the timing of treatment for severe diarrhea and in the rate of improvement remain significant, suggests that the NCDDP was not as successful in improving treatment practices through passive education, as was initially forecast. Thus as Langsten concludes, there are substantial gaps between knowledge and practice in Menofia with respect to the treatment of diarrheal disease: while knowledge and 'ever-used' of ORS are nearly universal, appropriate and sustained usage of ORS in the treatment of diarrheal disease with ORS has not been achieved. In this context, this survey attempted to measure to what extent education, widely expected to facilitate both knowledge and appropriate and sustained usage of health interventions, (LeVine, 1994; Mosley, 1993), represented an important 'social support' factor in this equation; or conversely, to what extent the lack of education represented an important constraint to the spread of health interventions. The findings presented above demonstrated that, while education enhanced maternal comprehension of health messages, this did not lead to appropriate and correct home-based usage of ORS and therefore, that these linkages may have been somewhat over-simplified in the health literature.

The social constraints to the acceptance and effective usage of child survival interventions are not necessarily universal however, and the relative success of the EPI in comparison to the NCDDP suggests that there may be something about the nature of home-based interventions which constrains their acceptance at the population level, irrespective of the

level of maternal education and accuracy in the comprehension of health messages. These differentials in outcome indicators may indicate that interventions which require contact with a health professional are more likely to succeed than home-based interventions. They may also indicate differentials in the perceived efficacy of an intervention in averting death among the population, which according to Mosley, is an important determinant of the sustained and effective usage of medical interventions. These issues will be further examined in the final chapter of this thesis.

Finally, the findings of this and the previous empirical chapter suggested, as Hobcraft's examination of DHS data indicated, that there is 'fairly clear evidence of differentiation according to the level of mothers education... in the treatment of childhood diseases,' and that the evidence of a direct association between maternal education and disease prevalence is less clear (Hobcraft, 1993, cited in Brockerhoff & De Rose, 1994:193). However, it is important to bear in mind that it was not possible to establish to what extent educational differentials in the timing of treatment in this sample indeed reflect an independent and direct causal association between maternal education and enhanced performance in the treatment of child morbidity in this sample. This is because of the widespread and universal preference for private doctors in these villages and the fact that educated mothers in this sample overwhelmingly came from better off households. This suggests that educated mothers seek prompt treatment simply because they can afford to

do so. The fact that educational disparities in maternal knowledge of dangerous disease symptoms and of the potentially fatal consequences of diarrhea-related dehydration and ARI were not significant in this sample lends support to the hypothesis that educational (and related knowledge) disparities in the timing of treatment and in the timing of signs of improvement from illness episodes may simply be a reflection of income-related disparities in access to the preferred source of care, the private doctor. In this context, it is important to re-emphasise that maternal perceptions of illness severity were accurate in this sample. Furthermore, among those who reported the child was not eating or breastfeeding normally during the diarrhea episode, only 26% described the case as simple while 48% perceived the case to be severe, (.03296)*. Thus similar to the CSRP findings where maternal perceptions of severity were found to be accurate, the mothers in this sample, both educated and uneducated, also demonstrated accurate knowledge and awareness of dangerous symptoms accompanying child morbidity. This lends strong support to the possibility that delays in seeking treatment among uneducated mothers are not related to their inability to detect dangerous symptoms and are more closely related to the lack of income for obtaining satisfactory medical treatment. Finally, the fact that uneducated mothers delayed treatment for severe episodes rather than simple episodes, contrary to expectations in the wider literature, (Jain, 1994), suggests that what were initially simple episodes became severe because of delays in seeking treatment. In sum therefore, given that maternal perceptions

of illness severity corresponded accurately with actual symptoms of severity in Menofia, it appears unlikely that uneducated mothers delayed treatment because they were unaware of the need for intervention. It is more probable therefore, that educational disparities in treatment practices are related to disparities in access to the preferred source of care, the private doctor.

Notes

- (1) Although mothers were asked about second consultation in this sample, the number of mothers who made a second visit was too small to make any substantial conclusions.
- (2) It is important to bear in mind here rural Egypt's early exposure to vaccination practices go as far back as the nineteenth century, see Chapter 1.
- (3) It is also important to examine the possibility that earlier signs of recovery among educated mothers in this sample are related to pre-existing nutritional status among children of educated mothers. However, to the extent that the CSRPs did not detect any educational disparities in anthropometric indices in their larger sample, it can be assumed that earlier signs of recovery may indeed be related to earlier timing of intervention among educated mothers.

Introduction

The empirical analysis presented in chapter four demonstrated that maternal education, did not affect the incidence of diarrheal disease in this sample. Similarly, fatalistic respondents who did not know what preventative measures to take with respect to diarrheal disease, the majority of whom were illiterate, did not experience a higher rate of diarrheal disease in this sample. Although, as Chapter 6 demonstrated, the role of maternal education in the treatment and management of illness episodes and in the rate of recovery was found to be more significant in this sample in comparison to prevention, these findings somewhat undermine the central place given to maternal education, and related knowledge in the prevention of disease, and in reductions in child morbidity and mortality.

This part of the analysis is concerned with examining these relationships within the context of health-related household resources. It begins with a review of the literature on the relationship between household resources and child health, focusing primarily on research conducted in Lower Egypt, with partial reference to the international literature, on the relationship between these variables where relevant.

The previous two empirical chapters sought to establish

the extent to which preventative and curative care represent important mechanisms in the relationship between maternal education and child health in this sample. The empirical chapter in this part, Chapter 7, is essentially concerned with the final set of intermediate determinants of child health with which this research was concerned, namely, health-related household resources and their relationship to maternal education and child morbidity. Before proceeding however, a number of factors with regard to this section of the analysis should be noted.

Despite the fact that education was a significant determinant of maternal knowledge of preventative measures, including environmental contamination, the inability of mothers equipped with this knowledge in illness control to affect the prevalence of disease suggests that household resources, (or the conditions in the Mosley framework), may override the relationship between education and illness control, in this sample. Testing this hypothesis however, as indicated in Chapter 3, is hindered by real life constraints since there are few educated mothers in this sample with inadequate health-related household resources. Given the necessary resources however, to what extent are educated mothers more able to prevent disease than their uneducated counterparts at the same 'adequate' level of resources ? This question has been crucial in the maternal education-child health debate ever since empirical evidence established maternal education as an independent determinant of child survival in its own right

as opposed to a mere reflection of socio-economic determinants, (Caldwell, 1979). It has important policy implications for child survival interventions in view of the recent international agenda for achieving HFA, (World Bank 1993; see Chapter 1). However, efforts to ascertain answers to this question are frequently inhibited by social realities since it is difficult to find a sample in which the educated are not also the wealthy. Thus the range of variability found in samples with respect to these two variables is rarely sufficient to establish statistical associations. This research in Menofia was equally constrained by these social realities.

Nevertheless, with these constraints in mind, and given the importance of establishing the role of disease prevention in the maternal education-child health relationship, the empirical chapter in this part attempts to examine these associations in Menofia. Significantly, as the empirical chapter below, (Chapter 7) indicates, the statistically weak relationship between maternal education and disease prevalence alters somewhat when examined against the level of household income as does the weak relationship between maternal knowledge and child health found in Chapter 4, when measured against certain health-related household resources. Before proceeding to these findings however, the following chapter examines the risk factors associated with diarrheal disease and respiratory infection in the wider literature and in Menofia in particular.

Chapter 6 Health-Related Household Resources and Child Morbidity Survey of the Literature

Introduction

This chapter examines the literature on the relationship between intermediate household resources and diarrheal disease and respiratory infection child morbidity in general and then in Menofia. While the primary focus is on anthropological findings in this research setting, the chapter also investigates the relationship between intermediate resources, maternal education and child health in the wider literature on Egypt.

As seen in Chapter 1, there is generally widespread consensus among health professionals that child mortality in the developing world is rarely the consequence of a single episode of severe illness. 'Growth faltering and ultimately mortality are the cumulative consequences of multiple disease processes including their biosocial interactions. Only infrequently is a child's death the result of a single isolated disease episode, or a direct consequence of a discrete illness such as neonatal tetanus or malaria,' (Mosley & Becker, 1991: 28). Similarly, 'few are the cases in which a specific etiology of disease has provided a complete account of the causation of disease... In reality, the search for the causation of disease may be a hopeless pursuit because most disease states are the indirect outcome of a constellation of circumstances rather than the direct result of single determinant factors,' (Dubois, 1970, cited in Shorter

1993:20). With these considerations in mind, this review begins by examining the epidemiological circumstances which precipitate diarrheal disease and respiratory infection child mortality in developing countries and then proceeds to examine their inseparable social and intermediate origins in the context of this research setting in rural Egypt.

The biological mechanisms of child mortality in the developing world typically operate through a chronic cycle of frequent and recurrent infections and/or nutrient deficiency, the cumulative consequences of which are, ultimately, increased exposure to the risks of child mortality, (see Chapter 1). 'This is largely because in the context of widespread social or material deprivation, inadequate household resources often induce an interactive association between recurrent infection and under-nutrition whereby the health consequences of one are exacerbated by increased exposure to the other. Infectious disease episodes which, in a more favorable environment may be rare and self-limiting, can have considerable consequences for survival when they interact synergistically with nutrient deficiency thereby reducing the child's capacity to resist more frequent, severe and ultimately more fatal episodes of recurrent infection. Indeed the simultaneous impact of recurrent infections and nutrient deficiency in settings deprived of health related resources frequently results in mortality risks to children which are greater than would be expected from a simple combination of their independent effects,' (Shorter, 1993: 30).

A growing body of evidence demonstrates the significance of this chronic cycle of recurrent infection and nutritional deficiency as the underlying biological mechanism which precipitates infant and early childhood mortality in developing countries, (Mata, 1978, cited in Mosley & Becker, 1991). Furthermore, evidence that this chronic cycle is very difficult to break without altering the community and home environments which are the source of repeated exposure to infection is now widely accepted among child health experts, (Shorter, 1993).

Underlying the high rate of exposure and susceptibility to child morbidity in the developing world is the high dosage of infectious agents maintained and transmitted by crowding, inadequate sanitation, poor personal hygiene, food preparation and defecation habits, (Shorter, 1993). 'Thus most of the factors which determine the health of children are situated in the activities of daily life. These daily domestic activities are themselves shaped, however, by the nature and level of resources available to households in the communities where they live. It is these resources, therefore, that constitute the ultimate determinants of child health,' (Shorter, 1993: 21).

Within this widely accepted conceptual framework for understanding and examining the determinants of child survival, specific disease episodes represent the intermediate determinants of child health, i.e., the transmission of infectious agents to children through environmental contamination, as opposed to the cause of illness or death. On this basis, the study of determinants of child survival 'begins with a biological problem in the host

and then searches for its social determinants recognising that the intermediate processes, (i.e. environmental contamination), do not exist independently of the social conditions which structure them' (Mosley, 1984: 28). Due to the epidemiological significance of diarrheal disease in developing countries, water and sanitation are among the most important intermediate resources in relation to child survival. The following section briefly examines the biological risk factors associated with water and sanitation in general before proceeding to examine the risk factors associated with child morbidity and mortality in the specific context of rural Egypt.

6.1 Risk Factors Associated with Diarrheal Diseases and Respiratory Infection

Diarrheal Diseases:

Since the diarrheal diseases are caused by diverse bacterial, viral, and parasitic enteropathogens with differing modes of transmission, 'the relationship between the diarrheal diseases and socioeconomic and environmental variables can be determined only if the epidemiology of the diarrheal diseases themselves is better understood,' (Black, 1984: 141). According to Black, until recently, studies of childhood diarrheal disease in developing countries had been able to detect a potential causal agent in less than 20% of stool specimens from children with diarrhea. Recent developments in the detection of enteropathogens however, have assisted understanding of the epidemiology of the diarrheal diseases in developing countries and allowed a better

description of the modes of transmission of specific types of diarrhea, (Black, 1984).

Among the bacterial pathogens, diarrheas due to E.Coli and Shigella are particularly common in developing countries. Among the three groups of viruses which have been identified in clinical research, rotaviruses appear to constitute a high percentage of the serious sporadic diarrheas of young children. Of the parasitic causes of diarrhea, E.histolytica and Giardia Lamblia are regarded as the most important. Environmental hazards include limited and contaminated water supplies, inadequate fecal disposal and unhygienic home conditions, (Black, 1984).

In a two year study at the CDD research center in Bangladesh, which provides the most complete information on the etiology and epidemiology of diarrhea in developing countries, dehydration was most common in children with E.Coli & rotavirus and illnesses associated with these two enteropathogens accounted for 77% of deaths. Thus the majority of diarrhea related deaths resulted from enteropathogens strongly associated with dehydration. Shigella was the pathogen most often associated with prolonged (greater than three weeks) diarrhea and was found to have the strongest effect of all types of diarrhea on the linear growth of children in Bangladesh. Thus E.Coli, rotaviruses and Shigella are the most important causes of severe diarrheal disease and death and their patterns of transmission, direct person-to-person contact through fecal-oral route or ingestion of contaminated food or water, are common to most of the other enteropathogens according to

epidemiological studies, (Black, 1984). Furthermore, because of the association of contaminated water and food with E.Coli, the avoidance of fecally contaminated water and attention to hygienic food handling techniques are expected to help prevent its occurrence according to Black, (Black, 1984).

The prevention of Rotavirus infection which spreads by direct person-to-person contact or contact with contaminated objects should be possible through the interruption of fecal-oral transmission of the virus according to Black, (Black, 1984). Sanitary waste disposal, avoidance of fecally contaminated water and objects, and in particular hygienic practices such as hand washing would be expected to assist in prevention. However, it seems that natural immunity occurs following one or more illnesses in childhood according to Black, (Black, 1984).

According to the literature, because of their small infective dose Shigella are easily spread from person to person. This fecal-oral transmission can occur by direct contact especially in young children; it can also be transmitted by contaminated food and in areas with poor disposal of feces, flies may carry the bacteria and contaminate food. In developing countries children aged 2-4 have the highest rate of Shigellosis. Transmission should be preventable by attention to personal hygiene, especially hand-washing after a bowel movement or contact with feces and proper handwashing has been found to reduce the spread of infection in Bangladesh, (Black, 1984). Pathogens like Shigella, rotavirus and G.lambliia are infectious in small doses and can be spread via contaminated hands or household objects. Interventions to

interrupt transmission of the enteropathogens may include safe disposal of human feces or protection of water supplies from contamination. According to the epidemiological literature, the most promising interventions may be those which focus on the household environment and the immediate risks to which the child is exposed. Thus potentially successful areas of intervention include improvements in the hygienic quality of foods and reductions in the degrees of household fecal contamination. The availability of water has been found to be inversely correlated with *Shigella* incidence in some areas but it appears that personal hygiene is more important than the amount of water available, (Black, 1984).

Water, Sanitation and Child Morbidity:

Although only recently have a series of epidemiological studies shown that the details of access to water determine the incidence of several infective diseases, the relation of personal hygiene to health has long been recognised. Since the supplies of water available greatly influence facilities for disposing of human excreta and these, in turn, affect the spread of many important diseases, water and sanitation have come to be regarded as inseparable in the prevention of disease historically and in the contemporary context of the developing world, (Feachem, McGarry & Mara, 1977).

As indicated above, water-washed diseases such as diarrhea result from inadequate water for a minimum level of personal hygiene. 'Where there is very little access to sufficient water

supplies, either because of distance or because the effort to bring sufficient quantities to the home is so great, than it may be impossible to maintain reasonable personal hygiene. The lack of personal hygiene facilitates the spread of intestinal infections from one person to another through dirty fingers. Thus water-washed infections result from lack of water for washing or personal hygiene and their prevention depends on availability, access to and quantity of domestic water rather than its quality,' (Feachem et al, 1977: 7-8).

According to the literature, 'it is not possible, nor is it desirable, to separate water-related diseases completely from those affected by sanitation,' (Feachem et al, 1977: '8). This is primarily because all of the water-borne and some of the water-based diseases depend on fecal access to domestic water sources. Thus their transmission may be prevented by safe disposal of feces as well as by protection of the water supplies. With respect to water-washed intestinal infections, there is considerable evidence that these may be reduced by better sanitary conditions which reduce soiling of the hands since all of the water-washed infections that can be spread from person to person by way of water supplies may also be more directly transmitted from feces to mouth or by way of dirty food. 'When this is the case the infections may be reduced by the provision of more abundant or more accessible water of unimproved quality,' (Feachem et al, 1977: 12). However, like many of the water borne and water-based diseases, water-washed diseases depend on access of human wastes to water or to people's mouths so that these may also be sig-

nificantly reduced by measures aimed at improving waste disposal as well as water supply. This applies particularly to diarrheal disease due both to bacteria and to viruses as well as protozoa. Thus the diarrheas, which are the most important water-washed diseases in this case study area, and are very important in relation to child mortalities, result from a variety of infectious agents but fall to a low incidence under good hygienic conditions, according to the wider literature, (Feachem et al, 1977).

In the epidemiological literature the question immediately arises as to what is an adequate volume of water for hygienic purposes in order to prevent the occurrence and spread of water-washed infections such as diarrheal disease. Unfortunately, no accurate answer is available. 'It seems clear from the epidemiological data that a few liters is not enough and that several hundred liters is more than enough but this is a great range. In practice it appears that unless water is piped into a home, water use is not at an optimal level for health. Furthermore when supplies are very short the successive re-use of water for washing people and utensils may be worse than substituting sand for cleaning utensils,' (Feachem et al, 1977: 13). Although there is little consensus as to the quantity of water necessary to minimise exposure to disease, there is widespread recognition of its importance and, according to WHO, 80% of diseases in the developing world are related to unsafe drinking water and inadequate hygiene, (El Katsha, Younis, El Sebaie & Hussein, 1989).

Airborne Infections and Associated Risk Factors/ Acute

Respiratory Infection:

In Egypt, ARI represents the second leading cause of child mortality after diarrheal disease. Unfortunately, as seen in Chapter 1, the evidence on risk factors associated with ARI in developing countries is extremely limited. Thus although among the international health community increasing attention is being focused on respiratory disease, in comparison to the diarrheal diseases, there is little information about the epidemiology of ARI in developing countries. However, in addition to age, nutritional status has been found to affect ARI and evidence from the most extensive survey on this relationship in Costa Rica indicates that nutritional status significantly affected rates of pneumonia and doubled case fatality rates for each decile below 80% weight for age, (Stansfield & Shepard, 1993).

With respect to the relationship between household resources and respiratory infection, studies from the developed world demonstrate a clear relationship between housing conditions, as measured by household size, number of rooms, number of persons per room and the incidence of respiratory infection. Finally, because many respiratory diseases can be treated with drugs, lack of health care is also a risk factor for mortality from ARI, (Stansfield & Shepard, 1993).

Summary:

In the wider analytical and empirical framework for the study of child survival, a summary of the epidemiological literature demonstrates that the intermediate determinants of health include 'environmental contamination through four categories crucial in the transmission of infectious agents: air - the route of spread for the respiratory and many other 'contact' transmitted diseases; food, water and fingers- the principle routes of spread for diarrheas and other intestinal diseases ... these intermediate processes do not exist independently of the social conditions which structure them however,' (Mosley, 1984: 27).

The following section examines the conditions which surround the intermediate determinants of health in Menofia focusing on water and sanitation resources, their usage and their implications for child health in the specific context of rural Egypt. It presents a descriptive summary of health-related resources, their relationship to environmental contamination and to child health in Lower Egypt. The background information for risk factors associated with diarrheal disease and, to a lesser extent respiratory infection, in this section is primarily based on ethnographic research and epidemiological surveys conducted in Menofia by the SRC, (El Katsha et al, 1989).

6.2. Risk Factors Associated with Diarrheal Disease and Respiratory Infection in Rural Lower Egypt

Water Sources and their Utilisation in Rural Lower Egypt:

An anthropologist commenting on the frequency with which contamination activities are mixed with food preparation and water handling in Menofia, relates these observations in her findings:

'It was quite common to see women moving directly between such duties as preparing dung for fuel, wiping a baby's bottom with a wet hand, cleaning the toilet or animals and their quarters and preparing and serving meals with direct hand contact, washing dishes or dipping water from a storage container', (Weidner-Read, 1986: 86).

In the epidemiological literature, these actions represent at least five potential routes for the transmission of diarrheal disease pathogens and suggest that there is considerable need for the extension of health education messages in the prevention of diarrheal disease in Menofia. On the other hand, a significantly contrasting and more realistic perspective is derived by measuring 'the sanitary discipline necessary to minimise the risks of exposure and the enormous daily burdens this places on household members where water supply and waste disposal are deficient, (Shorter, 1993). The authors of a study in Manshiet Nasser provide the following estimate of the effort required to minimise the risks of exposure to disease when water is taken from storage containers and waste disposal is lacking:

'To wash hands with soap requires a second person to pour water and a basin of water to be disposed of adequately subsequently. Adult labour to do this after each defecation and before taking food for children, ... as well as for themselves after handling diapers... is surprisingly demanding. At a minimum, thirty hand washing operations per day for a mother and her children all of them requiring pouring and disposal of waste water. Allow three

minutes for each operation and the total is about one and a half hours per day, most of which requires the time and oversight of a busy mother,' (Shorter, 1993: 45).

With these observations and constraints in mind, the following section presents descriptive material on behavioral patterns related to the handling and utilisation of water for household purposes and the environmental conditions and constraints which determine these processes in Menofia. It brings forward the household variables and their potential consequences for the intermediate determinants of child survival with which this chapter is concerned, namely, environmental contamination and the prevention of disease. It equally lays the foundations for observing the mechanisms that underlie health processes in this setting and how they are brought into play in the context of dense living conditions and lack of basic water and sanitation services which hinder the adoption of satisfactory hygienic practices within the home.

A. Water Sources and their Usage:

This section examines the different sources of water common to the Delta villages of Lower Egypt and some of the ways in which, and for which, water is used. As in most communities with scarce water resources, a complex water economy has emerged whereby different kinds of water are allocated for different tasks, (El Katsha et al, 1989).

Each village in Menofia has a public water system involving an elevated tank and pipes connecting some homes, but also public water standpipes. There are also private hand pumps and the canals.

Each of these sources of water has different implications for health and further implications which result from the disposal of waste water and of waste in general.

In general, however, the majority of villagers in Menofia have access to piped water. A public distribution network supplies villages either through public standpipes or through house connections. According to the SRC, water analysis indicates that some of the piped water sources are polluted during the summer months. Furthermore, hand water pumps are affected by subsurface contamination due to the installation of the hand pumps close to sources of pollution and contamination.

Irrigation canal water continues to be used heavily for washing clothes and utensils due to its soft properties in comparison to the ground water that supplies the piped and pumped sources. Unlike ground water, canal water is highly contaminated with fecal coliform and not suitable for domestic purposes, especially drinking. At the same time, in most villages the ground water table is less than one meter below the surface and it has risen recently due to the use of more water for irrigation and the deterioration of the drainage system. The high water problem is an acute problem in most of these villages.

1. Public Standpipes: With the introduction of piped water in Menofia, public standpipes were installed in different areas within each village cluster. The standpipes were established close to canals where excess water could drain easily, and along main roads. Although designed with multiple taps, most have only one

**Table 6.6: Loss-Makers and Profit-Makers,
Major Subsidised Industries 1983-7**

Year	Total no. of enterprises	of which, lossmakers according to:			
		Profit 1	2	3	4
Fertiliser enterprises - industry 123					
1983	7	2	2	0	0
1984	7	3	3	0	0
1985	6	3	3	0	0
1986	7	4	4	0	0
1987	7	2	2	0	0
Meat enterprises - industry 231					
1983	24	24	24	0	0
1984	23	19	20	1	2
1985	24	24	24	0	0
1986	24	24	24	0	0
1987	22	22	22	0	0
Poultry enterprises - industry 233					
1983	13	1	1	0	0
1984	14	0	0	0	0
1985	15	2	2	0	0
1986	15	0	0	0	0
1987	12	1	1	0	0
Grain enterprises - industry 241					
1983	13	13	13	0	0
1984	11	11	11	0	0
1985	10	10	10	0	0
1986	7	7	7	0	0
1987	5	5	5	0	0
Sugar enterprises - industry 243					
1983	12	3	3	0	0
1984	10	5	5	0	0
1985	11	3	3	0	0
1986	11	0	0	0	0
1987	11	1	1	0	0

(El Katsha et al, 1989).

House connections reach all concrete houses which also have septic tanks. The chemical parameters of this water source are within Egyptian standardized values according to the SRC. On the other hand, water samples were highly contaminated with bacteria and parasites especially those of stored water according to the SRC findings.

3. Hand Water Pumps: Privately owned hand pumps are common in rural Egypt. The hand pumps are dug in the soil to different depths depending on the nature of the soil. Usually a pipe is inserted until it reaches clear unsalty water which might be 15-30 meters below the surface. Often however, they are not dug deep enough to ensure that the water is not contaminated. The average cost for installation is £E200. Villagers install hand-pumps either in their backyard or in the street for use by neighbors, and repairs are attended by the owner. They are referred to by the name of the owner and the village. Most of the hand pumps have a cement platform for cattle watering and in some areas not served by piped water women rely on them extensively. However, some owners remove handles so the neighbors don't use them and dirty the surrounding area, (El Katsha et al, 1989).

The areas surrounding the handpumps are in better condition than the areas surrounding the standpipes. Respondents who use both say they are careful because of fear of the owners but the standpipes don't matter because they are government owned. Chemical

parameters fall within standards but the handpumps, which draw from sub-surface layers, were found to be contaminated with bacteria and parasites. Therefore the water from hand pumps is not suitable for drinking according to the SRC, (El Katsha et al, 1989).

4. Irrigation Canals: The canals surrounding the villages are mainly for irrigation. Nevertheless, women prefer to use the canals for chores which require abundant water such as washing utensils and clothes. The canals are also used for the disposal of solid waste and sullage as well as drainage from the public standpipes. In some villages, the Ministry of Works has installed concrete steps in different areas by the bank of the canal and this encourages women to wash there. The main reason women use the canal however, is the severe problem of the high ground water level and the lack of a sewerage system which means piped water sources are unsuitable for tasks which require substantial water such as laundry and utensil washing. It is also softer than ground water which produces less lather formation and hinders the proper cooking of legumes. Canal water is highly contaminated with bacteria and parasites due to waste disposal in the canals according to recent surveys and therefore cannot be used for drinking purposes, (El Katsha et al, 1989). Thus despite the suitability of canal water from the chemical point of view, it is not suitable for domestic purposes. Furthermore, the possibility of contracting bilharziasis associated with surface water contact is always present.

In contrast to the handpumps, privately installed piped public

water sources in the villages are derived from deep wells. Water is pumped to elevated tanks from which water is distributed to the public standpipes and to some houses. However, data show that the water from the public tanks does not meet sanitary requirements. The looseness of the cover, the irregularity of tank cleaning and the lack of use of disinfectants during the summer season all affect the characteristics of the stored water and suggest the possibility of contamination of water during storage according to the SRC, (El Katsha et al, 1989).

With respect to privately owned hand pumps, unlike construction of public water sources which is supervised by the health sector, these are not subject to formal supervision or guidelines. In addition, the public water sources usually draw their water from deep wells that are remote from surface contamination whereas the privately owned pumps are shallow ones and hence are more subject to surface contamination. Subsurface contamination is more frequent in private water pumps because these pumps can be constructed anywhere in the house according to the owner's preference rather than sanitary standards. Survey research indicates that some of these pumps are very close to sources of contamination such as latrines and solid wastes. Owners are unaware of the health hazards that might result from being close to contaminated areas according to the SRC. Cemeteries are an additional hazard. Although these are usually located on an elevated area to avoid the high ground water table, they are one of the causes of the pollution of the ground water particularly for privately owned shallow hand pumps because of

the septage of pollutants from the decomposition of the dead bodies, according to the SRC. According to Egyptian law, all cemeteries should be located at least 200 meters away from residential areas and 100 meters from ground water sources. In Menofia however, these regulations are not met with regard to privately installed hand pumps according to the SRC, (El Katsha et al, 1989).

The use of certain water pumps more than others for domestic purposes is governed by the palatability of the water such as taste, odor and clarity. In terms of contamination however, these criteria often have undesirable consequences for health. Thus according to the water and sanitation survey carried out by the SRC, the preferred water pump in one village, for example, has less dissolved salts, chlorides, sulfate and turbidity than the other pump and therefore has a more agreeable taste and odor. At the same time however, the preferred water source had a total bacteria count of 320/ml and fecal coliform bacteria of 45/100ml while the other pump had a total bacteria count of only 40/100ml and was free from any fecal coliform bacteria. Therefore although the more favored first pump is acceptable from the chemical point of view, it is less favorable from the biological perspective, (El Katsha et al, 1989).

B. Water Sources and Storage:

Women play key roles in water use and management throughout the developing world. In Menofia, women are similar to those in other developing countries in that they are the main procurers

and managers of water for domestic and personal use. In each pattern of water utilisation, various considerations influence their decisions in their particular circumstances. Thus similar to findings in other studies; 'women in their choices of water sources make reasonable decisions based on their own criteria of access, time, effort, water quality, quantity and reliability,' (Wijk-Sijbesma, 1985, cited in El Katsha et al, 1989: 70). In most villages, almost all water contact procedures applied for domestic use are sustained by careful and rational decisions.

With respect to child health, since the female as mother and house keeper determines the appropriate hygienic use of water, her participation is vital in efforts to halt the cycle of infections, especially diarrheal disease, resulting from the fecal contamination of foods and household water. Furthermore, women may also function as intermediate hosts between infection and disease transmission which may be a consequence of behavioral patterns relating to water use and sanitation. Thus their access and usage of water and sanitation sources is crucial in understanding risk factors associated with the intermediate determinants of child health.

Water contact occurs on a daily basis for at least one or more women in each household. At least one type of water source: (house connections, stand pipes, canals and hand pumps) is fairly close to most inhabitants but perhaps not the particular source they would prefer to use. However, women generally do not walk more than 300-500 meters to reach each of the three sources, (El Katsha et al, 1989). The following section examines the relative

importance of each water-contact practice; perceptions and behaviors related to existing water conditions and the environmental conditions which determine these. The use of water for domestic purposes involves drinking, cooking, laundering, washing utensils, house cleaning and watering of animals.

Drinking Water: Drinking water receives the best care possible with respect to source, fetching and storage according to ethnographic research in Menofia. The perception of clean water is that it must be clear and odorless; villagers are usually concerned with the taste and smell of their water. The responsibility of fetching and storing water is usually given to the most energetic women and the cleanest; in the extended family, the mother-in-law usually delegates the most appropriate candidate regardless of status, (El Katsha et al, 1989).

Most villagers prefer to use piped water for drinking either from installed systems or from the public standpipes. Some resort to hand pumps because of distance or irregularity, but the majority believe that piped water is most suitable for drinking because it is clean since it is treated; it is free from microbes due to the disinfectants the government adds to ensure its purity; it does not develop a bad taste or odor when it is stored for a long period of time unlike hand pumped water and it is accessible reliably. For those who rely on standpipes, however, there are numerous constraints:

- access is based on a first come, first served basis except for the elderly;
- low water pressure is common therefore filling water containers is a long procedure;

- it takes a long time to wash the container at the stand prior to filling;
- the provision of water is irregular; water is often cut off and women waste their time waiting for it to return, (El Katsha et al, 1989).

'In normal circumstances, however, the fetching of water does not exceed 20-30 minutes per load, and, in some cases, women may make several trips per day depending on consumption needs; consumption increases in summer months,' (El Katsha et al, 1989: 45). Almost all women use similar containers for fetching water; these are made of galvanised tin with a wide opening with no cover and a capacity of 20-22 liters. 'Women are generally aware of the importance of drinking clean water consequently they take great care to ensure minimum contamination while fetching water,' according to the SRC, (El Katsha et al, 1989: 46). The first step at the standpipe is to wash the container with soap and rice hay and rinse it thoroughly before filling it. 'The women also avoid times when other women are washing in order not to have contact with used water and other women respect this and allow them to advance their turn in filling their containers,' (El Katsha et al, 1989: 46).

According to the SRC, traditional storage practices continue even when the water supply becomes more accessible for cooling purposes. When water reaches the house the distribution and storage procedures remain under the control of the women of the house. Containers vary according to their function: The containers used for fetching water are not normally used for storing and containers used for cooling differ in material, shape and size from those used in storage, (El Katsha et al, 1989). They

are made of clay, glass or plastic and are usually narrow necked while those used for storage are larger, have a wide opening and are made of aluminum, zinc, galvanized tin or copper.

The Ollah is the oldest and most traditional cooling container in Egypt. All household members use the Ollah extensively regardless of whether there are taps in the house or not and they are refilled frequently. In most cases they are individually covered with a plastic cover or all together with a piece of clean cloth. The senior female is responsible for cleaning the Ollahs; from the inside they are rinsed with a little water before refilling; once a week they are cleaned from the outside with red brick dust or soap and water. Ollahs are used for communal drinking and are refilled from stored drinking water which is scooped with a plastic or aluminum cup. According to the SRC survey, analysis of water samples of water stored in the Ollah showed that they had less bacteriological contamination than water stored in the large containers. These were found to contain no fecal coliforms which may be attributed to their small capacity which encourages frequent cleaning, (El Katsha et al, 1989).

The Zir is a clay jar also extensively used as a water cooling container. The Zirs are less popular for cooling and are now used more for storing water according to the SRC. Whenever one drinks from the Zir the entire hand is dipped into the container using the cup available. These are washed and refilled in the same manner as the Ollah but less frequently because of their larger storage capacity, (El Katsha et al, 1989).

For storing drinking water other containers are also used. These are predominantly made of aluminum either with or without a tap attachment. All are covered with a loose or fitted cover and their capacity is 30 liters. The total bacteria count and fecal coliforms are higher in stored water than in tap water, according to the SRC, (El Katsha et al, 1989).

In sum, the storage of drinking water in rural Egypt is widely regarded to be a significant risk factor in the transmission of diarrheal disease. In general, most households in these communities store water; even when they are connected to the water network, because of frequent cutoffs or for cooling purposes. As indicated above, water is typically withdrawn from these containers by dipping, and is thus frequently subject to contamination by fecally polluted hands. Even when drinking water containers have taps or covers, the family ingests contaminants from other unprotected containers through the washing of vegetables and dishes.

A comprehensive report on the environmental hazards to health which was based on examinations of living conditions and stool samples of 12,000 persons in 35 villages in Egypt found the single most important transmission route for intestinal parasites and diarrheal agents to be the household water storage container, the Zir, (Miller, 1981, cited in El Katsha et al, 1989). Furthermore a study of the bio-chemical quality of water stored in the Zir in a village in the delta where all households had both piped water and latrines, found that 34% of the samples contained parasitic and bacterial contamination, (El Sebaie et al, 1981,

cited in El Katsha et al, 1989))

C. Domestic Usage of Water Sources - Domestic Hygiene and Control of Environmental Contamination:

Most of the utensil washing is done outside the houses in the canals or by pumps and standpipes except for families in concrete-roofed houses who have installed water pipes. Used water in the majority of cases is disposed of in the canal or down the street to avoid overflowing of septic tanks. Women also predominantly use the canal for laundry regardless of whether they have access to piped water. This is because washing at home requires several containers and takes a great deal of space in the house; fetching water for laundering is one of the toughest and most time-consuming tasks and entails collecting and going back to the canal to get rid of used water because throwing used water into the street bothers the neighbors. Disposal of grey water is a problem for households that lack working sewage connections which constitutes the majority of households in these villages. Although stringent rules govern disposal of water especially on laundry days, it is widely agreed that the workload is lighter at the canal, as one respondent indicates; 'If I wash at home I have to walk back and forth at least four times to carry the clean and dirty water since I have no water at home,' (El Katsha et al, 1989: 54). (Educated and professional working women are less inclined to wash at the canal, however, due to their social position or that of their husbands).

The extent to which water is used for house cleaning depends upon the floor type. For houses with cement floors, water is used

since floors are tiled or plastered with washable material. In adobe houses hardly any water is used since they have dirt floors; water may destroy the walls which have no foundation and may add to the humidity that already exists in adobe houses, (El Katsha et al, 1989). There is no preference as to the water used for cleaning houses: the majority use leftover water that is at hand. Although the Menofia research did not examine house cleaning procedures, research among rural inhabitants of an urban settlement with similar water constraints found that cleaning is done on a weekly basis and sweeping is done daily:

'Housecleaning is a comprehensive undertaking which is done either in full or not at all on any given day. Once brought to the required level of cleanliness the condition of the household is generally ignored until another comprehensive cleaning. There is no maintenance with women peeling vegetables onto the floor and only pushing the peels away and deterioration sets in almost immediately. Nevertheless this state is generally defined as clean as there is every intention of returning back to the hygienic state after a certain interval,' (Shorter, 1993: 49).

In rural Egypt, households with livestock and poultry, traditionally essential for both household consumption and income, include water buffalo, cows, donkeys, goats, sheep, and rabbits which are kept in the Zreeba. This consists of a room within the house with an entrance door opening into the middle of the courtyard. Zreebas are more common in adobe houses because red brick houses have raised foundations which make it difficult for animals to enter; thus they have a separate room with an independent entrance for large animals. In the adobe houses, because Zreebas have no separate entrance, animals and people come and go by the same door and contact with animals is closer.

According to the SRC, cleaning the Zreeba takes priority

over all household tasks and this includes removing dung for dung cakes and replacing dirt wet with animal urine with dry dirt. Wet dirt is usually piled in the corner until it accumulates and is then carried to the field as fertiliser every 3-4 days, (Katsha et al, 1989). Water is used for cleaning the feeding and watering containers, and, as with water sources for cleaning houses, there is no discrimination as to the source used for cleaning Zreebas. At the same time, the close contact with these sources of contamination, particularly dung cakes, among mothers is hypothesised by the SRC to represent an important source of the transfer of diarrhea pathogens to infants and children, (EL Katsha et al, 1989).

D. Solid & Sullage Waste Disposal:

Based on the research conducted by the SRC in Menofia, the existing facilities and the standard of community hygiene within the villages indicate that they suffer from :

- pollution of most water sources;
- lack of maintenance of water sources;
- lack of a proper disposal system for solid wastes and sullage, and;
- lack of a sewerage system, (El Katsha et al, 1989).

Like most rural areas in Lower Egypt, the majority of villages in Menofia have no sewerage system. The only available system for sewerage evacuation is administered by the village council serving all twelve villages in the area. The evacuation is done by a large truck equipped with a motor for suction which serves the area every 10-15 days and costs approximately £E2. Mosques, schools and health units have priority for this public utility and pay no charge for this service. Theoretically,

villagers residing along the main roads may obtain a similar service if time permits. However, few have any chance of receiving this service and most households rely on the private sector, (El Katsha et al, 1989).

Private emptying is carried out by a few out-of-town labourers according to the SRC. Labourers empty septage tanks with buckets attached to long ropes which are then discharged into a donkey-drawn cart. Since these are small, it often requires ten or more cart loads before the tank is empty. The labourer then usually dumps the septage into the nearest canal or drain despite the fact that the disposal of any waste material, especially septage, into the canals is strictly forbidden by Egyptian Law. The cost for each load is £E5 or more. Thus the principle technology of sewerage is private pits that are cleaned periodically for a fee and the contents are disposed of by buckets in close proximity to the residential areas, (El Katsha et al, 1989).

Solid Waste:

There is no system for solid waste or sullage collection in some villages while in others there is a regular solid waste collection system which consists of a large cart pulled by 2 mules and passes daily down the main streets in the village. Solid wastes are disposed of mostly in the streets, canals, fields or burned in the oven; the first two methods causing fly breeding which constitute a significant health hazard according to the SRC, (El Katsha et al, 1989).

The villages generally have their own system of recycling most of their waste material however, since food leftover is used for poultry and waste material for fuel. Empty containers are thrown either into the canals or into the streets as are dead animals, feathers and dirty water, (El Katsha et al, 1989). It is interesting to note here that, according to the SRC and to the findings of this survey presented in the following chapter, the villagers stress the need for a sewage system and for the collection of dirty water from houses as their most pressing problem and not the problem of solid waste disposal.

'Long ago a donkey cart used to pass by the different houses to collect used water; we wish this system would resume. We feel at the moment that this is more important than garbage collection because this is one of the main reasons that forces us to wash in the Canal'...'The content of the garbage is not a problem because we use most of it but the employed women who raise no poultry are the source of trouble since they get rid of all their garbage in the streets instead of the canal and their food consumption is different, they use more canned food. They are responsible for the accumulation of solid wastes that cause the bad odor in the streets,' (EL Katsha et al, 1989: 38).

Thus the disposal of water which usually includes sullage, (wash water), septage, (urine and stool), solid wastes and animal wastes, (manure), pose differing degrees of difficulties although sullage and septage disposal are the most urgent problems in most villages.

In a number of villages the high ground water table causes flooding of latrines and the formation of stagnant water ditches. Stagnant water and stagnant pools are used heavily for sullage disposal purposes. In some villages, stagnant water may also be due to both the high ground water table and the disposal

of sewage by infiltration through the soil from the different types of latrines. 'These swampy areas are located in the residential parts of the village and are breeding sites for mosquitoes whose larvae have been recovered from the stagnant water ditches. More significantly, diseases which can be transmitted through the unsanitary disposal of these wastes include viral diseases such as viral hepatitis; bacterial diseases such as typhoids and bacillary dysentery, and parasitic diseases such as amoebic dysentery,' (El Katsha et al, 1989: 50). In addition, contamination of ground water occurs through the chemical and biological contents of these waters. 'This is especially dangerous for the privately owned shallow hand pumps,' (El Katsha et al, 1989: 50).

In many villages throughout Lower Egypt as in low-income urban settlements, it is rare for households to have both water and sewerage. 'If water and sewage are taken together as a single independent variable because their effectiveness depends upon their working together, it is not difficult to understand how diarrheal diseases which are spread by the fecal-oral route, are more likely to be transmitted in families that have only a limited supply of water and no proper disposal facilities. The impact of handwashing, particularly after defecation, which has a significant effect on the spread of many agents of diarrheal disease is partially dependent on the availability of good sanitary infrastructure in the household which facilitates good hygienic behavior,' (Shorter, 1993: 60). As such a 'clean water supply close to the home and a hygienic toilet are believed to be among the corner stones of the environmental and social change that produced the dramatic

decline in infectious diseases in Europe and North America over the past 130 years,' (Feachem, 1983 cited in El Katsha et al, 1989: 62). In the current context of the developing world, 'excreta disposal is the most important area that needs to be improved, since it has a direct effect on the mechanism of disease transmission,' (Feachem, 1983 cited in El Katsha et al, 1989: 62). This section examines the manner of excreta disposal in the studied villages and its implications for child health.

Latrines:

Over 90% of households in Menofia have some sort of latrine for the disposal of excreta. However, according to Katsha et al, 'the fact that most houses have latrines does not imply that all family members use them. Observations of the habits related to the use of latrines indicate that these habits are affected by the age and sex of the individual as well as the type of house they live in,' (El Katsha et al, 1989: 62). In adobe houses these are used mainly by women, according to the SRC; (Home facilities being inadequate; men are more inclined to use the facilities at the mosque) and pre-school children are instructed to defecate in the street. This represents an important risk factor in the transmission of diarrheal disease according to the epidemiological literature, (Taylor et al, 1993).

Latrines are usually situated in the inner section of the courtyard below the staircase going up to the roof. They consist of a dark unventilated room 150 by 150 cm in size; the latrine opening is approximately 30cm in diameter and is located in the

middle of the room; it may be round, triangular or oval. On each side there is a brick where feet rest while squatting; the floor is usually plastered with cement and a tin container is placed inside or by the door for rinsing after defecation, (El Katsha et al, 1989).

Women clean the latrines once a week or every other week, according to the SRC, (El Katsha et al, 1989). Little water is used for cleaning the area surrounding the hole because the disposal system is not efficient. Since there is no drainage, it is not possible to absorb more than a very small amount of water and in order to avoid disruption of the mud walls which might be affected by the seepage of water, little water is used in cleaning according to El Katsha et al, (El Katsha et al, 1989).

General hygienic standards of the latrines are extremely poor according to the SRC. Latrine openings are left uncovered; they are poorly lit, unventilated and swarming with flies and mosquitoes and compared to the other parts of the house, people were least concerned with the standard and cleanliness of the latrines according to the SRC, (El Katsha et al, 1989).

In the redbrick houses with concrete and wooden roofs where the latrines are similar but with improved disposal systems, women continue to be the main users of the latrines but men are more inclined to use home facilities than the mosque while children continue to defecate in the street. The latrines in these households are situated in the rear of the house and are similar in size but doors are well-fitted and contain better ventilation.

When water is connected to these houses a faucet is placed in the latrine for use after defecation. These are also cleaned once a week, however, water is used cautiously to avoid overflowing of the tank. Thus conditions are better in these homes but rate below hygienic standards since women are subject to the same environmental constraints such as lack of a disposal system and limitation of water use according to the SRC, (El Katsha et al, 1989).

A common type of latrine in the villages covered by the SRC survey is the pit latrine. It consists of a hand dug rectangular or circular hole in the ground; the walls are lined with red brick and the pit is covered with a slab. After long usage, the solid contents of the latrine have to be emptied. 'The pit latrines are cheap, simple, practical and easy to construct in the soil of the delta region. Moreover the solid contents can be utilised as manure. On the other... hand they are odorous, attract flies, and contaminate the ground water, especially in places where the ground water table is high, (El Katsha et al, 1989: 64). Another type of latrine is a barrel placed in a pit dug in the ground. However, cleansing by water is not feasible due to the small capacity of this type of latrine. This attracts flies and discourages usage according to the SRC, (El Katsha et al, 1989). Finally, least used is the large sized septic tank flush, frengi, which is found in schools and mosques.

E. Sanitation and Hygiene:

Physical Environment:

Numerous health surveys have noted that not much attention is paid to the conditions of the streets and alleys by the villagers or the other responsible bodies in Menofia, (El Katsha et al, 1989). In the streets, stagnant water, solid wastes, animal dung and dead animals, empty containers and children's feces may be encountered. There is no regular system for cleaning or sweeping streets. Occasionally, a fine of £E2-5 is collected from villagers who throw dirty water or pile manure in the streets. However, the level of concern with environmental conditions at the community level is best summarised by one respondent in the SRC survey who stressed that: 'We usually clean our street when there is a wedding or a funeral,' (El Katsha et al, 1989: 39).

In villages where there is no regular solid waste collection or household waste containers, the impact is reflected in the fly index. The relationship between the fly index outside the houses and the presence of a waste container indicates that areas where houses do not use containers and where the residents throw their waste into the streets exhibit a far higher fly index according to the SRC, (El Katsha et al, 1989).

According to anthropological research in Menofia, general household sanitation indicates a lack of understanding of household and community health impacts of disposing waste into the streets. Furthermore, women do not generally perceive a health impact of allowing food and water waste to remain in the house

for extended periods of time which are both common practices, (Weidner-Read, 1983; El Katsha et al, 1989).

The presence of cattle, sheep, and poultry inside the house may be associated with some of the health hazards prevalent. The relationship between a separate room for animals and the fly index is again illustrated in data from the SRC in Kafr Shanawan: houses which had a separate room for animals were found to have a fly index of 163/sq.m. as compared to the high index of 232 in houses that had no such arrangement. Thus houses maintaining a separate room for animals show a lower tendency towards some disease transmission than those raising animals in the same house according to the SRC. Respiratory, gastrointestinal, eye and other febrile diseases are especially high in the latter houses. An ethnographic survey in Menofia found that many respondents saw a relationship between health and the presence of flies and other insects yet most did not perceive a relationship between health and the presence of animals.

Furthermore, most respondents did not consider a possible health effect from storing human and animal food together or storing human food with dung fuel even though the practice attracts insects. One anthropologist has noted that it is common to use the same metal pan for washing laundry, feeding animals and serving food without thorough cleaning in between. Furthermore, water containers close to where poultry or mammals are kept record higher total bacterial count and fecal coliforms from those placed away from animals or poultry. This is especially true if the container

is not covered or if water is drawn by dipping the cup into the water; the cup is usually placed where droppings may fall on the cup, (Weidner-Read, 1983).

Numerous health researchers in these villages indicate that the use of animal wastes to make dung cakes which are left in the open to dry is also related to fly breeding in the villages. The making of dung cakes facilitates the spread of fecal organisms. A further health hazard results from children defecating in close proximity: the child is placed on the mothers legs, defecates on the floor and the mother covers the stool with dirt or collects it with some paper and throws it into the street. Pre-school children more commonly defecate in the street, and not by the canal, as is commonly assumed. The epidemiology of E.Coli suggests that human feces, most probably from children, are a major source of infection in these villages, (El Katsha et al, 1989).

With respect to ARI, most of the adobe houses have, in addition to poor sanitary conditions, a high percentage of damp and humidity due to the dirt floors and because of the high ground water table. Damp floors in these houses appear to increase the incidence of chest and droplet infections and in some villages, disease incidence was higher among dirt floor houses. According to the SRC, 'on average, being more damp, having dirt floors, and being poorly ventilated, adobe houses favor breeding microbes and the transmission of respiratory infection diseases,' (El Katsha et al, 1989: 18). The use of butane gas has also been identified as an important potential risk factor in the prevalence of res-

piratory infection morbidity in the wider literature, (Taylor, 1993), and the CSRP survey indicates that the majority of households in Menofia use kerosene and butane gas in cooking, (Langsten & Hill, 1992). Finally, with respect to the transmission of airborne infections, anthropologists noted that sick children are not isolated from other family members, (Weidner-Read, 1983), although it is difficult to see how it would be possible to isolate infected children in these crowded conditions.

Personal Hygiene:

As stated previously, women may also function as intermediate hosts between infection and disease transmission which may be a consequence of behavioral patterns relating to water use and sanitation. Water borne diseases are related 'largely to behavioral patterns that are pursued equally in adobe and red brick houses, irrespective of the economic, educational or occupational backgrounds of the residents,' according to the SRC, (El Katsha et al, 1989: 19). These behavioral patterns are examined briefly here.

Women's concepts of personal hygienic standards in the villages are, in theory, influenced by the teachings of Islam which relates an extensive and comprehensive set of rules and guidelines regarding personal hygiene and sanitation to be followed by all Muslims in their daily life. Muslims are required to wash thoroughly with water after every episode of urination and defecation, and to bathe thoroughly after sexual intercourse and the menstrual cycle. Purification for prayer, which is required

five times a day, consists of an ablution whereby the hands, arms, face, mouth, nose and feet are rinsed three times each with water while the ears, neck and head are rinsed once. It is only necessary to repeat these procedures between prayers if the person has defecated, urinated or flagilated or has had any physical contact with feces or urine, i.e. from children or animals or from cleaning the laboratory, and is therefore impurified. The presence of feces or urine in any area of the house means that the area is impure and prayer forbidden in this location until the area is rinsed with water. The term for impurification in Islam and in colloquial Arabic, 'nigis', refers to a causal relationship between contamination and impurity and any religious practice, including the five daily prayers and reading the Koran, requires that the individual has first rinsed thoroughly in the manner described above. In areas where there is absolutely no access to water, Muslims may use earth on their hands and feet. Due to the frequent contact with feces and urine among mothers with newborn infants, religious scholars stress that the comprehensive ablution above is not necessarily required of these mothers before each prayer if the mother has changed the infant in between prayers and she is merely required to rinse her hands thoroughly after changing the infant, provided the mother herself has not defecated, urinated or flagilated.

According to anthropological research by the SRC, women in the villages are aware of these concepts but rarely put them into practice. They sometimes argued that it is too difficult to remain purified for prayer when there are infants around and therefore

they begin to practice prayers regularly only after the children have grown. With regard to rinsing after defecation and urination, it appears that women generally follow these practices. However, washing hands after defecation is less regularly practiced since many of these women do not practice prayers regularly. Bathing is done once a week and after the menstrual cycle and sexual intercourse according to the SRC, (Katsha et al, 1989).

Other ethnographic researchers in the villages emphasise that, despite their religious knowledge of the association in Islam between impurification and human and animal feces and urine, the women were not aware of the health hazards if the minimum standards of hygiene are not followed, (Weidner-Read, 1983).

Food Preparation / Storage Procedures & Utensil Washing:

In the epidemiological literature, food handling and eating habits constitute important components in the transmission of diseases such as diarrhea which are contracted through the fecal-oral route. In adobe houses, cooking is done in the courtyard where most of the latrines are found and on the dirt floor where poultry may be running around and the Zreeba is close by. Anthropological research in these villages indicates that women do not pay much attention to following proper hygienic measures in relation to food handling and preparation methods, particularly with regard to washing hands before food preparation, and, preparing food on the floor in close proximity to poultry. Furthermore, vegetables and fruits are frequently washed in canal water which may be contaminated with bacterial/

parasitic constituents and increases exposure to gastrointestinal disease organisms, (Weidner-Read, 1983; El Katsha et al, 1989).

Food habits among rural communities generally include eating from a common plate with each family member designated their corner of the plate. In Manshiet Nasser researchers observed that no family member, including children, is required to wash hands before eating but each person is expected to eat from the part of the plate which is directly in front. 'Bearing in mind that weaning is accomplished by moving children directly from breastmilk to family foods without much intermediary provision of special diets, these practices have mixed hygienic effects in protecting child health,' (Shorter, 1993: 44).

In some villages, anthropologists have reported that mothers weaning children dip their forefinger into a dish and then allow the infant to suckle food, (Weidner-Read, 1983). This practice has considerable hazardous consequences for the transfer of infectious agents to infants. Finally, with respect to cooking methods, there is some evidence that houses using fuel such as dung cakes or solid wastes, show a higher incidence of respiratory, gastrointestinal and eye diseases, according to the SRC. These findings show that fuels such as solid wastes or dung cakes, especially if associated with poor ventilation, overcrowding and a high fly index, increase the risk of contracting communicable diseases. This fact may be attributed to the irritating effect of some of these factors on the respiratory system while gastrointestinal and eye infections may be related to the high fly index associated with solid wastes

and dung cakes, (El Katsha et al, 1989).

Summary:

A summary of the anthropological survey findings on the sources of environmental contamination in the villages of Menofia demonstrates that, with regard to water, sanitation and hygiene:

- 'Women believe that water obtained from a pipe is pure and unlikely to transmit diseases. They are not particularly aware that the mode of water use may contribute to its contamination which in turn may be the cause of health hazards,' (El Katsha et al, 1989: 89);
- 'Bringing tap water into the house exacerbates the problem of disposal of sullage and septage caused by the mounting ground table. Therefore women generally use the canals to dispose of solid wastes and sullage because there is no system for disposal,' (El Katsha et al, 1989: 90);
- 'Respondents assume that since the canal water is running, there can be no pollution or harm to health,' (El Katsha et al, 1989: 90);
- 'Most of the adobe houses were observed to have lower hygienic standards than the redbrick houses due to poor ventilation, humidity, lack of septic systems, poorly kept latrines and no drainage system for installed piped water. They are therefore particularly susceptible to the breeding of microbes leading to diseases that are not directly related to water use. On the other hand, water-borne diseases rely to a great extent on patterns and constraints that apply equally to red brick and adobe houses, irrespective of the educational, economic or occupational background of the resident,' (El Katsha et al, 1989: 90);
- 'There is no specific area for cooking regardless of house type; it takes place on the floor close to animals and the feces of children... and no hygienic measures are taken with respect to processing and storing of dung cakes such as handwashing,' (El Katsha et al, 1989: 90);
- 'Handwashing prior to food handling, infant feeding, or after defecating was not performed by most women as a regular practice of daily life,' (El Katsha et al, 1989: 90), and, finally;
- Respondents in one anthropological survey could not foresee how

the management of their household chores such as washing or getting rid of used water could be strongly related to the sanitary conditions prevailing in their local environment, (Weidner-Read, 1983).

Despite this fact, however, the SRC anthropological surveys conducted in the villages of Menofia conclude that behavioral patterns relating to water and sanitation are directly related to other environmental aspects which are severely lacking, including; sewage systems, solid and sullage waste collection systems, and the lack of hygienic septic tank evacuation.

In sum, this review has attempted to illustrate some of the environmental hazards to which children in Menofia are exposed. It has presented descriptive material from anthropological research on household resources, primarily water and sanitation, and the environmental conditions which determine their usage in rural Lower Egypt. To what extent these sources of environmental contamination represent crucial intermediate variables in child survival and are in turn determined by socio-economic variables at the individual and household level are crucial questions in the literature on the determinants of child health. Although this review of anthropological and epidemiological literature suggests that these linkages are more or less obvious, the determinants of child health literature demonstrates that these relationships are neither straightforward nor consistent. The following section examines the relationships between household resources and child health in the health literature before proceeding to present the empirical findings of this research in Menofia.

6.3 Household Resources and Child Health: Aggregate Evidence

Child mortality in the developing world, as emphasised previously, represents 'the end point in a chain of repeated occurrences of illnesses with little time between them for adequate recovery and catch-up growth,' (Shorter, 1993: 30). However, despite widespread consensus concerning the chronic cycle of recurrent infections and/or related malnutrition as the underlying cause of child mortality in the developing world, (see Chapter 1), there is less consensus as to the relative significance of the intermediate variables involved in this process. With respect to water and sanitation, for example, in the health literature, there are numerous studies which demonstrate expected net associations between household water supply and/or toilet facilities and mortality; (Haines & Avery, 1982; Zachariah & Patel, 1982; DaVanzo et al 1983; Martin et al, 1983; Trussell & Hammerslough, 1983, cited in Cooksey et al, 1986), and others which find little effect between child mortality and water supply and sanitation, (Stephens, 1984, cited in Cooksey et al, 1986). In Egypt, weak effects according to the DHS data have been cited in the literature at the national level with respect to toilet facilities and child mortality, while the provision of piped water facilities is positively associated with higher survival probability in early childhood. Thus although there is general agreement that the social production of health involves multiple factors 'situated at successive layers of proximity with respect to health outcomes,' (Shorter, 1993: 35), there is little consensus as to the level of proximity of each of those

layers to child mortality.

At the household level, research attempting to determine the level of proximity of each of these layers to child mortality is based on a fundamental premise that the social and material conditions of life are major determinants of child survival and that these determinants make their impact through a set of intermediate mechanisms which can be decomposed analytically. Within this framework, disease and death are direct consequences of a set of factors originating in the social conditions of life and behavior of families, (Tekce, 1990). An effort is made therefore to specify concretely the potential link between household resources and child survival in terms of specific behaviors and experiences which mediate this relationship, such as feeding habits, hygienic practices and encounters with infectious illnesses. These, in turn, are typically influenced by the level of earned household income, the quality of housing, including the joint availability of water and sewer connection, and the educational level of the mother, (Shorter, 1993). Thus research at the household level has attempted to investigate more explicitly the relationship between resources related directly to the prevention of disease, such as water and sanitation, their relationship to socio-economic variables, primarily income and education, and their combined or individual effects on child survival.

In reality, however, the ability to control for intervening variables is extremely difficult despite the elaborations of research frameworks which successfully define the relevant variables at the conceptual level, as seen in Chapters 2 & 3. This is

particularly the case in measuring the role of maternal education in child survival. With these constraints in mind, this final section of the literature review examines research at the household level in Egypt which has attempted to measure the multiple factors involved in the production of child health and their relative proximity to child health outcomes, focusing on the maternal education factor. Firstly, however, the findings of a unique case study which was able to control for intervening variables in measuring the relationship between education and child survival with significant policy implications are briefly examined.

As seen in Chapter 2 country studies, in addition to Caldwell's, which demonstrate a strong association between maternal education and child survival at the household level, include Haines & Avery, on Costa Rica, 1982; Anker & Knowles on Kenya, 1977; Farah & Preston on Sudan, 1982; Trussell & Hammerslough on Sri Lanka, 1983; Martin et al on Indonesia, Pakistan and the Philippines 1983; DaVanzo et al on Malaysia, 1983, cited in Cooksey et al, 1986. Several crossnational analyses of the socio-economic determinants of child survival have also underscored the importance of female education, including data from Latin America, Behm 1980; Caldwell & McDonald, 1981, from 10 countries, and, Hobcraft et al 1984 from 29 countries, cited in Cooksey et al, 1986.

Despite these findings however, more recently some studies have found that the effects of maternal schooling on child

survival was rather weak with modest negative effects of schooling beyond primary level in Egypt, (Cooksey et al, 1986), leading some experts to argue that the education effect may have been exaggerated, (Deeb, 1990). A weak maternal education effect has been observed in Egypt by Kelly, Khalifa & Khorazanty, 1982, and by Casterline & Eid, 1983; cited in Cooksey et al, 1986. In these studies, the economic characteristics of households emerged as more significant predictors of child mortality than maternal education. Furthermore, the effect of maternal education has previously been reported to diminish with rising levels of literacy and per capita expenditure on health, (see Palloni, 1981, 1985). Although there has been extensive research on the diminishing effects of female education with respect to health services, few studies have examined the effects of household conditions.

One exception has been a unique controlled study where the effect of maternal education could be assessed at two points in time allowing evaluation of the effect of education on child mortality before and after a major environmental upgrading project. (see Chapter 2; Deeb, 1990). The upgrading interventions included improved access to water, sanitation, and improving and extending the physical structures of households. Sewage connections increased from 3% to 91% during this time. Approximately 1052 households were included in the baseline in 1981 and in the follow-up survey in 1985, (Deeb, 1990).

The study was concerned with two over-lapping interests; to investigate the determinants of child health and mortality and to explore whether background variables such as maternal education

and household income are mediated indirectly through more intermediate determinants, mainly household physical characteristics such as water and sanitation. The researchers found that, following the upgrading, child mortality declined by 28% between 1981-1985. Income differentials in child mortality increased as expected, since higher income households were more able to benefit from the improvements. With regard to maternal education, a greater decline in mortality was observed among illiterate mothers than among literate mothers, 29% as compared to 17%, leading to narrowing differentials by education following the upgrading. Thus, in the multivariate analysis, maternal education emerged as a significant predictor of mortality differentials before the upgrading intervention. 'Once the housing conditions improved, the effect of maternal education completely washes off. In 1985 the maternal education effect completely disappears as an independent variable,' (Deeb, 1990: 13) while a higher household income appears as a consistent determinant of lower CM in 1981 and 1985, i.e. both before and after the upgrading.

The findings of this controlled case study have significant policy implications in suggesting that household resources can override the role of maternal education as a significant determinant of child mortality. In the contemporary context of the developing world however, there are few cases of such intervention-specific natural experiments where the ability to control for intervening variables is maximized.

In the specific context of Egypt, one set of interpretations

on the persistence of mortality rates in excess of desired levels stresses direct factors such as poor water supplies and environmental sanitation and the inaccessibility of effective modern medical services, (Cooksey et al, 1986). Efforts to ameliorate these problems have not always been successful. For example, although the provision of drinking water has improved over recent decades, and, as of 1980, an estimated 80% of villages were served by government pumping and water treatment stations, as the previous section illustrated, 'often however, the supply is inadequate and thus a large proportion of rural households draw on contaminated water from various sources,' (Cooksey et al, 1986:10).

Similarly, 'while Egypt possesses an unusually dense network of low cost health services as well as a high ratio of medical personnel per capita, 2000 inhabitants per physician, the system has been criticised for being clinic-centered rather than community orientated and for the inability of medical personnel to relate effectively to village residents. Indeed two analyses fail to demonstrate a positive impact on child survival of the presence of health personnel or services in rural areas,' (Cooksey et al, 1986: 11). Thus 'while the formal medical system is regarded as highly efficacious, the encounters with it are viewed as intimidating by the families. Parents typically neither ask nor expect to receive information about the condition of their children from doctors and the encounters fail to strengthen the capacity of mothers to care for their children,' (Cooksey et al, 1986: 11). A competing interpretation emphasises the fundamental

role of social and economic conditions rather than the ineffectiveness of public health and sanitation programmes. According to this view, widespread utilisation of medical services and the improvement of sanitation and hygiene at the household level will only come with socio-economic change, (Cooksey et al, 1986).

Finally, although the DHS and EMCHS surveys suggest significant mortality differentials by education, previous analysis of EFS data indicated that the impact of maternal schooling on child survival is rather weak in Egypt. The only effects apparent are modest negative effects of schooling beyond primary level, (Ismail et al, 1983, Eid & Casterline, 1983).

The above discussion illustrates that the findings in the literature on the determinants of child survival in Egypt are far from conclusive with respect to the association between socio-economic determinants, intermediate determinants and their individual and combined effects on child survival in Egypt. The following section examines an attempt to assess the relationship between maternal education and child survival in Egypt while controlling for income, water and sanitation. It examines the findings of analysis of national level data which sought to measure the relationship between household income and child mortality; whether this relationship is mediated through household resources directly linked to the prevention of child morbidity, primarily water and sanitation and the role of maternal education in this equation. This discussion begins by examining the relationship between income and child health.

In the wider literature, 'relative to the attention given to parental education and the more direct determinants of child mortality, there has been a dearth of recent research on the association between household income and child survival,' (Cooksey et al, 1986: 3). According to Cooksey et al, a number of factors account for this:

- Firstly, the level and distribution of income is perceived to be less amenable to public policy action than other determinants of child health such as, the provision of clean water, accessibility of medical care or levels of female literacy, (Cooksey et al, 1986), and;
- Secondly, the primary reason is the lack of data. To compensate for the absence of data, other variables such as paternal education and occupation and household assets such as consumer durables and dwelling characteristics are often employed as proxies for direct measures of income and wealth. 'Yet both theoretically and for policy purposes, these distinctions are necessary,' (Cooksey et al, 1986: 4).

A further limitation to understanding the nature of income effects on child mortality is the emphasis on the infant period which may obscure significant impacts of income on child survival. According to the literature, income effects should gather strength with age from the neonatal period to early childhood as the relative role of the maternal factors diminishes and the relative role of environmental contamination, personal illness control and nutrient deficiency independent of maternal breastmilk increases, (Tekce, 1990; Cooksey et al, 1986). 'These distinctions are necessary and may have direct policy relevance,' according to Cooksey et al, (Cooksey et al, 1986: 5).

In a small set of household level studies which examine income effects summarised in Cooksey, et al, the findings are

quite varied. Significant effects net of other socio-economic variables are estimated with data from urban areas in Brazil, Merrick, 1985; one urban area in Sudan, Farah & Preston, 1982; a national study in Kenya, Anker & Knowles, 1979; in Kerala, India, Zacharia & Patel, 1982; and in low income areas in Jordan, Tekce et al, 1984; cited in Cooksey et al, 1986.

In Egypt, Cooksey et al, examining DHS data, indicate that the findings demonstrate lack of income effects on infant mortality; however there are highly significant effects on early childhood mortality in the expected direction. Mortality is lower among children of higher income households with a particularly sharp drop off in early childhood mortality between the middle and highest income households, (Cooksey et al, 1986).

Furthermore, the resilience of negative income effects on child mortality indicates that these effects are not operating through intervening variables, including water and sanitation. The authors emphasise that the 'resilience of household income effects in the DHS survey is somewhat surprising since we expected that household water and sanitation would serve as mechanisms for income effects... This outcome could be either due to the absence of income effects on the intervening variables, or, alternatively due to the absence of effects of these latter variables on mortality,' (Cooksey et al, 1986 : 26).

The study shows that only the source of water shows any net effects on early child mortality and these are only of moderate magnitude. 'Pursuing the puzzle further, we also

examined the effects of income on the intervening variables and found income to be a powerful determinant of source of water. Thus higher income households are more likely to have piped water in the dwelling. It would therefore appear that the indirect effects of income on mortality through household sanitation are weak primarily because of the rather weak net direct effects on mortality of source of water and type of toilet facilities. This does not rule out important income differentials in household sanitary conditions and child hygiene defined more broadly. But apparently, these differentials, in so far as they influence survival chances, are not due to income differentials in the source of drinking water or type of toilet,' (Cooksey et al, 1986: 26).

With respect to maternal education, 'the absence of maternal schooling effects is particularly noteworthy according to the authors. This finding applies both with and without controls for household income and to infant and child mortality alike,' (Cooksey et al, 1986: 29). Although 'child mortality did decline with increased schooling in this sample, especially at levels past primary schooling, the estimated effects were not statistically significant. These results conform with those from analysis from other Egyptian data, i.e. Kelly et al, 1982,' (Cooksey et al, 1986: 29). 'One might hypothesise that more educated women will take better advantage of the resources provided by greater income because of an enhanced understanding of child care needs. The findings indicate that schooling and income tend to reinforce each other in the infant period. In early childhood however, the relationship between net household income and maternal schooling

is insignificant. The negative impact of income on mortality at this stage applies to uneducated and educated mothers alike,' (Cooksey et al, 1986: 30).

The study concludes that no evidence of household income on survival is evident during the first 12 months of life but the effects are pronounced during early childhood. The authors conclude that, in view of the current research and policy emphasis on the importance of maternal education, the absence of maternal schooling effects is particularly noteworthy. This finding applies both with and without controls for household income and to infant and child mortality alike. The authors conclude that 'It would certainly ease public demands if no more than primary schooling were required,' (Cooksey et al, 1986: 33).

However, the insignificance of the interaction between net household income and maternal schooling in the early childhood period indicates that the 'negative effects of income on mortality at this age applies to educated and uneducated alike,' (Cooksey et al, 1986: 33). Thus in the context of Egypt, the conclusions of this investigation of aggregate level data from the DHS are that;

- no impact of household income on survival is evident in the first 12 months of life but the effects are pronounced in early childhood;
- the provision of piped water facilities is associated with a higher survival probability in early childhood;
- maternal schooling shows modest effects at best; this runs contrary to findings from many settings but is consistent with findings from previous multivariate analysis of data from Egypt, (Cooksey et al, 1986).

Although these findings conflict with the findings on the

impact of maternal education on child survival in other settings, the authors conclude that 'more is at issue than the atypicality of Egyptian society however, ... For one thing, the importance of maternal schooling as a mortality determinant has probably been exaggerated in recent discussions,' (Cooksey et al, 1986: 36; also in Deeb, 1990). Cooksey et al stress that, at the same time, however, 'a comparable body of empirical evidence on the role of income levels and, more generally, economic position, in the determination of survival chances does not exist and thus we are handicapped in any effort to assess the relative importance of household income, and the typicality or atypicality of our results from Egypt,' (Cooksey et al, 1986: 36).

Conclusion

Section one of this literature review examined the intermediate risk factors associated with child morbidity and mortality from the epidemiological literature. Section two described the nature of intermediate resources available to households in Menofia and the actions through which these resources are hypothesised to represent important risk factors associated child morbidity in the villages of the Nile Delta according to the findings of research in Menofia.

Despite the findings of the wider epidemiological studies on known risk factors and the anthropological research on their manifestations in Menofia in particular, in the literature on the determinants of child survival, these relationships do not appear

as straight-forward and the proximity of the different layers of health-related inputs to child survival, (Shorter, 1993), is not easily evident or indeed consistent. Nevertheless, in the determinants of child survival framework, income represents an important determinant of the resources available for purchasing intermediate health-related inputs, while maternal education represents an important determinant of the actions through which these resources are used in daily life to ensure the prevention of disease. In Chapter 4 it was demonstrated that maternal education enhanced maternal knowledge and therefore presumably enhanced these actions. The fact that education did not proceed to affect the prevalence of disease appeared somewhat paradoxical given the importance attached to maternal education in other research findings and its inclusion in the latest strategies for child survival, (see Chapter 1).

In other settings however, it has been argued that the relationship between education and child mortality is not as independent as suggested. In the controlled case study, once household physical infrastructure was improved, the effects of maternal education on child mortality became insignificant, (Deeb, 1990) while in the national level data for Egypt, Cooksey et al indicate that maternal education was not significantly related to child survival and that child mortality was affected by income among both educated and uneducated mothers. The following chapter presents the findings of this survey's attempt to examine these issues in Menofia. It attempts to examine the intermediate health-related resources available to families in this setting and

their association to disease prevalence among educated and uneducated mothers.

Introduction

This chapter examines the relationship between health-related household resources and child health in Menofia. It begins by exploring the extent to which health-related resources examined in the literature review in the previous chapter are significantly related to the prevalence of diarrheal disease and respiratory infection child morbidity in this sample. Prevalence in this context, as throughout the thesis, refers to morbidity within the 24 hour or two-week reporting period combined.

With respect to the incidence and prevalence of diarrheal disease and respiratory infection morbidity/mortality, the epidemiological literature in general and anthropological research in Menofia in particular, identified the following household-level factors as potential causes of diarrheal disease and respiratory infections:

- water sources, usage, and storage methods;
- fecal disposal and the disposal of septage, sullage and solid waste;
- the presence of animals and animal waste in close proximity to living quarters;
- food handling practices and preparation methods, and finally, with respect to respiratory infection;
- crowding levels and ventilation.

The following section examines the relationship between these variables and the prevalence of diarrheal disease and respiratory

infection child morbidity in this sample.

7.1 Water and Sanitation Resources and Diarrheal Disease Prevalence

Diarrheal disease prevalence was found to be significantly related to water sources in this sample. This relationship does not appear to work in the expected direction; it is however, consistent with sources of potential contamination described previously in Menofia particularly with respect to the potential environmental hazards of piped water inside and outside dwellings, (El Katsha et al, 1986).

The most common water sources in this sample were: tap water inside or immediately outside the dwelling, 44%; pumped water from a neighbor or relatives' tap outside the dwelling, 27%; and wells with a pump; 23%. The first two water sources constitute privately installed facilities while the well is a public facility.

It was hypothesised that households with water connections inside the dwelling would experience the least exposure to contamination and hence lower rates of diarrheal disease incidence. This hypothesis was made on the basis of epidemiological evidence presented in the previous chapter which emphasised the importance of quantity as opposed to quality of water in the spread of diarrheal disease pathogens, (Feachem et al, 1977). The findings of this research do not support this hypothesis however, and indicate that the highest rate of diarrhea is found among households using pumped water from a neighbor's/relative's pipe outside the dwelling, 55%, followed by households with piped

water inside the dwelling, 49% ; (see table 7.1). The lowest rate of diarrhea was found among households who used a public well, 27% (.00012)*. In other words, households with immediate access to abundant water supplies inside the dwelling did not experience the lowest rate of diarrheal prevalence.

These findings are inconsistent with the general epidemiological literature on the transmission of diarrheal disease pathogens; they are, however, consistent with the hypotheses put forward in epidemiological studies in rural Egypt, and in Menofia, concerning potential water-related sources of diarrheal disease transmission. They suggest that privately installed piped/pumped water inside and outside dwellings may indeed be contaminated by the high ground water table and subsurface contamination as suggested in the SRC's biological tests of water samples taken from different sources in Menofia which stress that owners do not follow the necessary sanitary procedures when installing piped water and hand pumps. Among the environmental hazards cited previously with respect to privately installed water sources are insufficient depth to avoid contamination and the installation of pipes (according to the owner's preference as opposed to sanitary requirements), next to sources of contamination such as latrines and solid wastes, (El Katsha et al, 1989).

Given that the lowest rate of diarrhea prevalence was found among households using wells; (73% did not have diarrhea in comparison to 45% among households using piped water from a neighbor or relative's pipe), the fact that households with the most access to water in, or immediately outside, the dwelling had the highest

rate of diarrhea, (55%), while those using public wells had the lowest rate, (27%), suggests that the quality of water may represent a significant source of contamination in this sample. Again this is contrary to the relationship between water and diarrheal disease stressed in the general health literature and epidemiological studies which emphasise that quantity and access to water to ensure adequate sanitation and hygiene in the home is more crucial for preventing diarrheal disease than the quality of water. These findings are, however, consistent with extensive biological examination of water sources in the Delta villages of Lower Egypt which emphasise that the quality of water is an important source of contamination in the transmission of diarrhea pathogens in this setting. Furthermore, although, for the majority of households in this sample, the procedure of collecting and bringing water to the household does not exceed 15 minutes, it frequently requires more than one trip per day. However, despite their relatively easier access to water sources, households with piped tap water inside their dwelling and households who relied on a tap immediately outside the dwelling belonging to a neighbor or relative, experienced the highest diarrheal prevalence. In sum, therefore, although these findings somewhat undermine the emphasis placed on quantity of water, they further support other research on water sources in rural Egypt which demonstrates high levels of contamination from inadequately dug piped water and/or the installation of private pipes/pumps close to sources of contamination.

Table 7.1 Diarrheal Disease Incidence and Water sources

	Tap-in-out in/out House	Pump-Neigh Public Tap	Well
Yes	49% (95)	55% (59)	27% (26)
No	51% (99)	45% (48)	73% (70)

(.00012)*

7.2. Diarrheal Disease Morbidity and Water Storage

The practice of storing water and methods related to storage procedures were identified in the previous chapter as a significant potential source of contamination in the transmission of diarrhea pathogens in rural Egypt by the SRC and in a more extensive investigation of health hazards in rural Egypt by Miller, (see Chapter 6). This section examines storage procedures among the 401 households in this sample and the extent to which diarrheal disease prevalence is related to storage methods including the various types of containers used and the duration of storage time.

The storage of water in this sample was relatively common; approximately 42%, or 170 households out of 401, stored water. The most frequently used storage container is the 'Tisht', (open plastic bucket) which is used by 23% (94 households); followed by the 'Bestella', (aluminum container), used among 15% of households (60 households); 'Hilal', (aluminum pots), used by 12%, (48 households) and finally, least used is the 'Zir', 9.2%,

(37 households). The majority of households stored water for only 24 hours. Households who relied on a relative's or neighbor's pump water source were most likely to store water followed by households who used wells, 41% of whom stored water. Households with a private tap inside or immediately outside the dwelling were least likely to store water, .6%. This indicates that water shortages are less common in these villages than in other rural and urban areas where the storage of water among households with piped water in the dwelling is common as a result of frequent cutoffs.

As seen in the previous chapter, water storage and the various types of containers used for this purpose have frequently been identified as a leading source of diarrheal disease in Egypt. Although the prevalence of diarrheal disease does not appear to be significantly higher in households which store water relative to those which do not, diarrheal disease was positively related to one type of water storage container in this sample, the 'Tisht'. Diarrheal disease prevalence among children in families who used this type of container for storage purposes was significantly higher than among other households, 51%, in comparison to 36% (.04251)*.

The most frequent users of the 'Tisht' for storage purposes were households who relied on a neighbor's or relative's source of water, 69%. As the previous section indicated, diarrheal disease prevalence was highest among this set of households in the sample and this fact, combined with the fact that a high percentage of these households use storage containers positively associated with diarrheal disease, suggests that the high rate of

exposure to contamination among users of this source of water is further exacerbated by unhygienic/inadequate storage containers. These assumptions, although difficult to confirm without a biological assessment of water sources before and after storage, are somewhat supported by the limited evidence available. Thus among well users who stored water in the 'Tisht,' only 32% of children had diarrhea. In comparison, among users of a neighbor or relatives' tap who stored water in the 'Tisht,' 59% of children had diarrhea. This may suggest that because the latter group are storing water from contaminated sources in contaminated containers, the risk of diarrheal disease among children from these households is particularly high; more than half of children from these households had diarrheal disease, 59%. In comparison, the majority of children from households whose source of water was the well but whose families stored water in similar containers did not have diarrhea, 68%, suggesting that the water from wells, as the previous section demonstrated, is the least associated with contamination and diarrheal disease pathogens. These assumptions, however, are difficult to confirm given both the lack of biological evidence and indeed the distribution of the sample for comparative purposes since only a small percentage of well users used the 'Tisht' containers. Nevertheless, these findings somewhat confirm the relationship between diarrheal disease prevalence and the quality of water from different sources demonstrated above and in the wider literature on potential water-related hazards to health in Menofia. Finally, although households who stored water in 'Hilal' also had a higher rate of diarrhea incidence, 52% as

compared to 41%, these disparities were not statistically significant.

7.3 Diarrheal Disease Morbidity & Toilet Facilities

Diarrheal disease prevalence was significantly related to the type of toilet facilities in this sample. For the majority of households, these consist of the 'baladi' without flush (bucket toilet without flush) and the 'hofra' (pit) type. Very few households had 'frenji' toilets, the modern type with septic tank, or 'baladi' toilets with a flush; i.e. bucket toilet with flush, only 2%. Thus the most common toilets were 'baladi' (bucket toilet) without flush, 79%, followed by the 'hofra,' (pit latrine) 20%. Diarrheal disease prevalence was found to be slightly higher among households with the 'hofra' type of toilet, 58%, than among households with the 'baladi' toilet, 43%, (.02652)*, (see table 7.2). An attempt to determine whether the location of toilet facilities affected diarrheal disease prevalence indicated that households whose toilet facilities were located in the center of the house, in the living room and under the steps leading to the roof experienced a somewhat higher rate of diarrheal disease in this sample in comparison to other households (.03512)*. Finally, diarrhea was not related to whether the household had water connected in the toilet although water connections were very rare.

Table 7.2 Diarrheal Disease Incidence and Toilet Facilities

	Frengi-Bucket Bucket No Flush	Pit/ Other
Yes	43% (136)	58% (42)
No	57% (179)	43% (31)

(.02652)*

The combination of water facilities with toilet facilities indicated that these relationships remain significantly consistent with diarrheal disease prevalence. Households with access to piped water inside the dwelling and those whose primary water source is the neighbor's/relative's pump-piped tap, both sources significantly associated with diarrheal disease morbidity, were combined with households whose toilet facilities are the 'hofra' type which were also positively associated with diarrheal disease morbidity. These households made up the 'negative' category. Households in the 'neutral' category had either a negative toilet type, i.e. 'hofra' and a positive water source, i.e. well, or vice versa, a positive toilet type, 'baladi' and a negative water source, 'tap-inside/outside'. Finally, 'positive' households consisted of those which used wells as their primary source of water and had 'baladi' toilets, both variables which were related to reduced diarrheal disease morbidity individually.

The data suggested that households in the negative category experienced the highest rate of diarrheal disease morbidity,

62%, followed by households with 'fair' resources, 49%. Diarrheal disease morbidity was lowest among households with 'good' resources, 25% (.00003)*. Furthermore, 'good' household resources were consistently associated with lower diarrheal disease morbidity even when 'poor' and 'neutral' households were combined, (.00003)* and 'poor' household resources were persistently associated with increased diarrhea when 'good and fair' households were combined, (.00729)*.

Diarrheal disease prevalence was also significantly related to methods of sewage waste removal from households in this sample. These consist of removal by municipality for large sewage systems and removal by small donkey carriages, or by individuals themselves for small systems. Households with larger systems whose sewage was removed by the municipality experienced a lower rate of diarrheal disease prevalence, 34% than households whose systems were small and which relied on removal by donkey carriage or by owners themselves, 48% (.01261)*. Thus the highest rate of diarrhea was found among households with small sewage systems removed by the owner, 64%, and the lowest rate was among households with fairly large, more advanced systems, 40%.

7.4 Diarrheal Disease Prevalence and Household Hygiene & Food Handling Conditions

The following sections examine the relationship between diarrheal disease morbidity and exposure to environmental contamination through the disposal of solid waste; through the

presence of animals and poultry in close proximity to living quarters, and through the preparation and management of food. These environmental and behavioral sources of potential contamination were previously identified in the SRC research in Menofia and in the epidemiological literature in general as potentially significant risk factors associated with diarrhea. The empirical findings presented below examine the relationship between these variables and diarrheal disease morbidity in this sample.

Diarrheal disease rates were not found to be related to the method or frequency of the removal of solid waste from the immediate vicinity of the household in this sample.

These findings are consistent with respondents' statements in the SRC research which emphasised that the disposal of solid wastes is not as problematic as the disposal of sullage and septage waste since most solid waste is recycled in the villages. Indeed the presence of solid waste surrounding the residential areas was often attributed to 'non-peasant' women who use canned goods and plastics and fail to recycle their waste. Thus, although solid waste disposal methods constitute a significant health hazard and attract flies close to living quarters, the fact that this waste is frequently removed for recycling purposes somewhat reduces the significance of solid waste as an important source of environmental contamination.

The majority of households in this sample remove solid waste

from the immediate vicinity daily; 83%. Furthermore, when asked whether the disposal of solid waste causes difficulties or problems for maintaining cleanliness inside the house or in the surrounding area, 92% of respondents in this sample responded no; while only 8% responded that it caused problems with cleanliness in the surrounding area and only .2% felt that the disposal of solid waste caused difficulties in maintaining cleanliness inside the household.

The SRC findings in Menofia described in the previous section hypothesise that the presence of animals or poultry in close proximity to living quarters may be a contributing causal factor in diarrheal disease and respiratory infection. The findings of this research do not demonstrate a significant relationship between the presence of animals and/or poultry and diarrheal disease incidence. Furthermore, there was no relationship between whether or not animals were kept in a specifically designated separate area for keeping animals, the Zreeba, and diarrheal disease prevalence.

Finally, according to the SRC, households with floor material made of earth/sand experience more difficulty in maintaining cleanliness and hygiene than households with tiled/cemented floor material where the use of water for cleaning purposes is easier and, according to the SRC, more frequent since it does not jeopardise the wall structure. Given that the maintenance of cleanliness and hygiene is easier in tiled/cemented households, an indirect relationship between

diarrheal disease and floor material was expected. However, diarrheal disease was only slightly higher in households with 'earth' floors, 48% in comparison to 40% in households with tile-cement floors.

Levels of hygiene in food preparation and handling practices were identified as potentially significant determinants of diarrheal disease morbidity in the epidemiological literature and in the SRC research findings presented in the previous chapter. The findings of this survey did not demonstrate a significant relationship between diarrheal disease prevalence and whether or not households had separate kitchen facilities in this sample, or to the location of food preparation and cooking in households. Further testing the relationship between the location of food preparation with respect to the location of toilet facilities and the prevalence of diarrheal disease suggested that there was no clear and consistent relationship between the proximity of food preparation/cooking areas to toilet facilities and diarrheal disease morbidity. This is interesting given that the previous section demonstrated an association between the location of toilet facilities and diarrheal disease.

With respect to potential routes of contamination from the presence of animals in close proximity to areas where food is prepared and/or the handling of animals and animal waste and subsequent management of food, both of which were hypothesised to constitute important sources of exposure to diarrheal disease in the SRC's assessment, the empirical findings here suggest that the association between these variables and the

prevalence of diarrheal disease is relatively insignificant. Finally, diarrheal disease prevalence was not related to the location and methods of cleaning vegetables or food utensils.

7.5 Respiratory Infection Morbidity and Crowding Conditions, Physical Structure & Ventilation

This section examines the relationship between household resources and respiratory infection focusing on the primary known household risk factors associated with exposure to respiratory infection; crowding conditions and ventilation. With respect to the crowding variable, a rough estimate of its relationship to respiratory infection incidence is made here by measuring nuclear and extended family living arrangements against the number of bedrooms. Although a more accurate assessment of crowding conditions would entail measuring the exact number of individuals against the number of rooms in the household, it is believed that a measure of crowding conditions by comparing joint/nuclear family living arrangements with the number of rooms is sufficient for the purposes of this analysis.

The ventilation variable, although included in the data collected for this research, is not examined here. This is primarily because the level of variation for this indicator was not sufficient to produce significant results; frequencies for this variable indicate that in the majority of households both bedrooms and livingrooms have windows, 96.7%, and 93%, respectively. In both cases, the majority have glass windows with wooden shutters; 63% and 65%, respectively, while the rest have only glass windows with

no shutters; 33% and 27%, respectively.

Respiratory Infection and Crowding:

The rate of respiratory infection morbidity was found to be significantly related to whether the household lived in a joint or single family unit. Among households who lived in extended family conditions, the prevalence of respiratory infection was 53% in comparison to only 36% among nuclear family units, (.00322)*. Although this is only a rough assessment of crowding conditions, the statistical significance of this relationship indicates that crowding conditions are an important contributory factor in the prevalence of respiratory infection among the under-5's in this sample.

Furthermore, although respiratory infection was not related to the number of bedrooms among both joint and single family household units, the prevalence of respiratory infection morbidity was higher among extended families with one-two bedrooms than among extended families with more than one-two bedrooms. This relationship however, was not statistically significant. In comparison, diarrheal disease prevalence did not increase in extended families, and this lends some support to the possibility that higher rates of respiratory infection in extended family households may be related to crowding conditions, and not to other negative implications of living in extended families such as reductions in per capita food consumption. Finally, although the SRC researchers in Menofia hypothesised that floors made of earth/sand were likely to facilitate the spread of air-borne

infections, respiratory infection was not related to the type of floor material in these households.

Summary: Household Resources and Child Health

This section has demonstrated significant relationships between diarrheal disease incidence and the following household resources: water sources; specific water storage containers; toilet facilities, and, finally sewage disposal methods. With respect to respiratory infection and risk factors associated with its spread according to the epidemiological literature, the prevalence of respiratory infection was found to be significantly related to crowding conditions in this sample.

Other areas which were hypothesised to constitute significant risk factors associated with diarrheal disease morbidity in the epidemiological literature in general, and in the environmental and anthropological assessments conducted by the SRC in Menofia, were not found to be significant determinants of the prevalence of diarrheal disease morbidity in this sample. These included solid waste disposal; the location of food preparation and handling and finally; the presence of animals and poultry in close proximity to living and cooking areas, and the proximity of cooking areas to toilet facilities.

The following section examines to what extent the variables found to be significantly related to diarrheal disease and respiratory infection child morbidity in this sample are

significantly related to household income and occupational status. It attempts to examine to what extent income represents a significant determinant of child morbidity and to what extent this relationship operates through the intermediate household resources which were found to be significantly related to child morbidity in the empirical findings presented above.

7.6 Income/Occupation, Household Resources and Child Morbidity

Two factors with respect to the income and occupation variables in this sample must be emphasised here. Firstly, the usual limitations with respect to the accuracy of income data are further compounded by the fact that income data is available for only one half of this sample; approximately 200 households. Secondly, the data on income levels was intended as one variable among many others collected for the purpose of obtaining an estimate of living standards in Menofia. These variables include:

- land ownership status/tenancy and size of land holdings and crops;
- occupation/employment in formal and informal sectors; consistency of employment in public, private and informal sectors;
- the educational status of all household members;
- female participation in agricultural activities, seasonal agricultural labour and formal sector employment;
- landless agricultural labourers; number of days worked and payments;
- dual occupations; among peasants, landless labourers and informal/formal sector employees;
- debts currently owed, amount and cause, and finally;
- ownership of livestock and consumer durables.

An accurate assessment of household economic resources and their relationship to child morbidity would reflect various combinations of these variables and their stratification into

relatively 'poor' and 'rich' households. This is made difficult by the fact that the distribution of households with respect to many of these variables does not facilitate such a clear stratification. Thus, the empirical findings and discussion below are merely intended as a basic indication and measurement of the relationship between income levels, health-related household resources and child morbidity. This is primarily because a more accurate assessment incorporating various combinations of the living standards variables outlined did not yield sufficient numbers in appropriately distinguishable categories for further crosstabulation with both household resources and child morbidity: the sample size and distribution with respect to these variables and child morbidity did not reflect sufficient variability.

The empirical analysis below begins by examining the relationship between income/occupation and household resources. The relationship between income/occupation and child morbidity is then briefly examined. Finally, the relationship between the three sets of variables together is examined; income, household resources and child health outcome.

1. Income and Water Sources:

Income was found to be slightly related to water sources in this sample. Households in the higher income categories, £E70-£E100 and £E101-£E450, were somewhat more likely to have piped water inside the dwelling than households in the lowest income category, £E30-£E70; although these findings were not

statistically significant (.09152). Households in the lowest income category were more likely to use wells as their primary source of water, 33%, in comparison to only 14% among the higher income groups. However, although the likelihood of having piped water inside the dwelling increases with income and the likelihood of using a well decreases, the percentage of households using an outside neighbor's/relative's pump is similar across income categories; £E30-£E70, 29%, £E71-£E100, 25%, £E100-450, 29%. Since diarrheal disease was highest among users of this source of water and among households with piped water inside the dwelling, this may partially explain why the relationship between income, household water resources and diarrheal disease is somewhat inconsistent. As indicated in section 1, households with piped water in the dwelling had a higher rate of diarrhea-related child morbidity than households using wells who had the lowest rate of diarrhea prevalence rates among all households. It is therefore expected that diarrhea will actually increase with higher household income when this relationship controls for source of water. Finally, income was not related to the storage of water.

2. Income and Toilet Facilities:

Income was not positively related to type of toilet facilities in this sample. Among lowest income groups, £E30-£E70, 78% of households had 'Baladi' toilets; among middle and higher income groups, approximately 85% had 'Baladi' toilets. Lowest income groups were more likely to have a 'hofra' toilet, 22%, than

households in higher income categories among whom approximately 16% had this type of toilet. However, these distributions were not statistically significant.

These findings suggest that the two variables, water sources and toilet facilities, which were associated with diarrheal disease prevalence in section 1 do not improve in a way that is conducive to preventing diarrheal disease incidence at higher income levels. Income was also not significantly associated with sewage disposal methods which, in section 1, were found to be slightly associated with diarrheal disease. Finally, income was not significantly associated with the storage of water or floor type, both of which were slightly related to diarrheal disease prevalence in the previous section, but more specifically in the findings of the SRC. In sum therefore, none of the household resources associated with diarrheal disease morbidity in section 1 of this chapter, appear to significantly improve with higher income, and, in fact one resource which was significantly associated with higher rates of diarrheal disease, piped water inside the dwelling, appears to increase with income.

These findings are somewhat consistent with those of Cooksey et al examined in the previous chapter. Using DHS data they demonstrated that although income was significantly related to child mortality, it did not appear to work through these intervening variables to affect child survival. However, while the findings above suggest that this is due to a weak association between income and water and sanitation sources which are positively related to child health, Cooksey et al argue that this is due to

a weak association between water and sanitation facilities and child mortality, (Cooksey et al, 1986).

With respect to disparities in health-related household resources between peasants and employed heads of households, a higher percentage of employed persons have piped water inside the dwelling, 50%, than peasants, 23%. Similarly, a higher percentage of peasants used wells as their primary source of water, 39%, as compared to only 20% among employed persons. However, a similar percentage of both groups used a neighbor's or relative's tap outside the dwelling; 40% and 30%, respectively. Given that users of this source of water experienced the highest rate of diarrhea, followed by households with piped water inside the dwelling, it follows that the relationship between occupation and diarrhea controlling for water sources, like that between income and diarrhea controlling for water, will not be significant in the expected direction.

Occupation and toilet type were not related with both peasants and employed heads of household equally likely to have 'baladi' and 'hofra' toilets. Finally, living arrangements with respect to joint/nuclear household composition were not related with an equal percentage of peasants and households with employed heads living in nuclear households, 77% and 72% respectively, and extended family housing, 23% and 26%, respectively. Floor material was, however, positively related to occupation with a higher percentage of peasants living in adobe houses with floor material of earth, 85%, and a higher percentage of employed persons having

tiles/cement, 35%, in comparison to only 16% of peasants (.00158)*.

3. Income, Housing and Crowding Conditions:

Income was not found to be a significant determinant of whether the family lived in extended or nuclear family conditions in this sample. Thus, if income is indirectly related to the prevalence of respiratory infection in this sample, it does not appear to operate by reducing the likelihood of living in extended family conditions which were associated with respiratory infection prevalence in section 1. The number of bedrooms in households, however, increases with income: among households in the higher income categories, approximately 70% lived in housing with more than one bedroom in comparison to only 51% among lower income groups. However, when the number of bedrooms is used as a proxy for crowding conditions in combination with joint/nuclear household status, the fact that the number of bedrooms was not statistically related to whether households consisted of joint or nuclear families, suggests that households with higher income do not necessarily live in less crowded conditions. Thus, to the extent that crowding conditions are significant determinants of respiratory infection in this sample, as demonstrated in section 1, crowding conditions do not appear to be significantly reduced at higher income levels.

4. Income/Occupation, Diarrheal Disease and Respiratory Infection Child Morbidity

This section examines the relationship between income

resources and child morbidity. Empirical research examined in the literature review in the previous chapter on the relationship between income and mortality in Egypt found that income was statistically associated with reduced child mortality. However, this analysis of DHS data in Egypt demonstrated that, although the relationship between income and child mortality was very significant, it did not appear to operate through intermediate determinants of child survival. The research findings presented in the previous section partially explain these paradoxical findings since household resources which were positively related to diarrheal disease and respiratory infection child morbidity, the leading causes of infant and child mortality in Egypt, were not significantly related to income levels. Thus, despite the significant associations between household resources and child morbidity, demonstrated in section 1 of this analysis, the fact that income was not a significant determinant of household resources positively associated with lower rates of child morbidity, may partially explain why income disparities in child mortality demonstrated in the DHS data did not operate through household resources.

With respect to the relationship between income and child morbidity examined in this sample, the findings here demonstrated that income disparities in child morbidity were not evident. Again this is related to the findings presented above and briefly summarised here:

- Firstly, although the prevalence of diarrheal disease was significantly related to toilet facilities and sewage systems as demonstrated in section 1, the relationship between income and sanitation variables positively assoc-

iated with diarrheal disease, particularly the 'hofra toilet', was relatively weak;

- Secondly, although higher income was significantly related to access to piped water inside the dwelling and lower income was significantly related to usage of water sources from wells, diarrheal disease prevalence was, in fact, lowest among the latter group whose source of water was primarily the well and households with piped water inside the dwelling had a higher rate of diarrheal disease. Furthermore, the highest rate of diarrhea was found among users of piped water outside the dwelling among whom income disparities were not evident. Finally, the storage of water was not related to income.

Thus, given the nature of the relationship between health-related intermediate household resources and child morbidity in this sample on the one hand, and that between income and household resources on the other hand, the weak relationship between income and child morbidity which emerged in these findings does not appear so paradoxical. Indeed it is interesting to note that the incidence of diarrheal disease, respiratory infection and the two combined, in fact, increased with income although these relationships were not statistically significant. Finally, the relationship between occupation and child morbidity was similarly insignificant.

Furthermore, the relationship between household resources positively related to both diarrheal disease and respiratory infection remained significant when controlling for income levels. Similarly, the relationship between income levels and child morbidity remained insignificant when controlling for household resources. Thus specific water sources, toilet facilities, sewage systems and extended family living conditions which were positively related to child morbidity in section 1, were unaffected by higher

levels of income. Essentially, therefore, since income and occupation were not significant determinants of the nature and level of intermediate resources, they failed to constitute important independent socio-economic determinants of child health in this sample. Although these findings somewhat undermine the significance of the relationship between socio-economic determinants at the household level (income, occupation), their manifestation through health-related intermediate determinants, and their impact on child health outcome, when maternal education is included in the equation, income proves to be somewhat more significantly related to child health in this sample. These relationships are examined in the final section of this chapter. Firstly however, the following sections of this empirical analysis are concerned with the relationship between maternal education/knowledge, intermediate health-related resources and child morbidity. With respect to the determinants of child health, these sections are therefore concerned with socio-economic determinants at the individual level, namely maternal education, knowledge/attitudes and practices and their relationship to child morbidity while attempting to control for the nature and level of household resources.

7.7 Maternal Education, Household Resources and Child Health

Essentially, the following two sections attempt to address the still unanswered question raised by the findings in Chapter 4; that is why, to the extent that maternal education was so positively related to knowledge and awareness of disease causation and prevention, particularly to knowledge of household sources of envir-

onmental contamination and their relationship to diarrheal disease, maternal education was not significantly related to child morbidity.

In seeking to measure the extent to which maternal education independently enhances the prevention of child morbidity, however, this analysis is hindered by the inherent obstacles with respect to the distribution of educated mothers, which were previously discussed and which are frequently encountered in research on the relationship between maternal education and child health. Theoretically, evidence that maternal education is a significant determinant of child health requires confirmation that, with 'inadequate' resources, educated mothers are more capable of preventing disease incidence than uneducated mothers. The small percentages of educated mothers with inadequate resources in this sample however, means that this hypothesis is difficult to test empirically. These obstacles are well illustrated in section one of the analysis which follows.

The distribution of the sample indicates that uneducated mothers with better resources are more common in this sample than educated mothers with inadequate resources. Therefore, an alternative empirical approach which might help in overcoming the inherent limitations in the distribution of educated mothers in this sample would be to examine what happens to child health when resources are relatively more adequate among educated and uneducated mothers; that is, whether, at adequate levels of resources, uneducated mothers experience a significantly higher rate of child morbidity than their educated counterparts. However, although this

would confirm a positive relationship between education and prevention, it would also suggest that the relationship between education and child health is not an independent one and may depend on access to adequate health-related resources. The somewhat significant relationship between income, education and child morbidity, examined in the final section of this chapter, suggests that this may indeed be the case with regard to the relationship between maternal education and child health in this sample.

A. Household Resources and Maternal Education:

This section examines the relationship between maternal education and household resources to provide background data prior to including the health outcome variables in the equation. As indicated previously, it is important to note here that, with respect to some of the variables significantly associated to diarrheal disease and respiratory infection, the percentage of educated women with inferior resources positively related to diarrheal disease is very small in this sample, i.e., the 'hofra' toilet. Therefore, an effort is made to combine resources positively associated with diarrheal disease to compensate for the small cells in the following section which examines the combined effects of these variables on child morbidity while controlling for maternal education.

1. Maternal Education and Water Sources:

Maternal education was positively related to water sources with a significantly higher percentage of educated mothers having

access to piped water inside the dwelling, 66%, as compared to only 38% among uneducated mothers, (see table 7.3). However, it will be recalled that houses with piped tap water had the highest rate of diarrhea prevalence after households who used a neighbor's or relative's pump tap. Among households with the latter source of water, the distribution is as follows, 14% among educated and 30% among uneducated mothers. For the category least associated with diarrheal disease, the wells, the distribution is as follows: 15% among educated mothers, and 26% among uneducated mothers. It can therefore be expected that because education is positively related to sources of water significantly related to high diarrheal disease morbidity, the relationship between maternal education, diarrheal disease prevention and diarrheal disease morbidity will not operate through water sources. Finally, water storage and the particular usage of 'Tisht' containers were both more common practices among uneducated mothers; 48%, in comparison to 24% among educated mothers with respect to water storage.

2. Maternal Education and Toilet Type:

Maternal education was significantly related to toilet type with a higher percentage of educated mothers having 'baladi' toilets than uneducated mothers, 95% and 76%, respectively. Only 5% of educated mothers had the 'hofra' type of toilet in comparison to 23% among uneducated mothers, (see table 7.4). Maternal education was not related to the location of toilet facilities although it was related to sewage systems. Among

educated mothers, 44% used municipal septage disposal methods indicating larger sewage facilities while 56% used other methods of sewage removal. Among uneducated mothers, only 27% used municipal disposal facilities while 74% relied on small donkey carriages, or removed the septage themselves, indicating more rudimentary sewage systems. Finally, maternal education was positively related to floor types (which according to the SRC are related to respiratory infection prevalence in Menofia), with a higher percentage of educated women living in households with tile/cement floor material than uneducated women, (00000)*. However, education was not related to nuclear/joint family living arrangements, which, it may be recalled, were a significant determinant of respiratory infection.

Table 7.3 Water Sources and Maternal Education

	Literate	Illiterate
Tap in/out House	70.9% (61)	43.5% (137)
Pump-Neighbor Relative	14% (12)	30.2% (95)
Public Tap-Well	15.1% (3)	26.3% (83)
	.00040*	

Table 7.4 Toilet Facilities and Maternal Education

	Literate	Illiterate
Frengi/ Baladi	95.3% (82)	77.5% (237)
Pit/ Other	4.7% (4)	22.5% (69)

.00017*

B. Diarrheal Disease and Household Resources Controlling for Maternal Education

This section examines the relationship between maternal education, child morbidity and household resources. It is concerned with measuring the extent to which educated mothers, at lower levels of resources, are able to prevent child morbidity as a result of their superior knowledge and awareness of the causes and prevention of disease. As the previous section indicates, however, the distribution of educated mothers with inferior resources is very limited. This somewhat hinders the statistical analysis. Furthermore, households with educated mothers are either over-represented with respect to superior resources, but which constitute significant sources of contamination, i.e. access to piped water in the dwelling, or under-represented in categories with inferior resources which constitute primary sources of contamination, i.e. the hofra toilet. An effort to combine these resources into 'good' and 'poor' categories did not reveal significant associations.

Among both educated and uneducated mothers, diarrheal disease remains higher in households using piped water and water from a neighbor or relative's tap than among households using wells. Among educated mothers, diarrhea in households using piped water inside the dwelling is higher than among household's relying on a neighbor/relative's tap. However, the percentage of educated women using the latter source is extremely small, (14%). Among uneducated mothers, the relationship between water source and diarrheal disease prevalence is consistent with the findings in section 1 of this empirical analysis; 58% among household's using a neighbor or relatives' tap; 50% among households with piped water, and only 29% among well users. These relationships are not significant for educated mothers (.08609) but significant among uneducated mothers, (.00037)*.

Water storage methods were not related to diarrheal disease among educated mothers, only 24% of whose children had diarrhea. However, in comparison to uneducated mothers who stored water, 47% of whose children had diarrhea, it appears that diarrheal disease prevalence was considerably lower among educated mothers who stored water than among uneducated mothers. These findings were not however, statistically significant. Furthermore, the percentage of educated mothers using the 'Tisht' container which was the only storage container statistically associated with diarrheal disease prevalence in this sample, was unfortunately too small to make comparisons with uneducated mothers.

The relationship between maternal education, toilet facilities / location and diarrheal disease is equally difficult

to measure based on these findings. With regard to toilet facilities, the percentage of educated mothers with 'hofra' toilets is too small to yield significant results. Nevertheless, among both educated mothers and uneducated mothers, diarrheal disease remained significantly higher in households with hofra toilets; 75% and 57%, respectively. The toilet location variable does not reflect significant educational disparities with respect to diarrheal disease morbidity, again, perhaps because of insufficient variability in the distribution of this variable.

Sewage disposal however, reveals significant educational disparities in diarrheal disease prevalence. Among educated mothers, diarrheal disease morbidity is similar in both households who use municipal septage disposal facilities and those who have less hygienic systems; 42% and 40%, respectively. Among uneducated mothers on the other hand, in households with less hygienic systems, a significantly higher rate of diarrheal disease was reported than in households with more sophisticated disposal methods; 50% as compared to 30%, (.00344)*. Thus among educated mothers sewage systems are not associated with diarrheal disease prevalence while for uneducated mothers, inferior septage disposal methods were related to a higher rate of diarrheal disease prevalence. Furthermore, in households with educated mothers, the frequency of septage removal was not related to diarrheal disease incidence; 46% in households where sewage was removed every six months and 39% in households where sewage was removed once a year. In comparison, in households with uneducated mothers, the frequency of sewage removal was slightly related to diarrheal disease

prevalence; 38% in households where sewage was removed every six months and 53% in households where sewage was removed once a year, (.04682).

The relationship between maternal education, water sources and toilet facilities combined, and diarrheal disease indicates, as expected, that facilities which were individually significantly related to diarrheal disease remain so when combined together, regardless of educational levels. Thus, for educated and uneducated mothers alike, households with 'bad-neutral' resources experienced a higher rate of diarrheal disease than households with 'good' resources. These findings were statistically significant for both groups suggesting that, in households with both poor water and toilet resources, diarrheal disease prevalence was unaffected by education. Similarly, among households with good resources, diarrheal disease prevalence was significantly lower for both educated and uneducated mothers alike. The exception was sewage disposal methods and the frequency of sewage removal, however.

With regard to respiratory infection, maternal education and housing conditions, this survey reveals significant educational disparities in the prevalence of respiratory infection, child morbidity and crowding conditions. Among educated mothers, the rate of respiratory infection was similar in both nuclear and extended family housing conditions; 43% and 54%, respectively. Among uneducated mothers, however, respiratory infection was significantly higher in extended family households than in nuclear family households; 52% and 34% respectively. Thus higher levels of

crowding were associated with respiratory infection in households where the mother was uneducated, but not in households where the mother was educated.

Summary:

The empirical findings presented above which attempted to examine the relationship between maternal education and child morbidity while controlling for intermediate health-related resources was considerably hindered by insufficient variability in the distribution of numerous important variables positively associated with child morbidity among educated mothers. Only with regard to two variables which were significantly associated with diarrheal disease and respiratory infection child morbidity in section 1, sewage removal and crowding conditions, was the educational distribution of this sample sufficient to make comparisons between child morbidity among educated and uneducated mothers. The findings with regard to these variables suggested statistically significant educational disparities in child morbidity. Thus, at the same level of 'inadequate' resources, educated mothers experienced less diarrheal disease and respiratory infection child morbidity with respect to these two variables. However, because these findings relate to only two variables, it is not possible to draw any firm conclusions on the relationship between maternal education, intermediate health-related resources and child health in this sample on the basis of these results.

The following section examines the relationship between maternal knowledge of disease prevention, household resources and child morbidity. Although maternal knowledge was positively related to maternal education in this survey and would therefore be expected to reflect similar data constraints in the empirical investigation as those outlined above, the relationship between preventative knowledge, household resources and child morbidity nevertheless constitutes a crucial and significantly under-researched component of the debate on the mechanisms through which maternal education affects child health. Furthermore, the findings of this survey on the relationship between preventative knowledge/ correct causal explanations of disease, household resources and child morbidity show some unexpected results which were not reflected when maternal education was examined more generally in the analysis above, lending some support for the role of maternal knowledge in enhancing greater protection from infection, or child morbidity, as hypothesised in the literature.

7.8 Maternal Knowledge of Disease Causation and Prevention, Health-Related Household Resources and Child Morbidity

This section examines the relationship between maternal knowledge of disease causation and prevention, household resources and child health. It is specifically concerned with measuring the extent to which knowledge and awareness of diarrheal disease prevention, significantly related to maternal education in this sample, reduces diarrheal disease prevalence in households with mothers equipped with this knowledge, independent of the nature and level of intermediate resources. It is therefore specifically concerned with the question posed by the findings in Chapter 4: that is, to what extent a mother's ability to reduce disease exposure through knowledge of disease prevention necessarily requires access to adequate resources. In other words, whether, in the absence of adequate resources, 'knowledgeable' mothers are no more capable of preventing disease incidence than their (ignorant) counterparts, or whether, at the same inadequate level of resources 'knowledgeable' mothers, through their awareness of environmental contamination, are able to effectively prevent illness episodes irrespective of the nature and level of household resources. Conversely, as with maternal education, an alternative approach would be to examine the extent to which, at an adequate level of resources, 'knowledgeable' mothers are more capable of preventing illness than their relatively (ignorant) counterparts.

The empirical discussion is divided into two parts and

begins by examining the distribution of households with respect to maternal causal explanations of disease and knowledge of prevention. Since the relationship between maternal knowledge and child morbidity was found to be insignificant in chapter four, the empirical analysis then proceeds to examine the relationship between maternal knowledge, household resources and child health. Thus, in the second part, the relationship between diarrheal disease prevalence and maternal knowledge is examined against the nature and level of household resources which were found to be significantly related to diarrheal disease morbidity in the first section of this chapter, namely; source and storage of water, toilet facilities and sewage systems.

A. Maternal Knowledge and Household Resources:

The variables representing maternal knowledge in this chapter are the same as those used in Chapter 4. These are grouped into two broad areas; knowledge of diarrheal disease causation and knowledge of diarrheal disease prevention. It will be recalled that 'positive' responses with respect to causation in previous chapters refer to scientifically or medically correct knowledge of the causes and prevention of diarrheal disease; i.e., contamination or food cleanliness responses. Neutral responses refer to irrelevant responses such as certain types of food or 'hot breastmilk'. Finally, negative responses constitute 'don't know' responses and fatalistic responses. In the analysis presented below, neutral and negative responses are frequently combined into one variable since both demonstrate a lack of knowledge and awareness of effective measures in the prevention of diarrheal

disease.

1. Diarrheal Disease Prevention, Toilet Facilities, Water Sources & Storage:

Knowledge of diarrheal disease prevention was not significantly related to toilet facilities with both mothers who had 'baladi' toilets and mothers who had 'hofra' toilets equally likely to have correct knowledge of preventative measures. Furthermore, specific knowledge of the relationship between contamination and diarrheal disease was not related to type of toilet facilities. Maternal knowledge of diarrheal disease prevention was also not related to methods of sewage disposal.

Knowledge of diarrheal disease prevention was significantly related to water sources, however, with a higher percentage of mothers with piped water facilities more likely to have 'positive' knowledge of the prevention of diarrheal disease than mothers whose primary source of water is a well; 64% and 33%, respectively. Similarly, a higher percentage of 'well' users scored negatively on knowledge of the prevention of diarrheal disease in comparison to mothers with access to piped water in the household; 67% and 36%, respectively, (.00000)*. This relationship, examined further below, somewhat further supports the hypothesis that the high prevalence of diarrheal disease in households with piped water facilities is related to the quality of water as opposed to negative practices in its usage, since the combined effects of abundant access and positive knowledge in the prevention of diarrheal disease incidence among households with piped water fails to alter the positive relationship between diarrheal disease

and piped water sources.

The relationship between maternal knowledge and water storage was insignificant with an equal percentage of mothers who stored water reflecting positive knowledge of diarrheal disease prevention, 50%, as those reflecting lack of knowledge, 50%. However, among mothers who stored water, a significantly higher percentage of mothers did not respond correctly to causal explanations of diarrhea; 60% of those who stored water gave negative-neutral explanations of the cause of diarrhea while only 40% gave positive responses.

B. Diarrheal Disease Morbidity, Knowledge of Diarrheal Disease Prevention and Causation, and Water Sources, Water Storage & Toilet Facilities:

This discussion begins by examining the relationship between diarrheal disease morbidity and maternal knowledge, controlling for water sources and water storage. This is followed by an examination of the relationship between diarrheal disease prevalence, maternal knowledge, and the two intermediate resources which were previously determined to be significantly related to diarrheal disease incidence: type of toilet facilities and sewage disposal systems.

The measurement of maternal knowledge here, as indicated above, consists of two variables: knowledge of the prevention of diarrheal disease and knowledge of causal factors associated with diarrheal disease. The first variable is a direct measure of maternal knowledge and awareness of measures which effectively prevent diarrheal disease morbidity while the second variable is

a measure of causal reasoning which, according to the anthropological literature presented in Chapter 2, is intrinsically linked to maternal practices and behavior in the prevention of diarrheal disease episodes.

1. Diarrheal Disease Prevalence, Household Water & Sanitation Facilities and Maternal Knowledge of Disease Prevention:

Among households with piped water, diarrhea incidence was the same for both mothers who responded positively and those who responded negatively to appropriate measures in diarrheal disease prevention. Among households whose source of water was a 'neighbor's/relative's pump-tap or outside tap,' neutral to negative respondents had a higher rate of diarrhea than positive respondents. However, these differences were not statistically significant; 63% and 48%, respectively (.13119). Among respondents whose primary source of water was the well, there were also no differences in diarrhea prevalence between positive and neutral-negative respondents.

i. Water Sources and Prevention

An alternative examination of the data crosstabulating diarrhea incidence with household water supplies while controlling for knowledge reveals similar findings. Thus, among positive respondents to the prevention of diarrhea, diarrhea remained significantly higher among households with piped sources and users of a neighbor's-relative's tap outside the dwelling than among households whose primary source of water was the wells, 48% and

25%, respectively. The findings are the same among neutral-negative respondents with respondents whose primary sources of water were a 'tap-in-out or a neighbor's/relative's pump', displaying a higher rate of diarrheal disease morbidity, 63% and 50%, respectively, than among respondents who relied on wells, 28%.

With respect to the causal explanations of diarrhea, the findings are similar. Among tap users, both positive and negative respondents to the cause of diarrhea had similar rates of diarrheal disease morbidity. Similarly, among users of a neighbor's/relative's pump and among well users, diarrheal disease incidence did not decrease with positive knowledge of the cause of diarrhea within each water source category. Furthermore, positive knowledge of the contamination causes of diarrhea, including contamination of water, does not appear to affect incidence with households using piped water, and from outside pumps, continuing to display significantly higher rates of diarrhea, irrespective of maternal knowledge, than households who rely on wells as their primary source of water.

The findings with respect to maternal knowledge, water storage methods and diarrheal disease are similar. Among households who stored water in the 'Tisht' container, a practice which was somewhat related to diarrheal disease morbidity in section 1, preventative knowledge did not reduce the prevalence of diarrheal disease; respondents with positive knowledge of the prevention of diarrheal disease and those with 'negative' or lack of knowledge experienced similar rates of diarrheal disease morbidity. Similarly, diarrheal disease incidence was the same among those who used any storage method irrespective of maternal

knowledge of diarrheal disease prevention.

ii. Toilet Facilities, Sewage Disposal Facilities & Diarrheal Disease Child Morbidity:

This section examines the relationship between maternal knowledge of diarrheal disease prevention/causal explanations and diarrheal disease morbidity while controlling for the type and location of toilet facilities and sewage removal systems.

Among households with baladi toilets, diarrhea incidence was the same for both mothers who responded positively and those who responded negatively to appropriate measures in diarrheal disease prevention. Similarly, among households with 'hofra' toilets, the rate of diarrheal disease was similar for both mothers with positive and negative knowledge of diarrheal disease prevention. Thus, among households with baladi toilets, previously associated with lower diarrheal morbidity, and among households with 'hofra' toilet facilities, significantly associated with higher rates of diarrheal disease prevalence, positive and negative respondents are equally likely to have diarrheal disease.

An alternative examination of the data crosstabulating diarrhea prevalence with household toilet facilities while controlling for knowledge reveals an unexpected relationship however, between negative respondents and diarrheal disease incidence. Among positive respondents to the prevention of diarrhea, diarrhea incidence remained significantly higher in households with the 'hofra' toilet than in households

with Baladi toilets; 61% and 41%, respectively. Among negative respondents however, although households with 'hofra' toilets experienced a slightly higher rate of diarrheal disease morbidity than those with baladi toilets, the difference is extremely small, 54% as compared to 46%, and statistically insignificant. Thus, among negative respondents, diarrheal morbidity was no longer significantly related to toilet type: or, alternatively, in households where mothers displayed incorrect or complete lack of knowledge in the prevention of diarrheal disease, including protection from exposure to sources of contamination, households with superior toilet facilities experienced a similar rate of diarrheal disease child morbidity as households with inferior toilet facilities, (see Table 7.5).

Furthermore, these findings recur in the relationship between causal explanations of diarrheal disease and toilet facilities. Among respondents who gave positive causal explanations of diarrheal disease, that is medically correct explanations, households with 'hofra' toilets are significantly more likely to have diarrheal disease than households with 'baladi' toilets. Among neutral-negative respondents, however, all households are equally likely to have diarrheal disease, (see Table 7.6). Thus among positive respondents, households with inferior toilet facilities were unable to effectively prevent diarrheal disease inspite of their awareness and knowledge of potential sources of contamination and their direct relationships to diarrheal disease morbidity. This suggests that household toilet facilities override the ability of mothers with knowledge

of how to prevent diarrhea and with medically correct causal explanations of diarrhea to effectively alter the significant relationship between poor toilet facilities and exposure to sources of diarrheal pathogens. At the same time, however, the fact that, among neutral-negative respondents who lack preventative and 'causal' knowledge, households with superior toilets were equally likely to experience diarrhea as those with inferior toilets suggests that, in the absence of preventative knowledge, the significance of superior resources as a 'protective' factor diminishes relative to the significance of inferior resources as a 'risk' factor in the exposure of children to diarrheal disease pathogens.

This finding further suggests that positive maternal knowledge was a significant determining factor in reducing diarrheal disease exposure among households with 'baladi' toilets relative to households with 'hofra' toilets. Thus in the absence of adequate toilet resources, mothers with accurate 'positive' knowledge of prevention were unable to significantly alter the relationship between diarrhea and toilet facilities. At the same time, mothers with adequate toilet facilities, but whose knowledge of prevention and causation was negative, experienced a similar rate of diarrheal disease as those with equally inadequate knowledge but even more inadequate toilet facilities. Thus knowledge of diarrheal disease did not decrease diarrhea prevalence rates in households with poor resources while, at the same time, the lack of knowledge undermined the significance of adequate toilet facilities as a

determinant of diarrheal disease morbidity in this sample.

Table 7.5 Toilet Facilities, Maternal Knowledge of Diarrheal Disease Prevention and Diarrheal Disease:

Positive Respondents:

	Frengi/ Baladi	Pit/ Other
Diarrhea		
Yes	41.3% (71)	60.5% (23)
No	50.7% (101)	39.5% (15)
	.03082*	

Negative Respondents:

	Frengi/ Baladi	Pit/ Other
Diarrhea		
Yes	45.5% (65)	54.3% (19)
No	54.5% (78)	45.7% (16)
	.34822	

Table 7.6 Toilet Facilities, Maternal Knowledge of Diarrheal Disease Causation and Diarrheal Disease:

Positive Respondents:

	Frengi/ Baladi	Pit/ Other
Diarrhea		
Yes	41.1% (58)	65.7% (23)
No	50.7% (101)	34.3% (12)
	.03082*	

Negative Respondents:

	Frengi/ Baladi	Pit/ Other
Diarrhea		
Yes	44.8% (78)	50.0% (19)
No	55.2% (96)	50.0% (19)
	.56204	

The relationship between diarrheal disease, maternal knowledge and sewage disposal systems indicates that diarrheal disease prevalence among both households with large and those with smaller inefficient sewage systems, was similar for both positive and negative respondents with respect to knowledge of prevention, and knowledge of disease causation. An alternative examination

of the data, however, suggests that the relationship between maternal knowledge of prevention, diarrheal disease and methods of sewage disposal is very significant.

Among positive respondents to the prevention of diarrhea, diarrheal disease prevalence was similar in both households with larger systems and those with smaller, less hygienic disposal facilities. Among neutral-negative respondents, however, diarrheal disease morbidity was significantly higher in households with less hygienic systems; 53% as compared to 27%, respectively; (.00212)*. Similarly, the relationship between maternal knowledge of disease causation, diarrheal disease incidence and methods of sewage disposal indicates that among positive respondents, diarrheal disease prevalence was similar in both households with larger systems and those with smaller, less hygienic disposal facilities. Among neutral-negative respondents, however, diarrheal disease was significantly higher in households with less hygienic systems; 52% as compared to 29% respectively; (.00222)*.

Table 7.7 Sewage Removal Facilities, Maternal Knowledge of Diarrheal Disease Causation and Diarrheal Disease Incidence:

Positive Respondents:

	Larger Systems	Small/Other
Diarrhea		
Yes	40.9% (18)	43.5% (50)
No	59.1% (26)	56.5% (65)
	.76956	

Negative Respondents:

	Larger Systems	Small/Other
Diarrhea		
Yes	29.2% (19)	52.3% (69)
No	70.8% (46)	47.7% (63)
	.00222	

2. Respiratory Infection Morbidity, Maternal Knowledge and Crowding Levels:

The relationship between respiratory infection, maternal knowledge of prevention/causation and crowding conditions is significant with respect to knowledge of causation, but not prevention. With respect to maternal causal explanations

of respiratory infection, maternal knowledge was positively associated with reduced respiratory infection in extended family living arrangements. Thus children in nuclear households experienced a similar rate of respiratory infection as those in more crowded extended family households where maternal knowledge of the causes of respiratory infection was medically accurate. In households where maternal causal explanations of respiratory infection were inaccurate and/or fatalistic, respiratory infection prevalence was significantly higher in extended family households, (57%), than in nuclear households (32%), (.01746)*. Thus respiratory infection was positively related to crowding conditions in households where mothers lacked knowledge, but not in households where mothers were aware of the causes, and hence possibly prevention, of respiratory infection.

Summary:

This section examined maternal causal and preventative knowledge of the two major diseases responsible for child mortality in Egypt and the relationship of this knowledge to disease prevalence at various levels of household resources which, according to the epidemiological literature, represent important risk factors associated with diarrheal disease and respiratory infection in general, and in rural Egypt, in particular. It sought to measure whether knowledgeable mothers are more capable of significantly altering the rate of exposure and susceptibility

to disease, irrespective of the nature and adequacy of household resources, than less knowledgeable mothers.

Although maternal knowledge and maternal education were significantly related to one another in this sample and would therefore lead us to expect that the findings here would not differ significantly from those in the previous section, this part of the empirical investigation has proved to be both necessary and valuable for two reasons. Firstly, the sample distribution with respect to a number of crucial variables, including toilet facilities, was more appropriate for statistical analysis when maternal knowledge was examined as the independent variable as opposed to maternal education. Secondly, the primary distinguishing objective of this research was not in examining whether or not a relationship exists between maternal education and child survival, a topic which has been extensively examined, albeit inconclusively, in national and crossnational surveys, (see Chapter 2). Rather, the aim of this field research was to obtain more insight into the mechanisms through which maternal education works to affect child health and whether this relationship, if indeed significant, operates through more intermediate determinants.

One of the mechanisms through which maternal education is hypothesised to enhance child survival is by increasing the level of maternal knowledge and awareness in the prevention of child illness. This hypothesis has important policy-implications in suggesting that it may be possible to enhance child survival

chances by improving maternal knowledge and skills in specific child care practices without having to significantly alter household resources in the short to medium term. Despite these implications however, maternal knowledge, and its impact on health-related preventative practices, has rarely been measured in health surveys beyond the anthropological level. As seen in Chapter 2, often when a significant relationship is found between maternal education and aggregate levels of child mortality, numerous untested hypotheses are presented to explain this association, i.e., that education improves the balance of power in households in favor of women. In addition to being unverified and perhaps unverifiable, these assumptions offer little insight in terms of child survival policies. Given the current emphasis on maternal education and the fact that current child survival strategies are largely based on promoting maternal knowledge, it is increasingly crucial to investigate the specific relationship between maternal knowledge and child health and to observe how this relationship operates at different levels of household resources.

The empirical findings examined above constituted an attempt to understand these relationships in the context of rural Egypt. They demonstrated that, with respect to water sources and water storage, maternal knowledge was not a significant determinant of diarrheal disease incidence. For households who used a neighbor's or a relative's source of water, the children of both mothers with accurate preventative/causal knowledge, and those without, were equally likely to have diarrheal disease and remained significantly more likely than children in households who used the other

two sources of water, to have diarrheal disease. Well users had the lowest rate of diarrheal disease, irrespective of maternal knowledge, and relative to the other two water sources.

The relationship between maternal knowledge, sanitation and diarrheal disease prevalence was slightly more significant, however. For the toilet facilities variable, positive maternal knowledge of causation and prevention did not alter the relationship between toilet facilities and diarrheal disease: inferior resources were significantly related to increased diarrheal disease and superior resources significantly related to reduced diarrheal disease prevalence. Lack of maternal knowledge in causation and prevention, however, undermined these disparities with both households with inferior and those with superior resources equally likely to have diarrheal disease. When compared with the findings among positive respondents, this suggests that maternal positive knowledge was indeed significant in reducing diarrheal disease in households with superior toilets relative to diarrheal prevalence in households with inferior toilets. Consequently, with respect to diarrheal disease prevalence, toilet resources and maternal knowledge, it appears that maternal knowledge enhances child health only when resources are adequate. The reverse is not true however, and when knowledge is inadequate but resources adequate, households with adequate resources experience similar rates of diarrheal disease as those with inadequate resources.

The relationship between maternal knowledge, diarrheal disease and septage waste disposal was more consistent and also significant.

Among positive respondents to the prevention and to the cause of diarrhea, diarrheal disease prevalence was similar in both households with larger systems and those with smaller, less hygienic disposal facilities. Among neutral-negative respondents however, diarrheal disease morbidity was significantly higher in households with less hygienic systems.

Finally, the relationship between respiratory infection prevalence, maternal knowledge of prevention/causation, and crowding conditions is slightly significant with respect to knowledge of causation but not prevention. With respect to maternal causal explanations of respiratory infection, maternal knowledge was positively associated with reduced respiratory infection in extended family living arrangements; children in nuclear households experienced a similar rate of respiratory infection as those in more crowded extended families in households where maternal knowledge of the causes of respiratory infection was medically accurate. In households where maternal causal explanations of respiratory infection were inaccurate and/or fatalistic however, respiratory infection prevalence was significantly higher in extended households than in nuclear households. Thus respiratory infection was positively related to crowding conditions in households where mothers lacked knowledge, but not in households where mothers were aware of the causes, and hence prevention, of respiratory infection.

It is possible to hypothesise from these findings that maternal knowledge of prevention and causal explanations

of disease are indeed significantly related to the prevention of diarrheal disease and respiratory infection when controlling for a number of significant health-related household resources. It is not possible, however, to conclude from these findings to what extent maternal knowledge of disease causation and prevention enhances child health independently of these intermediate household resources.

Among the three resources crucial in the prevention of diarrheal disease and respiratory infection, (toilet facilities, sewage disposal and crowding conditions), maternal knowledge affected child health independently of household resources for two variables; namely, septage waste disposal and crowding conditions. For the third crucial variable, toilet facilities, positive knowledge enhanced the impact of superior resources on child health while lack of knowledge reduced the impact of superior resources. It would appear, therefore, that the relationship between maternal knowledge and the effective prevention of diarrheal disease was dependent, in this case, on access to adequate resources. Thus the first two variables suggest a relationship between maternal knowledge and disease prevention independent of household resources while the last variable suggests that this relationship is indeed dependent on the nature and level of household resources. The final section of this empirical analysis may shed some light on the significance of these findings. It examines the relationship between maternal education, income and child health and indicates that, at higher levels of income, educational disparities in child morbidity are

surprisingly significant in this sample.

7.9 Maternal Education, Household Income and Child Health

This section examines the relationship between income, education and child morbidity. Although neither income nor maternal education as individual variables are significantly related to child morbidity in this sample, combined together, a somewhat more significant relationship emerges between these variables and child morbidity. The survey findings demonstrate that at higher income levels, (LE101-400), diarrheal disease prevalence is slightly higher among illiterate mothers; 62% of children whose mothers are illiterate have diarrhea, than literate mothers; only 39% of children at similar income levels, but whose mothers are literate, have diarrhea; (.07089; see table 7.8.) The findings with respect to respiratory infection and diarrheal disease morbidity combined are similarly significant. At higher levels of income, child morbidity, diarrheal or respiratory, is higher among uneducated mothers than among educated mothers at the same higher level of income: 83% and 70%, respectively. However, the most significant differences in child morbidity between educated and uneducated mothers at higher levels of income are reflected with respect to diarrheal disease in this sample, and educational disparities in respiratory infection at higher levels of income are not significant.

At lower levels of income, LE 30-100, the prevalence of diarrheal disease, respiratory infection rates and the two combined are similar for educated and uneducated mothers. Thus at lower levels of income, education does appear to affect maternal

performance in the prevention of diarrheal disease and respiratory infection in this sample. At higher levels of income, however, education enhances maternal performance in the prevention of diarrheal disease and uneducated mothers, despite their higher incomes, experience a significantly higher rate of diarrheal disease child morbidity in this sample. Income, therefore, does not appear to improve child health among uneducated mothers, while at lower income levels, education does not appear to enhance child health. These findings, therefore, suggest an inter-dependent relationship between maternal education and child health whereby education only enhances prevention in higher income households, (LE 101-400).

Given that income was not a particularly important determinant of household resources related to diarrheal disease, this relationship appears quite paradoxical. It is possible that income improves combinations of household resources which together affect diarrheal disease in households with educated mothers. However, attempts to combine variables in this sample did not reveal significant enough correlations. Nevertheless, it remains highly significant that neither income on its own, nor maternal education on its own, were significantly related to the prevalence of diarrheal disease. The combination of both higher income and maternal education, however, significantly improves child health. It remains possible that these relationships are a reflection of the impact of maternal performance in the treatment of diarrheal disease which indirectly affects diarrhea-related nutritional deficiencies and the rate of recurrent infections.

The policy implications of these findings and possible interpretations of these relationships are therefore further examined in the conclusion of this thesis which brings together the main findings of the three empirical chapters in this thesis.

Table 7.8 Income, Diarrheal Disease Prevalence and Maternal Education.

Literate Respondents:

Diarrhea	Yes	No
30-100LE	39.1% (18) 66.7% 26.1	60.9% (28) 66.7% 40.6
101-450LE	39.1% (9) 33.3% 13.0%	60.9% (14) 33.3% 20.3%
	(1.0000)	

Illiterate Respondents:

Diarrhea	Yes	No
30-100LE	43.8% (42) 66.7% 32.3	56.3% (54) 80.6% 41.5
101-450LE	61.8% (21) 33.3% 16.2%	38.2% (13) 19.4% 10.0%
	(.07089)	(missing 202)

The most recent international health strategy for promoting child health and survival in the developing world represents an attempt to accelerate the phased progress towards intersectoral PHC while simultaneously promoting selective child survival interventions in developing countries, (see Chapter 1; and World Bank, 1993). This thesis has attempted to investigate two aspects of this approach to the promotion of child health among the international community: maternal education and disease-specific interventions. With respect to female education, the research has attempted to investigate some of the mechanisms through which maternal education has been hypothesized to enhance child survival on the basis that without a clearer understanding of these mechanisms, the policy implications of this relationship remain so vague as to be of little use, (Cleland & van Ginneken, 1988; Ware, 1984), and secondly, that national and cross-national demographic and health surveys which have shown broad associations between maternal education and child survival at the aggregate level have not been empirically conducive for understanding the mechanisms through which education enhances child survival at the household level, (LeVine et al, 1994).

In attempting to examine the maternal education - child health relationship and its policy implications, this case-study has illustrated the substantial empirical difficulties involved in investigating the mechanisms through which education has been

hypothesised to enhance child survival in the literature. Although all of the determinants of child survival present different degrees of difficulties in establishing the direction of causation and in controlling for intervening variables, establishing the pathways through which education enhances child health is among the more difficult tasks in the study of the determinants of child survival since it requires the study of human behavior and its determinants at the domestic level.

In this context, this research attempted to overcome some of the inherent difficulties in examining the pathways through which education enhances child health by adhering to the main conceptual elements of the Mosley/Chen child survival research framework which is intended to facilitate and advance research on health policy, social policy and medical interventions, (Mosley & Chen, 1984). By separating the socio-economic determinants of child survival from the proximate determinants, or biological variables, through which the former necessarily operate to affect child health outcomes, the framework emphasises the need for a detailed specification of the direction of causation and hence a careful consideration of intervening variables in child survival research. Secondly, an effort to minimise some of the inherent empirical difficulties in investigating the mechanisms through which education enhances child survival was made by adopting, as far as possible, the empirical variables which were defined by Ware as representing the ideal requirements of a household survey designed to study

the pathways through which education enhances child survival, (Ware, 1984).

According to Ware, a real educational impact should be independent of household income in that 'with the same resources, educated women should be able to provide healthier lives for their children than their illiterate counterparts,' (Ware, 1984: 207). Ideally a survey designed to address this question would, firstly, be conducted in an area where educational disparities in mortality are known to exist. The setting for this survey was chosen on the basis of educational disparities in child mortality which had previously been established by the CSRP in the early 90s, (Langsten and Hill, 1992). Secondly, the survey should be conducted on the age group where educational disparities are expected to be most significant. The sample was therefore chosen to represent the age group which the health literature in general, (Palloni, 1981), and research in Egypt at the aggregate level (DHS, 1993; EMCHS, 1993) and at the household level, (Tekce, 1990), had previously demonstrated educational disparities in mortality were most significant, the 3-5 year age group. Because the significance of maternal factors as determinants of mortality differentials are presumed to have diminished, and the significance of household resources and the ways in which mothers use those resources have increased by this age, (Tekce, 1990), the survey focused on this age group. Thirdly, an ideal survey for examining the mechanisms through which education enhances child survival would aim, as this survey did, to collect data on: levels of household income; household assets; land ownership; employment;

female employment and the care of children among mothers in active employment outside the household and among those involved in agricultural activities, in addition to data on the educational attainment of mothers and levels of literacy among the sample. Household health-related resources would also be examined and the variables selected with a view to their impact on health. This was achieved in Menofia by focusing on health-related variables which anthropological and epidemiological survey data had previously indicated were significant determinants of child morbidity in the villages studied including, water and sanitation sources, food handling practices and housing conditions. In sum, since the incidence of child morbidity had previously been demonstrated to be associated with a disproportionate contribution of the complex of water, food and airborne diseases in these villages, the household-level health related variables investigated were selected with a view to their impact on health, based on previous research findings from a multi-disciplinary perspective (El Katsha, et al 1989).

With respect to the dependent variable in this survey, child morbidity, an effort was made to control for the possibility of educational disparities in the reporting of child morbidity by conducting the survey in a setting where previous research had demonstrated educational disparities in maternal awareness of disease symptoms and symptoms of severity were not significant. In the wider health literature, it is often assumed that estimates of child morbidity will be inaccurate because under-reporting of child morbidity, like child mortality, is suspected to be

widely prevalent among uneducated mothers. This is because uneducated mothers are expected to consider the incidence of child morbidity to be insignificant on account of its frequent recurrence and because they are assumed to be less aware of dangerous disease symptoms than their educated counterparts. It is important to note here, however, that, with respect to educational disparities in the reporting of child mortality, the under-reporting of mortality in large-scale surveys among uneducated mothers has recently been questioned on the basis that, in most societies, a child's death is a significant event, and, often, 'a threatening subject of conversation... it does not necessarily follow that women from elite groups in which child mortality is a relatively rare experience will be more willing to recall such deaths than illiterate village women for whom such events are regrettably common place,' (Ware, 1984:192).

With respect to child morbidity, although there is no way of knowing to what extent educational disparities in morbidity reporting were significant in this sample, it is important to note that educational disparities in knowledge of disease symptoms, the ability to identify symptoms, and the potentially fatal consequences of disease episodes were not significant in this sample. Furthermore, in the larger CSRP survey, maternal definitions of severity were found to be closely correlated to the presence of dangerous symptoms for diarrheal disease and respiratory infection. Thus an attempt to minimise the potential significance of educational disparities in morbidity reporting was made by conducting the survey in a setting where previous and on-going research by the CSRP had dem-

onstrated that educational disparities in maternal perceptions of disease symptoms were not significant and by confirming these findings in the present survey.

According to Ware, once the above conditions are taken into consideration, the ideal survey for examining the pathways through which education enhances child survival would then be based on the working hypothesis as to the ways in which education is thought to influence child health. In measuring this relationship, therefore, this research was concerned with examining the specific pathways through which education had been hypothesised to enhance child survival in the literature, yet for which the empirical evidence was either weak, conflicting, or indeed non-existent. It was particularly concerned with examining to what extent educated mothers enhance the health of their children through specific child care practices given the unresolved controversy in the health literature in which numerous experts have argued that the impact of maternal education manifests itself less through specific child care practices and more through a general transformation of women's social value, (see Chapter 2). Educational disparities based on child care practices have significant policy implications since such disparities would suggest the possibility of enhancing maternal performance in specific preventative or curative child care practices through health information and health education messages and would therefore suggest more short-term policy implications to the maternal education / child health relationship, as seen in Chapter 2. Despite the importance of establishing these linkages for policy purposes however, few

studies have contrasted the role of maternal knowledge and skills in observed educational disparities in child health. Thus the focus of this research in this context was on examining the role of maternal knowledge and skills in the pathways through which education had been hypothesised to enhance child survival in the literature as summarised in Chapter 2. These are that educated mothers enhance the health of their children by cooperating to a greater extent with preventative and/or curative health services; by being more active in the household or everyday life to ensure that the child does not become sick in the first place, or, by managing illness episodes effectively when they do occur, (Caldwell, 1994).

Based on the hypothesis that educated mothers may enhance the health of their children through specific child care practices and the related hypothesis that such an association may have wider policy implications for short term reductions in child mortality, the survey attempted to extrapolate the intermediate variables involved in the maternal education child survival relationship by contrasting the knowledge and practices of educated mothers with those of uneducated mothers. According to Ware, an ideal survey for testing this hypothesis would attempt to establish whether educated women do, in fact, enhance child survival through a specific contribution to child health needs by collecting data about knowledge of disease symptoms; prevention; causal explanations of disease, treatment, and the dietary management of illness episodes, with a view to establishing whether educated mothers do in fact possess superior

knowledge and skills in health-related child care practices. A survey for examining the above associations would also investigate usage of health facilities to determine whether disparities in treatment practices do in fact exist between educated and uneducated mothers (Ware, 1984), as this survey did.

In sum, this survey attempted to overcome some of the inherent difficulties in examining the intermediate mechanisms in the maternal education child survival relationship by adhering to the essential elements of Ware's research framework for examining the pathways through which education enhances child health as far as possible, and by adopting the Mosley/Chen conceptual framework for examining the determinants of child survival at the household level. However, despite using the Mosley/Chen child survival research framework in general and adhering to the formula established by Ware for investigating the mechanisms through which education enhances child survival in particular, social realities in the field, as in other research settings where this relationship has been examined, imposed significant constraints which limited the ability to control for intervening variables and therefore to establish the direction of causation throughout much of the analysis. The most significant constraint was the fact that educated mothers were overwhelmingly better off than uneducated mothers in the communities studied. It is not possible to escape from the fact that, in order for survey results to demonstrate an independent education effect on child health and to determine, in turn, how this relationship works

and what its policy implications are, it should be possible to show that this impact operates even after controlling for the income of the household. A real educational impact should be independent of household income in that, with the same resources, educated women should be able to provide healthier lives for their children than their illiterate counterparts, (Ware, 1984). Thus in order to form the basis of concrete policy recommendations, the maternal education child survival relationship must be demonstrated to be a causal one and independent of income. As even Ware herself emphasises, however, few studies have effectively contrasted the relative impact of maternal education and household income on child survival. This is largely due to the fact that it is exceedingly difficult to find a setting in which the educated are not also the wealthy. 'Educated women tend to live in wealthier households not only because of any contribution they may make to the household but also and possibly more significantly, because educated women can hold out for higher income husbands, particularly in countries where female education is relatively rare,' (Ware, 1984:198).

Furthermore, according to Ware, no studies demonstrate that poor but educated women with limited access to effective sanitation or medical facilities achieve significant reductions in child mortality. It is important to emphasise that this is not due to the lack of effort among health researchers to examine these linkages while controlling for intervening variables, but due to the difficulties in finding an exceptional setting where such women exist; even Ware points out that there are few places

which have a school without also having a health center, (Ware, 1984). This may suggest that regardless of how accurate and elaborate the specification of survey requirements for testing the mechanisms through which education enhances child survival are in the initial survey questionnaire, the ideal survey for testing these pathways must be conducted in an exceptional setting where poor but educated mothers are known to exist.

In this context, one of the few such exceptional settings which comes to mind is Iraq. The case of Iraq perhaps represents a rare but natural setting where educated women with limited access to health and sanitation facilities currently exist due to the sanctions imposed by the United States and its Allies in the International Community following the Gulf War. Significantly, both infant and child mortality rates have increased substantially in Iraq during the past six years despite the fact that female education is relatively high in this country. Recent aggregate level data indicates that the impact of the rapid decline in household income and rapid deterioration in access to medical facilities and effective sanitation has had widespread negative repercussions for child survival in Iraq. Natural experiments such as Iraq may also occur in intervention-specific research which is conducted before and after efforts to improve household health-related resources. An example which was examined in this thesis was the upgrading of slum and squatter settlements in Jordan where educational disparities in child mortality ceased to be significant once housing conditions and access to water and sanitation facilities were improved. These two cases illustrate

rare conditions in which the relative impacts of maternal education, household income and health related resources on child mortality can be measured in a setting where the ability to control for intervening variables is optimised due to rare and exceptional circumstances.

Nevertheless, bearing in mind the substantial difficulties in measuring the significance of intervening variables in the maternal education-child health relationship in situations where the ability to control for intervening variables is not maximised, as in this research setting, a number of factors emerged as significant from the findings of this case study of 401 households in rural Egypt on the relationship between maternal education and child health. The first is that, contrary to the expectations of numerous experts in the health literature, (Kaufmann & Cleland, 1994; Caldwell, Reddy & Caldwell 1983; Basu, 1993), educational disparities in maternal knowledge of disease causation and prevention were significant in this sample. In particular, educational disparities in maternal knowledge of the relationship between child morbidity and health-related household resources which constituted high risk factors in the communities studied, such as water and sanitation resources; cleanliness and contamination; food handling practices and the presence of animal waste and insects in close proximity to households, were especially significant. Thus, although, as seen in Chapter 2, numerous experts suggest that since educated and uneducated mothers hold similar views about the cause and prevention of disease, it is unlikely that maternal knowledge is a significant factor in observed educational differ-

entials in child mortality, the findings of this survey suggest that, with respect to the first part of this hypothesis, these assumptions are not universal. Educated mothers in this sample at least, do in fact have useful knowledge with respect to the prevention of disease and therefore presumably have the potential, at least, to enhance the survival of their children through specific child care practices in domestic behavior which ensures that the child does not become sick in the first place.

However, although maternal education was positively related to accurate knowledge in causal explanations of disease and in the prevention of disease, the findings of this survey indicated that enhanced knowledge and awareness did not lead to greater protection against infection among educated mothers in this sample. Thus, while educated mothers were found to have the knowledge and awareness and, therefore, the capacity through individual-level variables to promote activities in daily life to ensure the prevention of disease, both educated and uneducated mothers in this sample demonstrated similar rates of child morbidity and, despite their superior knowledge and skills in preventing disease, educated mothers were unable to substantially reduce the incidence of child morbidity. Furthermore, maternal knowledge of disease causation and prevention was not directly linked to disease prevalence rates: both mothers who had medically or scientifically accurate knowledge of disease causation and prevention, and mothers who were either fatalistic or ignorant about the causes and prevention of disease, experienced similar rates of child morbidity.

These findings suggested the possibility that, in the absence of adequate health-related household resources, educated and knowledgeable mothers were no more able to reduce disease prevalence rates than their uneducated counterparts and consequently, that the maternal education child-health association may not be so independent after all, at least with respect to one of the pathways through which education is hypothesised to enhance child survival, the prevention of disease.

The empirical chapters of this thesis, which attempted to examine this hypothesis while controlling for intermediate household resources, were considerably hindered by insufficient variability in the distribution of numerous important variables among educated mothers. The findings with regard to only two variables significantly associated with child morbidity, crowding conditions and sewage removal methods where the variation in the distribution of educated mothers in the sample was sufficient, indicated that these variables revealed statistically significant educational disparities in child morbidity. Thus, at the same level of 'inadequate' resources, educated mothers experienced less diarrheal disease and respiratory infection child morbidity than uneducated mothers with the same level of inadequate resources, with respect to these two variables.

With respect to the relationship between maternal knowledge of disease prevention, household resources and child morbidity, although maternal knowledge was positively related to maternal education in this survey and could therefore be expected to

reflect similar data constraints in the empirical investigation as those outlined above, the relationship between preventative knowledge, household resources and child morbidity nevertheless constitutes a crucial and significantly under-researched component in the policy debate on the relationship between maternal education and child health. As indicated in Chapter 2, disclosing the relationship between maternal knowledge and awareness in the prevention of child morbidity has important policy-implications. Despite these implications, however, maternal knowledge and its impact on health-related preventative practices has rarely been measured in health surveys beyond the anthropological level. Given the current international emphasis on maternal education and the fact that current child survival strategies are largely based on promoting maternal knowledge and skills, it seems increasingly crucial to investigate the specific relationship between maternal knowledge and child health, and to observe how independent the association is at different levels of household resources.

This survey attempted to examine maternal causal and preventative knowledge of the two major diseases responsible for child mortality in Egypt, and the relationship of this knowledge to disease prevalence at various levels of household resources which, according to the epidemiological literature, represent important risk factors associated with diarrheal disease and respiratory infection in general, and in rural Egypt, in particular. It sought to measure whether knowledgeable mothers are more capable of significantly altering the rate of exposure and susceptibility to disease, irrespective of the nature and adequacy of household

resources, than less knowledgeable mothers.

The findings of this survey demonstrated that, with respect to water sources and water storage, maternal knowledge was not a significant determinant of diarrheal disease incidence. The relationship between maternal knowledge, sanitation facilities and diarrheal disease prevalence was significant, however. For the toilet facilities variable, positive maternal knowledge of cause and prevention did not alter the relationship between toilet facilities and diarrheal disease prevalence: inferior resources were significantly related to increased diarrheal disease and superior resources significantly related to reduced diarrheal disease prevalence. Lack of maternal knowledge in causation and prevention however, undermined these disparities with both households with inferior and those with superior resources reporting similar rates of diarrheal disease prevalence. This suggested that maternal positive knowledge was indeed significant in reducing diarrheal disease incidence in households with adequate facilities relative to diarrheal prevalence in households with inadequate facilities. Consequently, with respect to diarrheal disease prevalence, toilet facilities and maternal knowledge, it appears that maternal knowledge enhances preventative practices when resources are adequate. The reverse is not true, however, and when knowledge is inadequate, but resources adequate, households with adequate resources experience similar rates of diarrheal disease prevalence as those with inadequate resources.

The relationship between maternal knowledge, diarrheal disease

prevalence and sewage waste disposal facilities was more consistent and also significant. Thus, among positive respondents to the prevention and to the cause of diarrhea, diarrheal disease prevalence was similar in both households with relatively hygienic sewage removal systems and those with smaller, less hygienic disposal facilities. Among neutral-negative respondents however, diarrheal disease morbidity was significantly higher in households with less hygienic systems.

With respect to maternal causal explanations of respiratory infection, crowding conditions and respiratory infection morbidity, maternal knowledge was found to be positively associated with reduced respiratory infection in extended family living arrangements and the prevalence of respiratory infection was positively related to crowding conditions in households where mothers lacked knowledge, but not in households where mothers were knowledgeable about causal factors associated with respiratory infection.

Despite the significance of some of the associations found in this sample, however, it is not possible to conclude from these findings to what extent maternal knowledge of disease causation and prevention enhances child health independently of health-related household resources. Among the three resources related to the prevalence of diarrheal disease and respiratory infection, in this sample (toilet facilities, sewage disposal facilities and crowding conditions,) maternal knowledge affected child health independently of household resources for two variables; namely, sewage waste disposal and crowding conditions. For the third

crucial variable, toilet facilities, positive knowledge enhanced the impact of adequate resources on child health while fatalism and/or ignorance reduced the impact of adequate resources. It would appear therefore, that the relationship between maternal knowledge and the effective prevention of diarrheal disease was dependent, in this case, on access to adequate resources. Thus the first two variables suggested a relationship between maternal knowledge and disease prevention independent of household resources while the last variable suggested that this relationship is indeed dependent on access to adequate sanitation facilities.

Although these findings appeared somewhat paradoxical, the relationship between maternal education, income and child health which demonstrated that, at higher income levels, (LE 101-400), educational disparities in child morbidity were surprisingly significant, suggested that the relationship between maternal education and child health in this sample is not as independent as the literature suggests in other settings. Although neither income nor maternal education as individual variables were significant determinants of child morbidity in this case study, when these variables were combined together, a significant relationship emerged between these variables and child morbidity. The survey findings demonstrated that at higher income levels, diarrheal disease prevalence was significantly higher among illiterate mothers than among literate mothers.

The findings with respect to respiratory infection and

diarrheal disease morbidity combined were similarly significant. At higher income levels, child morbidity, diarrheal or respiratory, was higher among uneducated mothers than among educated mothers at the same higher level of income. However, the most significant differences in child morbidity between educated and uneducated mothers at higher income levels were reflected with respect to diarrheal disease in this sample. At lower income levels, the prevalence of diarrheal disease, respiratory infection rates and the two combined were similar for educated and uneducated mothers. Thus among higher income households, maternal education was effective in reducing disease prevalence rates. The converse was not true however; when household income was inadequate both educated and uneducated mothers reported similar rates of child morbidity. These findings therefore suggested an inter-dependent relationship between maternal education, income and child health whereby education only enhanced prevention when income was adequate.

In relation to policy interventions, these findings have important implications in suggesting that with respect to the prevention of disease, behavior and 'conditions' are somewhat inter-dependent and may be inseparable in enhancing the proximate determinants of child health. They also suggest that the maternal education child health relationship may be less amenable to policy intervention in the area of prevention than initially forecast. The hypothesis that the maternal education-child health association may have short-term policy implications is based on the premise, summarised by Ware, that if education is effective

because it transmits certain ideas of hygienic practices, then, presumably one could teach these matters to mothers directly without having to provide eight years of schooling for all potential mothers, (Ware, 1984). The absence of a direct linkage between maternal knowledge and disease prevention in this sample suggests that these associations may have been over-simplified and that the intermediate variables in the maternal education/child survival relationship may be less amenable to intervention in the short to medium term than the literature suggests.

In the specific context of Egypt, these findings are inconsistent with the possibility that educational disparities in child health outcomes observed in aggregate data sets are related to the prevention of disease, but are consistent with an earlier study which attempted to control for income, and the intermediate determinants of health in testing the maternal education/child survival relationship. In the latter study, income differentials in child survival were more significant than educational differentials, (Cooksey et al, 1986). The need for further research at the household level with respect to this aspect of the maternal education / child survival debate must be emphasised in view of its policy implications.

With respect to the second pathway through which maternal education has been hypothesised to enhance child survival in the literature, ensuring that illness is soon brought under control, the findings of this survey suggest that educated mothers do in fact seek treatment earlier than uneducated mothers and that their children begin to show signs of recovery sooner than the children

of uneducated mothers. Thus with respect to the relationship between education and child health, it appears that maternal performance in curative care with respect to the timing of treatment may indeed represent an important intermediate mechanism in the maternal education-child health relationship since the early initiation of treatment was also related to earlier signs of recovery. However, to what extent disparities in the timing of treatment were related to the fact that private doctors are the preferred source of care among all mothers, educated and uneducated, in this sample and in the larger CSRP sample covering twelve villages, is unclear. It is clear however, that educated mothers have higher incomes and can afford to initiate prompt consultation at the universally preferred source of care, the private doctor.

The possibility that uneducated mothers delay treatment for as long as possible for financial reasons in this setting, cannot be discounted. Furthermore, the possibility that uneducated mothers postpone treatment because of their lack of knowledge and awareness of dangerous disease processes and the potentially fatal consequences of diarrheal disease and respiratory infection morbidity, of which they were equally knowledgeable as their educated counterparts in this research setting, is questionable. It must be measured against the fact that the government health unit is widely disliked and even pharmacy consultation is preferred to the health unit. Therefore, it is possible that uneducated mothers postpone treatment for as long as possible not because of their lack of 'awareness' of the need for medical

intervention but because of their general lack of faith in the health unit and the lack of resources to cover the costs of the private doctor.

With respect to the relationship between maternal causal explanations of disease and treatment practices which are widely hypothesised to be closely correlated and coherent in the anthropological literature, the findings of this research suggested that mothers with medically or scientifically accurate causal explanations of disease do indeed seek treatment significantly sooner than fatalistic and/or ignorant mothers. However, again, it is not possible to establish to what extent fatalism is directly related to delays in treatment, or whether these delays are a reflection of financial constraints to meeting the costs of the universally preferred source of care, the private doctor. If this is the case, then these findings suggest that the potential for improving treatment variables by improving maternal knowledge and skills are limited without parallel improvements in health services. As Ware points out, it is frequently suggested that the 'positive association between the educational level of mothers and their use of effective medical services to treat their sick children in fact results from educated women abandoning fatalism... Of more direct concern here is whether to view poverty and deprivation as the cause of the under-use of medical services by the illiterate or alternatively to blame ignorance as the cause,' (Ware, 1984: 200).

Two points must be made with respect to the direct linkages between maternal knowledge of disease causation and the timing of

treatment which were found to be positively correlated in this sample. In the health literature, fatalism is widely used to explain unfavorable health practices such as delays in seeking treatment among illiterate mothers with negative repercussions for child health outcomes, (Caldwell, 1979). The findings of this research suggest that the negative relationship between fatalism and child health care practices, particularly curative care, may have been somewhat oversimplified in the literature. This is reflected in the fact that fatalistic and illiterate mothers nevertheless accepted and used both preventative interventions and curative care extensively in this setting.

With respect to the relationship between fatalism and curative care in the wider context, according to Ware, research in Nigeria has demonstrated that the belief that certain people are destined to die young coincides with an aggressive search for remedies since 'such judgements are confirmed only after the event,' (Ware, 1984:201). In this context, fatalism does not necessarily conflict with the usage of curative care as is commonly suggested by outside observers in the same way that outside observers who explain educational disparities in child mortality through female autonomy often 'underestimate the power of women in traditional societies and overestimate their power in educated households that appear to be somewhat influenced by Western values and cultures,' (Ware, 1982: 196). Thus according to Ware, illiterate mothers with fatalistic perceptions of disease causation and prevention in Nigeria were nevertheless found to seek all types of treatment before concluding that the failure to cure

the child must have been God's will and fatalism is used to explain a death after the event has occurred.

The same was found to apply in Menofia; fatalistic and illiterate respondents nevertheless took extensive action to treat illness episodes and invariably resorted to modern Western facilities. Widespread assumptions of a direct link between fatalism and the failure to act in the face of illness therefore appear to ignore the fact that the same religious heritage which requires resignation and acceptance of the Divine Will often coincides with the command to take every initiative possible in the first place, to prevent illness, and, in the second place, to seek with equal vigour every possible treatment once illness has occurred before interpreting the outcome in fatalistic terms over which the family, having taken every possible course of action, ultimately had to accept the will of God.

These considerations underscore the need for incorporating an understanding of the the cultural context and religious heritage in the setting in which the maternal education-child survival relationship is being investigated since the mechanisms through which education enhances child survival may vary in different cultural contexts, in the same way they may vary in societies at different stages of development. As illustrated in Chapter 2, educational disparities were significant in the use of preventative interventions in India, but not in Egypt, and maternal causal explanations of diarrheal disease which were similar in two very different societies, Kenya and Egypt, resulted in very

different treatment practices. In the former case, treatment consisted of traditional remedies which were consistent with causal explanations of disease while in the latter case, mothers with the same causal explanations resorted to modern Western medical facilities.

In sum, although the analysis of educational disparities in the timing of treatment in this survey suggested that maternal performance in enhancing recovery from infection through prompt initiation of treatment may represent an important pathway in the maternal education child survival relationship, it has also suggested that the widespread preference for private doctors may represent an important factor in the postponement of treatment among illiterate mothers. If this is the case, then improvements in the quality of care are necessary prerequisites for enhancing the capacity of mothers through health education to seek early treatment and thereby reduce educational differentials in curative care and their impact on child mortality. The findings of this survey therefore suggest that the potential for improving treatment variables by improving maternal knowledge in curative care may be limited without parallel investments in the quality of care.

With respect to prevention, although this research has demonstrated a direct connection between literacy and functional knowledge about preventative health care practices, it has also demonstrated that the link between these individual-level variables and the prevention of child morbidity may be weak without parallel improvements in the quality of household resources and household

income. In sum therefore, the findings of this survey suggest that perhaps the maternal education child health relationship may be less amenable to direct interventions which could enhance short-term reductions in child mortality than initially forecast.

In the wider context, as seen in Chapter 1, the possibility of promoting short-term reductions in child mortality by teaching mothers directly appropriate practices in curative care and in the dietary management of illness episodes has served as the underlying foundation for the widespread implementation of population-based child survival interventions since the early 1980s, and in current strategies for disease control in the latest health agenda by the international community, (see Chap.1). Thus 'in each of the priority interventions targeted in the most recent global initiatives for child survival, the ultimate goal is substantial behavior change through education. Fundamental to any change in health status are information, knowledge and skills... Effective population based care therefore requires active and informed participation by families and communities,' (Mosley, 1993: 684).

The findings of this research suggest, however, that without improvements in household resources and in access to adequate and affordable health care, the capacity to enhance maternal performance through knowledge and skills in health care practices may be limited in reducing mortality differentials. With respect to curative care in particular, the Egyptian experience with home-based selective child survival interventions which attempted to improve the knowledge and skills of mothers in the

treatment and dietary management of diarrheal disease suggests that the impact of 'passive education' on child mortality may have been somewhat over-simplified in the literature.

In theory, diarrheal disease control programmes are widely expected to succeed because ORS can be provided at the lowest level facility or in the home as can the clinical diagnosis required to distinguish watery diarrhea from other diarrheas and the degree of severity of dehydration (Martines et al, 1993). Aggregate level data indicate however, that despite 90% exposure to the diarrheal disease campaign in Egypt, ORS usage remains extremely low, (38% in the last episode,) and that diarrhea remains the main cause of death in Egypt, (Langsten & Hill, 1992; Rashad, 1989; SPAAC, 1989). These findings suggest that the gaps between optimal and actual case management at the individual and at the health sector levels remain substantial in Egypt despite the extensive resources allocated to the NCDDP for almost a decade.

In the health literature, it is widely agreed that programmes to prevent deaths from diarrhea and ARI require that mothers be motivated and trained to become informed diagnosticians and managers of home therapy. The most direct approach to promote the desired change is through mass media, ideally reinforced through maternal education, according to the literature. At the same time, evidence at the anthropological level suggests that education enhances the ability of mothers to comprehend health messages with greater proficiency, (LeVine, et al 1994). These findings, while somewhat undermining the role of 'passive education' in recent analysis of DHS data, (Brokerhoff & De Rose,

1994), support Preston's theory in which maternal education facilitates the spread of health information.

This thesis attempted to examine some of these linkages in the context of the Egyptian experience with diarrheal disease control. It sought to examine to what extent maternal education and the comprehension of health messages subsequently influences appropriate and correct usage of health interventions since few studies have examined the three dimensions of this relationship concurrently: maternal education; comprehension of health messages and subsequent usage of health interventions. In the wider context of contemporary child survival strategies, the empirical analysis presented here, therefore, attempted to investigate some of the difficulties involved in the implementation of disease-specific interventions at the household level, (which remain significantly under-researched), and the impact of passive education through mass media in the dissemination of health technologies in the context of the Egyptian experience with diarrheal disease control.

It was assumed that since education is widely considered to facilitate the spread of health information, and in the anthropological literature, knowledge of the purpose of ORS has been found to be conducive to its usage, educated mothers would be more likely to use this home-based medical intervention. However, while educated mothers were more likely to comprehend the purpose of ORS and displayed functional knowledge of ORS, they were not more likely to use it in this setting. Thus the findings of this survey contradicted the causal linkages suggested in the health

literature: ORS usage in Egypt remains very low, 38%, in the last episode, even among educated mothers who understood the purpose of ORS. Thus although education is widely hypothesised to enhance the spread of health information, and the anthropological literature suggests that maternal comprehension of the purpose of home-based interventions encourages acceptance and usage, this survey, while confirming the former hypothesis, suggested that the latter was not the case. Furthermore, although the campaign may have enhanced timely treatment of diarrheal disease in relation to ARI, treatment received by mothers at health facilities was not appropriate, particularly at the preferred source of care, the private doctor. Indeed educated mothers were even less likely than uneducated mothers to use ORS because of their extensive usage of the private doctor and because home-based initiation of ORS, one of the primary messages of the NCDDP campaign, remains extremely rare among all mothers and was hardly ever even recommended as a potential action by mothers in the treatment of diarrhea. Therefore, there remain significant gaps between optimal and actual case management of diarrhea at both the health sector and household levels in Egypt despite years of exposure to the NCDDP health education messages and efforts to improve SCM at health facilities.

At the same time, Egypt's experience with the diarrheal disease control program contrasts sharply with Egypt's success with the EPI which, by all accounts, has achieved significant coverage. This suggests that some interventions are more successful than others and perhaps those which require interaction with a health

practitioner differ in their perceived efficacy in averting death. Perhaps ORS has been less successful because mothers everywhere want the diarrhea to stop and in not meeting this demand, home-based initiation of ORS usage remains low while the demand for private doctors who are meeting this demand with unnecessary antibiotics and antidiarrheals remains high, (Langsten & Hill, 1992). It is interesting to note in this context that despite the widespread dislike of the health unit, in response to why mothers by-passed the health unit, mothers frequently indicated that they only attend the health unit for vaccination purposes. It appears somewhat paradoxical that mothers should be willing to use the health unit for preventative interventions, but not for the treatment of diarrheal disease. The contrasting experiences between the EPI campaign and the NCDDP campaign suggest that the acceptance and usage of an intervention may indeed depend on its perceived efficacy in averting death as suggested by Mosley.

With respect to the ARIP, as seen in Chapter 1, the successful implementation of this intervention requires, as a precondition, an efficient and effective PHC infrastructure, in addition to the active and informed participation of families in diagnosis and management of home therapy. In view of the difficulties encountered in sustaining effective SCM at the health sector level and in training health practitioners in appropriate SCM with respect to diarrheal disease and, in view of the deteriorating PHC infrastructure, it is likely that the ARIP will encounter many obstacles in addition to the recurrent costs affecting the sustainability of child survival interventions in Egypt once donor

funding ceases.

The need for improving the quality of care has been well illustrated in the case of Egypt's experience with the diarrheal disease program which clearly illustrates the gaps between optimal and actual case management in the implementation of health interventions at the health sector level. Similar inadequacies will no doubt substantially reduce the impact of the ARIP unless these gaps are addressed. Appropriate case management of ARI requires effective health education for mothers, recognition of suspected pneumonia and that children are brought to health facilities where health practitioners have been trained in appropriate case management. As Langsten indicated with respect to the ARIP in Egypt, brief training in proper diagnosis, however, did not ensure that respiratory infection was properly treated. Thus these prerequisites for effective case management of ARI will inevitably require a comprehensive approach to improving access to health facilities and the quality of care if the program is to achieve substantial reductions in ARI-related mortality, the second leading cause of infant and child mortality in Egypt after diarrheal diseases.

In the wider context of child survival strategies, upon launching its CSR in the early 1980s, UNICEF declared that mass media, social marketing techniques and low cost interventions targeting the major diseases responsible for child mortality in the developing world together suggested that, 'if the world wanted it, one half or more of the 15 million childrens' lives being lost each year could be saved. The major barrier is the lack of aware-

ness among parents and communities to use the new techniques. The revolution in mass media and social marketing is the only way of achieving a self-sustaining survival and development revolution for children,' (Cash et al, 1987: 10). However, as the Egyptian DDC experience has illustrated, a field-based evaluation of disease-specific interventions indicates that the biological and social factors which can constrain the impact of child survival interventions are often further exacerbated by constraints at the health sector level leading to large gaps between optimal and actual case management.

Although Egypt's implementation of the NCDDP represented the first nation-wide diarrheal disease control programme following the launching of UNICEF's CSR and rapidly became internationally renowned as evidence of the potential success of child survival interventions, the supply and demand constraints which have been well illustrated in the Egyptian experience with DDC in this thesis suggest that this optimism was largely unfounded. Even if demand for medical interventions is enhanced through mass media, the Egyptian experience has suggested that supply constraints must be addressed concurrently and with equal vigor since there is no point in teaching mothers to identify dangerous symptoms and to seek medical care without ensuring that mothers have access to, and receive, adequate and appropriate care at health facilities.

Perhaps the Egyptian experience with DDC, rather than illustrating the potential success of disease-specific home-based interventions, has demonstrated that the gaps between optimal and

actual case management at both the health sector and individual levels can remain significant even after years of health education and training for both mothers and health practitioners. This raises doubts as to the extent to which health education and information can enhance child survival by improving performance in the treatment of disease without simultaneous investment in health facilities, and suggests that campaigns to enhance early and prompt treatment of child morbidity may be ineffective if the quality of care at health facilities is not addressed simultaneously. In this context, it is ironic that it was actually an initiative to improve the quality of care in the 1980s, the Strengthening of Rural Health Services Project, sponsored by USAID, which laid the initial foundations for the NCDDP.

In the wider context of the current international emphasis on maternal education in the promotion of child survival and on disease-specific interventions, it is important to note that while investments in female education and disease-specific interventions may be easier to address than the more difficult determinants of child survival, such as income distribution, poverty and disparities in access to adequate health facilities, in reality the determinants of child survival may not be so easily separable. The Egyptian experience in this context raises doubts with regard to the possibility of short-cuts in the 'process' of health development. The shortcomings of the NCDDP's education messages in enhancing the treatment of diarrheal disease at the household level and the fact that diarrheal disease mortality remains high in Egypt raise further doubts over the possibility

of short-term reductions in child mortality through mass media promotion of home-based disease specific interventions.

Similarly, the findings of this survey on the relationship between maternal education and the prevention and treatment of child morbidity at the household level suggest that the relationship between maternal knowledge and the enhanced performance of mothers in specific child care practices may be somewhat dependent on access to adequate health-related household resources and on access to adequate health facilities. Therefore, the possibility of rapid reductions in child mortality through short to medium term interventions in the promotion of appropriate and correct health care practices and disease specific technologies may have been somewhat exaggerated by donors and policy makers anxious to see rapid reductions in child mortality. The need for further research at the household level on both the pathways through which education has been found to enhance child survival in aggregate data sets and on the constraints to the efficacy of disease-specific must be emphasised in view of the current international emphasis on maternal education and home-based disease control interventions in contemporary strategies for the promotion of child health and survival.

The findings on treatment-seeking behavior and the gaps between optimal and actual case management at health facilities in Egypt also suggest that the health unit, contrary to the government's expectations, is not the first contact point between the population and the health services but indeed the last. In this wider context, it is fitting here to ask what has happened

to PHC, PHC services and HFA by 2000 to which the government in Egypt committed itself in 1980 ? While this question is beyond the scope of this thesis, perhaps the answer is best obtained from the respondents themselves and their evaluations of the health services. For the large majority who by-passed the health unit in favor of the pharmacy or the private doctor and for those who didn't, the answer was that 'there is nothing there,' 'the doctor is never there,' and 'they don't examine the child,' in addition to the response that the health unit no longer distributes free medication. Thus among the 401 evaluations of the health unit in this sample, the majority of mothers replied that the doctor or services need improvement suggesting that the quality of care is the main reason for low usage of the health unit and, not, as is commonly argued by health planners in Egypt, that the health unit is by-passed because it no longer provides free medication.

Correspondingly, it is fitting to ask here what has happened to the intersectoral emphasis on comprehensive PHC and Egypt's commitment to preventative and promotive HFA since signing the HFA declaration in 1980? The insight of historians is perhaps appropriate here. Observing a list of ailments treated at health facilities in 1831, Kuhnke found that three major afflictions stand out: trachoma, hookworm disease, and dysentery 'the catchall term then applied to diarrhea... With additions made possible by more accurate diagnosis, the list has remained depressingly the same for the past 150 years,' (Kuhnke, 1990: 87). Taha Hussein, one of Egypt's most eminent authors of the twentieth century, writing on the cholera epidemic in 1947, commented that although

Egypt had built schools and a MOH since the 1902 epidemic, its people were still victims of poverty, illiteracy and disease, (Gallager, 1990). While Egypt is free from the epidemics of the past, Taha Hussein would no doubt find it even more despairing that health researchers in rural Egypt today are still concerned with the same environmental and household conditions as the doctors who were sent to the afflicted regions in the 1947 cholera epidemic; water sources, water storage methods, and sanitation facilities. Even sadder perhaps that a Russian physician commissioned by his government to investigate the trustworthiness of Egyptian quarantine following the 1848 cholera epidemic (who reported a highly informative description of the provincial health service), reported that the standard of sanitation and hygiene was in most cases fair and in some cases admirable and that the hospitals, health facilities and towns were clean, and well-maintained. Among those governates which received an admirable verdict was Menofia where the streets were swept twice daily, (Kuhnke, 1990). The SRC assessments of risk factors associated with the prevalence of disease in rural Egypt suggest that more than 150 years later, conditions in Menofia have worsened instead of improved.

The resources available for preventative and promotive health since Egypt signed the HFA declaration in 1980 have been determined by a debt crisis which has preoccupied policy makers and informed opinion for more than two decades, (Amin, 1994). In relation to the multitude of crises Egypt is facing, a persistently high infant and child mortality rate seems less urgent

and an increased investment in mainstream components of PHC, disease-specific interventions, sponsored by the donor community, may seem a blessing at this time. The difficulties the Egyptian government is having in sustaining these programs, in transferring them to the MOH, and in meeting its cash contributions and the recurrent costs which the projects have incurred, all issues raised in USAID's assessment of the CSP, would lead one to question these assumptions, however. More importantly, the gaps between optimal and actual case management at the health sector and individual levels which have been aptly illustrated in this thesis in the Egyptian experience with selective home-based disease control interventions would certainly raise further doubts over these assumptions. As Gadomski et al point out, in the wider context of diarrheal disease control programs, 'this is not to say that these interventions have not been effective but that their costs have been vastly under-estimated and their effectiveness over-estimated,' (Gadomski et al, 1990: 236).

Two weeks before the revolution in 1952, the Rockefeller Foundation, having come to the conclusion that the eradication of disease in Egypt required social and political change and somewhat more than the mere application of scientific interventions, terminated its mission in Egypt and chose instead to focus on the promotion of high yielding varieties of crops in Latin America and Africa which, this time, promised to eliminate world hunger, (Gallager, 1990). While donors involved in disease control interventions in Egypt today are somewhat less naive than their predecessors of the 1940s, as Rashad points out, donors and the

government in Egypt are not keen to see the impact of their programmes at the population level questioned. 'The fact that association does not always imply causation is not always welcome by donors anxious to see the effects of their programs. A proper evaluation of the success of any program should show not only the occurrence of a certain improvement but also the sustainability of this improvement in the ability of the health system to replicate the envisaged effect for other cohorts in future years when the initial inputs of the program fades and to carry over this effect to older ages so that life saving is not a short postponement of death,' (Rashad, 1989:112-113). However, in the wider context, the international health community has come to recognise that there are important constraints to the efficacy of disease-specific child survival interventions which require more research at the household level. For Egyptian child health policies which have come to rely extensively on donor-funded disease-specific interventions, this recognition may be important for future child survival efforts.

While USAID and the international organizations operating in Egypt address the consequences of disease, (and population growth), through technical interventions, who today is addressing their socio-economic causes in Egypt: poverty and inequality which, in the 1990s, reached levels comparable to Brazil, once internationally recognized as having the most skewed distribution of income and land in the developing world ? The social causes of disease continue to be addressed by the same opposition parties who participated in the public health debates of the 1940s; primarily the leftist opposition, (the Nasserists), and the Islamic Parties.

However, in contrast to the the 1940s when extensive freedom of expression stimulated a lively political debate on the socio-economic, political and colonial causes of disease and on the limited efficacy of American sponsored disease control campaigns (through heated parliamentary debates and a relatively unrestrained media), these issues are now addressed through various forms of extremism. Social unrest, or 'terrorism', as the government prefers to label it, is an overwhelming concern for the government of Egypt. Consequently, the essential participants in determining the extent to which the government addresses the social causes of disease in Egypt, those attempting to rectify its economic crises, the World Bank and the IMF, have adopted an important 'sensitivity' to the impact of adjustment on the poor and vulnerable having been repeatedly reminded of the 1977 bread riots which resulted when Sadat attempted to remove the subsidy on Egypt's staple food, (see Waterbury, 1983). Given that the level of investment in preventative and promotive health and in addressing the social causes of disease through intersectoral investments, like almost every other aspect of Egypt's development, is now more or less determined by the measures the IMF/WB take to correct its economic crises, it is perhaps a good thing that the latter have incorporated a recognition of the factors which determine health at the household level in their agendas since 1993, and that they are beginning to acknowledge the need for more research on the constraints to the efficacy of population based disease-specific interventions at the community and service-delivery levels.

The GHALC country case-studies illustrated that political

and social will conducive to achieving health is achieved through indigenous initiatives which occurred prior to, and irrespective of, government commitment to international declarations. However, the likelihood of a recurrence of far-sighted and revolutionary indigenous responses to health development in Egypt, such as Mohamad Ali's outreach program and the training of women health auxiliaries in the nineteenth century, or, indeed, the health and poverty debates of the 1940s which addressed the social causes of disease and the limitations of disease-specific interventions extensively, seem very distant from Egypt's contemporary economic and social predicament. In view of this fact, the fact that the international health community is addressing some of the social determinants in the 'process' of health development in its policy statements, and that it is acknowledging the limitations of previous strategies, suggests some progress in an area where the prospects for further reductions in infant and child mortality seem very dim indeed.

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