Union of Myanmar
Ministry of Immigration and Population
Department of Population and UNFPA

Research Study on The Determinants of Infant and Child Morbidity and Mortality in Myanmar

Department of Population

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Research Study on

The Determinants of Infant and

Child Morbidity and Mortality

in Myanmar

P r e f a c e

This volume is the second one on selected topics prepared by the Department of Population: the first one is on The Elderly population in Myanmar: Trends, Living Conditions, Characteristics and Prospects and the current one is a research study on Infant and Child Morbidity and Mortality in Myanmar using data from the 2001 Fertility and Reproductive Health Survey (2001 FRHS). It has been dealt with in the main report from 2001 FRHS published in 2003, however there remains much information to be analysed and areas to be explored. Hence the current report is a somewhat detailed analysis done on the topic and it has not been attempted this depth previously. It has analyzed the levels of infant and child mortality. The analysis focuses on child diarrhoea, and whether it is being treated, and on the determinants of child survival. Since it is a monograph length, it has gone into some length on literacy reviews and comparisons with data from other Asian countries. It has also included some complex statistical techniques for analysis of other socioeconomic variables having impact on the likelihood of infant and child having diarrhoea.

I hope the report provides a wealth of information on infant and child morbidity and mortality and recommendations for policy and decision makers, programme managers, especially for health programmes, and academicians and researchers, and would be useful to them.

I would like to thank the Government and the Ministry for allowing us to undertake this research and UNFPA for making this undertaking possible with its assistance. I would also like to express thanks to Population Council for its technical assistance and editing the report. Thanks are also due to the research team on the topic who worked tirelessly and dedicatedly, to those who supervised them and to all concerned without whose interest, dedication, and contribution this report would not be this success.

Col: Tin Yee

Director General

Department of Population

Date: April, 2005

FOREWORD

The Programme of Action of the International Conference on Population and Development (ICPD) set out 20-year goals in four related areas, of which the second one was the need to reduce infant and child mortality throughout the world. The ICPD set as a goal that by 2015 all countries should aim to achieve an infant mortality rate below 60 deaths per 1,000 live births and an under-5 mortality rate below 45 per 1,000.

In the Southeast Asia region, millions of children are still dying before their fifth birthday. The majority of these children are dying from disease or from a combination of malnutrition and preventable diseases. In Myanmar, mortality follows a pattern similar to other developing countries, with deaths heavily clustered in the first five years of life and, in particular, before the first birthday. The leading causes of morbidity and mortality among children are acute respiratory infections, pneumonia, malaria and diarrhea. Myanmar's levels of infant and child mortality are relatively high: over 8 per cent of children born in the preceding five years before the 2001 family and reproductive health survey (FRHS) had already died before the start of the survey.

Myanmar is one of the signatories of the ICPD Programme of Action, and the Government has put much emphasis on improving the reproductive health status of the country's people. The Ministry of Health acknowledges the importance that delivering high-quality health care has in reducing infant and child mortality and in improving overall reproductive health. UNFPA and its partner agencies have an important role to play in helping the country to realize these goals of the ICPD Programme of Action and of the related targets contained in the Millennium Development Goals.

Part of the assistance that UNFPA can provide is in helping to develop relevant measurement tools and in establishing a reliable database so that it is possible to monitor the progress that is being made. Based on the wealth of information collected from the 2001 FRHS, it is now possible to begin to construct such a database, which is imperative if we are to examine the factors that contribute to infant and child morbidity and mortality. The present study utilizes data from the 2001 FRHS and will make an important contribution to our understanding of the reality of the child health and mortality situation in Myanmar.

I would like to take this opportunity to record my congratulations to the Department of Population of the Ministry of Immigration and Population for the commitment and dedication it has shown in carrying out this successful undertaking. I wish to express my appreciation to all the technical staff of the Department of Population and of the Population Council for their hard work and expertise in the preparation of this monograph. I hope that the findings from this important work can contribute to a further improvement in the country's reproductive health situation through development of more effective and appropriate strategies and interventions. UNFPA looks forward to further collaborate in strengthening the national database and in developing meaningful population and reproductive heath indicators.

Daniel B. Baker
UNFPA Representative
Myanmar

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Executive Summary

This paper provides an in-depth analysis of infant and child morbidity and mortality in Myanmar using data from the 2001 Fertility and Reproductive Health Survey (2001 FRHS). The paper examines different demographic and socio-economic factors and the relative importance that they have on the extent of child diarrhoea, how likely children with diarrhoea will receive oral rehydration salt (ORS) treatment and the effects of these variables on the likelihood of child mortality.

The leading causes of morbidity and mortality among children in Myanmar are acute respiratory infections, pneumonia, malaria, dysentery and diarrhoea. In the two weeks and the 24 hours before the 2001 FRHS was undertaken 4.9 and 2.1 percent of children aged five or younger suffered from diarrhoea. Of the children with diarrhoea, 37.6 percent received ORS treatment, while many, 18 percent, received no treatment at all.

Myanmar's level of infant and child mortality are relatively high; over 8 percent of children born in the five years before the 2001 FRHS had died before the survey was undertaken. In Myanmar mortality follows a pattern similar to other developing countries, with deaths heavily clustered in the first five years of life; and in particular in the first year.

The factors most strongly associated with a child experiencing an episode of diarrhoea in the two weeks before the surveys were domain of residence of the child, the age and sex of the child, and the type of toilet facility available in the household. Programs designed to improve levels of household sanitation would have a clear impact on reducing levels of diarrhoea. Diarrhoea is most common from the age of 6 months to 23 months. This probably reflects the increased risks that occur during the period of weaning when children still have low levels of protection against infections. Public health programs should provide information to parents about the risks, and how to protect from the risks, in this vulnerable period.

Household characteristics had a more significant impact on whether children received ORS for diarrhoea, than whether they had the disease or not. Children were more likely to receive ORS if they were living in households with more modern facilities. The type of drinking water, the type of roof and whether the household had electricity had a strong impact on whether children received ORS or not. For example, close to 80 percent of children with diarrhoea and who had piped water received ORS; in other households only around a third

of the children with diarrhoea received this treatment. Similarly, close to 60 percent of children living in a house with a manufactured roof received ORS while in other households less than a third of children received diarrhoea. Further, over half of children who had diarrhoea in households with electricity received ORS, compared to a third of children in households without electricity.

The probability of ORS treatment is closely related to the economic standing of households. The multivariate analysis suggest that the effects of the household variables reflect the ability of better off households to purchase or access treatment. Programs designed to improve access to ORS treatment will significantly reduce the negative impacts of childhood diarrhoea. Another factor that clearly promotes ORS treatment is getting a child sick with diarrhoea seen by a health provider. Efforts to educate parents about the importance of seeking health care for their children when they have diarrhoea will help increase the likelihood of use of ORS.

The analysis identified numerous factors that affect infant and child mortality. The results show a clear relationship between reproductive patterns and the likelihood of a child surviving to their fifth birthday. The strongest effects are seen for the length of the previous birth interval. The odds of a child dying are almost 2.5 times higher for a child born after a previous interval of less than 2 years compared to child born after an interval of 3 or more years. Mothers in their twenties and early thirties have the highest probabilities of their children surviving.

Ensuring that mothers have access to ante-natal care from the formal health system contributes to lower levels of infant and child mortality, although this variable was not affective when controlling for the length of the previous birth interval, suggesting that those mothers who do access the formal health system are also more likely to space their children – perhaps because they are influenced by the information they receive from the health system. This reinforces the need to further strengthen the birth spacing programme and also integrate the program with the maternal and childcare programme.

The results suggest that household economic conditions are an important determinant of the probability of a child survival. The multivariate results show that the odds of a child death are reduced by almost one-half if the mother lives in a household that has electricity. In this case, electricity is a proxy for the level of economic standing of the household. It is

likely that children from households that are better off are more likely to receive better health care and have better nutrition, than children born into poorer households.

In conclusion, the results from this analysis are generally in the expected direction and consistent with the results of many other studies. Comprehensive reproductive health and child survival programs should be undertaken to further improve child health and reduce infant and child mortality.

This may be achieved through improving access to piped drinking water, electricity and mass media exposure (radio and television) in the households as well as upgrading health-seeking behaviour of mothers to have regular ANC by health professionals and births delivered by qualified health professionals, in hospitals or clinics wherever possible. In terms of policy interventions, prolonged breastfeeding, good ANC and PNC supported by birth spacing and extensive use of modern medical care both for mothers and newborns would certainly contribute to improvements of child morbidity and mortality in Myanmar.

Living conditions are a factor in determining levels of infant and child morbidity and mortality in Myanmar. Improving sanitation would reduce infant and child morbidity and result in decreased mortality. Although most of the socio-economic impacts on morbidity and mortality are mediated by sanitation, health, and reproductive patterns, improvements in socio-economic characteristics such as education will facilitate improvements in child survival.

Great efforts need to be made to accurately measure levels of child survival in Myanmar. Further research is required on risk factors associated with a range of infant and child morbidity. For example, little is known about the health seeking behaviours of mothers, and more research is needed in this area. It is also proposed that more proximate indicators of child health, such as birth weight and anthroprometric measures such as weight and height be included in future surveys.

Chapter I

Scope of Study

1.1 Background

This report provides an in-depth analysis of infant and child morbidity and mortality in Myanmar using data from the 2001 Fertility and Reproductive Health Survey (2001 FRHS). The analysis focuses first on child diarrhoea, and whether it is being treated, and second on the determinants of child survival. The impacts of demographic and socio-economic factors on the likelihood of child diarrhoea, how likely children with diarrhoea receive oral rehydration salt (ORS) treatment, and the probability of infant and child mortality are also included in this analysis.

The leading causes of morbidity and mortality among children in Myanmar are acute respiratory infections, pneumonia, malaria, dysentery and diarrhoea (National Health Plan 1996-2000; UNICEF 2001). In the two weeks and the 24 hours before the 2001 FRHS was conducted, 4.9 and 2.1 percent of children aged five or younger suffered from diarrhoea. Of the children with diarrhoea, 37.6 percent received ORS treatment, while a sizeable proportion, 18 percent, received no treatment at all.

Myanmar's level of infant and child mortality are relatively high with over 8 percent of children born in the five years before the 2001 FRHS having died at the time of the survey. In Myanmar, mortality follows a pattern similar to other developing countries, with deaths heavily clustered in the first five years of life; and in particular in the first year after birth. Whereas 50 percent of all deaths in the developed world occur among people over 70, the same proportion of deaths in the developing world occur among children during the first five years of life. If deaths at this point of life could be reduced, it would contribute significantly to improving overall levels of child survival.

The report includes seven chapters. The first deals with the background and objectives of the study. The second chapter reviews available literature and presents the conceptual framework of the study. The third chapter presents sources of data, data definitions, methods of analysis and data limitations. Levels of infant and child mortality in

Myanmar and Asia are reviewed in the fourth chapter. The fifth chapter explores the impact of child demographic characteristics, mother's socio-economic characteristics, and the mother's reproductive patterns and household characteristics on the likelihood that children had diarrhoea and were treated with ORS. The sixth chapter uses the same variables, mentioned above, plus the mother's utilisation of health services during her pregnancy to determine what impact they have on infant and child mortality. The final chapter presents the study's conclusions and recommendations.

1.2 Objectives

The overall objective of this study is to examine the correlates of infant and child morbidity and mortality in Myanmar. The specific objectives are to:

1. Investigate the effect of children's demographic characteristics, mothers' socio-economic characteristics, mothers' reproductive characteristics and household characteristics on the likelihood that children experience diarrhoea and are treated for diarrhoea;

2. Examine the impact of children's demographic characteristics, mothers' socio-economic characteristics, mothers' reproductive characteristics; mothers' health seeking behaviour during pregnancy and household characteristics on infant and child mortality; and

3. Recommend appropriate policy and program measures based on the findings from this study for improving child survival in Myanmar.

Chapter II

Literature Review

2.1 Introduction

This chapter reviews relevant studies on factors affecting infant and child morbidity and mortality. It focuses on the relationship between women's socio-economic characteristics; their reproductive patterns; their utilization of health services; and their household characteristics with child morbidity and mortality.

2.2 Determinants of child survival

Young children are in many ways the most vulnerable group to adverse effects of exposure to health threats. They are sensitive not only to conditions in their immediate environment after birth, but also to the pre- and post-natal health of their mother, and the quality of the health support services. Information on infant mortality thus provides both a specific indication of the health status of young children, and a more general indicator of the overall quality of health conditions and the effectiveness of health facilities (Verdiell, 2003).

Every year nearly 11 million children die before their fifth birthday; 99 percent of these deaths occur in developing countries (UNICEF, 2003). More than 10 million children die each year in the developing world, the vast majority from causes preventable through a combination of good care, nutrition, and medical treatment. Mortality rates for children under five dropped by 15 percent since 1990, but the rates remain high in developing countries (World Bank, 2004).

In developing countries, one child in 10 dies before its fifth birthday, compared with 1 in 143 in high-income countries. In some developing countries up to 30 percent of children die before they reach age five compared to as little as 2 percent or less of children in most developed countries UNICEF (1992). These differences are, in part, determined by socio-economic characteristics of the country in which a child is born and lives (Bohm, 1983). Child deaths have dropped rapidly in the past 25 years, but progress everywhere slowed in the 1990s, and a few countries have experienced increases in the same period. At current rates of progress, only a few countries are likely to achieve the Millennium

Development Goal of reducing child mortality to one-third of their 1990 levels (World Bank, 2004).

While the presence of disease and poor nutritional status acting together explain child deaths, either or both of these determinants are affected by bio-demographic risk factors such as birth weight, birth spacing and birth order, food intake (including breastfeeding), and child care practices. Theses are in turn affected by socioeconomic characteristics such as family economic status, place of residence, parental education and parental occupation. (Hobcraft, McDonald, and Rutstein 1984; Mosley and Chen 1984; United Nations 1985; 1991; 1998).

The risk of death and poor health among infants and young children is closely associated with their mother's characteristics as well as the environment in which they live. Maternal education has often been considered to be closely associated with the entire process of infant mortality reduction. Mothers control the initial stages of a child's life and development almost completely, and only gradually begin to share this responsibility with their husbands, other family members or institutions as the child grows older.

Thanh (2002) using the 1997 Demographic and Health Survey and Vietnam's 1997 Socio-Economic Statistics Data examined the net effect of maternal education and social inequality and their interaction on the incidence of child diarrhoea. She found that children born to mothers with higher education are less likely to suffer from diarrhoea. Although, geographic differences did not affect child diarrhoea, economic inequality among areas was found to be an important predictor of child diarrhoea. Children living in poor areas are more likely to have diarrhoea than those living in richer areas. Thanh concluded that the effect of maternal education on diarrhoea occurs through the strong impact of personal hygiene, sanitation, and childcare knowledge of the mother. Regardless of the inequalities among areas in socio-economic development, higher educated mothers are more likely to protect their children from diarrhoea than are less educated mother.

Studies from developing countries, mostly in Asia and Latin America have suggested that child mortality is more closely associated with mother's education than any other factors (Hobcraft and others, 1984). Maternal education play an crucial role in improving the child survival even after controlling a number of other factors such as socio-economic characteristics of husband, including his education level and occupation in Nigeria (Caldwell, 1979), in Nicaragua (Sandiford et. at., 1995) and Costa Rica (Haine et.

at.,1982). In a study in Kenya, Mosley (1985), found that child mortality and level of mother's education and poverty was strongly associated. Others studies from the micro level to macro inter-country comparison invariably reaffirm the influence of maternal education on infant and child mortality (Cochrane and others, 1980; United Nations, 1985, 1994; Da Vanzo and Habicht, 1986; Cleland and van Ginneken, 1989; Bicego and Boerma, 1993).

However, in their study using data from the first round of DHS surveys from 22 countries, Desai and Alva (1998) argued that although there is a strong relationship between maternal education and indicators of child health, a casual relationship is far from established. Education may act as a proxy for the socio-economic status of the family and geographic area of residence. They pointed out that introducing controls for husband's education and access to piped water and toilet attenuate the impact of maternal education on infant mortality and children's height-for-age. But they agreed that even after inclusion of other socio-economic factors in their model, maternal education remains statistically significant for children's immunization status, thus effecting indirectly on the child survival.

The positive effect of parental education on child survivorship is well established and widely accepted. One of the significant features of this relationship is the fact that it appears to hold across cultures. It might be plausible to argue that education therefore has some universal feature that affects all individuals in the same way (Kaufmann and others, 1994). It is generally agreed that maternal education acts as an independent determinant of infant and child mortality and is at times considered a proxy for other social variables. Maternal education influences child survival through various pathways: enhanced socio-economic status, greater health choice for children, including interaction with medical personnel, cleanliness, and emphasis on child quality in terms of fewer children, and greater food and capital investments (Caldwell, 1979; Ware, 1984).

Household socio-economic status is important for child survival because it determines the amount of resources (such as food, good sanitation, and health care) that are available to infants (Millard, 1994). Children born in households with moderate economic standards experienced a low mortality risk, particularly after the first month of life; this outcome may be due to the provision of better nutritional requirements to both the mother and child.

The household living situation is crucial in determining child survival. According to the World Bank (2000), environmental health risks fall into two broad categories. The first

are the traditional hazards related to poverty and lack of development, such as lack of safe water, inadequate sanitation and waste disposal, indoor air pollution, and vector-borne diseases. The second category is the modern hazards such as urban air pollution and exposure to agro industrial chemicals and wastes that are caused by development lacking environmental safeguards.

Environmental risk factors account for about one-fifth of the total burden of disease in low income countries according to recent estimates (World Bank, 2001). WHO (2002) reports that among the 10 identified leading mortality risks in high-mortality developing countries, unsafe water, sanitation and hygiene ranked second, while indoor smoke from solid fuels ranked fourth. The environmental risk factors were responsible for about 3 percent of deaths in the high-mortality countries, with most of these deaths (90 percent) occurring among children.

Many studies had shown that in developing countries infant mortality is much higher in rural than in urban communities. The obvious reason is that in general rural areas have poorer living conditions than urban areas, and health-care facilities are less readily available and tend to be of poorer quality (Pandey, 1998; Madise, 1995). However, (Madise, 1995), in his study on infant mortality in Zambia argued that among poorer households in urban areas, child mortality can be as high as or higher than rural households. Other studies have shown that infant mortality is related to other household characteristics such as toilet facilities (DaVanzo and others, 1983), water supply (Brockerhoff, 1990, Brokerhoff and Derose, 1996), and access to electricity (Madise and Diamond, 1995).

The reproductive process has also been shown to have a strong relationship with infant and child survival and mediate many of the effects of household, maternal and other background variables on child survival. The age of a mother at the birth of her child, the length of the preceding and subsequent birth interval, the birth order, and whether a birth was wanted or not wanted, have all been shown to influence child survival (Cleland and Sathar, 1984; Koenig et al., 1990; Madise and Diamond, 1995; Whitworth and Stephenson, 2002).

Some researchers have documented evidence of a reverse J-shape pattern in the association between maternal age and infant mortality, with teenage and older mothers having elevated risks of child loss (Bicego and Ahmad, 1996; Geronimus and Korenman, 1993; Manda, 1998). The World Fertility Survey (1984) found that children born to very

young mother and to mothers over the age of 35 were most likely to die during infancy. Similarly, Jain and Visaria (1988) for India, Da Vanzo (1984) for Malaysia, Ahmed et al (1991) for Liberia, and Chidambaram et al (1985) for a number of developing countries, reported that mortality tended to be high for children born to teenage mothers, lowest for mothers aged 20-30 and then higher for those born to mothers aged 35 and above.

There are many possible reasons for the relationship between young maternal age and child survival. The first reason may be the physiology of the adolescent mother. Because their reproductive systems are not yet fully matured and the pregnancy may be too stressful for them, thus the babies born to them may be less healthy. The second possible reason is the socio-economic status of the adolescent mother may lower than that of older mothers and they may be less likely to seek adequate prenatal care and less ready psychologically and materially to care for their children (Commission on Behavioral and Social Sciences and Education, 1989).

Children born to older mothers have greater risk of mortality and morbidity because the capability of their reproductive system to cope with the burden of pregnancy has declined. As a consequence, they may encounter more frequent problems during pregnancy and birth. Children born to older women may have poor health at the time of birth because of the greater likelihood of birth trauma or genetic abnormalities (Commission on Behavioral and Social Sciences and Education, 1989).

Children of first, second and third order births experienced higher risks of dying during the neonatal period compared with fourth and higher order births. However, during the later childhood period, children of first, second and third order births faced lower risks when compared with those of higher order births. A plausible reason could be that children of higher order births receive poorer food and care by virtue of being born in large families.

The strongest relationships occur for length of preceding birth intervals. Despite different methodological approaches, and variations in data quality, studies in a wide variety of geographic settings have found that short preceding birth intervals are associated with elevated risks of infant and child mortality. Cleland and Sathar (1984) in Pakistan, Da Vanzo et al (1983) in Malaysia, Gubhaju (1986) in Nepal, DeSweemer (1984) in India, Miller et al (1992) in Bangladesh and the Philippines, Pebley and Stupp (1987) in Guatemala, Hobcraft (1991) and Hobcraft and others (1985) in a large number of societies, Palloni and Millman (1986), Boerma and Bicego (1992) in Latin American, African and

Asian countries, all document the adverse effects of short birth interval on survival prospects of children. The impact of a short preceding interval on mortality has generally been reported to be most pronounced during infancy, although the effects can extend through early childhood (Koenig and others, 1990). Very short and, to a lesser extent very long intervals, have been found to result in elevated risks of dying for children (Rutstein, 2000).

Using a large, high-quality longitudinal dataset on around 145,000 pregnancy outcomes gathered over a period of more than twenty years from an experimental setting in Matlab, Bangladesh, (DaVanzo and others, 2004) found that, "compared with intervals of 3-5 years in duration, preceding interbirth intervals of less than 24 months in duration are associated with significantly higher risks of early neonatal mortality, and that interbirth intervals of less than 36 months are associated with significantly higher risks of late neonatal mortality, post-neonatal mortality, and child mortality".

While there is a consensus about the effects of birth intervals on child survival, there is no agreement about the mechanisms through which the effects operate (Boerma and Bicego, 1992; United Nations, 1994). Explanations for the effects of short preceding birth interval on child mortality have centred on three causal mechanisms: biological effects related to maternal depletion; behavioural effects associated with competition between siblings for tangible resources and parental care; and disease transmission among children born at close intervals (Koenig et al., 1990).

In the maternal depletion explanation for a relationship between mortality and the length of birth intervals, childbearing and lactation are argued to have harmful and lasting effects on a mother's nutritional status and repeated and closely spread childbearing would leave a woman with less time to recover between pregnancies, thus leading to low birth weight and increasing infant and childhood mortality ((Tabutin 1978, Miller et al. 1993; Pebley and Davanzo 1993; Higgins and Alderman 1997). Another factor related with the maternal depletion is the rigor of childbearing. Due to short birth interval and repeated childbearing, the amount of time a mother will spend on child rearing will be increased because she will have more than one very young child to care for at the same time (Perrenoud 1981; Imhöf 1984; Lynch and Greenhouse 1994; Breschi and Derosas 2000).

The second mechanism is the competition among siblings for parental care and the scarce resources. When two births are spaced very closely, the amount of time and other

resources that are invested on them will be reduced, and each child may not receive as much care and attention as he would if he did not have a sibling of roughly the same ages (Makepeace and others, 2004). Close birth spacing can also create even more direct competition among siblings in the case of breastfeeding. A mother who becomes pregnant soon after a child is born is likely to wean that child sooner than she would have she not become pregnant again**.** Since breastfeeding is an important determinant of child health in many societies, premature termination of breastfeeding often substantially increases exposure to infection and increases the risk of malnutrition.

The relationship between birth intervals, breastfeeding and child survival is complex. On the one hand, prolonged breastfeeding may delay the next conception by delaying the return of ovulation. This may improve child mortality through its contribution to longer birth spacing. On the other hand, breastfeeding may be interrupted as the result of early weaning or child death, and in the absence of contraceptive use, the next conception is likely to occur more rapidly than if breastfeeding had continued. There are also direct nutritional and immunological effects of breastfeeding on child survival (Palloni and Millman, 1986; Palloni and Tienda, 1986).

The third mechanism is the disease transmission among children born at close interval. Close birth spacing may increase children's exposure to infectious diseases by fostering transmission of infections among household members who are of similar ages. Many infectious childhood diseases affect a relatively narrow age range. If there is more than one child in the household in that age range, the chances of introducing the disease to the household and transmission of higher or repeated doses of the infectious organism may be dramatically increased, thus increasing the likelihood of multiple or more severe illness. This is especially a problem with diarrhoea diseases, for which repeated incidence may result in malnutrition, and with measles, for which transmission in the household may be associated with more severe and fatal infection (Commission on Behavioral and Social Sciences and Education, 1989).

Some of the association between child survival and length of birth interval has been argued to be the consequence of a spurious association resulting from failure to take into account the survival status of the preceding child (Winikoff, 1983; DeSweemer, 1984; Cleland and Sathar, 1984; Boerma and Bicego, 1992). In general, these studies argue that the death of the older of two siblings during infancy tends to shorten the interval between

births by involuntary cessation of breastfeeding leading to an early resumption of ovulation, or because of the replacement effects, whereby parents seek to replace the dead child.

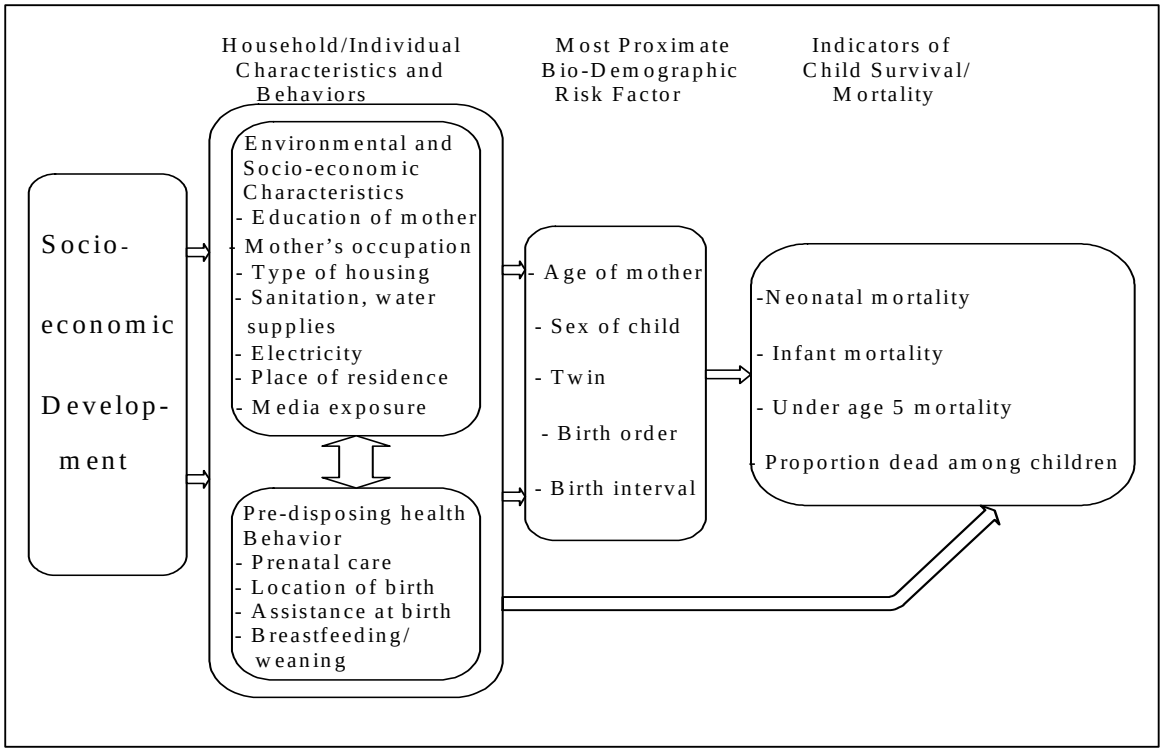
Population Council researchers have analyzed the impact of unintended births on children's survival, health, and schooling in the Dominican Republic, Egypt, Kenya, Philippines, and Thailand. They found that unplanned births might lead to higher mortality risks for children, poorer nutrition, and less education.

2.3 Conceptual Framework

The present study focuses on the determinants of child morbidity and mortality. One framework suited for this study is that suggested by Mosley and Chen (1984). This framework combines social and bio-demographic variables, and integrates research approaches employed by both social and medical scientists. The model is based on the premise that all social and economic determinants of child mortality operate through a common set of proximate determinants to affect child mortality. The proximate determinants are specified in five groups, all of which are considered to be affected by socioeconomic and program factors: maternal factors (e.g. maternal age, birth order, birth spacing), environmental contamination (e.g. food, air, water, sanitation); nutritional deficiency (including breastfeeding); injury; and personal illness control (including immunization, prenatal and postnatal care, the use of health services).

The framework followed in this paper is shown below. First socio-economic development affects the maternal factors (such as education, occupation) and environmental factors (such as type of housing, sanitation, water supplies). It also affects health-seeking behaviours of mothers such as prenatal care, assistance at birth, place of delivery. These factors also affect each other. There are also proximate bio-demographic risk factors (such as age of mother, sex of child, birth order and birth interval). These factors affect the child morbidity and mortality. Following this framework, this study develops and utilizes various measures to examine the infant and child mortality in the Myanmar context.

Figure 2.1 Proposed framework for the analysis of child survival in Myanmar



Chapter III

Data and Methods

3.1 Data Sources

Data used in the analysis are drawn from the 2001 Fertility and Reproductive Health Survey (2001 FRHS) conducted by the Department of Population of the Ministry of Immigration and Population. Responses to two questionnaires are used; the household questionnaire with 36,808 respondents, and the ever-married women (aged 15-49) questionnaire with 8,288 respondents. The following variables from the household questionnaire are used: geographic identification, place of birth, place of residence over the last five years, highest education level, and occupation during the last 12 months. The variables used from the ever-married-women questionnaire include a geographic indicator, characteristics of the interviewed women, birth history and diarrhoea and treatment.

3.2 Data Definitions

Diarrhoea:

Whether the child had diarrhoea within the two weeks before the survey.

Duration of diarrhoea:

The period of time the child had diarrhoea; this is divided into one day, two days, three days and four or more days.

ORS:

Whether the child with diarrhoea received oral rehydration salt treatment or not.

Sex of child:

Sex of child; categorized as either boy or girl.

Twin:

Whether the child comes from a single or multiple birth.

Age of the child:

The age of the child at the time of the survey; this is divided into under six months, 6-11 months, 12-23 months, 24-35 months and 36-59 months.

Domain:

Administratively Myanmar is divided into 14 administrative units: seven states and seven divisions. The states are: Kachin, Kayah, Kayin, Chin, Mon, Rakhine and Shan, and the divisions are Tanintharti, Sagaing, Bago, Magway, Mandalay, Yangon and Ayeyarwaddy. For the 2001 FRHS the country was stratified into nine domains. Domain 1 includes Kachin, Shan and Kayah states. Domain 2 includes Kayin and Mon states and Tanintharti division, while Domain 3 includes Chin state and Sagaing division. Bago division is in Domain 4, Magway state is in Domain 5, Mandalay division is in Domain 6, Rakhine state is in Domain 7, Yangon division is in Domain 8 and Ayeyarwaddy division is in Domain 9.

Residence:

Where the children were living at the time of the survey; this is divided into urban and rural areas.

Education of mother:

The completed level of the mother's education, which is divided into no education, primary school, middle school, high school, university and other.

Occupation of mother:

Among employed mothers, what occupation they were employed in; divided as white collar, blue collar, labourer, agricultural worker and other.

Watch TV at least once a week:

Whether the mother watched a TV at least once a week; divided into yes or no.

Listen to the radio at least once a month:

Whether the mother listened to a radio at least once a week; divided into yes or no.

Read a newspaper at least once a week:

Whether the mother read a newspaper at least once a week; divided into yes or no. This was asked to mothers who had at least Standard 3 education.

Age of mother:

Mother's age in completed years at the time of the interview, which is divided into six categories: <20, 20-24, 25-29, 30-34, 35-39 and 40-49.

Age of mother at birth:

Mother's age in completed years when she gave birth to her child; this is divided into the same six categories: <20, 20-24, 25-29, 30-34, 35-39 and 40-49.

Birth interval:

The period between each birth, which is divided into; first child, less than 2 years, 24-35 months and more than 35 months.

Birth order:

How many children the women have given, categorized as 1, 2, 3, 4, 5, and 6 or more children.

Duration of breastfeeding:

The period of time the mother breastfed her child, divided into: no breastfeeding, less than 1 year, 1-2 years, more than 2 years.

Source of ANC:

From whom the women received antenatal care, for their last four pregnancies since 1996; categorized as: doctor, nurse, TBA (traditional birth assistant) and no one.

Place of delivery:

Where the women delivered their children; divided into: home, hospital/clinic and elsewhere.

Assistance at delivery:

Who assisted the women during the delivery of their children; categorized as: doctor, nurse, TBA and other.

Source of drinking water:

From where the mother and child obtain their drinking water, namely: pipe water, water from a well and other sources.

Type of roof:

The type of the household's roof, which is categorized as either manufactured or other.

Type of toilet:

The type of toilet used by household members: water seal (an improved pit latrine), pit/bucket and none/other.

Electricity:

Whether the household had electricity or not.

3.3 Methods of Analysis

The unit of analysis employed in this study is the individual child. In the 2001 FHRS details for each child born in the five years before the survey are provided. Each of these births contributed one observation to the constructed data set. Information related to the mothers of the children were merged with the data about each child. Similarly, information about the household in which a woman lived at the time of the survey was attached to the child record.

Chapter V employs both bivariate and multivariate techniques to determine what impact child demographic variables, along with the mother's socio-economic characteristics, mother's reproductive patterns and household characteristics have on the likelihood that children had diarrhoea and were treated with ORS.

Chapter VI uses life tables and multivariate techniques to determine the factors associated with infant and child mortality in Myanmar. Life tables techniques were used, as not all children were exposed to the risk of death for the full period of five years. For example, those children aged 6 months at the time of the survey had only been exposed to the risk of death for six months, and hence there remains a small likelihood that they could still die before their fifth birthday. The life table subdivides the period of observation into smaller time intervals; for each interval, all children who have been observed at least that long are used to calculate the probability of death occurring in that interval. The probabilities estimated from each of the intervals are then used to estimate the overall probability of the death occurring at different time points.

In Chapters V and VI two sets of odds ratios are presented for the multivariate tables because of the multicollinear nature of the two variables than measure birth interval and birth order. The first category of the birth interval variable is 'first birth' and this is the same as the first category of birth order, creating the need to estimate models separately once with birth interval and once with birth order. The variable 'age of child' is included in the models in Chapter V but not in Chapter VI, as current age is used as the value for censored cases in the proportional hazards models presented in Chapter VI. Health access variables during pregnancy are not included in the model estimated in Chapter V, as they are not expected to have an impact on diarrhoea.

3.4 Data Limitations

There are a number of problems in using the 2001 FRHS to determine the extent of diarrhoea, how often it is treated with ORS and the factors that impact on infant and child morbidity and mortality. The questions about both diarrhoea and ORS treatments are only asked for the two oldest children aged less than five years. If there are more than two children aged less than five no information is collected on them. Another problem is determining what diarrhoea actually refers to. What is diarrhoea for one person may not be so for another. Further, some mothers may be unaware of incidences of diarrhoea that their children have. Thus, the extent of diarrhoea in the population may not be accurately measured by the survey.

Health seeking behaviour is not available from the FRHS for sicknesses that may be related to the death of the child. It is also not possible from the FRHS data to untangle the effects of breastfeeding on child survival: whether the length of breastfeeding was a factor positively associated with child survival, or whether a child sickness or early death led to an early cessation of breastfeeding. It is also not possible from the data to examine many of the competing hypotheses relating reproductive patterns to child survival. Resolution of these hypotheses would require bio-medical data collected within a prospective study design.

Chapter IV

Infant and Child Mortality in Myanmar and the Asian region

4.1 Introduction

This chapter reviews the level of infant and child mortality in Myanmar and the changes that have occurred over time. Further, it compares the situation in Myanmar with what exists in other Asian countries.

4.2 Infant and child mortality in Myanmar

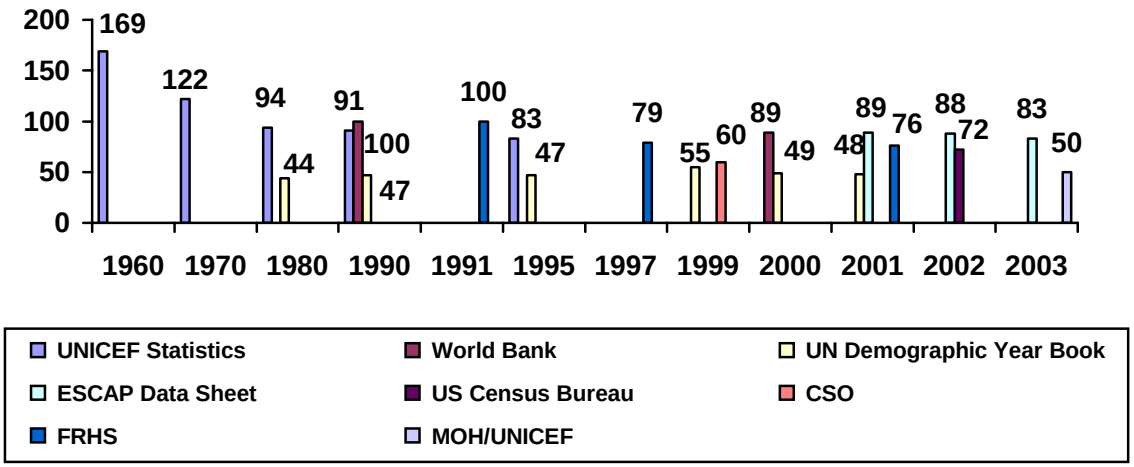
Available evidence suggests that the levels of infant and child mortality in Myanmar have declined in the 20th Century as a result of the gradual diffusion of Western medicine and other public health measures. Myanmar has made progress in providing modern health and medical services to all sectors of the population. Further, progress in literacy and education has also been important in diffusing knowledge and practice of modern hygiene (Mohamed Ismael Khin Maung, 1990). The extension of health services, combined with low-cost interventions addressing major causes of mortality such as increasing immunization coverage, promotion of ORS treatment and increased access to essential drugs, have also been factors in decreasing child mortality in Myanmar (Department of Health 1995).

The National Health Plan (1996-2000) estimates that one-quarter of total admissions to health care facilities and one-third of all deaths in children under five in Myanmar are due to acute respiratory infections. The same report estimated that diarrhoea is another leading cause of deaths among children under-five in Myanmar, with about 2.7 million diarrhoea episodes believed to occur annually, leading to approximately 30,000 deaths. On average, Myanmar children have two or more episodes of diarrhoea per year, which are complicated if the child also suffers from malnutrition and/or other illness (UNICEF, 2001).

It is hard to accurately determine the level and trends in the infant mortality rate (IMR) (the number of infants dying before reaching the age of one year per 1,000 live births in a given year) in Myanmar, as eight different sources since 1960 have suggested rates ranging between 44 and 169. The results vary due to differences in objectives, study

designs, coverage, and methods of data collection; but they reflect a descending trend in mortality (MOH, 20 03). The steepest decline occurred between 1960 and 1980, when the rate fell from 169 to 94, as estimated by UNICEF, or even to a low of 44 as claimed in the UN Demographic Year Book (Figure 4.1).

Figure 4.1: Infant Mortality Rate in Myanmar: 1960-2003, by different sources



Sources:CSO (2002); ESCAP (1999,2001,2002,2003);

A number of these reports have major data limitations, for example UNICEF estimations were calculated on registered hospital cases and omitted deaths not reported to, nor occurring outside of, the public health care system. The most reliable data on child mortality comes from the series of nationally representative reproductive health surveys conducted by the Department of Population. The 1991 PFCS survey estimated a national IMR of 100 in the year before 1991, and the 1997 FRHS provided an estimate of 79 around 1997 resulting from the death of around 92,500 infant deaths in that year, while the 2001 FRHS, estimated the rate to be 76.

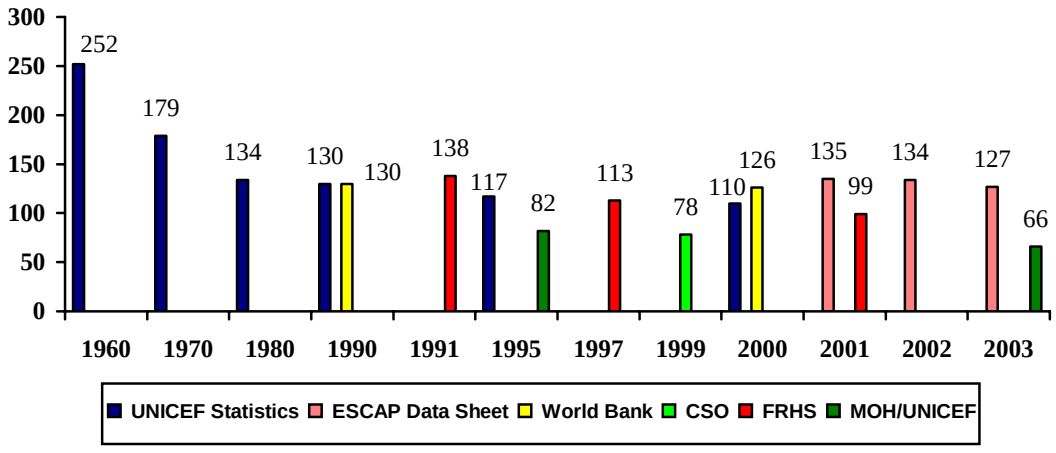
The IMR in Myanmar is relatively high compared to other Asian countries (Table 4.1). Only Lao PDR, Cambodia and Nepal have higher IMRs than Myanmar. Of concern for Myanmar is that the country's IMR is improving slower than in these four other countries. From 1985-1990 to the projections of 2000-2005 the rate improved by 5 points, while in Lao PDR, Cambodia and Nepal the rate improved by 28, 27 and 39 points respectively.

Table 4.1: Infant mortality rates in Asian countries; 1985-2005

Country	Infant mortality rate (per 1,000 live births)			
	1985-1990 Estimates	1990-1995 Estimates	1995-2000 Estimates	2000-2005 Projections
Myanmar	73.4	73.1	80.4	69.5
Bangladesh	105	91	79	67
Brunei Darussalam	10	11	10	9
Cambodia	100	91	83	73
China	50	47	41	37
India	94	79	73	65
Indonesia	70	59	48	40
Lao PDR	116	104	97	88
Malaysia	17	15	12	10
Mongolia	68	68	66	58
Nepal	110	96	83	71
Philippines	52	43	34	29
Republic of Korea	14	12	8	7
Singapore	7	6	5	5
Thailand	38	29	25	21
Vietnam	56	47	40	34

Sources: UNESCAP (2000)

Figure 4.2: Percent distribution of child mortality in Myanmar: 1960-2003



The child mortality rate (CMR) (the number of children aged less than 5 years who die in a year per 1000 live births) in Myanmar fell steeply from an estimated 252 in 1960 to 134 in 1980 (Figure 4.2). After that date, the rate declined further and was estimated to be

127 (estimated by ESCAP Data Sheet) or 66 (estimated by the Ministry of Health and UNICEF 2003) in 2003. From 1990 to the present, seven different sources have provided estimates ranging from 66 to 138; the variation once again reflects the different methods in calculating the rate.

The CMR in Myanmar is also relatively high compared to other Asian countries (Table 4.2). Although, Myanmar's CMR is high at 95.5 (1995-2000), it compares favourably to the rate in Lao PDR, Cambodia, Nepal, Bangladesh, India and Mongolia. All these countries have CMRs of over 100, with the rate in Lao PDR being as high as 156. These countries, along with Myanmar, need to improve their CMRs substantially to reach the levels displayed for the next tier of countries of Indonesia with a CMR of 63, Vietnam with a CMR of 56 or China with a CMR of 48.

Table 4.2: Child mortality rate in Asian countries; 1995-2005

Country	Child mortality rate (per 1,000 live births)	
	1995-2000 Estimates	2000-2005 Projections
Myanmar	95.5	NA
Bangladesh	111	92
Brunei Darussalam	11	10
Cambodia	119	104
China	48	41
India	99	86
Indonesia	63	49
Lao PDR	156	141
Malaysia	15	23
Mongolia	99	85
Nepal	117	98
Philippines	42	35
Republic of Korea	10	9
Singapore	6	6
Thailand	32	26
Vietnam	56	45

Source:UNESCAP (2000)

Chapter V

Diarrhoea and Child Morbidity in Myanmar

5.1 Introduction

Diarrhoea is a major cause of child morbidity and mortality in Myanmar. If not properly treated it can cause dehydration and a loss of minerals, leading to rashes, fatigue, nausea, and cramps, and in some cases death, particularly among children. In the 2001 FRHS, 4.9 percent of children aged five or less suffered from diarrhoea in the two weeks before the survey, while 2.1 percent of the children had it in the 24 hours prior to the survey. Of the children who had diarrhoea in the two weeks before the survey 37.3 percent received ORS.

This chapter determines the relative importance of the children's demographic characteristics, the mothers' socio-economic characteristics, their reproductive patterns, their utilisation of health services and their household characteristics on the likelihood that the children had diarrhoea and whether or not it was treated with ORS.

5.2 Children's demographic characteristics

The 2001 FRHS indicates that boys aged less than five years were significantly more likely to have had diarrhoea (5.7 percent) within the last two weeks of the survey than were girls (4.1 percent) (Table 5.1). This may be due to biological differences, though it could also be explained by differing feeding and playing styles. For example, in Myanmar boys have greater freedom to play on the ground, increasing their chance of being contaminated by bacteria.

Although more boys than girls had diarrhoea, fewer boys received ORS treatment than did girls. Among girls with diarrhoea 43 percent received ORS, while 33.8 percent of boys did so. However, this difference was not statistically significant.

The level of diarrhoea and treatment with ORS among children from single and multiple births was similar. Children from single births had slightly lower rates of diarrhoea and slightly higher rates of ORS treatment; however the differences were not statistically significant.

The age of the children affected both the likelihood that children had diarrhoea and whether it was treated with ORS or not. Infants aged 6-11 months had the highest rate of diarrhoea with 7.6 percent experiencing diarrhoea in the two weeks before the survey. This was followed by children aged 12-23 months, with 6.1 percent of them having diarrhoea and 5.7 percent of those aged six months or less. The oldest children in the study, those aged 36-59 months had the lowest rate of diarrhoea with only 3.5 percent. This difference can be explained by the greater vulnerabilities faced by younger children, especially during the time they are being weaned and hence being introduced to food and liquids that may be contaminated.

Infants with diarrhoea were less likely to be treated with ORS than were the children aged between one and five. Those aged six or fewer months with diarrhoea were the least likely to receive ORS, with only 15.8 percent of them being treated in this way, while only around a quarter of those aged between six and 11 months received ORS. In comparison, nearly half of the children aged between one and two years received ORS. One reason why so few infants received ORS, despite having diarrhoea was that their mothers were exclusively breastfeeding them.

The duration of the child's diarrhoea significantly influenced whether they received ORS or not. Children least likely to receive ORS were those who had diarrhoea for only one day, this is likely because many parents may have felt that the problem was not serious and that treatment was unnecessary. Up to the third day the longer the duration of diarrhoea the more likely children received ORS, with those with diarrhoea for three days the most likely to be treated in this way. Among children who had diarrhoea for four or more days, there was a drop off in the proportion receiving ORS, with less than a third of them being treated this way. This is likely as the diarrhoea by this stage may have been less severe.

5.3 Women's socio-economic characteristics and the likelihood that their children had diarrhoea and received ORS

The extent that children had diarrhoea and were treated with ORS varied depending on their mother's socio-economic characteristics (Table 5.2). The domain that the children lived in, their residence and their mother's occupation had an influence on levels of child

diarrhoea. While, the child's residence, the mother's education and whether the mother watched TV or listened to the radio at least once a week affected whether the children received ORS.

Table 5.1: Percent of children experiencing diarrhoea and receiving ORS in the two weeks prior to the survey, by demographic characteristics of the children (2001 FRHS)

Characteristics of children	Diarrhoea within the last two weeks		Children who received ORS		No. of children
	Percent	Number	Percent	Number	
Sex of child					
Boys	5.7	142	33.8	48	2479
Girls	4.1	100	43.0	43	2437
Total	4.9	242	37.6	91	4916
Level of significance	0.008		0.146		
Twins					
Single birth	4.9	239	37.7	90	4861
Multiple birth	5.5	3	33.3	1	55
Total	4.9	242	37.6	91	4916
Level of significance	0.855		0.878		
Age of child					
Under 6 months	5.7	38	15.8	6	661
6-11 months	7.6	34	26.5	9	449
12-23 months	6.1	59	49.2	29	971
24-35 months	4.9	44	36.4	16	906
36-59 months	3.5	66	45.5	30	1890
Total	4.9	241	37.6	90	4877
Level of significance	0.001		0.005		
Duration of diarrhoea					
1 day			29.2	19	
2 days			35.6	21	
3 days			54.2	32	
4 days plus			32.2	19	
Total			37.6	91	
Level of significance			0.027		

Note: The population for this table consists of the respondent's last two living children born in the five years before the survey.

The domain or residence reflects differentials in economic development through the country, as well as differences in ethnicity, geography, climate, and cultural characteristics. There was a statistically significant difference in the level of diarrhoea among the different domains. Domain 2 (Kayin/Mon/Tanintharti) had the lowest incidence of child diarrhoea

with only 2.3 percent of children suffering from this problem, even though it is not one of the more developed regions of the country. The most developed domains, domain 6 (Mandalay) and domain 8 (Yangon) also had very low rates of child diarrhoea, being 2.6 and 3.1 respectively. Poorer areas of the country had higher rates of diarrhoea, such as domain 3 (Chin/Sagaing) where 11 percent of children had diarrhoea in the two weeks before the survey, a level close to twice as high as the next domain.

Table 5.2: Percent of children experiencing diarrhoea and receiving ORS in the two weeks prior to the survey by socio-economic characteristics of women (2001 FRHS)

Socio-economic characteristics of women	Diarrhoea within the last two weeks		Children who received ORS		No. of children
	Percent	Number	Percent	Number	
Domain					
1 Kachin/Kayah/Shan	6.4	36	47.2	17	565
2 Kayin/Mon/Tanintharyi	2.3	10	50.0	5	441
3 Chin/Sagaing	11.0	72	34.7	25	655
4 Bago	5.6	29	27.6	8	520
5 Magway	2.4	10	40.0	4	416
6 Mandalay	2.6	17	41.2	7	660
7 Rakhine	5.2	24	41.7	10	459
8 Yangon	3.1	15	46.7	7	479
9 Ayeyarwaddy	4.0	29	27.6	8	721
Total	4.9	242	37.6	91	4916
Level of significance	< .001		0.690		
Residence					
Urban	3.8	43	53.5	23	1140
Rural	5.3	199	33.8	68	3776
Total	4.9	242	37.6	91	4916
Level of significance	0.040		0.016		
Mother's education					
No education	5.3	58	31.0	18	1092
Primary	5.5	143	34.3	49	2620
Middle School	3.8	27	66.7	18	703
High School	2.9	8	37.5	3	274
University	2.2	4	75.0	3	181
Other	4.3	2	0	NA	46
Total	4.9	242	37.6	91	4916
Level of significance	0.111		0.010		

Table 5.2……(Continued)

Mother's occupation (asked to those women employed)					
White collar	2.3	3	66.7	2	128
Blue collar	3.7	36	33.3	12	972
Labourer	7.9	29	34.5	10	366
Agricultural worker	5.7	68	39.7	27	1183
Other	0	NA	0	NA	7
Total	5.1	136	37.5	51	2656
Level of significance	0.010		0.657		
Watch TV at least once a week					
Yes	4.7	123	44.7	55	2640
No	5.2	119	30.3	36	2276
Total	4.9	242	37.6	91	4916
Level of significance	0.358		0.020		
Listen to the radio at least once a week					
Yes	5.0	56	57.1	32	1113
No	4.9	186	31.7	59	3803
Total	4.9	242	37.6	91	4916
Level of significance	0.849		0.001		
Read a newspaper once a week (for those with Standard 3 education or more)					
Yes	4.0	38	52.6	20	950
No	5.2	145	37.2	54	2783
Total	4.9	183	40.4	74	3733
Level of significance	0.136		0.085		

Note: The population for this table consists of the respondent's last two living children born in the five years before the survey.

There was no significant statistical relationship, between the likelihood that children with diarrhoea were treated and in which domain they lived. Despite that, domain 2 (Kayin/Mon/Tanintharti), which had the lowest rate of diarrhoea, had the highest proportion of children receiving ORS, with half of all children with diarrhoea in this domain receiving ORS.

Almost 1.5 times more children living in rural areas experienced diarrhoea than those in urban areas (5.3 percent and 3.8 percent respectively, a difference that was statistically significant). Children in rural areas were more likely to be living in poorer housing conditions with poorer sanitation than were children in urban areas. Not only were the conditions worse in the rural areas, but children with diarrhoea were less likely to be treated with ORS compared to children living in cities. Only a third of children in rural areas with diarrhoea received ORS, while in the urban areas over half of such children

received ORS. One reason for this is that rural parents most likely would have had less access to ORS, even if they were able to afford the treatment or were aware of the importance of treating diarrhoea with ORS.

As noted in the literature review, mother's education has a clear relationship with child diarrhoea, children of more educated mothers are less likely to have diarrhoea and more likely to receive treatment. This is because educated mothers are more likely to be aware of the importance of sanitation, are more likely to have access to modern health services and are more likely to seek these services than are less educated mothers, resulting in healthier children.

However, in this study there was no significant statistical relationship between mothers' education and the probability that their children had diarrhoea. Despite that, children with mothers with university education had the lowest level of diarrhoea (2.2 percent), while those with no education (5.3 percent) and primary education (5.5 percent) had the highest rates of diarrhoea. Nevertheless, the higher the level of education of the mother the more likely she was to treat her child's diarrhoea with ORS. Three-quarters of the children who had diarrhoea and who had mothers with a university degree received ORS, compared to under a third of such children with mothers with no education. This difference was statistically significant.

Mothers' occupation affected the incidence of child diarrhoea but not the likelihood that children received treatment. Children of mothers with the highest employment status, white-collar workers, had the lowest level of diarrhoea (2.3 percent), while children whose mothers were labourers had the highest rate (7.9 percent). Mothers with high status employment were more likely to have better housing and thus better able to ensure better sanitation, and decreasing the chances that their children would get diarrhoea.

Mothers watching TV, listening to the radio and reading a newspaper at least once a week was not related to the level of child diarrhoea. However, those mothers who were watching TV or listening to a radio were more likely to be giving their children ORS than were mothers who did not regularly access these media. It is unclear why this is the case. There could be messages on TV and radio stressing the importance of ORS, or it could be that these mothers are better educated and know the importance of this treatment.

5.4 Reproductive patterns of women

The age of the mother, the birth interval, the birth order and the duration of breastfeeding did not significantly influence the levels of child diarrhoea or the extent that these children received ORS treatment (Table 5.3). However the relationship between the length of the previous birth interval and the incidence of diarrhoea approached statistical significance, with children born less than 24 months after the birth of the previous child having the highest incidence of diarrhoea (6.2 percent) and those born three years after the last birth, or who were first births having the lowest levels. These results suggest that cross-infection of siblings of similar ages may contribute to the burden of childhood diarrhoea.

Table 5.3: Percent of children experiencing diarrhoea and receiving ORS in two weeks prior to the survey by reproductive patterns of women (2001FRHS)

Women's reproductive patterns	Diarrhoea within the last two weeks		Children who received ORS		No. of children
	Percent	Number	Percent	Number	
Age of mother at birth					
<20	4.6	16	37.5	6	346
20-24	4.5	48	37.5	18	1069
25-29	5.6	77	36.4	28	1385
30-34	4.8	54	42.6	23	1123
35-39	3.8	27	37.0	10	708
40-49	7.4	18	27.8	5	242
Total	4.9	240	37.5	90	4873
Level of significance	0.232		0.928		
Birth interval					
first birth	4.4	58	36.2	21	1329
less than 2 years	6.2	35	51.4	18	562
24-35 months	6.1	52	34.6	18	856
More than 35 months	4.5	97	35.1	34	2148
Total	4.9	242	37.6	91	4895
Level of significance	0.107		0.339		
Birth Order					
1	4.4	58	36.2	21	1306
2	4.8	52	36.5	19	1076
3	4.4	38	31.6	12	865
4	4.2	26	46.2	12	615
5	5.9	24	54.2	13	404
6+	6.8	44	31.8	14	650
Total	4.9	242	37.6	91	4916
Level of significance	0.189		0.428		
Duration of					
Never breastfed	3.7	5	60.0	3	136
Less than 1 year	5.0	60	25.0	15	1204
1-2 years	4.9	122	41.8	51	2466
More than 2 years	4.9	51	41.2	21	1050
Total	4.9	238	37.8	90	4856
Level of significance	0.925		0.098		

Note: The Population for this table consists of the respondent's last two living children born in the five years before the survey.

5.5 Household characteristics

The type of toilet a household had and whether they had electricity significantly affected levels of child diarrhoea (Table 5.4). This was not the case for the household's source of drinking water or the type of roof that the household had. Children living in households with a seal toilet, which was the most common type of toilet in the survey, were the least likely to have diarrhoea, with only 4.3 percent of them reported to have had diarrhoea in the reference period. Children in families that did not have a seal toilet, a pit or a bucket as a toilet were the most likely to have diarrhoea, with 6.3 percent of them doing so. A family's toilet reflects both the level of wealth and hygiene that exists in the household. Children in poorer families were likely to have poorer sanitation and greater chances of having diarrhoea.

Table 5.4: Percent of children experiencing diarrhoea and receiving in the two weeks prior to the survey by household characteristics (2001 FRHS).

Household characteristics	Diarrhoea within the last two weeks		Children who received ORS		No. of children
	Percent	Number	Percent	Number	
Source of drinking water					
Pipe	2.9	9	77.8	7	312
Well	4.7	137	36.5	50	2893
Other	5.6	96	35.4	34	1711
Total	4.9	242	37.6	91	4916
Level of significance	0.095		0.040		
Type of roof					
Manufactured	4.2	59	59.3	35	1407
Other	5.2	183	30.6	56	3509
Total	4.9	242	37.6	91	4916
Level of significance	0.134		<.001		
Type of toilet					
Water seal	4.3	129	44.2	57	3008
Pit/bucket	5.7	68	32.4	22	1188
None/other	6.3	45	26.7	12	720
Total	4.9	242	37.6	91	4916
Level of significance	0.031		0.065		
Electricity					
Yes	3.8	45	55.6	25	1173
No	5.3	197	33.5	66	3742
Total	4.9	242	37.6	91	4915
Level of significance	0.049		0.006		

Note: The population for this table consists of the respondent's last two living children born in the five years before the survey.

Children living in households with electricity were less likely to have diarrhoea than those children living in households without electricity. This difference was statistically significant, and likely reflect the socio-economic standing of the households, with better-off households much more likely to have electricity than those households without access to electricity.

Household characteristics had a more significant impact on whether children received ORS for diarrhoea, than whether they had the disease or not. Children were more likely to receive ORS if they were living in households with more modern facilities. The type of drinking water, the type of roof and whether the household had electricity had a strong impact on whether children received ORS or not. For example, close to 80 percent of children with diarrhoea and who had piped water received ORS; in other households only around a third of the children with diarrhoea received this treatment. Similarly, close to 60 percent of children living in a house with a manufactured roof received ORS while in other households less than a third of children received diarrhoea. Further, over half of children who had diarrhoea in households with electricity received ORS, compared to a third of children in households without electricity.

It is clear that the probability of ORS treatment is closely related to the economic standing of households. In part this may reflect the greater access to information about treatment that better-off households enjoy. As shown above in Table 5.2, there are significant effects of access to media on the likelihood of ORS treatment. The effects could also reflect the ability of better off households to purchase treatment. This issue will be explored further in the multivariate analysis presented in the next section.

5.6 Multivariate analysis of diarrhoea

To determine the most important factors are affecting the levels of child diarrhoea, this section presents the results of the estimation of three-model logistic regressions (Tables 5.5 and 5.6). Because of the mutilcollinearity between length of birth interval and birth order two sets of models are estimated, the first (Table 5.5) including length of birth interval and the second the birth order (Table 5.6). The first model tests the relative importance of the children's sex, age, the domain where they are living and whether they are located in urban or rural areas. The second model includes these variables plus mother's education,

mother's occupation, whether she watched television, listened to the radio and read a newspaper at least once a week, mother's age at birth of her child, birth order and duration of breastfeeding. The third model includes the same variables of the first two models plus the source of the family's drinking water, they type of roof and toilet they have and whether they have electricity.

Table 5.5: Odds ratios from logistic regression showing the effect of selected predictor variables, including length of birth interval, and diarrhoea (2001 FRHS)

Variables	Model		
	1	2	3
Sex of child			
Female	0.690***	0.689***	0.691***
Male	1.000	1.000	1.000
Twin			
Yes	1.073	1.029	0.983
No	1.000	1.000	1.000
Age of child	***	***	***
Under 6 months	1.497	1.548*	1.523
6-11 months	2.564***	2.629***	2.618***
12-23 months	2.239***	2.301***	2.321***
24-35 months	1.404	1.424	1.397
36-59 months	1.000	1.000	1.000
Domain	***	***	***
1 Kachin/Kayah/Shan	1.000	1.000	1.000
2 Kayin/Mon/Tanintharti	0.361***	0.344***	0.343***
3 Chin/Sagaing	1.897**	1.775**	1.861**
4 Bago	0.905	0.889	0.843
5 Magway	0.344***	0.307***	0.285***
6 Mandalay	0.410**	0.379**	0.396**
7 Rakhine	0.804	0.789	0.579
8 Yangon	0.492*	0.487*	0.482*
9 Ayeyarwaddy	0.645	0.594*	0.559*
Residence			
Urban	1.000	1.000	1.000
Rural	1.189	0.984	0.856
Mother's education			
No education		1.000	1.000
Primary		0.836	0.841
Middle school		0.562	0.614
High school		0.447	0.529
University		0.389	0.459
Mother's occupation		*	
White collar		0.560	0.550
Blue collar		0.788	0.771
Labourer		1.702*	1.590
Agricultural worker		0.944	0.943
Not working		1.000	1.000
Watched television at least once a week			
No		0.963	1.004
Yes		1.000	1.000

Table 5.5 …… (Continued)

Listened to the radio at least once a week			
No		0.819	0.941
Yes		1.000	1.000
Read a newspaper at least once a week			
Yes		1.262	1.335
No		1.317	1.345
Less than S3 education		1.000	1.000
Mother's age at birth of child			
<20		0.637	0.608
20-24		0.583	0.565
25-29		0.761	0.747
30-34		0.648	0.643
35-39		0.509	0.494*
40-49		1.000	1.000
Length of previous birth interval			
First birth		1.113	1.125
Less than 24 months		1.467	1.447
24-35 months		1.296	1.271
More than 35 months		1.000	1.000
Source of drinking water			
Pipe			0.548
Well			0.898
Other			1.000
Type of roof			
Other			1.004
Manufactured			1.000
Type of toilet			*
Water seal			0.592*
Pit/bucket			0.742
Other/None			1.000
Electricity			
No			1.176
Yes			1.000
Chi-square	107.586***	138.190***	148.629***
Df	15	35	41
Change Chi square		30.603*	10.439

* Significant at 0.05 level; ** Significant at 0.01 level; *** Significant at 0.001 level

In the first model the significant factors were the sex and age of the child and the domain where they lived. These factors were significant in all three models. The odds of girls having had diarrhoea in the two weeks prior to the survey were around 30 percent less than for boys in each of the three models. Further research should explore whether the difference is due to biological factors or whether there are social-cultural factors, which could be targeted to help reduce diarrhoea among boys.

When controlling for other variables, the domain with the lowest level of child diarrhoea was Magway. This was the case in each of the three models. Children in this domain had odds of having had diarrhoea that were roughly 70 percent less than that of the reference group (Kachin/Kayah/Shan). Other areas with low incidence of childhood diarrhoea included Mandalay, Yangon and Kayin/Mon/Taninthayi. Chin/Sagaing had by far the highest incidence of childhood diarrhoea. Further research is required to determine the factors that contribute to these substantial differences between areas in the probabilities of children experiencing diarrhoea.

Age of child is also a significant determinant of diarrhoea. The odds of children aged 6-11 months and 12-23 months experiencing diarrhoea are over twice that of children aged 36 to 39 months at the time of the survey. It is probable that the youngest children are protected from contracting diarrhoea by being breastfed by their mothers. Once they are weaned, however, they are exposed fully to opportunities for contracting the sickness, as they grow older and as their immunity increases the probability of contracting diarrhoea decreases. The crucial period that interventions should target in trying to reduce diarrhoea is the period of weaning.

In model two, only maternal occupation has a significant effect, and this effect become non-significant when household factors are controlled in model three. In the third model the household's type of toilet was the only significant variable influencing whether children would have diarrhoea or not. Children living in households that had a water seal toilet had odds of diarrhoea that were approximately 40 percent less than the odds for children living in households with no toilet or another form of toilets. This suggests that increasing the number of households with seal toilets could significantly reduce child diarrhoea.

Table 5.6: Odds ratios from logistic regression showing the effect of selected predictor variables, including birth order, and diarrhoea (2001 FRHS)

Variables	Model		
	1	2	3
Sex of child			
Female	0.689***	0.689***	0.691***
Male	1.000	1.000	1.000
Twin			
Yes	1.073	1.029	0.983
No	1.000	1.000	1.000
Age of child	***	***	***
Under 6 months	1.500	1.518	1.495
6-11 months	2.556***	2.584***	2.575***
12-23 months	2.239***	2.267***	2.285***
24-35 months	1.410	1.410	1.384
36-59 months	1.000	1.000	1.000
Domain	***	***	***
1 Kachin/Kayah/Shan	1.000	1.000	1.000
2 Kayin/Mon/Tanintharti	0.367***	0.350***	0.349***
3 Chin/Sagaing	1.923**	1.809**	1.887**
4 Bago	0.920	0.889	0.841
5 Magway	0.347***	0.305***	0.282***
6 Mandalay	0.415**	0.382**	0.397**
7 Rakhine	0.814	0.783	0.574
8 Yangon	0.499*	0.490*	0.482*
9 Ayeyarwaddy	0.653	0.592*	0.555*
Residence			
Urban	1.000	1.000	1.000
Rural	1.187	0.983	0.856
Mother's education			
No education		1.000	1.000
Primary		0.830	0.836
Middle school		0.561	0.614
High school		0.448	0.529
University		0.402	0.473
Mother's occupation		*	
White collar		0.560	0.548
Blue collar		0.790	0.773
Labourer		1.690*	1.583
Agricultural worker		0.955	0.952
Not working		1.000	1.000
Watched television at least once a week			
No		0.973	0.949
Yes		1.000	1.000
Listened to the radio at least once a week			
No		0.814	0.792
Yes		1.000	1.000

Table 5.6 ……(Continued)

Read a newspaper at least once a week			
Yes		1.259	1.328
No		1.319	1.344
Less than S3 education		1.000	1.000
Mother's age at birth of child			
<20		0.581	0.725
20-24		0.735	0.693
25-29		0.918	0.881
30-34		0.724	0.708
35-39		0.537	0.518
40-49		1.000	1.000
Birth order			
1		0.864	0.904
2-3		0.829	0.855
4 and above		1.000	1.000
Source of drinking water			
Pipe			0.548
Well			0.891
Other			1.000
Type of roof			
Other			1.019
Manufactured			1.000
Type of toilet			*
Water seal			0.596*
Pit/bucket			0.741
Other/None			1.000
Electricity			
No			1.171
Yes			1.000
Chi-square	107.264***	135.042***	145.420***
Df	15	34	40
Change Chi square		27.778*	10.377

* Significant at 0.05 level; ** Significant at 0.01 level; ***Significant at 0.001 level

Although the length of the previous birth interval does not have a significant impact on the odds of diarrhoea, the effects are in the expected direction, with children born less than 2 years after the previous birth of their mother, displaying odds of diarrhoea that are about 50 percent higher than the odds for children born more than three years after the previous birth. In table 5.6, birth order had no significant impact on the odds of a child experiencing diarrhoea. There was very little differences in the odd ratios reported in Tables 5.5 and 5.6.

5.7 Multivariate analysis of ORS

In determining the most important factors leading to the use of ORS for children who experienced diarrhoea, three-model logistic regressions similar to those described in the previous section were estimated. The only difference is that duration of diarrhoea and source of assistance when sick have been added to the first model (Tables 5.7 and 5.8).

In the first model the variables that were significant were urban/rural residence, duration of diarrhoea and the age of the child. Children in rural areas were significantly less likely to receive ORS compared to those in urban areas. This is likely because families in urban areas are more likely to have access to ORS and tend to be richer and better educated and thus, on average, would be more willing to obtain ORS for their children.

The children least likely to receive ORS treatment for episodes of diarrhoea are the youngest children. Many of these children would still be exclusively breastfed and hence mothers may not wish to provide them with other liquids. Those children most likely to receive ORS treatment are those whose duration of diarrhoea had reached three days. These children have probably reached the stage where treatment is required.

The second model significantly adds to the explanation of the likelihood of receiving ORS treatment. The one variable that is significant is the person who the child receives treatment from for the diarrhoea. Children who receive treatment from a doctor or nurse, or from a traditional birth attendant are many times more likely to receive ORS treatment compared to those children who receive no treatment. This, in part, reflects the severity of diarrhoea episode. Those children suffering the severest episodes are the most likely to seek medical attention and subsequently to receive ORS treatment. However, this effect occurs after the duration of the episode, an indicator of severity, is controlled. The results therefore

indicate that encouraging parents to seek treatment for their children's diarrhoea will significantly increase the likelihood of correct treatment.

Table 5.7: Odds ratios from logistic regression showing the effect of selected predictor variables, including length of birth interval, for the use of ORS (2001 FRHS)

Variables	Model		
	1	2	3
Sex of child			
Male	1.000	1.000	1.000
Female	1.377	1.836	2.019
Twin			
No	1.000	1.000	1.000
Yes	1.209	1.150	1.495
Age of child	*	*	*
Under 6 months	0.172**	0.148*	0.087**
6-11 months	0.400**	0.182*	0.113**
12-23 months	0.719	0.672	0.525
24-35 months	0.634	0.378	0.321
36-59 months	1.000	1.000	1.000
Domain			
1 Kachin/Kayah/Shan	1.000	1.000	1.000
2 Kayin/Mon/Tanintharti	0.623	1.440	1.069
3 Chin/Sagaing	0.444	0.726	0.797
4 Bago	0.268*	0.499	0.626
5 Magway	0.572	0.663	1.166
6 Mandalay	0.442	0.807	0.832
7 Rakhine	0.459	1.215	2.040
8 Yangon	0.482	0.648	0.347
9 Ayeyarwaddy	0.252*	0.532	0.809
Residence			
Urban	1.000	1.000	1.000
Rural	0.323**	0.186**	0.320**
Duration of Diarrhoea	**	*	*
1 day	0.618	1.205	1.366
2 days	1.253	0.842	0.776
3 days	2.535*	4.372*	5.181*
4 days	1.000	1.000	1.000
Mother's education			
No education		1.000	1.000
Primary		0.701	0.532
Middle school		1.608	1.917
High school		0.846	0.868
University		2.775	1.456
Mother's occupation			
White collar		1.960	2.914
Blue collar		0.319	0.405
Labourer		0.497	0.926
Agricultural worker		0.917	1.315
Not working		1.000	1.000

Table 5.7……(Continued)

Television			
Yes		1.000	1.000
No		0.756	0.713
Radio			
Yes		1.000	1.000
No		0.346	0.248**
Newspaper			
Yes		0.922	0.450
No		2.096	2.030
Less than S3 education		1.000	1.000
Mother's age at birth of child			
<20		2.340	4.013
20-24		0.769	1.197
25-29		0.976	1.229
30-34		1.176	1.324
35-39		1.930	1.965
40-49		1.000	1.000
Length of previous birth interval			
First birth		0.519	0.351
Less than 24 months		1.804	1.737
24-35 months		0.710	0.673
More than 35 months		1.000	1.000
Assistance during diarrhoea		***	***
Doctor/Nurse		33.694***	49.517***
TBA/Other		11.173***	17.007***
None		1.000	1.000
Source of drinking water			**
Pipe			37.404**
Well			0.720
Other			1.000
Roof			
Manufactured			1.000
Other			0.770
Type of toilet			
Seal			1.948
Pit/bucket			1.267
Others/None			1.000
Electricity			
Yes			1.000
No			0.272*
Chi-square	38.451**	124.390***	142.839***
Df	18	40	46
Change Chi square		85.940***	18.449**

* Significant at 0.05 level; ** Significant at 0.01 level; *** Significant at 0.001 level

Table 5.8 Odds ratios from logistic regression showing the effect of selected predictor variables, including birth order, for the use of ORS (2001 FRHS)

Variables	Model		
	1	2	3
Sex of child			
Male	1.000	1.000	1.000
Female	1.377	1.836	2.066
Twin			
No	1.000	1.000	1.000
Yes	1.209	0.957	1.222
Age of child	*	*	*
Under 6 months	0.172**	0.137*	0.093**
6-11 months	0.400**	0.144*	0.092**
12-23 months	0.719	0.666	0.538
24-35 months	0.634	0.331	0.280
36-59 months	1.000	1.000	1.000
Domain			
1 Kachin/Kayah/Shan	1.000	1.000	1.000
2 Kayin/Mon/Tanintharti	0.623	1.975	1.366
3 Chin/Sagaing	0.444	0.783	0.901
4 Bago	0.268*	0.623	0.796
5 Magway	0.572	0.941	1.969
6 Mandalay	0.442	1.319	0.430
7 Rakhine	0.459	1.339	2.705
8 Yangon	0.482	0.863	0.490
9 Ayeyarwaddy	0.252*	0.572	0.907
Residence			
Urban	1.000	1.000	1.000
Rural	0.323**	0.157**	0.276*
Duration of Diarrhoea	**	*	*
1 day	0.618	1.347	1.455
2 days	1.253	0.814	0.687
3 days	2.535*	4.814*	5.584*
4 days	1.000	1.000	1.000
Mother's education			
No education		1.000	1.000
Primary		0.588	0.452
Middle school		1.413	1.751
High school		0.889	0.187
University		4.023	2.229
Mother's occupation			
White collar		3.312	4.645
Blue collar		0.237*	0.287
Labourer		0.345	0.629
Agricultural worker		0.684	0.944
Not working		1.000	1.000
Television			
Yes		1.000	1.000
No		0.771	0.771
Radio			
Yes		1.000	1.000
No		0.309*	0.231**

Table 5.8….. (Continued)

Newspaper			
Yes		1.043	0.516
No		2.650	2.614
Less than S3 education		1.000	1.000
Mother's age at birth of child			
<20		6.012	10.638
20-24		2.317	3.499
25-29		2.038	2.515
30-34		1.600	1.669
35-39		2.685	2.701
40-49		1.000	1.000
Birth order		*	*
1		0.208*	0.148**
2-3		0.294*	0.308*
4+		1.000	1.000
Assistance during diarrhoea		***	***
Doctor/Nurse		37.852***	50.431***
TBA/Other		11.764***	17.015***
None		1.000	1.000
Source of drinking water			**
Pipe			39.882**
Well			0.742
Other			1.000
Roof			
Manufactured			1.000
Other			0.816
Type of toilet			
Seal			2.582
Pit/bucket			1.461
Others/None			1.000
Electricity			
Yes			1.000
No			0.316
Chi-square	38.451**	127.834***	145.398***
Df	18	39	45
Change Chi square		89.384***	17.564**

* Significant at 0.05 level; ** Significant at 0.01 level; *** Significant at 0.001 level

None of the exposure to information variables have a significant effect on the likelihood that parents will provide ORS treatment to their children who are experiencing diarrhoea. However, in model 3, two of the variables that index the socio-economic status of the households, presence of electricity and water supply are statistically significant. This suggests that economic resources are important in determining whether parents provide ORS treatment to their children.

5.8 Conclusion

There are a wide range of variables that influence the likelihood that children would have diarrhoea and would receive ORS treatment. The three-model logistic analysis indicates that the most important variables influencing diarrhoea are the sex of the child, the domain that they live in and the type of toilet that they have. Boys were more likely to have diarrhoea than girls, there are substantial variations among areas in the likelihood of experiencing diarrhoea, and children with water seal toilets were less likely to have diarrhoea than children in households with other toilet facilities. While, the most important variables influencing whether children with diarrhoea would be treated with ORS were the age of the children, the duration of diarrhoea, from whom the child received treatment and the socio-economic status of the household.

Chapter VI

Determinates of Infant and Child Mortality in Myanmar

6.1 Introduction

Using reported deaths among children born in the five years before the 2001 FRHS, this chapter determines the relative importance of factors leading to infant and child mortality in Myanmar. Life tables are used to present the determinants of infant and child mortality, namely children's demographic characteristics, the mothers' socio-economic characteristics, their reproductive patterns, their utilization of health services during their pregnancy and their household characteristics. Further, multivariate analysis is used to determine to what extent these variables contribute to infant and child mortality in Myanmar.

Of the 5,502 births that occurred in the five years before the survey, 464 had died by the time of the survey (8.4 percent). Of the deaths before the age of two years, nearly half occurred by the end of the first month of life. Of the remaining deaths, approximately another half occurred by the end of the first four months of life, another 25 percent by the end of eight months, and the remaining between nine and 24 months of life. Only about 7 percent of deaths of children occured between the second and fourth years of life (Figure 6.1).

6.2 Child survival and child demographic characteristics

The survival probabilities of girls were greater than that of boys at every stage in the first five years of life (Figure 6.1A and Table 6.1), a pattern found in other countries. By the end of five years, the life table indicates that up to 11 percent of boys die, compared to under 10 percent of girls. This difference was statistically significant. Further investigation needs to determine if this difference results from biological advantages that females have over males, or whether there are cultural factors that are also leading to greater deaths among boys.

Figure 6.1 Proportion of Births surviving by completed months: Births occurring in the 5 years before survey.

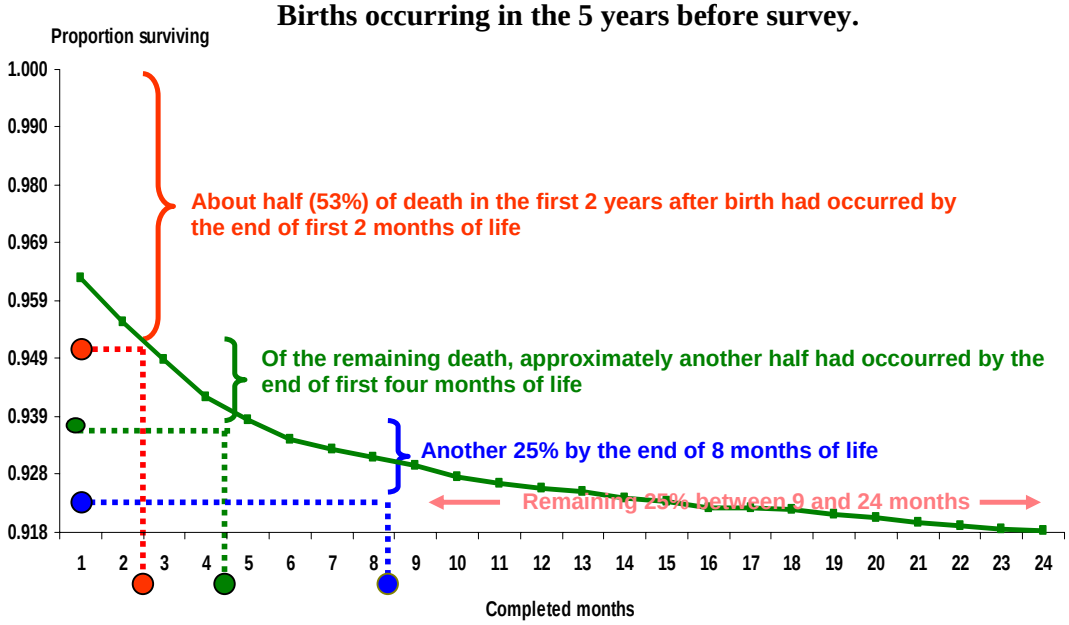
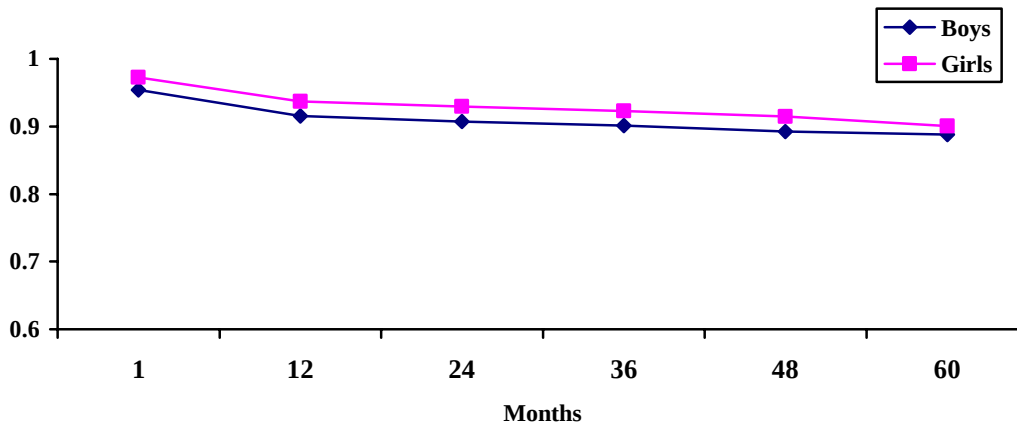


Figure 6.1 A: Proportion of children surviving at completion of specific months by sex.



There was a marked difference in the survival probabilities of children from single and multiple births; at every stage children from multiple births were more likely to die. The life table estimates that in the first year of life 3 percent of children from single births die; compared to 22 percent of those from multiple births. By the end of five years 10 percent of

children from single births would die, yet from multiple births the figure was four times greater. The reason for this is likely to be a combination of biological and environmental factors. On average children from multiple births are likely to be born smaller than children from single births placing them at greater health risks. Children from multiple births are also unlikely to receive the same care and attention that children from single births receive, further placing them at risk.

Table 6.1: Proportion of children surviving at completion of specific months by demographic characteristics of the children

Characteristics of child	Proportion of children surviving to the end of a specific month						Number of children
	1	12	24	36	48	60	
Sex of child* **							
Boy	0.9539	0.9153	0.9075	0.9010	0.8922	0.8883	2812
Girl	0.9728	0.9370	0.9297	0.9227	0.9148	0.9006	2690
Multiple birth or not* **							
No	0.9664	0.9307	0.9234	0.917	0.9085	0.8997	5407
Yes	0.7789	0.6598	0.6297	0.6055	0.6055	0.6055	95

*** Significant at 0.001 level

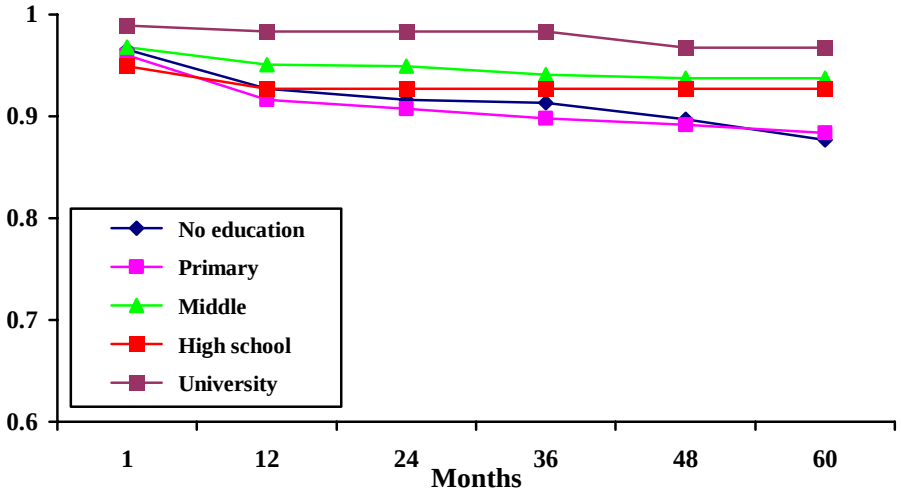
6.3 Child survival and mothers' socio-economic characteristics

Child survival was affected by the residence of the children, the extent that their mothers received formal education and whether their mothers had access to the media through reading newspapers or not (Table 6.2). However, the domain the children were living in, mother's occupation, and whether mothers were watching TV or listening to the radio at least once a week were not significantly related to child mortality.

Children living in urban areas had a higher rate of survival than those who were living in rural areas. At the end of first month of life the proportion of children surviving in urban areas was estimated to be 2 percent higher than for children in rural areas. By the end of the fifth year this had increased to close to 4 percent. The reason for this is likely a combination of better sanitation conditions, better access to health services and because urban people are likely to be richer and better educated, thus increasing the probability that their children will be healthy or will have access to proper care when they are ill.

Mother's education influenced child survival; those who were better educated had a lower chance of their children dying those who were less educated (Figure 6.2). By the end of five years, 3 percent of children whose mothers had university education, compared to 12 percent of children whose mothers had no education, were estimated to have died. This finding confirms the importance of mothers' education on child survival, as noted in the literature review.

Figure 6.2: Proportion of children surviving at completion of specific months by mother's education



The life table estimates indicate that mothers who were reading newspapers at least once a week were less likely to suffer a child death than mothers who did not read newspapers. The question, 'whether mothers were reading newspapers or not', was asked to only those who had Standard 3 education or more, and thus it does not include women with no education. It is not clear why this differential in survival existed. It is possible that women reading newspapers were gaining information that helped protect their children. Though, compared to other women, these women were more likely to be reading other materials that were assisting them look after their children. For example, they may be better at following doctor's written instructions. Further, mothers who were reading newspapers were likely to be richer and better educated than those women who were not doing so, which was also likely to result in healthier children.

Table 6.2: Proportion of children surviving at completion of specific months by maternal variables

Mother's socio-economic characteristics	Proportion of children surviving to the end of a specific month						Number of children
	1	12	24	36	48	60	
Region							
1 Kachin/Kayah/Shan	0.9653	0.8284	0.9121	0.9020	0.8774	0.8774	636
2 Kayin/Mon/Tanintharti	0.9661	0.9223	0.9135	0.9053	0.8937	0.8937	502
3 Chin/Sagaing	0.9641	0.9362	0.9342	0.9269	0.9189	0.9460	728
4 Bago	0.9521	0.9106	0.8918	0.8851	0.8851	0.8851	597
5 Magway	0.9519	0.9189	0.9189	0.9152	0.5152	0.5152	458
6 Mandalay	0.9611	0.9228	0.9193	0.9193	0.9193	0.9193	725
7 Rakhine	0.9674	0.9389	0.9315	0.9211	0.9164	0.8813	522
8 Yangon	0.9773	0.9270	0.9139	0.9019	0.9019	0.9019	533
9 Ayeyarwaddy	0.9624	0.9320	0.9269	0.9204	0.8998	0.8846	801
Residence**							
Urban	0.9781	0.9395	0.9340	0.9288	0.9245	0.9245	1239
Rural	0.9588	0.9220	0.9138	0.9067	0.8972	0.8859	4263
Education***							
No education	0.9653	0.9271	0.9162	0.9132	0.8971	0.8770	1241
Primary	0.9601	0.9161	0.9072	0.8981	0.8916	0.8837	2970
Middle	0.9680	0.9507	0.9491	0.9410	0.9374	0.9374	755
High school	0.9495	0.9271	0.9271	0.9271	0.9271	0.9271	300
University	0.9890	0.9833	0.9833	0.9833	0.9674	0.9674	185
Mother's occupation							
White collar	0.9854	0.9555	0.9555	0.9437	0.9437	0.8976	138
Blue collar	0.9638	0.9286	0.9176	0.9125	0.9075	0.9075	1080
Labourer	0.9615	0.9036	0.9007	0.8965	0.8965	0.8965	416
Agricultural worker	0.9495	0.9074	0.8976	0.8949	0.8745	0.8745	1351
Others	0.8750	0.8750	0.8750	0.8750	NA	NA	8
Watched TV at least once a week							
Yes	0.9633	0.9295	0.9220	0.9174	0.9102	0.9042	2929
No	0.9629	0.9219	0.9142	0.9050	0.8953	0.8837	2573
Listened to the radio at least once a week							
Yes	0.9598	0.9309	0.9213	0.9138	0.9065	0.9065	1246
No	0.9641	0.9256	0.9179	0.9110	0.9023	0.8907	4256
Read newspapers at least once a week (for those with Standard 3 education or more)**							
Yes	0.9705	0.9417	0.9405	0.9367	0.9367	0.9367	1024
No	0.9608	0.9221	0.9143	0.9061	0.8971	0.8898	3126

** Significant at 0.01 level; *** Significant at 0.001 level

NA- No respondent exposed

6.4 Child survival and mothers' reproductive patterns

The classical U-shaped curvilinear relationship between infant morality and the age of mother at the time of childbirth, as mentioned in the literature review, was observed in this study (Table 6.3). Mothers aged 25-29 at the birth of their child, had children with the highest survival rate through the first five years of life, with only 8 percent of such children

being estimated to die within the first five years of life. In this study, teenage mothers along with those aged 35-39 had the second best child survival probabilities, with over 10 percent of their children estimated to die, which was much lower than the estimated 17 percent of deaths among children born to mothers aged 40-49.

The birth interval with the highest child survival rate was for those who were born 36 or more months after their older sibling, while those with the lowest survival rate was for those born less than two years after their older sibling. This pattern existed from the first to the 60th month. By the end of five years, 9 percent of children in the birth interval of more than 36 months were estimated to have died, compared to 17 percent of children who were born less than two years after their sibling. This finding corresponds with many other studies that show that short birth intervals are associated with elevated risks of infant and child mortality.

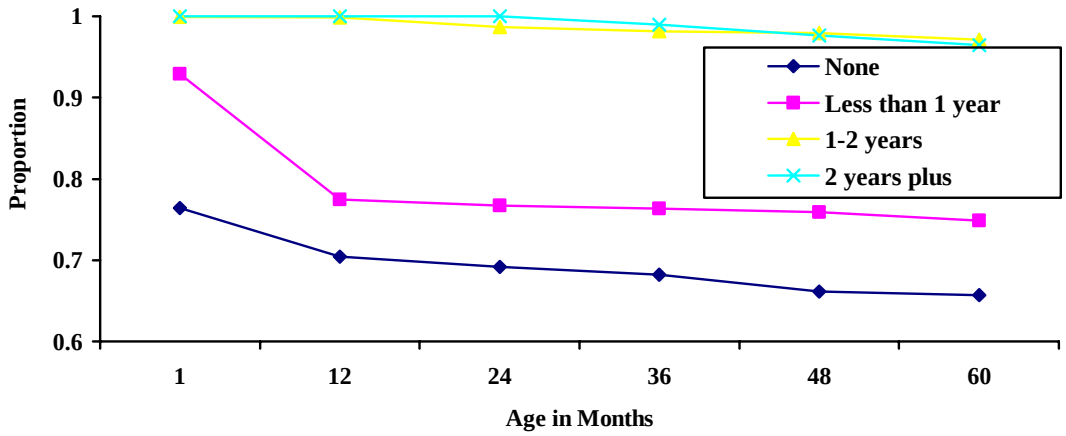
Table 6.3: Proportion of children surviving at completion of specific months by mother's reproductive patterns

Mother's reproductive patterns	Proportion of children surviving to the end of a specific month						Number of children
	1	12	24	36	48	60	
Mother's age at birth of child**							
Less than 20	0.9617	0.8994	0.8923	0.8923	0.8923	0.8923	393
20-24	0.9585	0.9198	0.9130	0.9065	0.9013	0.8884	1210
25-29	0.9696	0.9412	0.9349	0.9301	0.9208	0.9166	1517
30-34	0.9624	0.9255	0.9186	0.9080	0.8969	0.8917	1258
35-39	0.9669	0.9349	0.9247	0.9197	0.9089	0.8923	791
40-49	0.9471	0.8902	0.8739	0.8574	0.8457	0.8273	284
Birth interval**							
First child	0.9539	0.9124	0.9096	0.9044	0.9000	0.8925	1482
Less than 2 years	0.9377	0.8769	0.8570	0.8497	0.8342	0.8342	676
24-35 months	0.9711	0.9347	0.9249	0.9131	0.9099	0.8974	971
36 months plus	0.9735	0.9456	0.9403	0.935	0.9242	0.9126	2348
Birth order							
1	0.9614	0.9245	0.9226	0.9187	0.9141	0.9064	1435
2	0.9624	0.9220	0.9137	0.9103	0.9046	0.8940	1200
3	0.9697	0.9385	0.9331	0.9233	0.9144	0.9144	962
4	0.9661	0.9432	0.9301	0.9272	0.9132	0.9132	679
5	0.9594	0.9140	0.9113	0.8957	0.8840	0.8733	469
6+	0.9589	0.9108	0.8922	0.8820	0.8703	0.8448	757
Breastfeeding***							
None	0.7641	0.7046	0.6914	0.6824	0.6611	0.6566	407
Less than 1 year	0.9291	0.7748	0.7668	0.7635	0.7593	0.7485	1488
1-2 years	0.9992	0.9984	0.9866	0.9812	0.9791	0.9712	2530
2 years plus	1.0000	1.0000	1.0000	0.9896	0.9761	0.9643	1077

** Significant at 0.01 level, *** Significant at 0.001 level

Breastfeeding had a beneficial effect on child survival (Figure 6.3). Close to a quarter of the children who were not breastfed were estimated to have died in the first month of their life, compared to an estimated 0.1 percent of children breastfed between one and two years and an estimated no deaths for children breastfed for more than two years. However, it should be noted that a major reason why children were not breastfed was that they had died, and this distorts the effect of breastfeeding. Despite this, children who were breastfed one year or more had better survival rates to those who were breastfed for a shorter period than this.

Figure 6.3: Proportion of children surviving at completion of specific months by duration of breastfeeding



6.5 Child survival and utilization of health services

Children whose mothers received antenatal care (ANC) from a doctor, nurse or from the category 'other', had better survival rates than children whose mothers received ANC from a TBA, or if they did not receive any ANC. By the end of five years, children of mothers who gained ANC from a doctor faired the best, with 5 percent of these children estimated to have died. The group 'other' was very small with only 45 children; nevertheless the survival rate was high with only 7 percent of these children estimated to have died after five years. Further investigation is needed to determine who was providing ANC to these children's mothers. Nurses provided the majority of ANC to the mothers in the study and the child survival of these mothers was relatively good, with 9 percent of

such children estimated to have died after five years. However, children of mothers who received ANC from a TBA or from no one had poor survival rates, as 14 and 15 percent respectively of these children were estimated to die after five years.

In Myanmar, the majority of children are born at home, though a significant proportion are born in hospitals or clinics, and as shown in the 2001 FRHS a very small number (0.5 percent of all births) are born elsewhere. There was very little difference in the survival rates for those born at home and those born in a hospital or a clinic, as 9 percent of children in both groups were estimated to have died after five years. Although, children born at hospitals or clinics are likely to have had the best medical care this was not reflected in improved survival rates for the children. This probably results from some children born in hospitals being delivered there as a result of complications, and thus being at greater risk of dying than other children. The survival rate for children born elsewhere was very poor, with 35 percent of all such children estimated to have died after five years.

Table 6.4: Proportion of children surviving at completion of specific months by the reproductive health seeking behaviour of mothers

Reproductive patterns of women	Proportion of children surviving to the end of a specific month						Number of children
	1	12	24	36	48	60	
ANC* **							
Doctor	0.9776	0.9511	0.9462	0.9462	0.9462	0.9462	587
Nurse	0.9662	0.9351	0.9305	0.9240	0.9159	0.9072	3534
TBA	0.9703	0.9031	0.8904	0.8804	0.8564	0.8564	404
Other	1.0000	0.9304	0.9304	0.9304	0.9304	0.9304	45
No one	0.9466	0.9069	0.8884	0.8755	0.8681	0.8513	864
Place of delivery* **							
Home	0.9671	0.9319	0.9250	0.9180	0.9120	0.9047	4426
Hospital & Clinic	0.9601	0.9348	0.9251	0.9227	0.9186	0.9101	859
Elsewhere	0.9655	0.8580	0.7752	0.7752	0.7752	0.6460	29
Assistance during delivery							
Doctor	0.9595	0.9328	0.9263	0.9263	0.9263	0.9165	698
Nurse	0.9692	0.9418	0.9367	0.931	0.9217	0.9159	3534
TBA	0.9659	0.9214	0.9129	0.9043	0.9094	0.8913	2062
Other	0.9195	0.8575	0.8327	0.8177	0.7922	0.7775	398

*** Significant at 0.001 level

6.6 Child survival and household characteristics

The household source of drinking water, the type of roof and whether the household had electricity or not affected child survival (Table 6.5). The more modern the household the more likely that a child survived their first five years of life.

By the end of five years, households with piped water had the best estimated child survival rates with 95 percent of them estimated to be alive (Figure 6.4). This compares to less than 90 percent for households that used well water or another source for their water. Only a small proportion of households in this study have piped water and thus if this percentage could be increased it could help reduce child mortality.

Households with manufactured roofs and those with electricity had higher levels of child survival compared to those that did not. After five years, households with manufactured roofs had an estimated child survival rate of 93 percent, compared to only 88 percent for those without these types of roof. The child survival rate for houses with electricity was 94 percent, compared to 88 percent for children in houses without electricity.

Figure 6.4: Proportion of children surviving at completion of specific months by household's source of water

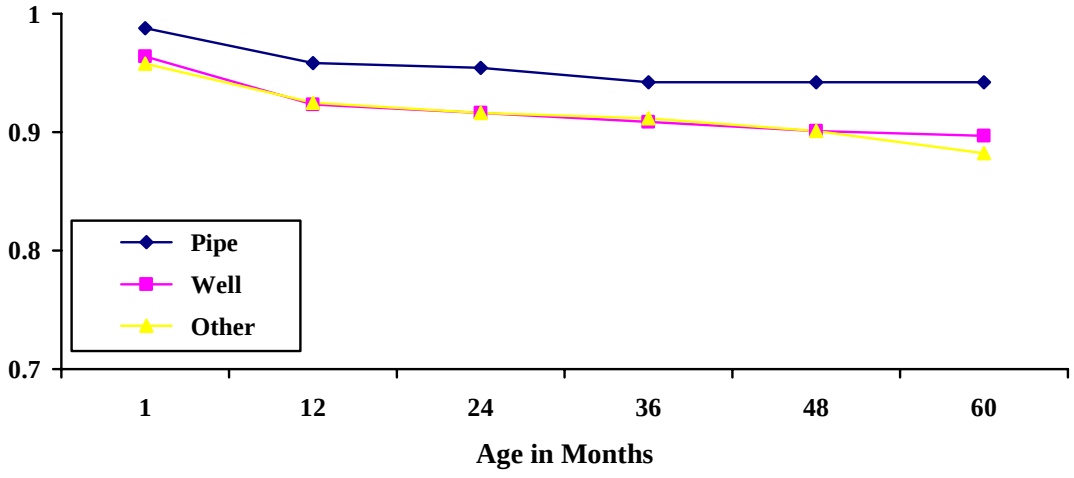


Table 6.5: Proportion of children surviving at completion of specific months by household characteristics

Household characteristics	Proportion of children surviving to the end of a specific month						Number of children
	1	12	24	36	48	60	
Source of drinking water*							
Pipe	0.9879	0.9584	0.9545	0.9423	0.9423	0.9423	332
Well	0.9638	0.9234	0.9160	0.9086	0.9009	0.8972	3250
Other	0.9577	0.9247	0.9162	0.9115	0.9008	0.8824	1920
Type of roof***							
Manufactured	0.9703	0.9454	0.9426	0.9385	0.9288	0.9252	1525
Others	0.9604	0.9186	0.9091	0.9015	0.8936	0.8831	3977
Type of toilet							
Water seal	0.9620	0.9288	0.9235	0.9183	0.9098	0.9059	3327
Pit/bucket	0.9631	0.9151	0.9038	0.8958	0.8886	0.8762	1360
None/other	0.9680	0.9323	0.9214	0.9108	0.9010	0.8799	815
Electricity***							
Yes	0.9807	0.9584	0.9539	0.9507	0.9486	0.9446	1255
No	0.9579	0.9164	0.9079	0.9002	0.8900	0.8798	4246

* Significant at 0.05

*** Significant at 0.001 level

6.7 Multivariate analysis of infant survival

To determine which factors are most important in affecting infant mortality two different proportional-hazard models were created, the first one includes birth intervals and the second includes birth orders. The results presented indicate the odds ratio of the event (an infant dying) occurring at each time interval. The odds ratios are interpreted as the odds of an infant death occurring relative to an omitted reference category.

The variables included in these models were the sex of the child, whether the child came from a single or multiple birth, which domain they were living in and their place of residence. In the second model the same variables were used plus mother's education, mother's occupation, the age of the mother at the time of her child's birth, the birth interval, who the mother received ANC from and who the mother received assistance from during the delivery of her child. In the third model the same variables were used plus the household characteristics, namely source of drinking water, type of roof, type of toilet and whether the house had electricity.

In the first model (Table 6.6) the variables that were significant were sex of the child, whether the birth was a single or multiple birth and residence of the child. Infant boys were significantly more likely to die than infant girls. In all three models, infant boys had

odds of dying at each time interval in the first 12 months of life that were roughly 40 percent greater than that of girls. Infants born in single births had a much greater chance of survival compared to those who belonged to multiple births. This was the case in all three models. While infants in rural areas had a lower likelihood of survival than did children in urban areas, this was only significant in the first model, suggesting that some of the impact of residence is associated with socio-economic differences of mothers.

In the second model, along with the sex of the infant and whether the infant came from a single or a multiple birth, which were significant in the first model, mother's age at her child's birth and the length of the previous birth interval were significant. Infants of mothers aged 25-29 had the best survival rates compared to infants with mothers with different ages. They had odds of survival that was close to 50 percent better than that of children of mothers aged 40-49. This was the case in both models two and three. Infants born after the longest birth interval of more than 35 months, had the best survival rates while infants born after the shortest birth interval, less than 24 months, had the worst survival rates. This was the case in both the second and third models.

In the third model the only additional variable that was significant was whether the household had electricity or not, with children in households with electricity having better survival rates compared to those without electricity. Households with electricity are likely to be richer than those households without this form of power. Further, electricity also results in improved sanitation conditions.

Table 6.6: Estimated odds ratios from proportional hazard models of infant mortality, including birth interval (2001 FRHS)

Variables	Model		
	1	2	3
Sex of child			
Male	1.396**	1.429**	1.453**
Female	1.000	1.000	1.000
Twin			
Single birth	0.180**	0.213**	0.231**
Multiple birth	1.000	1.000	1.000
Residence			
Urban	0.714*	0.849	1.032
Rural	1.000	1.000	1.000

Table 6.6 ……(Continued)

Domain			
1 Kachin/Kayah/Shan	1.000	1.000	1.000
2 Kayin/Mon/Tanintharti	1.049	1.195	1.045
3 Chin/Sagaing	0.893	0.921	0.907
4 Bago	1.369	1.497	1.323
5 Magway	0.878	0.996	0.924
6 Mandalay	0.941	1.096	1.085
7 Rakhine	0.724	0.849	0.939
8 Yangon	1.459	1.447	1.292
9 Ayeyarwaddy	0.951	1.004	0.866
Mother's education			
No school		1.000	1.000
Primary		1.223	1.238
Middle		0.997	1.064
High school		1.542	2.085
University		0.303	0.430
Others		1.292	1.213
Mother's occupation			
White collar		0.358	0.433
Blue collar		0.420	0.467
Labourer		0.481	0.508
Agricultural		0.522	0.585
Other		1.000	1.000
Mother's age at child's birth		**	**
<20		0.681	0.691
20-24		0.663	0.679
25-29		0.372**	0.384**
30-34		0.595*	0.602*
35-39		0.529*	0.535*
40-49		1.000	1.000
Birth interval		**	**
First birth		1.767**	1.767**
Less than 24 months		2.284**	2.254**
24-35 months		1.482*	1.493*
More than 35 month		1.000	1.000
Source of ANC			
Doctor		1.073	1.309
Nurse		0.935	0.918
TBA		1.240	1.264
Other		0.000	0.000
None		1.000	1.000
Assistance delivery			
Doctor		0.663	0.777
Nurse		0.577	0.602
TBA		0.608	0.591
Other		1.000	1.000
Source of drinking water			
Pipe			0.497
Well			1.119

Table 6.6 …….. (Continued)

Type of roof			
Manufactured			0.833
None			1.000
Others			1.000
Type of toilet			
Water seal			1.291
Pit/bucket			1.347
Others/None			1.000
Electricity			
Yes			0.466**
No			1.000
Chi-square	44.724**	98.743**	116.875**
Df	11	32	38
Change Chi-square		54.934**	20.682**

* Significant at 0.05 level;** Significant at 0.01 level

Replacing birth interval with birth order in the analyses results in a number of changes in the findings (Table 6.7). Girls and children from single births continue to have better probabilities of survival compared to boys and children from multiple births. Mothers aged 25-29 and those aged 35-39 had children who had better survival probabilities compared to the reference group, those aged 40-49. The source of ANC in this analysis was significant, with mothers receiving ANC from a doctor or a nurse having better significant survival rates compared to the reference group, those who did not receive any ANC. Among household characteristics, both the type of toilet and whether the household had electricity were significant. The results indicate that households with water seal toilets had the worst survival rate after controlling for other indicators of socio-economic status of households.

Table 6.7: Estimated odds ratios from proportional hazard models of infant mortality, including birth order (2001 FRHS)

Variables	Model		
	1	2	3
Sex of child			
Male	1.315**	1.318**	1.329**
Female	1.000	1.000	1.000
Twin			
No	0.150**	0.144**	0.147**
Yes	1.000	1.000	1.000
Residence			
Urban	0.757*	0.895	1.015
Rural	1.000	1.000	1.000

Table 6.7……..(Continued)

Domain			
1 Kachin/Kayah/Shan	1.000	1.000	1.000
2 Kayin/Mon/Tanintharti	0.937	0.926	0.847
3 Chin/Sagaing	0.845	0.812	0.814
4 Bago	1.364	1.279	1.176
5 Magway	1.011	0.973	0.930
6 Mandalay	1.069	1.032	0.986
7 Rakhine	0.853	0.791	0.905
8 Yangon	1.094	1.069	1.003
9 Ayeyarwaddy	0.958	0.871	0.781
Mother's education			
No school		1.000	1.000
Primary		1.133	1.148
Middle		0.796	0.867
High school		1.260	1.539
University		0.327	0.435
Other		1.620	1.559
Mother's age at child's birth			
<20		0.796	0.798
20-24		0.767	0.769
25-29		0.593**	0.592
30-34		0.722	0.723
35-39		0.589**	0.592
40-49		1.000	1.000
Birth order			
1		1.022	1.015
2-3		0.969	0.982
4-+		1.000	0.889
Source of ANC		*	
Doctor		0.498**	0.556**
Nurse		0.691**	0.681**
TBA		0.877	0.877
Other		0.748	0.764
None		1.000	1.000
Place of delivery			
Home		0.651	0.580
Hospital		0.741	0.745
Clinic		0.655	0.677
Elsewhere		1.000	1.000
Assistance at delivery			
Doctor		1.066	1.102
Nurse		0.867	0.871
TBA		1.029	0.997
Other		1.000	1.000
Source of drinking water			
Pipe			0.716
Well			1.075
Other			1.000
Type of toilet			
Water seal			1.437*
Pit/bucket			1.361
Other/None			1.000

Table 6.7…….(Continued)

Roof			
Manufactured			0.889
None			1.000
Electricity			
Yes			0.525**
No			1.000
Chi-square	99.708	136.191	154.205
Df	11	33	39
Change Chi-square		38.303	20.109

* Significant at 0.05 level; ** Significant at 0.01 level

6.8 Multivariate analysis of child survival

The same methods of determining the probability of an infant's death are used to determine the factors associated with child deaths. The same two different models were used, one with birth intervals and the other one with birth orders along with the same variables as before.

The odds ratios for the proportional hazard model for children are similar to that for infants when including birth intervals (Table 6.8). Boys and children from a multiple birth had poorer survival rates compared to girls and children from a single birth. This was the case in all three models. Further, children in urban areas faired better than those in rural areas, but this once again only significant in the first model.

Among the added variables in the second model mother's age at the time of her child's birth, the birth interval and who provided assistance at the child's birth were significant. Children of mothers aged 25-29, 30-34 and 33-39 had a higher probability of surviving compared to the reference group, those aged 40-49. Children in each of the birth intervals had poorer survival probabilities compared to the reference group, those whose birth interval was more than 35 months. This indicates that encouraging mothers to delay their next child could help reduce child mortality. Children who were delivered by a nurse or TBA faced significantly fewer deaths compared to those who were delivered by someone in the category 'other'. There was no such significant difference for children delivered by a doctor. This is most likely because the doctors were at the delivery because of known complications, increasing the probability of deaths among this group.

In the third model the only added variable that was significant was whether the household had electricity. This was exactly the same as with the analyses of infant mortality.

Table 6.8: Estimated odds ratios from proportion hazard models of under-five mortality, including birth interval (2001 FRHS)

Variables	Model		
	1	2	3
Sex of child			
Male	1.366**	1.409**	1.439**
Female	1.000	1.000	1.000
Twin			
Single birth	0.157**	0.187**	0.198**
Multiple birth	1.000	1.000	1.000
Domain	*		
1 Kachin/Kayah/Shan	1.000	1.000	1.000
2 Kayin/Mon/Tanintharti	0.897	1.020	0.871
3 Chin/Sagaing	0.764	0.799	0.769
4 Bago	1.210	1.363	1.175
5 Magway	0.626	0.737	0.663
6 Mandalay	0.707	0.836	0.790
7 Rakhine	0.534	0.622	0.536
8 Yangon	1.172	1.274	1.141
9 Ayeyarwaddy	0.939	1.045	0.876
Residence			
Urban	0.698*	0.824	1.017
Rural	1.000	1.000	1.000
Mother's education			
No school		1.000	1.000
Primary		1.212	1.259
Middle		0.902	1.014
High school		1.308	1.829*
University		0.227	0.342
Mother's occupation			
White collar		0.914	0.956
Blue collar		0.880	0.853
Elementary worker		0.871	0.800
Agricultural		1.000	1.000
Mother's age at child's birth		*	**
<20		0.600	0.600
20-24		0.655	0.666
25-29		0.389**	0.398**
30-34		0.618*	0.616*
35-39		0.590*	0.587*
40-49		1.000	1.000
Birth interval		***	***
first birth		1.743**	1.738**
less than 24 months		2.333**	2.290***
24-35 months		1.484*	1.504*
More than 35 month		1.000	0.840

Table 6.8 …….. (Continued)

Source of ANC			
Doctor		0.954	1.197
Nurse		0.817	0.818
TBA/Other		0.996	1.030
None		1.000	1.000
Assistance at delivery		*	*
Doctor		0.583	0.692
Nurse		0.560*	0.585*
TBA		0.566**	0.547**
Other		1.000	1.000
Source of drinking water			
Pipe			0.592
Well			1.136
Others			1.000
Roof			
Manufactured			0.827
None			1.000
Type of toilet			
Water seal			0.976
Pit/bucket			0.971
Other/None			1.000
Electricity			
Yes			0.426**
No			1.000
Chi-square	64.200**	126.690**	145.847**
df	11	32	38
Change in Chi-square		62.575**	22.724**

* Significant at 0.05 level; ** Significant at 0.01 level, *** Significant at 0.001 level

Replacing birth interval with birth order brought a number of changes to the odds ratios (Table 6.9). In model one, the sex of the child, whether the birth was single or multiple and the residence remained significant, with girls, children from single births and those in urban areas at a comparative advantage over boys, children from multiple births and those in rural areas.

In model two, the age of the mother and her source of ANC were significant factors in affecting child deaths. Mothers aged from 25 to 39 had fewer children dying than did those in the reference group, those aged 40-49. Mothers receiving ANC from a doctor or a nurse had fewer deaths than did those mothers who did not receive ANC. Increasing the proportion of mothers receiving ANC from doctors or nurses would help reduce child mortality. The only added variable in model three that was significant was whether the house had electricity or not. The effect of the presence of electricity on enhancing the

survival of children was very strong, this reflects the importance of improved living standards in reducing child mortality.

Table 6.9: Estimated odds ratios from proportional hazard models of under-five mortality, including birth order (2001 FRHS)

Variables	Model		
	1	2	3
Sex of child			
Male	1.284**	1.295**	1.307**
Female	1.000	1.000	1.000
Twin			
Single birth	0.140**	0.138**	0.141**
Multiple birth	1.000	1.000	1.000
Domain			
1 Kachin/Kayah/Shan	1.000	1.000	1.000
2 Kayin/Mon/Tanintharti	0.829	0.851	0.762
3 Chin/Sagaing	0.732	0.724	0.712
4 Bago	1.148	1.112	1.007
5 Magway	0.739	0.725	0.675
6 Mandalay	0.801	0.795	0.746
7 Rakhine	0.742	0.710	0.722
8 Yangon	0.982	1.005	0.930
9 Ayeyarwaddy	0.837	0.785	0.694*
Residence			
Urban	0.716**	0.867	0.973
Rural	1.000	1.000	1.000
Mother's education			
No school		1.000	1.000
Primary		1.142	1.167
Middle		0.757	0.840
High school		1.108	1.364
University		0.394**	0.525
Other		1.387	1.359
Mother's age at child's birth			
<20		0.723	0.726
20-24		0.730	0.730
25-29		0.568**	0.567**
30-34		0.698*	0.700*
35-39		0.599**	0.598**
40-49		1.000	1.000
Birth order			
1		0.935	0.926
2-3		0.936	0.949
4-+		1.000	1.000
Source of ANC			
Doctor		0.430**	0.483**
Nurse		0.617**	0.618**
TBA		0.846	0.857
Other		0.583	0.602
None		1.000	1.000

Table 6.9…. (Continued)

Assistance at delivery			
Doctor		0.829	0.859
Nurse		0.854	0.865
TBA		0.947	0.921
Other		1.000	1.000
Source of drinking water			
Pipe			0.836
Well			1.098
Other			1.000
Roof			
Manufactured			0.879
None			1.000
Type of toilet			
Water seal			1.190
Pit/bucket			1.150
Other/None			1.000
Electricity			
Yes			0.536**
No			1.000
Chi-square	126.615	176.811	193.901
df	11	33	39
Change Chi square		51.078**	19.134**

* Significant at 0.05 level; ** Significant at 0.01

Chapter VII

Summary and conclusion

This study has undertaken a comprehensive analysis of factors associated with childhood diarrhoea and mortality using data from the 2001 FRHS. The factors most strongly associated with a child experiencing an episode of diarrhoea in the two weeks before the surveys were domain of residence of the child, the age and sex of the child, and the type of toilet facility available in the household. Programs designed to improve levels of household sanitation would have a clear impact on reducing levels of diarrhoea. Diarrhoea is most common from the age of 6 months to 23 months. This probably reflects the increased risks that occur during the period of weaning when children still have low levels of protection against infections. Public health programs should provide information to parents about the risks, and how to protect from the risks in this vulnerable period.

The household characteristics had a more significant impact on whether children received ORS for diarrhoea, than whether they had the disease or not. Children were more likely to receive ORS if they were living in households with more modern facilities. The type of drinking water, the type of roof and whether the household had electricity had a strong impact on whether children received ORS or not. For example, close to 80 percent of children with diarrhoea and who had piped water received ORS; in other only around a third of the children with diarrhoea received this treatment. Similarly, close to 60 percent of children living in a house with a manufactured roof received ORS while in other households less than a third of children received diarrhoea. Further, over half of children who had diarrhoea in households with electricity received ORS, compared to a third of children in households without electricity.

It is clear that the probability of ORS treatment is closely related to the economic standing of households. The multivariate analysis suggest that the effects of the household variables reflect the ability of better off households to purchase or access treatment. Programs designed to improve access to ORS treatment will significantly reduce the negative impacts of childhood diarrhoea. Another factor that clearly promotes ORS treatment is getting a child sick with diarrhoea seen by a health provider. Efforts to educate parents about the importance of seeking health care for their children when they have diarrhoea will help increase the likelihood of use of ORS.

The analysis identified numerous factors that affect infant and child mortality. The results show a clear relationship between reproductive patterns and the likelihood of a child surviving to their fifth birthday. The strongest effects are seen for the length of the previous birth interval. The odds of a child dying are almost 2.5 times higher for a child born after a previous interval of less than 2 years compared to child born after an interval of 3 or more years. Mothers in their twenties and early thirties have the highest probabilities of their children surviving.

Ensuring that mothers have access to ante-natal care from the formal health system contributes to lower levels of infant and child mortality, although this variable was not affective when controlling for the length of the previous birth interval, suggesting that those mothers who do access the formal health system are also more likely to space their children – perhaps because they are influenced by the information they receive from the health system. This reinforces the need to further strengthen the birth spacing programme and also integrate the program with the maternal and childcare programme.

The results suggest that household economic conditions are an important determinant of the probability of a child survival. The multivariate results show that the odds of a child death are reduced by almost one-half if the mother lives in a household that has electricity. In this case, electricity is a proxy for the level of economic standing of the household. It is likely that children from households that are better off are more likely to receive better health care and have better nutrition than children born into poorer households.

In conclusion, the results from this analysis are generally in the expected direction and consistent with the results of many other studies. Comprehensive reproductive health and child survival programs should be undertaken to further improve child health and reduce infant and child mortality.

This may be achieved through improving access to piped drinking water, electricity and mass media exposure (radio and television) in the households as well as upgrading health-seeking behaviour of mothers to have regular ANC by health professionals and births delivered by qualified health professionals, in hospitals or clinics wherever possible. In terms of policy interventions, increased child spacing, prolonged breastfeeding, good ANC and extensive use of modern medical care both for mothers and newborns would certainly

contribute to improvements of child morbidity and mortality in Myanmar.

Living conditions are a factor in determining levels of infant and child morbidity and mortality in Myanmar. Improving sanitation would reduce infant and child morbidity and result in decreased mortality. Although most of the socio-economic impacts on morbidity and mortality are mediated by sanitation, health, and reproductive patterns, improvements in socio-economic characteristics such as education will facilitate improvements in child survival.

Great efforts need to be made to accurately measure levels of child survival in Myanmar. Further research is required on risk factors associated with a range of infant and child morbidity. For example, little is known about the health seeking behaviours of mothers, and more research is needed in this area. It is also proposed that more proximate indicators of child health, such as birth weight and anthroprometric measures such as weight and height be included in future surveys.

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