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CHAPTER 1

INTRODUCTION

1.1 Background

This study addresses important issues on infant and childhood mortality in Zimbabwe. This country provides an interesting context within which to study child health because of the substantial improvements in indicators of living conditions for a decade after political independence (attained April 18, 1980) and the reversal of socio-economic gains since the early 1990s due to the worsening recession and political instability. Broadly, this study is expected to contribute to the understanding of the levels, trends, differentials and determinants of infant and child mortality in Zimbabwe and other African countries as well. The study offers an in-depth analysis of the 2005-06 ZDHS survey and should assist in the understanding of the mortality situation among children in Zimbabwe. The study provides appropriate conclusions and recommendations to facilitate the formulation of maternal and child health policies and the design of relevant child health programming in Zimbabwe.

Childhood mortality is one of the important indicators of a country's general medical and public health conditions, and consequently, the country's level of socioeconomic development. Its increase is therefore not only undesirable but also indicative of a decline in general living standards. Data indicate that some eleven million children under the age of five years die annually in the world as a whole, of whom over ten million are in the developing world.[1] It is not surprising that infant and child mortality measures are of key relevance in assessing progress in overall national development as well as progress for children. It is for this reason that this thesis focuses on the relative importance of

maternal, socioeconomic and environmental factors on infant and child mortality.

The International Conference on Primary Health Care held in Alma Ata in 1978 was the first to consider how child mortality could be reduced world-wide by systematic development of a primary health care system. Since then, the United Nations has been actively involved in reducing infant and under-five mortality in developing countries. To this end, the Plan of Action adopted at the World Summit for Children, held in New York in September 1990, incorporates specific targets for the reduction of infant and under-five mortality. In order to monitor progress towards the Plan of Action goals, the estimation of under-five mortality rates in the developing world has become increasingly important.[1]

Reducing mortality and improving the health of young children has long been a concern of the international community. One of the eight Millennium Development Goals (MDGs) adopted after the Millennium Summit in 2000 is to reduce child mortality (MDG4). Donors and development agencies, the United Nations and national governments around the world committed themselves to the goal of reducing the under-five mortality rate by two-thirds between 1990 and 2015. Two of the key indicators for monitoring progress towards this goal are the under-five mortality rate and the infant mortality rate.[2] MDG4 is deemed unachievable for Zimbabwe under the present circumstances where under-5 mortality, poverty and HIV/AIDS remain high. Poverty, hunger, and the HIV/AIDS situation must improve first before the MDG4 can be achieved. [2]

Country estimates of the level and trends in childhood mortality are needed to help set priorities, shape policies, design programmes and monitor progress towards the MDGs at the national level. These

estimates are needed at the international level to inform funding decisions for activities directed towards reducing child mortality. To be useful for the latter purpose, the country estimates must be internationally comparable. Yet developing accurate and timely estimates of childhood mortality poses a considerable challenge.

There are limited data in many developing countries and a lack of agreement on how best to generate estimates from what data are available. Mortality of children under the age of five remains unacceptably high in many developing countries. Under-five mortality needs to remain the focus of public health policy to protect the gains in child survival from new threats such as HIV and AIDS. A special edition of the Bulletin of the World Health Organization stressed this point and noted that 10.5 million children still die each year.[3]

Evidence has been found that under-five mortality has increased due primarily to the increasing prevalence of AIDS in the population.[4,5] Numerous causes have been cited for the reversal or stagnation of child survival. Adetunji concludes that not all of the stagnation in child mortality levels can be directly attributed to the prevalence of HIV and AIDS.[6] The resurgence of malaria and lower levels of vaccination coverage and health care utilization have also contributed to the reversal of child survival trends.[6]

Deteriorating health systems have resulted in fewer children being vaccinated against childhood diseases, and thus increases or stagnation in mortality levels have occurred. Recent data from two states in India (Rajastan and Arunachal Pradesh) show stagnation of child mortality coinciding with lower vaccination coverage between 1992 and 1998.[6,7,8] Changes in socioeconomic conditions such as women's level of education and investment in the health sector have affected child

survival. It is against this background that the relative importance of maternal, socioeconomic, environmental contamination and personal illness control determinants to infant and child mortality is the major focus of this study.

An assessment of the determinants of childhood mortality focusing on under-five mortality as a broad category would not capture the differential impact of maternal and socioeconomic factors on mortality among children. It is for this reason that this study focuses on infant and child mortality as separate components of under-5 mortality. Previous studies have further shown that maternal determinants are more important during the infant age (0-11 months) than the child (12-59 months) age. In turn, socioeconomic and environmental factors are more important during the childhood than the infancy phase. Hence, in order to show the differential impact of endogenous (maternal) factors and exogenous (socioeconomic and environmental factors) on under-5 mortality this study will analyse mortality within the following age classifications:

Infant mortality ($_1q_0$): the probability of dying between birth and exact age one year;

Child mortality ($_4q_1$): the probability of dying between exact ages one and five years.

Studying the determinants of childhood mortality within these childhood age segments is appropriate and meaningful in that it facilitates the design of relevant public health interventions and programmes aimed at improving child health and child survival in Zimbabwe. Research has further shown that the HIV and AIDS epidemic threatens to reverse 30 years of childhood mortality reductions in sub-Saharan Africa.[5,9]

However; Africa also faces a number of other economic and social problems, which may also be threatening child survival improvements. In order to be able to determine appropriate health policy for under-five children, it is necessary to have a better understanding of how important these different factors are[5].

Despite the broad approach towards child health, the decline in childhood mortality in Africa has been slower since 1980 than in the 1960s and 1970s. Of the thirty countries with the world's highest child mortality rates, twenty-seven are in sub-Saharan Africa.[10] The region's under-five mortality rate was 173 per 1,000 live births in 1998 compared to the minimum goal of 70 per 1,000 internationally adopted in the 1990 World Summit for Children.[10]

It is not known why the infant and child mortality rates are staying higher or even increasing in many sub-Saharan African countries despite action plans and interventions made. Mortality rates among children under the age of five remain strikingly high throughout the majority of sub-Saharan Africa. While other areas of the world have experienced declining rates of childhood mortality over the last 30 years, this area, for the most part, still maintains relatively high rates.[10]

It has been recently noted that 18 of the 20 countries across the world with the highest childhood mortality rates were in sub-Saharan Africa.[11] As the world enters into the 21st century, childhood mortality remains a big issue for these developing countries, especially as researchers attempt to distinguish what factors contribute to the high levels.

1.2 Study Purpose

The overall purpose of this thesis is to establish the levels and trends of under-five mortality and the differentials thereof and to determine the relative importance of various maternal, socioeconomic, environmental contamination and personal illness control determinants of infant and child mortality in Zimbabwe. The study will focus on the relationships between infant and child mortality and birth order and birth interval, maternal age, type of birth, sex of child, birth size, antenatal visits, place of delivery, province, rural-urban residence, maternal education, paternal education, wealth status, piped water and flush toilet.

1.3 Population, Social Development and Political Economy of Zimbabwe

1.3.1 Population

Population estimates vary widely owing to the impact of AIDS. The last census in Zimbabwe in 2002 reported a population of 11.6 million persons and an inter–censal population growth rate 1.1 percent.[12] The majority of Zimbabweans are Shona, a broad ethno-linguistic group who are concentrated mainly in the north and eastern regions. They outnumber the Ndebele who live mainly in the south and western regions, by four to one. The total population of Zimbabwe in 2009 is an estimated 12.5 million people.

1.3.2 Political Economy

For much of its existence as an independent nation, Zimbabwe has been widely viewed as a “success story” in terms of its socioeconomic development and political stability. In the 5 to 10 year period following independence, economic growth was strong and operated to mitigate the potentially harmful influence of very high fertility and rapid population growth on living standards. After this period of growing prosperity, a number of internal and external factors including political instability,

sharp increases in government expenditures and an adverse movement in terms of trade started to reverse the trend from one of improving to one of declining living standards that continued at least into 2008.

Over the last 15 years, Zimbabwe has been going through socio-political and economic challenges that have seen most of the human development indicators decline. A politically and economically polarised environment resulting from lack of consensus on policy issues, capacity erosion in all sectors of the society and a diminished domestic resource base for development activities are undermining social development in Zimbabwe. Poverty has become a perennial problem in Zimbabwe underlying the current food crisis, the HIV and AIDS epidemic and the deteriorating social and economic conditions.[12]

Poor households are characterised by high dependency ratios. While the mean household size for the nation was estimated at around 4.6 in 1998, it is currently 5.5 and 6.1 for the poor and very poor households, respectively. This compares to a household size of 3.1 for the non-poor households. And rural households are also more likely to be poorer than urban households.[12,13]

1.3.3 Social Setting

Accelerated social and economic development in Zimbabwe in the first decade after independence was followed by accelerated declining social and economic conditions, from the early 1990s to the present. There were also a number of potentially adverse developments that coincided with the upturn in mortality in Zimbabwe. After a decade of growth, per capita income stagnated in the early 1990s. Impressive gains in levels of education were not sustained. Improvements in public health measures, particularly immunisation levels, also leveled out or were reversed. The

late 1980s and early 1990s also saw the emergence of HIV and AIDS as major public health factors in Zimbabwe.[13,14]

Presently, Zimbabwe is completely cut off from international aid support after defaulting on its loans. It no longer has a working relationship with the International Monetary Fund or the World Bank, and most western donors have frozen all aid. However, Zimbabwe has bilateral relationships with a few countries, for example, China and Iran and the countries in the SADC region.

The unemployment rate presently stands at 80 percent and inflation at nearly 14 million percent, by far the highest in the world. Eight percent of the people are living in poverty and Gross Domestic Product (GDP) is projected to shrink annually by 10 to 15 percent. Real income dropped by 75 percent in 10 years after 1995. Coupled with the current economic melt-down in the country is the havoc caused by the HIV and AIDS epidemic. The HIV and AIDS prevalence rate is presently estimated at 15.6 percent, one of the highest in sub-Saharan Africa and in the world.[15]

1.4 Rationale of Study

Data indicate that some eleven million children under the age of five die annually in the world as a whole, of whom over ten million are in the developing world. Nearly three quarters of the child deaths in the developing world are caused by diseases for which practical, low cost interventions exist. A large majority of these lives being lost could be saved. Moreover, these deaths represent nearly 700 million years of future potential life lost annually (assuming a life expectancy at birth in the absence of under-five mortality of about 70 years).[16]

1.5 Objectives of the Study

The broad objective of the study is to establish levels and trends of under-5 mortality and to determine the impact of maternal, socioeconomic and environmental contamination variables on infant and child mortality in Zimbabwe.

The specific objectives guiding this research are to:

1. Present and analyse levels and trends of under-5 mortality in Zimbabwe,
2. Analyse selected demographic and socioeconomic under-5 mortality differentials in Zimbabwe and determine the trends in under-5 mortality between 1950 and 2006.
3. Identify the relative impact of maternal, socioeconomic, environmental contamination (sanitation) and personal illness control determinants on infant and child mortality,
4. Estimate the effect of unmeasured and immeasurable factors on the risk of infant and child death,
5. Provide recommendations for health policy formulation, planning and action towards improving child survival prospects in Zimbabwe.

1.6 Organisation of the Thesis

Chapter 1 provided Zimbabwe's background pertaining to population, social development and political economy. The chapter further provided details on the rationale of the study and its objectives. Chapter 2 discusses the conceptual framework and review of previous studies on levels, trends and determinants of childhood mortality. Chapter 3 presents the methodology of the study. The results of the study are presented in Chapters 4 to 7 as follows:

- Trends in various types of childhood mortality are presented in Chapter 4.
- Results of bivariate relationships of the independent variables with infant and child mortality are presented in Chapter 5.
- Results of multivariate relationships with infant and child mortality (relationships after controlling for the impact of other variables) are presented in Chapter 6.
- Results for the analysis of the determinants of infant and child mortality controlling for frailty effects are presented in Chapter 7.

Finally, Chapter 8 presents the discussion of findings, conclusions and recommendations emanating from the research.

The list of references is shown after Chapter 8. Appendix 1 shows the 2005-06 Zimbabwe Demographic and Health Survey woman's questionnaire. The letters of approval for the thesis project are shown in Appendix 2. Appendix 3 shows proof of acceptance of an article drawn from chapter 6 of this thesis for publication in *Demographic Research* journal. The article is entitled *"Determinants of infant and child mortality in Zimbabwe: results of multivariate hazard analysis"*. Finally, Appendix 4 shows the curriculum vitae of the author of the thesis and a summary of the purpose and contents of the thesis project.

CHAPTER 2

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

This chapter presents the review of literature and the theoretical framework guiding this study. The review of literature has three parts. The first part deals with results of research and observations on trends in infant and child mortality in Africa and Zimbabwe, the second part deals with determinants of under-5 mortality while the third part presents the theoretical perspectives of frailty. The second part of the chapter presents the Mosley and Chen framework, which is the theoretical framework underpinning this study. This classical proximate determinants framework is in this study extended to include HIV/AIDS.

2.2 Review of Literature

2.2.1 Trends in Under-5 Mortality including the role of HIV/AIDS

Mortality rates among children under the age of five remain strikingly high throughout the majority of sub-Saharan Africa. While other areas of the world have experienced declining rates of childhood mortality over the last 30 years, this region, for the most part, still maintains relatively high rates. As the world enters into the 21st century, childhood mortality remains a big issue for these developing countries, especially as researchers attempt to distinguish what factors contribute to the high levels.[17]

Hill, Bicego and Mahy examined trends and determinants of childhood mortality in Kenya in the late 1980's to mid 1990's.[5] Their analysis focused on merged data from the 1993 Demographic and Health Survey

and 1998 Demographic Health Survey in Kenya. Multivariate analysis was used to examine the factors associated with mortality risks in childhood. The independent variables used in the proportional hazard models included mother's education, wealth status, residence, maternal age, birth order, sex and preceding birth interval.

In addition, an indicator of the HIV epidemic, the prevalence of HIV in the district of birth of the child, was applied. With no controls, the models confirmed an increase in mortality of about 25 percent between 1984-1986 and 1996-1998. Including socioeconomic and biodemographic controls tended to strengthen the upward trend in mortality; in other words, had there been no changes in these factors, child mortality would have been expected to decline.

Introducing controls for health variables such as immunisation, pregnancy and delivery care, prevalence of childhood diseases and maternal and child malnutrition - also did not alter the underlying trends substantially. Thus the authors concluded that rising child mortality could not be explained by socioeconomic, biodemographic or health status factors. The authors concluded that the HIV epidemic appeared to be the most probable cause of the observed recent increase in child mortality in Kenya. Of the health variables, the only one found to be significantly protective was immunisation.[5]

Although accurate information on cause of death is lacking, the cause of death structure of under-5 mortality in Zimbabwe is probably similar to most countries in sub-Saharan Africa and dominated by pneumonia, malaria, measles and diarrhoeal diseases. It is estimated that these diseases have been responsible for some 60 percent of the disease burden in the region around 1990.[18]

Due to the inadequacies of the registration of deaths in Malawi, Baker[19] uses indirect methods to estimate levels and trends in mortality. She employs a widely used technique developed by Brass, which is based upon retrospective reports of children ever born and children surviving. This technique involves taking the proportion of the children dead to those ever born to women categorized by age group. The proportions are converted into probabilities by multiplying the proportion of children dead among children ever born to women of a certain age group by an adjustment factor based on comparisons of cumulative parities of women of different age groups. The results indicate that owning a pit latrine does not have a significant effect on child mortality.

This is contrary to her original hypothesis and she concludes that this variable is not a good measure of environmental contamination and has many limitations. Just because a household has sanitation facilities (such as a pit latrine) does not mean that it will be used hygienically or by all members of the household. To buttress this point, she notes that in a study on child mortality in relation to water supply and nutritional status in Malawi, it was found that the young children often did not use the pit latrines, and consequently there was much faecal contamination around the homes (ibid).

In their study of trends and differentials in child mortality in Zimbabwe from 1970 to 1994, Marindo and Hill observed that after Independence in the early 1980's, child mortality in Zimbabwe fell rapidly.[20] They further noted that the pace of child mortality decline in Zimbabwe since 1970 has not been uniform. The period 1970-1979 was associated with a slower pace of mortality decline whereas the period 1980-1987 witnessed a faster pace of mortality decline. In this study the authors also observed regional differences in under-5 mortality in Zimbabwe. Their findings indicated that the Eastern region (Masvingo and

Manicaland) had the highest under-5 mortality (100 deaths per 1,000 live births) followed by the Northern region which consisted of Mashonaland East, Mashonaland West and Mashonaland Central (80 deaths per 1,000 live births) and the Southwestern region consisting of Matabeleland North, Matabeleland South and Midlands (63 deaths per 1,000 live deaths). The Metropolitan region which combined the two major cities of Harare and Bulawayo had the least mortality levels (39 deaths per 1,000 live births). The relatively low under-5 mortality prevalent in the South-western region of Zimbabwe has been confirmed by other surveys in Zimbabwe.[12,13,14,21]

The provincial variations in under-5 mortality in Zimbabwe have also been noted by Bah in his study of recent trends in infant and child mortality and possible explanations in Zimbabwe.[22] Bah observed that the lowest under-five mortality rates were in the Matabeleland North and Matabeleland South provinces. He also observed that the period 1986-1988 saw the reversal of the gains in mortality decline in Zimbabwe. Bah argued that after the period 1986-1988 some provinces in Zimbabwe experienced a slow-down in mortality decline while for some of the provinces there were reversals in mortality decline. Bah states that "the figures also show that 1986 to 1988 was the turning point after which the decline became much slower and even reversed in some areas" (ibid) (p. 37). Bah further added that the slowing down of mortality decline, which happened after the period 1986-1988 in Zimbabwe is not an uncommon event in developing countries (ibid). Citing Palloni[23] Bah stated that the reasons for the slow-down in mortality in Zimbabwe after the period 1986-1988 could be due to constrained social and economic development as well as poor health care infrastructure (ibid).

The study by Bah also used correlation analysis to determine whether the factors affecting infant mortality were the same as those affecting

child mortality. The high correlations of 0.9 pointed to the fact that the factors affecting infant and child mortality rates were indeed probably similar. Bah provides two sets of hypotheses as explanations for the slow-down in mortality after the period 1986-1988. The first was that it could have been possible that child mortality had been significantly reduced due to immunization and therefore children were dying of other diseases in the mid 1980s. The second hypothesis provided by Bah was the epidemiologic polarization, that is, the possible widening of socioeconomic differentials in Zimbabwe (ibid).

According to Bah epidemiologic polarization "... describes how different population subgroups experience contrastingly different epidemiologic profiles and these profiles diverge further instead of converging to a common profile. The concept has been found to occur in Latin America where there has been a long history of oppression and exploitation" (ibid) (p 39). Bah further argued that while there was no available data to support the case for epidemiologic polarization it could still have been possible that epidemiologic polarization could have contributed to the slow-down in child mortality in Zimbabwe after the period 1986-1988 (ibid).

The observation of the provincial variations that existed in child mortality in Zimbabwe made by Bah[22] and Marindo and Hill[20] is supported by Root[24] who also observed that Matabeleland North and South provinces had lower levels of under-5 mortality when compared to Mashonaland East, West and Central provinces in Zimbabwe.

Marindo and Hill[20] also observed mortality differentials by residence in Zimbabwe. This differential has been observed in other demographic studies conducted in the country. Rural areas generally have higher childhood mortality than urban areas.[12,13,14,21] Marindo and Hill observed

that from the period 1983-1988 to the period 1990-1994 the rural-urban mortality differentials narrowed largely due to the increase in childhood mortality for urban mothers and the falling mortality for rural mothers.[20]

An interesting aspect noted by Marindo and Hill is the relatively higher under-5 mortality experienced in the other urban areas compared to the larger metropolitan areas such as Bulawayo and Harare.[20] The authors postulate that the acceleration in the increase in under-5 mortality in the other urban areas apart from Harare and Bulawayo could be due to the impact of HIV/AIDS (ibid). When persons fall ill they generally migrate from the rural and major urban areas to the smaller towns. However, Marindo and Hill also noted that it is difficult to draw a correlation between under-5 mortality and HIV/AIDS particularly in situations where the mortality estimates are computed from data on reports by the mothers in the survey (ibid). In the first instance, these mothers are not there to report these deaths in the survey because they would have died. This phenomenon, which tends to depress under-5 mortality estimates, forms part of the hypotheses that will further be explored in chapters 4, 5 and 8 of this thesis (ibid).

The recent evidence from the Zimbabwe Demographic and Health Survey of 2005-06 indicates a reversal of the increase in infant and under-5 mortality that prevailed from 1988 to 1999[21]. It is difficult to accept that there has been a decline in under-five mortality in Zimbabwe. We expected an increase in under-five mortality due to the direct and indirect impact of HIV and AIDS and the negative impact caused by the economic and political downturn prevailing in the country.

2.2.2 Determinants of Childhood Mortality

2.2.2.1. Introduction

This section contains three parts. The first part deals with studies that focus on mortality as the outcome. The second part reviews studies that focus on morbidity and the third part reviews studies that focus on health practices as explanatory factors.

2.2.2.2 Mortality

Cleland and van Ginneken[24] using the results of multivariate analysis of data from 16 countries presented by Hobcraft et al.[25] demonstrate that shifts in the reproductive pattern (as measured by birth interval, birth order and maternal age) cannot explain the education/ child mortality relationship. However, Behrman[26] using data that permits control for the education of a woman's siblings, finds the education effect had nearly disappeared. One interpretation of this finding is that the previously reported effects of maternal education may simply be the effect of unobserved familial abilities and motivation passed on to the daughter by mother.[27]

Zerai[28] examined socioeconomic and demographic variables in a multi-level framework to determine conditions influencing infant survival in Zimbabwe. She employed Cox regression analysis to study the socioeconomic determinants of infant mortality, based on data from the Zimbabwe Demographic and Health Survey conducted in 1988. The most unique finding was that women's average educational levels in their community exert a greater effect on infant survival than the individual mother's educational level. This result supports assertions that child survival is strongly impacted by mass education.[24]

Root[29] further examined population density and spatial differentials in child mortality in Zimbabwe using data from the 1988 Zimbabwe

Demographic and Health Survey and the 1992 census. Root focused his study on the possible explanation of population density as an explanatory factor for the provincial variations in under-5 mortality in Zimbabwe. In his study, Root classified the eight rural provinces in Zimbabwe into "Ndebele provinces" and "Shona provinces". The former comprised of Matabeleland South and Matabeleland North while the later constituted Manicaland, Mashonaland Central, Mashonaland East, Mashonaland West, Midlands and Masvingo provinces. The findings from the study by Root[29] confirmed the observations made by Bah[22] and Marindo and Hill[20] that Matabeleland South and Matabeleland North provinces experienced lower under-5 mortality than the other provinces in Zimbabwe. Using the Cox regression method to control for the effects of socioeconomic, demographic and environmental factors, Root concluded that children aged between 1 to 4 years residing in "Ndebele provinces" experienced 45 percent lower mortality than their counterparts living in the "Shona provinces".[29]

Furthermore, Root rejected the hypothesis that health care provision and/or cultural factors were responsible for the provincial under-5 mortality differentials in Zimbabwe.[24] Rather, he asserted that it was the lower population densities prevailing in the "Ndebele provinces" as compared to the "Shona provinces" that were responsible for the lower under-5 mortality rates experienced in the "Ndebele provinces". He argued that "The hypothesis that low population densities in the Ndebele provinces have contributed to their lower child mortality is plausible" (ibid, p. 419).

Root recommended additional research to determine the specific routes through which population density affects the disease - transmission processes. He added that "… as population densities also vary within provinces, it would be worthwhile examining the relationship between

inter-provincial variation in child mortality and population density" (ibid, p. 420).

Jhamba used data from the 1984 Zimbabwe Reproductive Survey (ZRHS) and the 1988 Zimbabwe Demographic and Health Survey (ZDHS) to study child mortality differentials in Zimbabwe.[30] He used the multiple linear regression method to explore the relationship between the independent variables and childhood mortality. The variables studied in that study included region of residence, place of residence, maternal education, age at first marriage, ever-use of modern contraception and use of health services for prenatal care. The findings from Jhamba's study confirmed that higher maternal education levels lead to lower child mortality, as do postponement of marriage.[30] The findings also showed that use of modern contraception led to a reduction in childhood mortality of at least 20 percent. Living in urban areas was associated with a reduction in child mortality of the same magnitude as use of modern contraception. According to Jhamba "As levels of education among women rise, this should lead to an increase in age at marriage, greater use of modern contraception as well as increasing use of modern health services" (ibid, p. 170). Consistent with other research findings, for example, Bah[22] Marindo and Hill[20] and Root[24], the results from Jhamba's study showed that Manicaland, Mashonaland Central and Mashonaland provinces exhibited higher child mortality levels than Matabeleland South and North provinces in Zimbabwe (ibid).

Jhamba added that "Because the geographical differentials remained significant after controlling for the other factors, the high mortality provinces may also be disadvantaged in other socioeconomic indicators not considered in this study, such as physical characteristics, transport facilities, health infrastructure and other social developments" (ibid, p. 170). Jhamba also maintained that it was the individual characteristics

of parents and their households that largely determined child survival (ibid).

Woelk et al.[31] used the preceding births technique developed by Brass and Macrae[32] to estimate child mortality rates in Zimbabwe. The study by Woelk et al. involved interviews with 2,229 mothers attending four antenatal care centres at two polyclinics in Harare, at a provincial hospital in Marondera and at a district hospital in Mutoko. The results from this study indicated that there were minor differences between under-2 mortality and under-5 mortality. Woelk et al explained the lack of a notable difference between under-2 mortality and under-5 mortality to "some degree of urbanization being experienced at two of the centres, and to a systematic selection bias of the method" (ibid, p. 63). This study further confirmed that younger (below 20 years) and older (above 40 years) maternal age increased the risk of child mortality compared to maternal age in the age group 20-40 years. The authors also observed that longer birth intervals, that is, of 3 years and above, elevated child survival.

Bicego[27] applied a three-step procedure using proportional hazards regression to estimate trends and determinants of childhood mortality in Haiti. He used the data from the 1987 EMMUS in Haiti. Maternal education and young age at birth were found to have marked effects on neonatal survivorship but little effect thereafter. Indices that reflect community-level access to child health services were shown to be important, especially in childhood ($_4q_1$).

Manda[33] used data from the 1992 Demographic and Health Survey in Malawi to study the relationship between infant and child mortality and birth interval, maternal age at birth and birth order with and without controlling for other relevant explanatory variables. He also investigated

the direct and indirect (through its relationship with birth intervals) effects of breastfeeding on childhood mortality. The study employed proportional hazards models. The results show that substantial birth interval and maternal age effects are largely limited to the infant period. The influence of social and economic variables on the mortality risk and on the relationship between biodemographic variables and mortality risk is much enhanced with increasing age of the child. The study further shows that consideration of breastfeeding status of the child does not significantly alter interpretation of effects of preceding birth interval length on mortality risk, but does partially diminish the succeeding birth interval effect.

Abou-Ali[34] assesses socio-demographic and household environmental impacts on child mortality in Egypt. He estimates a duration model for the entire sample together with a three-part model. Neonatal mortality is first modelled by using a discrete dependent variable model and the mortality risk in the infant - up to his first birthday - and childhood –from the first birthday to under 5 years stages is modelled using non-parametric, semi-parametric and parametric duration models. In this particular application, this three-part model predicts mortality better than a duration model for the under five child mortality in general since it uncovers some interesting differences between the impacts of household environmental and socio-demographic determinants on the neonatal, infant and subsequent mortality risk. Results show that access to municipal water decreases the risk and sanitation is found to have a more pronounced impact on mortality than water.

Jacoby and Wang[35] examine the determinants of child mortality and morbidity in rural and urban China using a competing risks approach. The data source is the 1992 China National Survey for Children, which resemble the Demographic and Health Surveys. The key findings

include (1) higher maternal education levels reduce child mortality which means that - controlling for other factors - a child living in a neighbourhood with more educated mothers has about 50 percent lower mortality risk; (2) access to safe water/ sanitation, and immunization reduces diarrhoea incidence in rural areas, while access to modern sanitation facilities (flush toilets) reduces diarrhoea prevalence in urban areas; (3) significant linkages between Acute Respiratory Infections (ARI) incidence and use of unclean cooking fuels (firewood and coal) are found using the city level data constructed from the survey.

This study indicates that effective policy interventions for improving health outcomes often lie both within and outside the health sector. Cross-sectoral approaches can potentially produce large health benefits. Based on the data, Jacoby and Wang[35] projected that mother's education plays a role in the survival rate for children aged below five years of age. Results in urban areas found male children had higher mortality rates than female children; a result Jacoby and Wang (ibid) said is inconsistent with data from other countries. It was also found that access to flush toilets significantly lowered mortality rates.

In a related study Wang[36], using the data from the 2000 Ethiopia Demographic and Health Survey examines the socioeconomic and environmental determinants of child mortality. She ran three hazard models, the Weibull, the Piece-wise Weibull and the Cox model to examine the impact of location (rural-urban), female education attainment, religion affiliation, income quintile, and access to basic environmental services (water, sanitation and electricity) on neonatal, infant and under-five mortality. The results show that children born in rural areas face much higher mortality risk compared with those born in urban areas. A strong statistical association is found between poor environmental conditions and child mortality rates. Safe water, sanitation

and electricity are mainly accessible to households living in urban areas (accounting for less than 20 percent of the total population).

In Ridder and Tunali[37] the aim is to assess whether empirical evidence supports the presence of family specific frailty components. Although child mortality differentials with respect to water supply and sanitation in many developing countries suggests that access to piped water and toilet facility may improve survival chances of children, Ridder and Tunali[37] could not find any evidence supporting this relation. Guilkey and Riphahn[38] estimate a structural discrete time hazard model of the determinants of infant and child mortality in the Philippines in order to evaluate the effect of biological variables on mortality. They find that controlling for biological mechanisms; birth order and parity no longer have a direct effect on mortality. However, breastfeeding is found to be one of the most important determinants of child survival. Trussell and Hammerslough[39] provide a complete self-contained exposition of estimating a life table with covariates through the use of hazard models applied to child mortality in Sri Lanka. Their results show that the type of toilet facility, mother's and father's education, urban/rural estate residence, ethnicity, birth order, age of mother at birth and gender are strongly related factors with child mortality.

2.2.2.3 Morbidity

Woldemicael[40] examines the effect of socioeconomic factors that determine childhood diarrhea in Eritrea. He uses data from the 1995 Eritrea Demographic and Health Survey. The method employed is logistic regression. The results show that household economic status and place of residence are significant predictors of diarrhea.

The study also discovers an important relationship between diarrhoeal morbidity and age of child and number of children living in the house

with particularly high prevalence of diarrhoea at the age of weaning and in households with a large number of living children. However, the effects of toilet facility and maternal education are not found to be statistically significant when other factors are held constant.

A comparative study of urban areas of Ghana, Egypt, Brazil and Thailand by Timaeus and Lush[41] clearly indicates that children's health is affected by the economic status of the household. According to these authors, children from better-off households have lower diarrhoeal morbidity and mortality in Egypt, Thailand, and Brazil. Such differentials in diarrhoeal diseases by household economic status are probably due to differences in childcare practices, for instance preparation of weaning foods and personal hygiene.[41]

2.2.2.4 Health Care Seeking Practices

Lavy[42] analyses the effects of quality and accessibility of health services and other public infrastructure on the health of children in Ghana. Incorporating some community characteristics the author constructed an indicator of poor water quality and sanitation. Focusing on child survival, height and weight, the results suggest an important role for public health policy in eliminating the rural-urban disparities, particularly in improving health status of rural children as well as reducing their mortality rates.

While the higher socioeconomic status of better-educated women explains about half of the magnitude of the relationship between maternal education and child survival[24], the domestic health practice of individual women is probably the new most salient mechanism in the maternal education - child mortality relationship. The fact that mother's education is a more important determinant of child survival than father's education is probably due to greater maternal involvement in child-health related care.[43]

Mother's education influences her choices and skills in health care practices.[43,41] According to Caldwell[43] both educated and illiterate mothers recognize when their child is sick but the educated mother more frequently will take action "without waiting for (her) husband or mother-in-law to notice the child's condition too." This is partly because illiterate women do feel a lack of capability when dealing with the modern world." [43]

Caldwell found that the educated mother is "more likely to report back to the health center if the treatment does not seem to be effecting a cure. Educated women see the health process as experimental... (and do not feel it is an attack on the health care practitioner to give this important feedback)." (p.106)[43]

Joshi[44] has postulated that it is through the acquisition of skills and identity that education impacts the health behaviour of women, but says, "While these findings are interesting, they are still incomplete. More studies, especially longitudinal ones, are needed before these findings can be woven into a meaningful theory." [44]

2.2.3 Theoretical Perspectives of Frailty

This section presents theoretical perspectives around the concept of frailty or unobserved heterogeneity. Results on the impact of maternal, socioeconomic and environmental contamination variables on infant and child mortality taking account of frailty are presented in Chapter 7.

According to Sastry, frailty, also referred to as unobserved heterogeneity, represents an individual's susceptibility to the risk of death[45]. Sastry further argues that frailty includes those factors that allow the risk to death of children belonging to one mother or in one family or living in one community to be different from another mother or

community. On the other hand, Omariba argues that the basis of frailty is that children belonging to one mother or one family or one community have certain shared characteristics that predispose them to common risk[46]. It is these shared characteristics that would make them different from the other children. Omariba further states that frailty effects can broadly be classified as genetic, behavioural and environmental factors that occur at various levels that include the child, the family and the community.[46]

The presence of frailty indicates the amount of variation across families and communities in the risk of dying due to unobserved factors and suggests that deaths are likely to be clustered in certain families and communities[46]. The term death clustering has also been used to determine whether families or communities continue to differ after known determinants of mortality have been accounted for.[45,46,47]

Frailty, which arises from death clustering, encompasses factors that are not included in the baseline hazard but that have a bearing on the individual's risk of death. In other words, the frailty effect represents the unmeasured effects in the standard models frequently used.[45,46] Hence, the frailty effect in the models presented in Chapter 7 captures the unobserved familial characteristics that include for instance, mother's attitude towards health care-seeking behaviour and forms part of the unobserved factors at the family and community levels. Frailty models also assume that the mortality risks of children are correlated.[45,46] Therefore, the presence of frailty is an indication of the difference between and among families and communities. Frailty therefore indicates that deaths are likely to be clustered in families and communities.[45,46] On the basis of the aforementioned literature it is therefore important to study to what extent children in Zimbabwe are different from one family to another and from one community to another,

having controlled for maternal, socioeconomic and environmental factors considered in this study. The study of frailty is made possible by the fact that the sampling design of the 2005-06 Zimbabwe Demographic and Health Survey utilised a multi-stage design which allows researchers to estimate the magnitude of the frailty effect at household and community levels. This is because the sample in the 2005-06 Zimbabwe Demographic and Health Survey is stratified by province, ward, enumeration area, cluster and household. In this study, frailty will be studied at family level (using 'MOTHERID' as the grouping variable) and community (using 'CLUSTER' as the grouping variable). The estimates of the magnitude of the frailty effect at family and community level based on data from the 2005-06 Zimbabwe Demographic and Health Survey will be presented, analysed and interpreted in Chapter 7.

2.2.4 Concluding Remarks

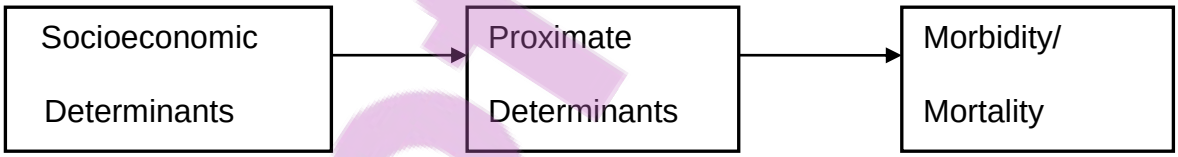
This section presented an overview of literature on maternal, socioeconomic and environmental determinants of childhood mortality. It also presented the theoretical concepts around the concept of frailty in this section. The determinants of childhood mortality have been extensively researched in most parts of the world as evidenced by numerous published articles. However, little research has been conducted in Zimbabwe in spite of the fact that it has one of the highest infant and child mortality rates in the world.

2.3 Theoretical Framework

This section discusses the analytic framework guiding this study. An analytic framework developed by Mosley and Chen in 1984 is applied in this study to explaining the mechanisms through which various determinants operate to affect infant and child mortality.[48] The framework categorises the determinants into two groups: indirect

determinants (for example, education and availability of sanitation facilities); and direct or proximate determinants (for example, immunisation and child-feeding practices). Proximate determinants have the closest or most direct effect on mortality. Indirect factors, on the other hand, are the most "distant" from mortality, and they operate through one or more proximate factors to affect mortality (see Figures 2.1 and 2.2). The Mosley and Chen framework was developed before HIV/AIDS had reached pandemic stages. HIV/AIDS, in particular among mothers, is, therefore, a maternal factor that should be added to the Mosley and Chen framework. A covariate for HIV prevalence in the Cox proportional hazard models will therefore be included in order to determine the impact (direct and/ or indirect) of HIV/AIDS on infant and child mortality. The methods used to compute the impact of the HIV prevalence rates in this study will be explained in detail in Chapter 3.

Figure 2.1: Summarised Mosley and Chen Framework

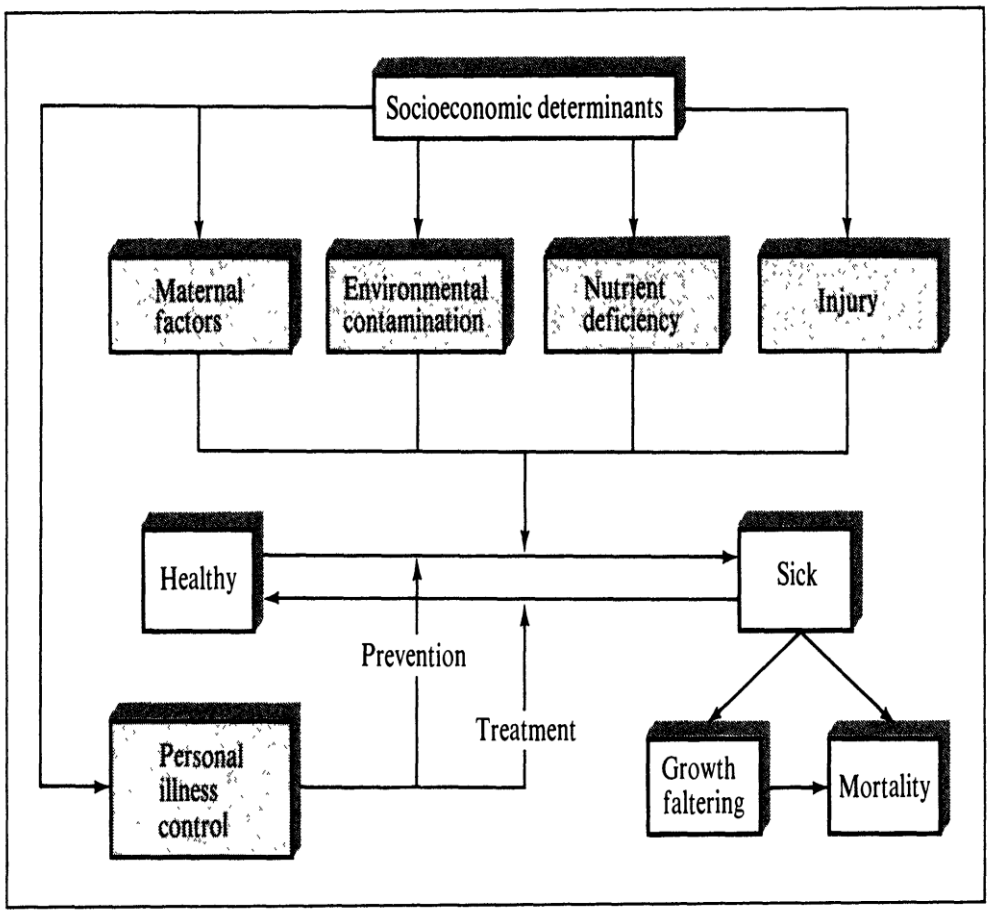


Source: Extracted from Mosley and Chen[48]

The summarized conceptual framework (*Figure 2.1*) shows how socioeconomic determinants operate through proximate determinants that in turn influence the risk of diseases and the outcome of disease process.[48]

An extended version of this model is found in Figure 2.2.

Figure 2.2: The Mosley and Chen (1984) Proximate Determinants Framework



Source: Mosley and Chen.[48]

The theoretical framework of child health in Zimbabwe here begins with some of the individual-level variables in the classical proximate determinants framework.[48] Other crucial variables are added that operate through the proximate determinants, such as maternal and paternal education, wealth status and place of residence (see Figure 2.2). Proximate determinants operate through specific mechanisms to determine child health outcomes. Socioeconomic variables operate through the proximate determinants of child health.[48] Although we

acknowledge that community conditions also exert an impact on socioeconomic conditions to influence proximate determinants of child health indirectly, these will not be looked at in this study.

Presently, maternal fertility variables are typified by later marriage and childbearing, lower parities, and longer birth intervals than in preceding periods in Zimbabwe. Operating through the biological mechanism of improved production of breast milk and through the social mechanism of less competition with siblings for mother's attention and household resources, children get better nutrition and better care, thus improving their survival chances.[49]

In Zimbabwe, household contamination is still a big problem. Piped water is provided to a minority of households. Only 36 percent of households have water piped into the dwelling, yard or plot, while 5 percent of households use a public tap or standpipe.[21] In rural areas, boreholes are the main source of drinking water (38 percent), followed by unprotected and protected dug wells (18 percent and 17 percent, respectively).[21] Most households (87 percent) do not treat their water. Of the selected urban households in the 2005-06 ZDHS survey, 78 percent do not treat their water, compared with 91 percent in rural areas.[21]

Sanitation measures are still not adequate in Zimbabwe. Improvements in hygienic sanitation facilities work through the mechanism of less exposure of children to contamination to make them less susceptible to disease and eventually lower mortality. Forty percent of households in Zimbabwe have access to improved toilet facilities that are not shared with other households, of which 19 percent flush to a piped sewer system, 2 percent flush to a septic tank, and less than 1 percent flush to a pit latrine. More than 4 in 10 households in rural areas have no toilet facility.[21]

Nutrient availability has worsened in Zimbabwe due to deteriorating economic conditions. Operating through the mechanism of decreased susceptibility to illness, improved nutrient availability leads to improvements in child health.[50,51] The current socio-economic meltdown in the country coupled with decreased agricultural production and persistent droughts are constraining nutrient availability to infants and children. Comparison of results from the 1988, 1994, 1999 and 2005-6 ZDHS surveys indicate that in Zimbabwe nutritional status of young children has worsened. [13,14,21]

The prevalence of stunting has risen steadily from 21 percent in 1994 to 28 percent during 2001-2005. Wasting remained at a comparatively high level (7 percent) throughout the period. The proportion underweight decreased between 1994 and 1999 and then rose to 17 percent during 2001-2005. Malnutrition as measured by the three indices namely; height-for-age, weight-for-height and weight-for-age also worsened between 1994 and 2005-06 and is higher in rural areas than urban areas.[21]

Personal disease control is typified by a sharp decline in immunisation coverage and access to treatment. Comparison of the 2005-06 ZDHS results with those of the earlier surveys shows that there has been a decline in vaccination coverage in Zimbabwe, from 80 percent in 1994 to 75 percent in 1999 to the current rate of 53 percent. This is not surprising given the worsening social and economic conditions in the country since the late 1990s. Various studies have shown that timely personal disease control is critical for improving child survival chances.

Mother's higher levels of education and increased professional and blue collar employment of the household head lead to low child-health-risk

fertility, timely immunization of children, adequate nutritional intake by children, and household environments with lessened contaminants. Children whose mothers have more than secondary education have somewhat lower mortality than children whose mothers have less education. These socioeconomic variables operate through the proximate determinants to influence child health.[48]

Amongst the numerous factors that have been found to be associated with childhood mortality, maternal education has been shown to have the greatest impact on children's survival chances. Education is highly and negatively correlated with childhood mortality even when other factors correlated with education have been controlled.[25,29,49]

Although there is general consensus about the importance of maternal education, there is little agreement on the mechanisms through which education operates to affect mortality. Nayar contends that educated people are more aware of the location of health care facilities and are more likely to utilize them.[52] At home, they may take better care of their children by providing more nutritious food and practicing hygienic habits (for example, washing hands before handling food). Jain on the other hand, contends that increased levels of education result in better utilization of available health facilities.[53] A more economically oriented argument by Schultz states that better educated mothers earn more in the labour market and consequently their household incomes are elevated, thus enabling them to purchase goods and services to improve child health.[54]

Women's educational attainment has improved significantly in Zimbabwe. The proportion of women aged 15-49 years with secondary education and above (that is, 10 or more years of schooling) increased from 16 percent in 1980 to 31 and 40 percent in 1986 and 1992

respectively and to 43 percent by 2002.[12] Though education levels have improved vastly at the national level, rural as compared to urban areas still lag behind. Consequently, we expect areas with relatively high educational attainment to have lower levels of childhood mortality. Distinct childhood mortality differentials by place of residence (rural-urban) and by province of residence have been observed in Zimbabwe. Apart from the data from the technical reports from the Zimbabwe Central Statistical Office[13,14,21] these variations and their possible explanations have also been observed by various authors, notable among them are Bah[22], Jhamba[30], Marindo and Hill[20] and Root[29]. Their works will be discussed in detail in the literature review section of this thesis.

In their study in Kenya, Anker and Knowles found that malarial endemicity in different regions had a strong effect on childhood mortality levels.[55,56] Place of delivery is also an important determinant of mortality, particularly neonatal mortality. Children delivered in modern health facilities usually exhibit lower rates of mortality. However, in some cases, mortality among children delivered in modern facilities is observed to be higher because mothers use these facilities mostly when they have pregnancy complications.[53]

The level of utilisation of modern health delivery services is quite high in Zimbabwe. For example, 68 percent of the women delivered their children in modern health facilities (that is, hospitals or health centers) in 2005-6.[21] The remainder delivered in their homes or in the homes of traditional birth attendants. The figure for 2005-06 (68 percent) is slightly lower than that recorded in the 1999 ZDHS (72 percent) and the 1994 ZDHS (69 percent).[21]

Almost all women who had a live birth in the five years before the 2005-06 ZDHS survey received antenatal care from health professionals (94

percent). Only 5 percent of mothers did not receive any antenatal care.[21] Due to differential levels of utilisation of delivery health facilities per area, areas with higher levels of utilisation are expected to have lower levels of childhood mortality.

When universal education is encouraged and high percentages of women complete schooling, women have a more egalitarian role in society that allows them to delay childbearing and encourages lower parities that are conducive to improved child health.[43,49] When men and women exercise their right to choose their education and employment, living standards rise as a result of increased household economic resources. This produces living environments with reduced contamination that promote child health. Development resources such as piped water and adequate sanitation promote health because they also reduce contamination. Finally, when child health is a high priority in the public sector, as reflected in the building of hospitals and health centers that include prenatal care, immunisation, and growth-monitoring programs, children's survival chances improve.[43]

The principal hypotheses to be tested in this thesis are that infant and childhood mortality are lowest in households and areas:

- that have a high proportion of educated women;
- that have access to antenatal care;
- that are located in the urban areas;
- that have a high level of utilisation of modern delivery health facilities, and
- that have low HIV rates among mothers.

2.4: Concluding Remarks

This chapter discussed the literature review and the conceptual framework. It was noted that the Mosley and Chen framework is a relevant framework for this study. However since the Mosley and Chen framework was developed before HIV/AIDS had reached epidemic stages, HIV prevalence will have to be included in the Cox proportional hazard models in order to study its impact on infant and child mortality.

The discussion on the literature review included evidence on the interplay between various relevant demographic and socioeconomic variables. It is clear from the review of the literature that the Cox proportional hazards model was little used in the study of the determinants of infant and child mortality in Zimbabwe. The rationale for the study is to fill this gap in the literature, firstly, by describing in detail the childhood mortality levels and trends in Zimbabwe; and secondly, by employing survival analysis (Cox proportional hazard models) to examine the determinants of infant and child mortality in Zimbabwe from 1996 to 2005.

CHAPTER 3

DATA AND METHODS

3.1 Introduction

This chapter presents the methodological approach to the study. Also provided is a model specification of the variables in the Mosley and Chen framework that will be studied. This is followed by a discussion of the statistical analytical techniques utilised in the study. We also present an evaluation of the quality of data from the 2005-06 ZDHS survey and an assessment of the assumption of the Cox proportional hazards model. Finally, the chapter ends with some concluding remarks.

This study used individual-level variables whose relationship to infant and child survival has been well established.[48,49] The relationship between infant and child mortality and maternal, environmental contamination and personal illness control variables is investigated. Other variables from the classical proximate determinants model such as nutrient availability and incidence of injury are not examined because of the absence of sufficient information on the variables themselves from the 2005-06 ZDHS survey data.

The study also incorporates socioeconomic variables. Socioeconomic variables such as wealth status determine the availability of nutritional resources, which is especially important because once infants reach the age of 6 months; they can no longer depend on nourishment from breast milk alone. Mother's education is important because it facilitates her integration into a society impacted by traditional customs, colonialism, and neo-colonialism. Education heightens her ability to make use of government and private health care resources and it may increase the autonomy necessary to advocate for her child in the household and the outer world.[24,43]

3.2 Source of Data

The study used data collected from the 2005-06 ZDHS survey. The 2005-06 ZDHS survey collected data from a sample of 8,907 women aged 15-49 years and 7,175 men aged 15-54 years.[21] This ZDHS is the fourth comprehensive survey conducted in Zimbabwe as part of the Demographic and Health Surveys (DHS) programme. The DHS are a rich source of data on developing countries in general, and Africa in particular. These national probability surveys provide a wealth of information on child health, the proximate determinants of fertility, fertility preferences, and other social and economic characteristics unmatched as a source of data from developing countries.

Retrospective data was collected in the four rounds of the DHS surveys in Zimbabwe and provide complete birth histories, as well as more detailed fertility, mortality and maternal and child health information on the five years preceding the survey, that is 1984-88, 1990-94, 1995-99, and 2001-05.[13,14,21,50] However, data on mortality are also available for 5-9 years and 10-14 years before the date of the survey.

The empirical analysis in this study for the independent variables for the next part is restricted to 10 years before the 2005-06 ZDHS survey, that is, 1996-2005 so that the hazard ratios are based on a sufficient number of cases in each category to ensure statistically reliable estimates.

3.3 Model Specification

Section 3 describes the specification of the dependent, independent and outcome variables which were components of the Cox proportional hazard model in this study.

3.3.1 Dependent Variable

Childhood mortality is analysed in two age periods: mortality from birth to the age of 12 months which will be referred to as infant mortality and mortality from the age of 12 months to the age of 60 months which will be referred to as child mortality. In both cases the dependent variable is risk of death occurring in an age interval such as from birth to age one, in a period, for example, a calendar year. This examination of two dependent variables is necessary since it has been observed that the effect of some determinants of childhood mortality (for example, maternal age and sanitary conditions) differ in relative importance from those in infancy.[33,56,57,58,59]

The children who died during infancy, that is, 0-11 months were included in the Cox proportional hazard analysis. Children were censored when they were alive at age 1 year old. Children aged 12 months and above were excluded from the proportional hazard analysis for the study of determinants of infant mortality.

In the case of child mortality, children who had died aged 12-59 months were included in the analysis. Children were censored when they were alive at age 5 years old. Children who had reached the age of 60 months and above (and were surviving at the time of the survey) were excluded from the child mortality analysis.

3.3.2 Independent Variables

Based on the Mosley and Chen[48] determinants of childhood morbidity and mortality framework, the independent variables studied were:

- Maternal factors: *(child's birth order, preceding birth interval, maternal age, child's sex, type of birth and perceived weight of child at birth),*

- Socioeconomic variables *(maternal education, paternal education, wealth index, province and area of residence),*
- Environmental contamination: *(toilet facility and source of drinking water),*
- Personal illness control: *(antenatal visits and place of delivery),* and
- HIV prevalence rate as at the year of birth of the child.

3.3.3 Outcome Variable

The outcome variable in the bivariate and multivariate proportional hazards models presented in this study is the hazard ratio (relative risk) of dying in a specific age range of childhood. The age ranges used are:

- Infant mortality ($_1q_0$): the probability of dying between birth and the first birthday), and
- Child mortality ($_1q_4$): the probability of dying between the exact age one and the fifth birthday.

3.4 Statistical Methods

Data from multiple demographic sources in Zimbabwe were used in the analysis of the levels and trends of infant and child mortality. This addresses the first and second objectives of the study. The third objective is addressed through the construction and analysis of bivariate and multivariate Cox proportional hazard models to estimate the relative effect of maternal, socioeconomic, environmental contamination (sanitation) and personal illness control variables on infant and child mortality in Zimbabwe during 1996-2005.[60,61] The fourth objective is addressed through the construction and analysis of frailty models in order to allow for the estimation of the effect of unmeasured and immeasurable factors on the risk of infant and child death. The final objective is addressed through detailing major conclusions and

appropriate recommendations to facilitate the design of child health policies and programmes directed towards improving child survival in Zimbabwe.

The Child Data file that was used in this study was constructed from the Individual Woman's Data file - Individual Recode (IR) from the 2005-06 ZDHS survey using the CASESTOVARS command in SPSS 16.0.[62] The CASESTOVARS command restructures complex data that has multiple rows for a case. This command can be used to restructure data in which repeated measurements of a single case are recorded in multiple rows (row groups) into a new data file in which each case appears as separate variables (variable groups) in a single row.

The Individual Recode file contained all of the data collected from women aged 15-49 years identified through the household roster in the 2005-06 ZDHS survey. A subset of the child data file was created for live births and under-5 deaths during the 1996-2005 period. This was the data file that was used to study the impact of maternal, socioeconomic, environmental contamination and personal illness control variables on infant and child mortality.

The data were adjusted for sampling weights *(v001)* using the SPSS 16.0 weighting command, namely, WEIGHT and for clustering *(v005)* within the STATA estimation commands.[63] Weighting the data is important because if the data is not weighted then the derived estimates are biased toward the over-sampled sub-populations. If the clusters are not used the standard errors will tend to be too small, and some effects will appear to be significant when they are not.

The Cox proportional hazard models were constructed by using the COXREG command available in SPSS 16.0[62]. The frailty hazard models

were constructed by using the STCOX and SHARED commands in STATA 10.0[63]. Separate hazard models were developed for infant mortality and child mortality. The significance tests in the hazard models were performed at three levels, that is, "*p<0.05*", "*p<0.01*" and "*p<0.001*".

Cox regression, which stems from the work of Cox[60] and which implements the *proportional hazards model* or *duration model*, was designed for analysis of time until an event or time between events. Cox regression was used for analysis of the determinants of infant and child mortality in this study because it can handle censored cases. Multiple and logistic regression cannot handle censored cases. Censored cases are cases for which the event, in this analysis – child death, has not yet occurred.

The central statistical output from Cox regression is the hazard or risk ratio. The "hazard" is the event of interest occurring. In this analysis, the hazard is infant or child death. A hazard ratio, also called the hazard function, is the estimate of the ratio of the hazard rate in one group to the hazard rate in another group for a coded covariate.[64] For a continuous covariate, the hazard ratio is the ratio of the hazard rate given a one unit increase in the covariate to the hazard rate without such an increase. The hazard ratio may be partitioned into the baseline hazard ratio (depending on time alone) and the covariate hazard ratio (depending on the covariate(s), controlling for time). The difference between the baseline model and the model with covariates shows the effect of the covariates in the model.[64]

The proportional hazards model assumes that for an individual with a vector of covariates in *x*, the hazard rate (death rate) at time *t* is given by:

$$h_i(t_i; x_i) = h_o(t_i)\exp(\beta^i x_i)$$

where $h_i(t_i; x_i)$ is the underlying hazard function at time *t* for *x=0* (that is, all covariates at their appropriate reference levels) and β^i is a vector of unknown coefficients of covariate effects.

The total number of live births during the 1996-2005 period was 9,491. The number of under-5 deaths during the same period was 603. Of these deaths, 465 occurred during infancy (0-11 months) and 138 during the childhood age (12-59 months). The number of under-5 children born 5 years before the 2005-06 ZDHS survey, that is during 2001-2005 was 5,474.

We have decided to retain type of birth as an important independent variable in this study taking into account that we are referring to extremely small numbers. Only 2.9 percent of the children born during the period 1996-2005 were multiple births. It is further assumed that half the twins born are concordant by sex (have the same sex) and half are discordant.

Figure 3.1 shows the survival plot for under-5 children in Zimbabwe during 1996-2005 plotted using data from the Child Data file constructed from the Individual Recode file. The data in Figure 3.1 shows that the majority of under-5 deaths occurred during the infancy stage. It is therefore important to study the risk profile of infants (0-11), separately from births in the childhood age (12-59), in order to determine the various factors that predispose them to mortality risk. Research has shown that endogenous (maternal) factors are more important during infancy than during the childhood stage. In turn, exogenous

(socioeconomic and environmental) factors are more predominant during childhood than during infancy.[48] For this reason, in this study the analysis of mortality is divided into infant and child ages.

3.5 HIV prevalence estimates

The classical demographic framework developed by Mosley and Chen[48] did not provide for HIV/AIDS since by the time it was developed HIV/AIDS had not reached pandemic stages. In this thesis provision is therefore made for the inclusion of HIV prevalence in the multivariate modeling as was done by Hill, Bicego and Mahy[5] in their study in Kenya. In that study, Hill, Bicego and May used district level HIV seroprevalance data collected from antenatal sentinel surveillance sites in Kenya. HIV testing was done as part of the survey in the 2005-06 ZDHS survey, for the first time in Zimbabwe. Since HIV estimates between the period 1996-2005 by province of residence were not readily available from the Ministry of Health in Harare, similar estimates disaggregated by rural and urban area and for the period 1996-2005 had to be obtained for use in this study. A variable (HIVprevRU) was created in the child data file and assigned to each child in the dataset, separately for rural and urban areas, and an HIV prevalence rate as at the year of birth of the child. This variable was then incorporated in the Cox proportional multivariate analysis, separately for infant and child mortality. It was expected that the inclusion of HIV prevalence in the multivariate analysis should give an indication of the direct and/ or indirect impact of HIV/AIDS on infant and child mortality in Zimbabwe.

3.6 Direct and Indirect Demographic Techniques

In this thesis both direct and indirect estimates of childhood mortality were utilized to study mortality levels and trends. Direct estimates can be unreliable if the census or survey data are characterised by errors such as under- or over-enumeration and poor age-reporting on the part

of the population canvassed. The development of indirect methods of demographic estimation was meant precisely to improve the accuracy and quality of demographic estimates.[65]

Indirect techniques are methods of demographic estimation that allow reasonable accuracy in the measurement of demographic parameters. Such techniques produce estimates of a certain parameter on the basis of information that is only indirectly related to the outcome. The most common indirect approach is the Brass child survival method, which uses data on the average number of children ever born and the number of surviving children of women in each five-year age group, along with a simple mathematical model linking the two.[65]

In the context of developing countries where the vital registration systems are often deficient and incomplete, indirect estimates offer more plausible estimates of demographic parameters than direct estimates. Moreover, even censuses and surveys are also far from yielding perfect demographic data. Differential coverage of the population is very often present in censuses and surveys.[65] It is therefore in order to assess the comparability of direct and indirect estimates of infant and under-five mortality in Zimbabwe.

The aggregate number of children ever-born (CEB) and the number of children dying (CD) to all women aged 15-49 years classified by 5-year age groups were used to calculate the proportion of children dead (PD) and the average parities (AP) from the 1988, 1994, 1999 and 2005-06 ZDHS surveys. These data are the input for computing the indirect infant and under-5 mortality estimates. Estimates of infant and under-5 mortality were computed in MORTPAK using the Coale-Demeny North Model Life Table system and Trussell Equations.[66] The indirect methods

exploit the relationship between the proportion of CEB dying before the survey date and past levels of childhood mortality.[65]

3.7 Multiple-spline Regression

In this thesis, weighted least squares was used to fit a multiple-spline regression line to the data points from direct and indirect estimates and to extrapolate the estimated trend to cover the period from 1960 to 2005 in Zimbabwe. The multiple-spline statistical method is a recent technique in mortality estimation that was developed by the Inter-agency Group for Child Mortality Estimation[2] in an attempt to harmonise under-5 mortality estimates. This technique has been widely applied by United Children's Fund, the World Health Organisation and the United Nations Population Division in the estimation of infant and under-5 mortality rates in many countries in the World, including Zimbabwe.

The major strength of this technique is that it accommodates multiple data points in the estimation of the true levels depicted by the regression line.[2] In this thesis, the regression lines for infant mortality and under-5 mortality were fitted independently. Standard weights developed by the Inter-agency Group for Child Mortality Estimation were assigned to all the data sources. The LOWESS command in STATA was used to fit the weighted least squares regression lines to infant and under-5 mortality estimates, separately.[63]

3.8 Quality of the Data Used in the Mortality Measurement

3.8.1 Introduction

This section assesses the quality of the available data from the 2005-06 ZDHS survey used in the mortality measurement in this study. Retrospective data such as that from the ZDHS surveys are subject to a number of potential problems such as omission of dead children and

age misreporting. It is not possible to determine directly whether the data are free from errors, but several tests are carried out to examine whether the data lead to plausible estimates.

The major concerns in this study are under-reporting of live born children, particularly those who died, and the accuracy of reporting on the dates of birth and age at death of the children. The accuracy of the data is particularly important in the interpretation of the direct and indirect estimates of childhood mortality analysed in Chapter 4 and the determinants of infant and child mortality analysed in Chapters 5, 6 and 7. In order to evaluate the quality of the data in the 2005-06 ZDHS survey, the following aspects were examined:

- Completeness of age at death reporting in the 2005-06 ZDHS survey,
- The age distribution of the samples of women in the four rounds of the ZDHS surveys conducted in 1988, 1994, 1999 and 2005-06,
- Age-specific average parities of the samples of women in the four rounds of the ZDHS surveys,
- Under-reporting of live births.

3.8.2 Completeness of Age at Death Reporting

Table 3.1 shows data on age reporting for under-5 children who died during 1996-2005. Close to 99 percent of the under-5 deaths had complete age at death information reported in the ZDHS2005-06 survey.

There were only 8 under-5 deaths (1.4%) during the 1996-2005 period that had missing information on age at death. Imputation of the month of death was used in these particular cases.

3.8.3 Age Distribution of Women in the Reproductive Age group

Figure 3.2 shows the percent distribution of women aged 15-49 years in the four rounds of the ZDHS surveys conducted in Zimbabwe. The proportions of women interviewed in the four surveys are fairly consistent across the seven reproductive age groups, with the highest proportion in the 15-19 year-age group and the lowest proportion in the 45-49 year-age group. This supports the view that there was no systematic omission of women from the four surveys.

3.8.4 Age-specific Average Parities

Figure 3.3 shows data on age-specific average parities of women in the four samples of the ZDHS surveys. The parity data is of good quality; is in the expected direction; and suggests declining fertility trends in Zimbabwe from 1988 to 2005. On average, women in their early twenties gave birth to about one child, women in their early thirties have had three children, and women currently at the end of their childbearing years have had more than five children.

3.8.5 Under-reporting of Live Births

We use the Brass P/F ratio method to test for under-reporting of live births in the 2005-06 ZDHS survey.[65] The Brass P/F ratio method is an indirect technique that adjusts the level of observed age-specific fertility rates, which are assumed to represent the true age pattern of fertility, to agree with the level of fertility indicated by the average parities of women in age groups lower than age 30 or 35, which are assumed to be accurate. We computed the fertility estimates from the Brass P/F ratio method using the MORTPAK-LITE programme. The results on the fertility estimates computed using the Brass P/F ratio method indicate that there is no evidence that older women seriously under-reported their live births as is often expected. The adjusted Total Fertility Rate (TFR) of 3.81 children per woman and unadjusted TFR of 3.80 children

per woman are similar. This suggests that the fertility data in the 2005-06 ZDHS survey is of good quality. The similarities in the P/F ratios (adjustment factors) further suggest that the 2005-06 ZDHS survey had least distortions in age misreporting.

3.9 Test of the Cox Proportional Hazards Assumption

It is important to test the assumption of the proportional hazards model before any modeling will take place. The Cox proportional hazards model can only be applied when certain assumptions are met. The most important of these is the proportionality requirement. We assessed whether or not the requirement was met. In this regard we used a combination of statistical tests and graphical methods described below to test the assumptions of the proportional hazards model. Though the Cox model is non-parametric to the extent that no assumptions are made about the form of the baseline hazard, there are still a number of important issues which need be assessed before the model results can be safely applied. It is for this reason that in this section we present and discuss the tests of the Cox proportional hazards assumption that we conducted and the results thereof.

A key assumption in the Cox model is that of proportional hazards, that is, the ratio will remain constant over time. In a regression type setting this means that the survival curves for two strata (determined by the particular choices of values for the independent variables) must have hazard functions that are proportional over time (that is, constant relative hazard). The proportional hazards assumption is met when the curves are parallel[61]. We now discuss the statistical procedures and the results from the tests we conducted.

First, we used the STPHTEST command in STATA to test the proportionality of hazards in the Child Data file that we used for the analysis of determinants of infant and child mortality. The results of this

statistical test are presented in Table 3.2. We found that the output from STPHTEST is non-significant (p=0.267), indicating an absence of evidence to contradict the proportionality assumption.

Second, we used the SURVIVAL command in SPSS 16.0 to construct Kaplan - Meier survival curves to evaluate the assumption of proportionality of hazards graphically. We arbitrarily selected one variable from each of the three categories of the Mosley and Chen[48] theoretical framework that are used to analyse the determinants of infant and child mortality. The three variables that we selected were sex of child, residence and presence of flush toilet. We expect that an evaluation of these three variables provide a fair assessment of the proportionality assumption.

The Kaplan - Meier survival plots for sex of child, residence and flush toilet are presented in Figures 3.4 to 3.6. First, Figure 3.4 shows that the survival curves from birth to age 5 for female and male children are fairly proportional over time indicating constant relative hazards. Second, Figure 3.5 illustrates the Kaplan - Meier survival plot from birth to age 5 by area of residence. Figure 3.5 shows that the survival curves for urban and rural areas depict constant relative hazards. Finally, Figure 3.6 shows the Kaplan - Meier survival plot until age 5 for children born to mothers in households with or without access to a flush toilet. The survival curves for the two strata for flush toilet (yes/ no) indicate proportionality of hazards.

The proportional hazards assumption is not violated when the curves are parallel. On the basis of the global test of proportionality of hazards and the Kaplan - Meier survival plots that we constructed and discussed in this section, we conclude that the Cox proportional hazard model can safely be applied to the Child Data file that we extracted from the 2005-

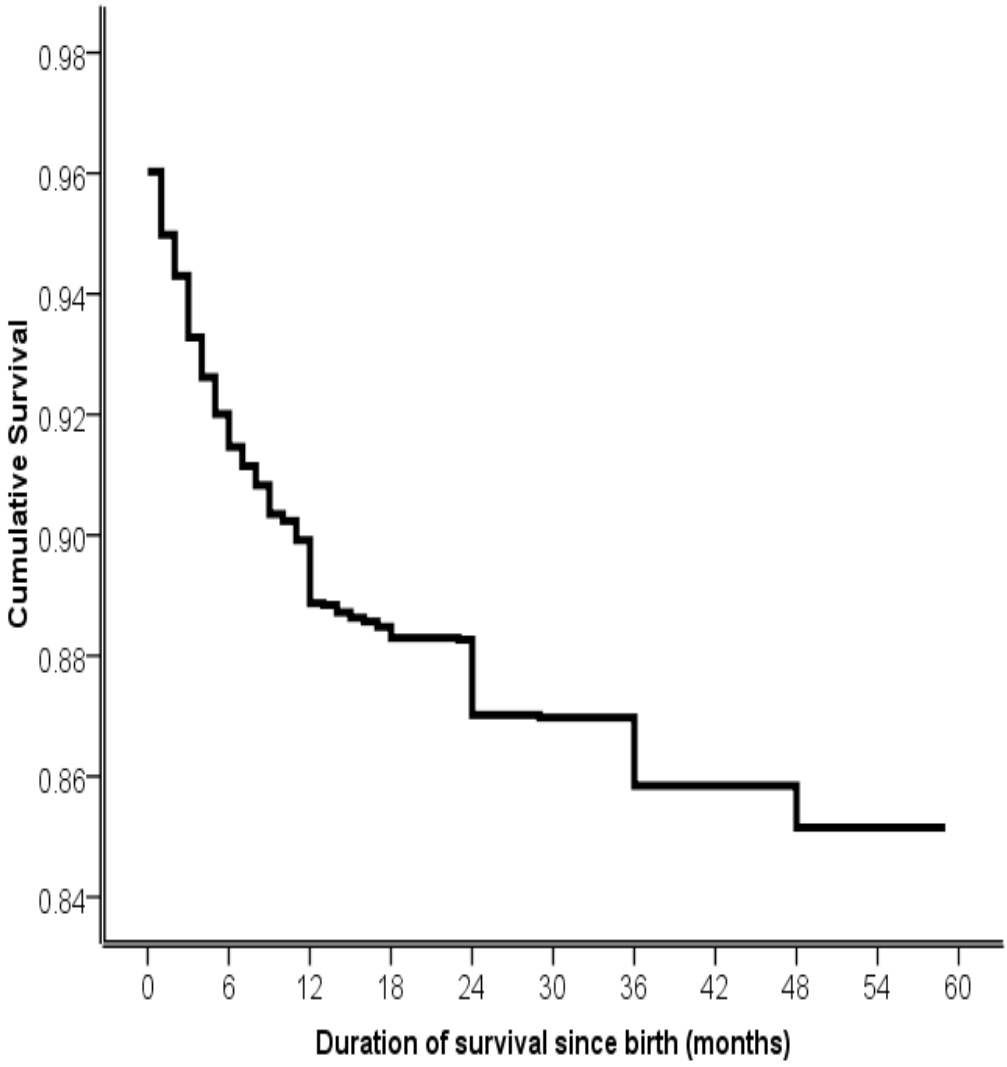
06 ZDHS survey to study the determinants of infant and child mortality during 1996-2005 in Zimbabwe.

3.10 Concluding Remarks

Chapter 3 presented the methodological approach employed in this study, statistical and analytical methods used and an evaluation of the quality of data from the 2005-06 ZDHS survey. None of the tests conducted to determine the quality of data is conclusive on its own. However, based on indicators discussed in this section, and in the absence of any systematic errors in the data, the quality of the mortality data in the 2005-06 ZDHS survey is satisfactory. The Cox proportional hazards model can only be applied when certain assumptions are met. The most important of these is the proportionality requirement. We assessed whether or not this requirement was met. Two tests were conducted; the global test of the proportionality of hazards and the Kaplan - Meier survival plots for testing whether the hazard functions are proportional over time. Both these tests indicated the absence of evidence to contradict the proportionality assumption. It is therefore plausible in this study to apply the Cox proportional hazard method to study the determinants of infant and child mortality during 1996-2005 in Zimbabwe.

We now turn to Chapter 4 which presents a detailed study of the levels and trends of infant and child mortality in Zimbabwe and offers an opportunity to further evaluate the quality of the mortality data in the 2005-06 ZDHS survey.

Figure 3.1: Kaplan - Meier Survival Curve for Under-5 Children Born during 1996-2005 (2005-06 ZDHS survey), Zimbabwe



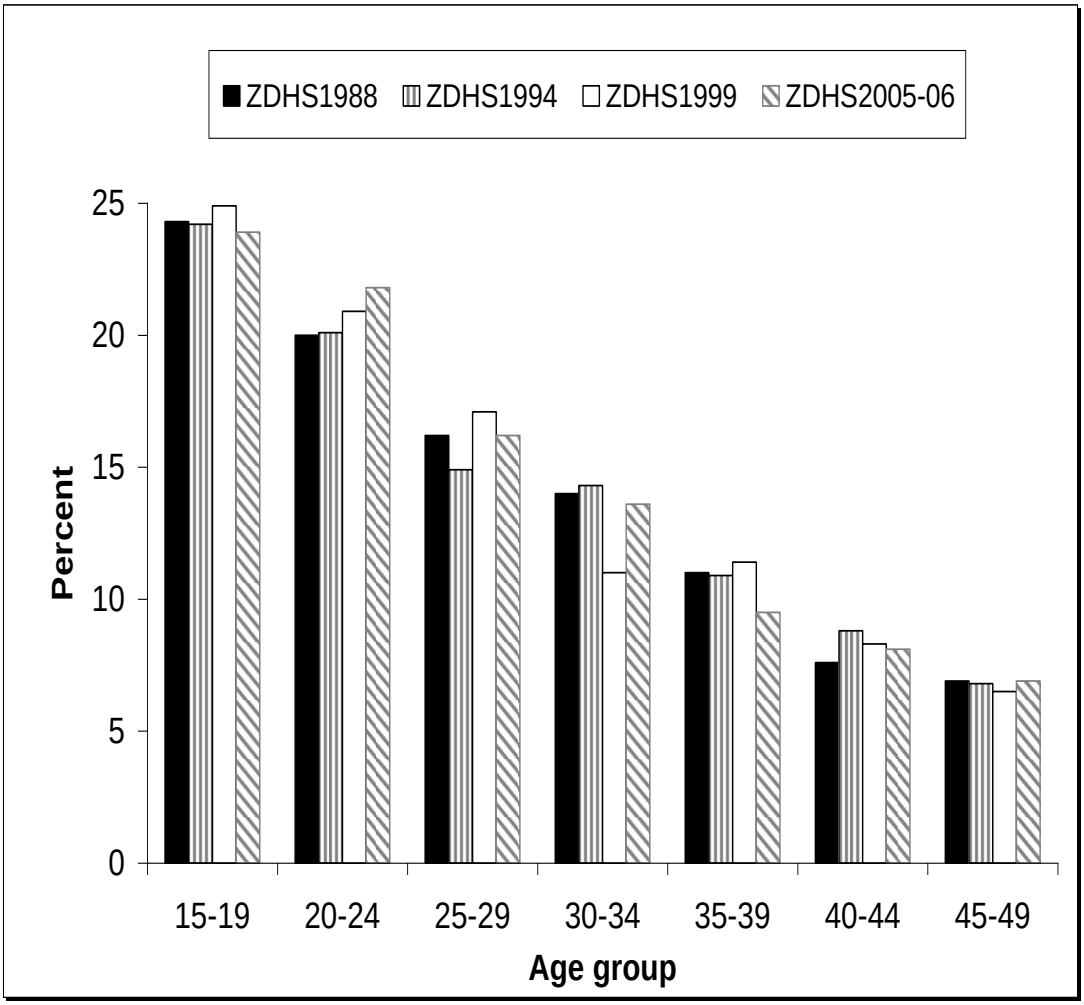
Source: Author's calculations Zimbabwe Central Statistical Office/ Macro International Inc21

Table 3.1: Completeness of Age at Death Information for Under-5 Children born during the 1996-2005 Period, 2005-06 ZDHS survey, Zimbabwe

Indicator	**Frequency**	**Percent**
Month and year	595	98.6
Year and age - month imputed	8	1.4
Total	**603**	**100.0**

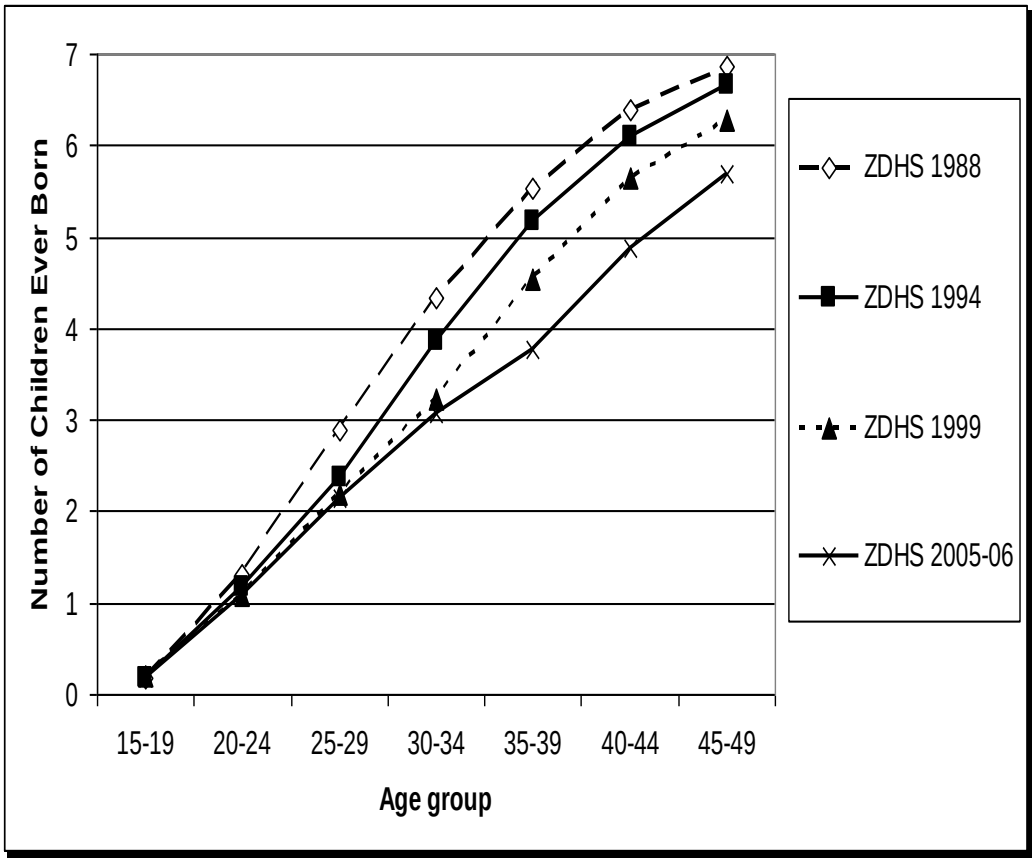
Source: Author's calculations Zimbabwe Central Statistical Office/ Macro International Inc21

Figure 3.2: Percentage Distribution of Women by Age (15-49) Interviewed during each of the 4 ZDHS surveys, Zimbabwe



Source: Compilation from various published reports [Zimbabwe Central Statistical Office/ Macro International Inc 13, 14, 21, 50]

Figure 3.3: Number of Children Ever Born by Age of the Mother, 1988 ZDHS, 1994 ZDHS, 1999 ZDHS and 2005-06 ZDHS survey, Zimbabwe



Source: Compilation from various published reports [Zimbabwe Central Statistical Office/ Macro International Inc 13,14,21,50]

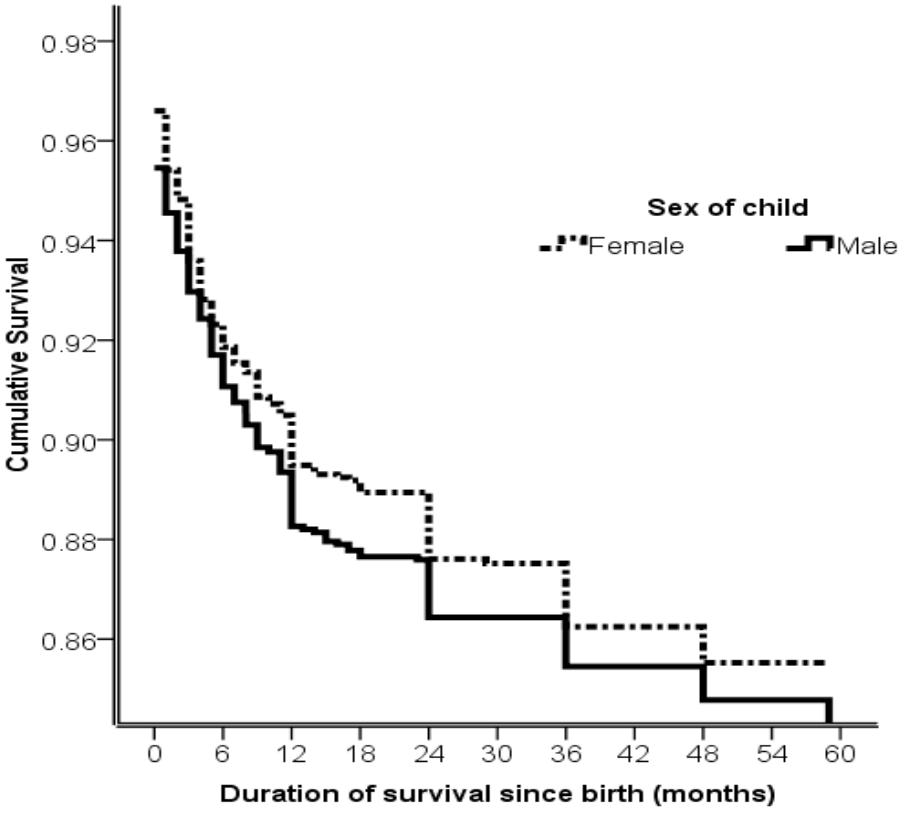
Table 3.2: Test of the Proportionality of the Hazard Assumption, 2005-06 ZDHS, Zimbabwe

	Chi-square	**Degrees of freedom**	**Probability of the Chi-square**
Global Proportionality Test	2.64	2	0.267

*p<0.05

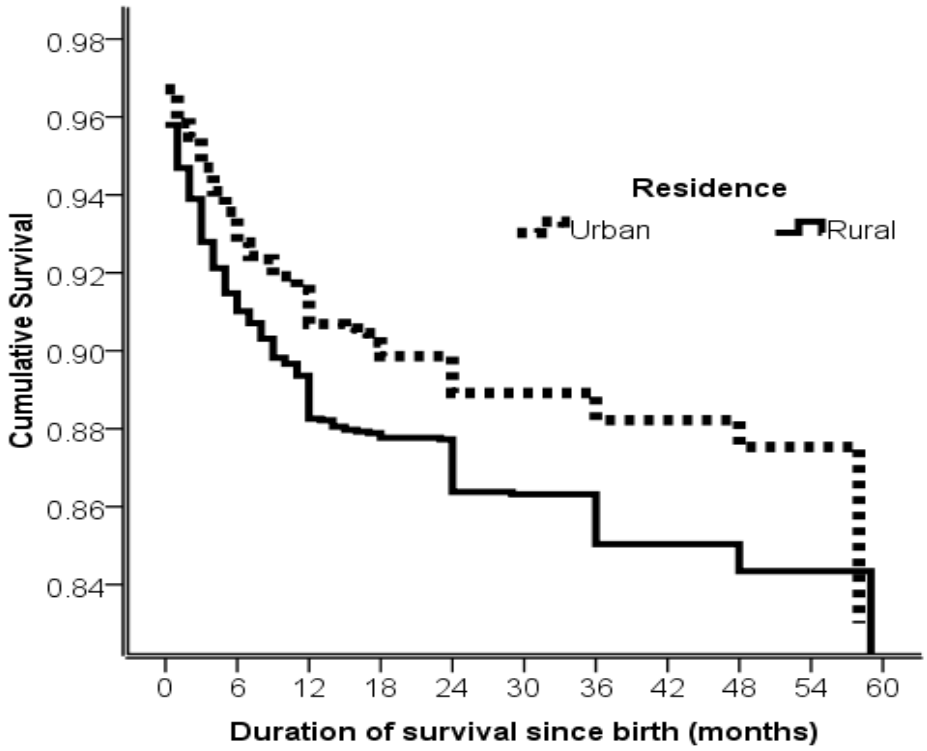
Source: Author's calculations Zimbabwe Central Statistical Office/ Macro International Inc 21

Figure 3.4: Kaplan - Meier Survival Curves Classified by Sex of Child for Under-5 Children Born during 1996-2005 (2005-06 ZDHS), Zimbabwe



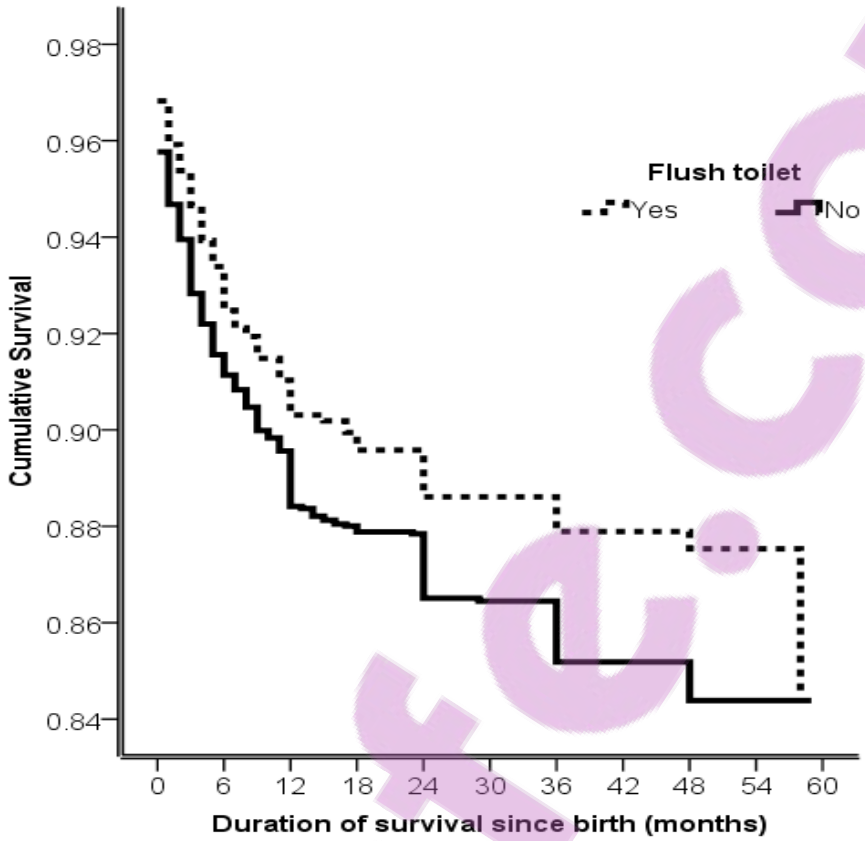
Source: Author's calculations Zimbabwe Central Statistical Office/ Macro International Inc 21

Figure 3.5: Kaplan - Meier Survival Curves Classified by Residence for Under-5 Children born during 1996-2005 (2005-06 ZDHS), Zimbabwe



Source: Author's calculations Zimbabwe Central Statistical Office/ Macro International Inc 21

Figure 3.6: Kaplan - Meier Survival Curves Classified by the Presence of Flush Toilet for Under-5s born during 1996-2005 (2005-06 ZDHS), Zimbabwe



Source: Author's calculations Zimbabwe Central Statistical Office/ Macro International Inc 21

CHAPTER 4

LEVELS AND TRENDS IN INFANT AND CHILD MORTALITY IN ZIMBABWE

4.1 Introduction

This chapter describes trends in infant and child mortality in Zimbabwe using direct and indirect demographic estimates. The study of levels and trends of early childhood mortality is fundamental to the bivariate and multivariate analysis of maternal, socioeconomic and environmental determinants of infant and child mortality conducted in Chapters 5, 6 and 7.

4.2 Analysis and Interpretation of Mortality Levels and Trends using Direct Estimates

Section 4.2 presents data on levels and trends of neonatal, postneonatal, infant, child and under-5 mortality rates in Zimbabwe. The estimates presented in this section are based on direct estimates from the Zimbabwe Demographic and Health Surveys conducted in 1988, 1994, 1999 and 2005-06. Indirect estimates of infant and under-5 mortality are provided in section 4.3. This section also presents a comparison of estimates obtained using these two approaches in order to derive a plausible trend of childhood mortality in Zimbabwe.

4.2.1 Neonatal and Postneonatal Mortality Levels and Trends

Figure 4.1 presents neonatal mortality (< 1 month) and postneonatal mortality (1-11 months) rates for the period 1990-1994, 1995 -1999 and 2001-2005. The neonatal and postneonatal mortality rates for the 1980-1984 period are not presented because the 1988 ZDHS survey report did not show these rates. The data show that survival at all ages below 12 months had not improved from the period 1990-1994 to the period 1995-1999. However, survival improved from the period 1995-1999 to

the period 2001-2005. Most of this improvement was due to the decline in neonatal mortality from 29 deaths per 1,000 live births for the 1995-1999 period to 24 deaths per 1,000 live births during the 2001-2005 period.

4.2.2 Infant, Child and Under-5 Mortality Levels and Trends

Figure 4.2 presents infant mortality (0-11 months), child mortality (1-59 months) and under-5 mortality (0-59 months) rates for the period 1984-1988, 1990-1994, 1995-1999 and 2001-2005. The pattern obtained is similar to that observed for neonatal and postneonatal mortality. Survival at all ages below five declined from the period 1984-1988 (77 deaths per 1,000 live births) to the period 1995-1999 (102 deaths per 1,000 live births). A comparison of the under-5 mortality rate for the 1995-1999 period with the rate for the 2001-2005 period indicates that mortality declined from the level of 102 deaths per 1,000 live births during the 1995-1999 period to 82 deaths during the 2001-2005 period. Most of the difference in under-5 mortality between the two recent ZDHS surveys appears to be the result of a decline in child mortality because the infant mortality rate during the 2001-2005 period was 60 deaths per 1,000 live births, only slightly lower than the rate observed in the 1995-1999 period (65 deaths per 1,000 births). These mortality trends are largely unexpected. Especially unexpected is the decline in 2001-2005 compared to 1995-1999. There could be several reasons for this. First, it is possible that more women took antiretroviral drugs (ARVs) while pregnant, thereby increasing the survival chances of their children. Second, it is also possible that many women aged 15-49 years who were HIV positive died, thereby reducing the pool of women who were giving birth to HIV positive children who would then eventually die.

More evidence will now be provided throwing light on the plausibility of the infant and child mortality rates obtained in the 2005-06 ZDHS

survey. Data on the health status of children between 1994 and 2005 in Zimbabwe are shown in Table 4.1. Data on measures such as anthropometry, low birth-weight and immunisation coverage suggest that child health deteriorated in Zimbabwe during this period. The coverage for all vaccines among children aged 12-23 months dropped from 80 percent to 53 percent from 1994 to 2005-06. The percentage of children aged 12 to 23 months who had not received any vaccinations was more than five times higher in 2005-06 than in 1994 (4 percent and 21 percent, respectively). The nutritional status of under-five children in Zimbabwe also declined between 1994 and 2005-06. The prevalence of stunting (low height-for-age) rose from 21 percent in 1994 to 29 percent at the time of the 2005-06 ZDHS. The proportion under-weight (low weight-for-age) decreased somewhat between 1994 and 1999 and then rose to a level of 17 percent at the time of the 2005-06 ZDHS.[13,14,21] It is therefore difficult to accept that childhood mortality declined between 2001 and 2005 as indicated by the 2005-06 ZDHS survey.

4.2.3 Comparison of Infant and Under-5 Mortality Rates for Periods 0-4 and 5-9 years Preceding four ZDHS Surveys

Table 4.2 shows infant and under-5 mortality estimates from the four rounds of the ZDHS and the reference periods to which the mortality estimates refer. Mortality estimates for the 5-9 year-period preceding the 2005-06 ZDHS survey should be roughly similar to those for the 0-4 year-period preceding the 1999 ZDHS survey. With the exception of the 2005-06 ZDHS survey, mortality estimates from the other three rounds of the surveys are fairly close. Comparison of the 1988 with the 1994 survey shows, for instance very similar rates in the comparable periods. The under-5 mortality rate 5 years before the survey in the 1994 ZDHS is similar to the under-5 mortality rate 0-4 years before the survey in 1988 (75 per 1,000 births in both surveys). However, the infant and under-5 mortality rates for the 5-9 year period from the 2005-06 ZDHS

survey were 37 and 54 deaths per 1,000 live births, respectively, while the corresponding estimates for the 0-4 year period preceding the 1999 ZDHS survey were 65 and 102 deaths, respectively. The lack of similarity of these estimates is evidence that infant and under-5 mortality are underreported in the 2005-06 ZDHS survey.

4.2.4 Mortality Differentials by Sex of Child

This section presents differentials of childhood mortality by sex of child. The mortality estimates are calculated for the 10-year period before the survey. This is done so that the rates are based on as large number of cases as possible.

4.2.4.1 Neonatal and Postneonatal Mortality Differentials by Sex

Figure 4.3 and 4.4 show differentials in neonatal and postneonatal mortality by sex for the following 10-year calendar periods: 1985-1994, 1990-1999 and 1996-2005. The 1988 ZDHS survey report did not provide the neonatal and postnenonatal mortality rates hence they are not presented in Figures 4.3 and 4.4. Survival prospects for female neonates and postneonates are better than their male counterparts during the three 10-year calendar periods. During the period 1990-1999 to 1996-2005 neonatal mortality declined by a fifth for both sexes from 28 to 23 deaths per 1,000 live births (males) and 24 to 19 deaths per 1,000 live births (females). Postneonatal mortality also declined for both sexes during 1990-1999 to 1996-2005 period from 35 to 28 deaths per 1,000 live births (male) and 32 to 29 deaths per 1,000 live births (female).

4.2.4.2 Neonatal to Postneonatal Mortality Ratios

Figure 4.5 shows data on trends in the ratio of neonatal to postneonatal mortality by sex of the child during the period 1985-1994 to 1996-2005. These estimates show further evidence regarding the possible omission

of deaths among children in the 2005-06 ZDHS survey. These ratios should be substantially similar (for female and male children) across all the 4 surveys in the absence of any omission of deaths. With the exception of the 1985-1994 period, the ratios for male children (0.94, 0.81, 0.82) are quite similar during the latter two calendar periods, that is, 1990-1999 and 1996-2005. Contrary to this pattern the ratios for female children (0.94, 0.75 and 0.66) are quite different across all the 3 surveys. This suggests possible omission of female deaths in the last 2 rounds of the ZDHS surveys.

4.2.4.3 Infant Mortality Differentials by Sex

Figure 4.6 shows infant mortality differentials by sex of child. In the period 1979-1988 the infant mortality rate for males and females was 65 and 50 deaths per 1,000 live births, respectively. The rates for infant mortality for males and females for the period 1985-1994 are 57 and 46 deaths per 1,000 live births, respectively, and those for the period 1990-1999 are 63 and 56 deaths per 1,000 live births, respectively. In the period 1996-2005 the infant mortality rate for males and females was 51 and 48 deaths per 1,000 live births, respectively. The period 1990-1999 to 1996-2005 witnessed a decline of infant mortality rates by 20 percent for males and 15 percent for females. After having decreased in the 1980s by close to 10 percent for both sexes, infant mortality rates increased by 10 percent for males and by 23 percent for females in the 1990s. This was most probably due to the impact of HIV and AIDS in Zimbabwe. Infant mortality declined once more for both sexes from the period 1990-1999 to the period 1996-2005. It is interesting to note that the survivourship gap between female and male infants considerably narrowed during the 1996-2005 period.

4.2.4.4 Child Mortality Differentials by Sex

Child mortality differentials by sex are shown in Figure 4.7. During the period 1979-1988 the survival prospects of male children were slightly better than their female counterparts. This phenomenon was reversed from the 1985-1994 period up to the 1990-1999 period in which the survivourship of male children worsened. During the latter period, child mortality reached its peak at levels of 31 and 35 deaths per 1,000 live births for females and males, respectively. The mortality gap between female and male children aged 1-59 months disappeared during the 1996-2005 period; female and male child mortality coincided at 21 deaths per 1,000 live births during the 1996-2005 period.

4.2.4.5 Infant to Child Mortality Ratios

Figure 4.8 shows the infant to child mortality ratios by sex of child for the 1979-1988 to 1996-2005 periods. These ratios show a rather unexpected pattern. They should be more or less similar in all the 3 surveys (for female and male children). The ratios for the 1996-2005 period, 2.43 and 2.29, for males and females, respectively, are not close to those of the other 3 surveys, which appear closer. This is evidence of either underreporting of infant and/ or child deaths or shifting of deaths in infancy to childhood or the reverse or both in the 2005-06 ZDHS survey.

4.2.4.6 Under-5 Mortality Differentials by Sex

The pattern obtaining for the sex differentials in under-5 mortality shown in Figure 4.9 is similar to that observed for infant mortality (see Figure 4.6). Under-5 mortality declined from levels of 85 and 95 deaths per 1,000 live births in the 1990-1999 period to 68 and 71 deaths per 1,000 live births in the 1996-2005 period, for females and males, respectively. It is further interesting to note that the survivorship gap between male and female under-5 children considerably narrowed during the 1990s.

4.2.5 Mortality Differentials by Rural- Urban Residence

This section discusses differentials in infant and childhood mortality by residence. The rates are presented for 10- year calendar periods.

4.2.5.1 Infant Mortality Differentials by Rural-Urban Residence

Figure 4.10 shows differentials in infant mortality by rural-urban residence. There was a steady increase in infant mortality levels in urban areas from the period 1979-1988 to the period 1996-2005 from levels of 38 deaths per 1,000 births to 47 deaths per 1,000 births, respectively. In contrast, the infant mortality rates in rural areas fluctuated from levels of 64 deaths per 1,000 births in 1979-1988 to 51 deaths per 1,000 in 1996-2005.

4.2.5.2 Child Mortality Differentials by Rural-Urban Residence

The trend in child mortality differentials by rural-urban residence shown in Figure 4.11 follows a similar pattern to that for infant mortality presented in Figure 4.10. Children in urban areas experience higher survival prospects than their rural counterparts. However, the gap in child mortality between rural and urban areas narrowed to 22 and 18 deaths per 1,000 live births in the 1996-2005 period from previous levels of 37 and 23 deaths per 1,000 live births in 1990-1999 period (rural and urban areas, respectively).

4.2.5.3 Under-5 Mortality Differentials by Rural-Urban Residence

Figure 4.12 presents trends in under-5 mortality by residence. The under-five mortality rate was 72 deaths per 1,000 live births in the rural areas, compared to 64 deaths per 1,000 live births in the urban areas, during the 1996-2005 period. For the 1990-1999 period, the under-5 mortality rate was 100 deaths per 1,000 live births in the rural areas compared to 69 deaths per 1,000 deaths in the urban areas. Similar to the trend in infant mortality, there are consistently higher under-5

mortality rates in rural areas than in urban areas of Zimbabwe. The decline in under-five mortality from 1990-1999 to 1996-2005 period was greater in rural areas (27 percent) than in urban areas (7.3 percent). We hypothesize that the much faster decline in infant, child and under-5 mortality between 1979-1988 and 1996-2005 in rural areas of Zimbabwe could be due to underreporting of deaths, especially in rural areas.

4.2.6 Mortality Differentials by Province

The differentials in mortality by province for infant and under-5 mortality are presented in Table 4.3. We observe that there are substantial provincial variations in infant and child mortality in Zimbabwe. During 1996-2005 under-5 mortality was highest in Manicaland province (100 deaths per 1,000 births) and lowest in Matabeleland South and Bulawayo provinces (45 deaths per 1,000 live births).

The decline in under-5 mortality between 1990-1999 and 1996-2005 varied by province. The decline in under-5 mortality was highest in Mashonaland province (34 percent) and lowest in Harare province (8.5 percent). Unlike the other 9 provinces which experienced mortality decreases, under-5 mortality increased by 17 percent between 1990-1999 and 1996-2005 in Matabeleland North province. We also observed that the decline in under-5 mortality during the same period was higher in Bulawayo (31.8 percent) than Harare (8.5 percent).

4.2.7 Regional Variations in Childhood Mortality

The regional trends in infant mortality rates are shown in Figure 4.13. The period 1980-1985 to 1990-1995 saw an improvement in infant survival prospects in Zimbabwe, South Africa, Botswana, Malawi, Lesotho, and in Sub-Saharan Africa and the Less Developed Countries. There was an initial increase in infant mortality in Zambia during 1980 to 1990 before a decline in 1985 to 1995. Infant survival prospects have

either worsened or stalled in South Africa, Lesotho, Kenya and Zimbabwe from 1995-2000 to 2000-2005 and improved in Mozambique, Botswana, Malawi and Zambia. Infant mortality rates declined during 2000-2005 as compared to 1995-2000 in Sub-Saharan Africa and in Less Developed Countries.[67]

4.3 Direct and Indirect Childhood Mortality Estimates

The direct and indirect estimates of infant and under-five mortality are presented in Figures 4.14 to 4.17. Tables 4.4 to 4.11 are the basis for the computations of the direct and indirect estimates presented in Figures 4.14 to 4.17. Therefore, the discussion in this section will be limited to Figures 4.14 to 4.17. In the four periods of roughly 10 years each covered in the four ZDHS surveys, it can be seen that the results of the indirect method were somewhat higher than the direct method. Figure 4.14 shows that between 1979 and 1986 infant mortality rates were rather similar at 55 deaths per 1,000 live births. Figure 4.15 reveals that between 1980 and 1990 there was some decline in infant mortality from 58 deaths to 51 deaths per 1,000 live births. Contrary to the these patterns, Figure 4.16 shows that between 1989 and 1996 infant mortality increased from 45 deaths to 69 deaths per 1,000 live births. Finally, Figure 4.17 shows that between 1992 and 2002 there was some decline in infant mortality from 45 deaths to 40 deaths and then an increase to 70 deaths per 1,000 live births.

It should be noted that the estimates from the direct methods refer to a fairly long time interval, for example, 1974-1978 in Figure 4.14, whereas the indirect methods compute estimates that refer to a specific point in time. This is a constraint in comparison of direct and indirect estimates. For comparison purposes it is assumed that the indirect estimates refer to the mid-point of the interval. In general, the differences between the direct and indirect estimates are small with a tendency towards

somewhat higher rates obtained with the indirect method. On the whole, the final conclusion is that both of them provide acceptable and reliable results.

4.4 Estimated Mortality Levels and Trends using Direct and Indirect Estimates and Multiple-spline Regression

The estimated levels of infant and under-5 mortality rates computed using the robust regression method are shown in Figures 4.18 and 4.19. The pattern and trend of the fitted regression lines of infant and under-5 mortality rates are similar. Both infant and under-5 mortality declined during the period from 1960 to 1990. However, the decline in mortality appears to have stalled from the 1990s to 2005. These results show that in 2005 in Zimbabwe child survival stagnated at levels of 61 and 82 deaths per 1,000 live births for infant and under-5 mortality, respectively.

The stagnation in the decline of the regression lines shown in Figure 4.18 and Figure 4.19 for infant and under-5 mortality respectively was probably caused by the inclusion in the multiple - spline regression equation of infant and under-5 mortality estimates from the 2005-06 ZDHS which were underestimates of the true mortality level during 2001-2005-6 in Zimbabwe. As we saw earlier, evidence was shown above which make it more likely that infant and under-five mortality increased between 1990 and 2005.[13,14,21]

4.5 Trends in Adult Mortality

In this section the recent trends of adult female mortality using data from the 1999 and 2005-06 Zimbabwe Demographic and Health Survey are studied. This is done as a result of the correlation between the risks of the mother and those of the children. Marindo and Hill[20] observed that survey data that solicit for information on child mortality from reports by women in the survey may fail to pick up childhood deaths due to AIDS

as the mothers would not be there to report these deaths as they would themselves have died before the survey. It is therefore relevant to study the recent trends in adult female mortality in Zimbabwe in this thesis.

Table 4.12 shows a comparison of age-specific mortality rates for women in the childbearing age group for the period 0-4 years before the 1999 ZDHS and for the period 0-6 years before the 2005-06 ZDHS survey. We observe that mortality rises rapidly with age and the rates plateau starting in the 35-39 year age group. Mortality rates doubled for older women that are in the age group 30-44 years between 1996-1999 and 2000-2005. Overall, mortality among women aged 15-49 years increased by 40 percent between 1996-1999 and 2000-2005. Mortality among men aged 15-49 years increased by 20 percent between 1996-1999 and 2000-2005 (data not shown in Table 4.12). We hypothesise that this rapid increase in adult mortality was due to the impact of the AIDS epidemic in Zimbabwe.

4.6 Trends in HIV Prevalence Rates

The HIV prevalence estimates for adults aged 15-44 years for rural and urban areas in Zimbabwe for the period 1996-2006 are shown in Table 4.13. The estimates show a declining trend from 1996-2006 and are higher in urban than in rural areas. However, a large part of the decline in HIV prevalence rates in Zimbabwe could be due to the refinement in the methodology used to estimate these rates, while some of the decline could be due to the impact of the HIV prevention programmes. However, HIV prevalence at 18.9 % (urban) and 17.6 % (rural) as at 2006 still remains high in Zimbabwe. In this thesis, we will incorporate the HIV prevalence rates in the Cox proportional multivariate analysis so as to study the possible direct and/ or indirect impact of HIV/AIDS on infant and child mortality. This follows similar pioneering work done by Hill, Bicego and Hill in Kenya.[5] In their study Hill, Bicego and Mahy were

able to show that in the presence of biodemographic, socioeconomic and environmental factors, a unit increase in HIV prevalence led to an increase of 10 percent in the odds of dying in childhood age.[5]

4.7 Concluding Remarks

Chapter Four examined childhood mortality levels and trends in Zimbabwe. The chapter further discussed selected demographic and socioeconomic mortality differentials and trends using the direct approach. Evidence was provided in support of the hypothesis that infant and child mortality rates in the 2005-06 ZDHS survey are or maybe too low. Such evidence included:

- Lack of similarity between infant and under-5 mortality rates for the 0-4 period preceding the 1999 ZDHS survey and the 5-9 period preceding the 2005-06 ZDHS survey.

- The worsening of child health indicators, that is, immunisation coverage, stunting and wasting, from 1994 to 2005-06.

- The narrowing of the gap in the mortality differentials by sex of child and rural-urban area of residence.

- The rapid increase in mortality among women aged 15-49 years by 40 percent between 1996-1999 and 2000-2005. This rise in adult mortality could have been due to the AIDS epidemic in Zimbabwe.

- The stagnation of infant and under-five mortality during the period 1990-2005 as observed from the multiple - spline regression analysis, and,

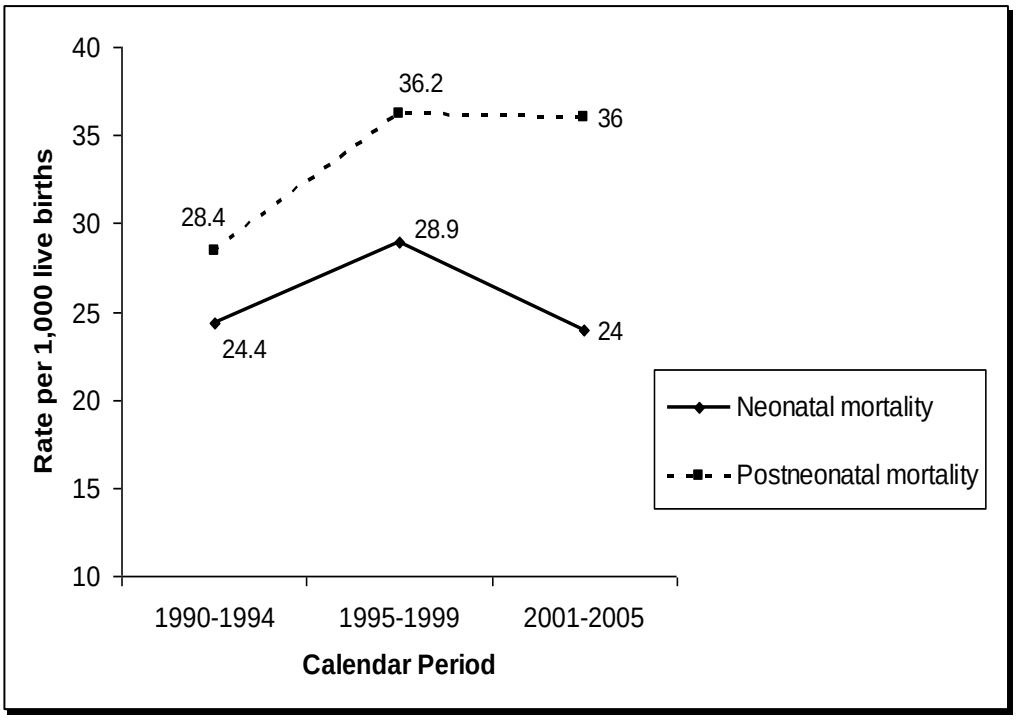
- The inconclusiveness of the trends in neonatal to postneonatal mortality ratios and the infant to child mortality ratios.

The mortality gap in Zimbabwe by rural-urban residence narrowed from 1979-1988 to 1996-2005 while the mortality gap by sex of child completely disappeared during the 1996-2005 period. These are unusual results, not observed in other DHS surveys in neighbouring countries such as South Africa.

It can be seen that the results of the indirect method are somewhat higher than those from the direct method. On the whole, the differences between the estimates computed using the two approaches were small. We therefore conclude that both the direct and indirect methods provide acceptable and reliable results of trends in infant and child mortality in Zimbabwe.

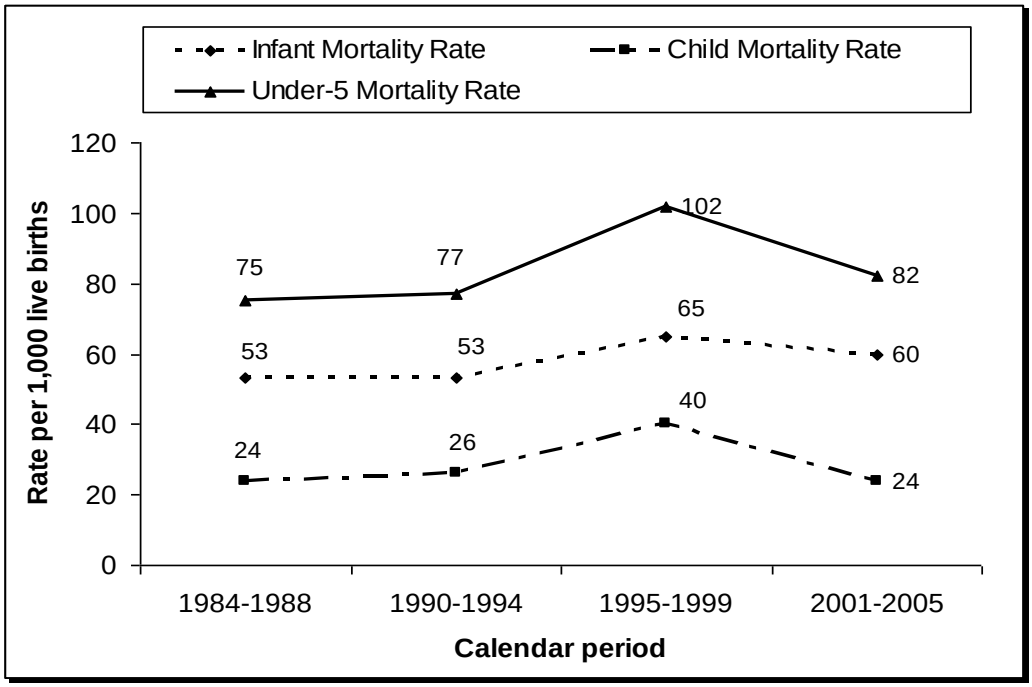
Chapter Five presents the bivariate analysis of the impact of the determinants of infant and child mortality in Zimbabwe during 1996-2005.

Figure 4.1: Trends in Neonatal and Postneonatal Mortality, Calendar Period, 1990-1994 (ZDHS1994), 1995-1999 (ZDHS 1999) and 2001- 2005 (ZDHS 2005-06), Direct Estimates, Zimbabwe



Source: Compilation from various published reports [Zimbabwe Central Statistical Office/ Macro International Inc13,14,21,50]

Figure 4.2: Trends in Infant, Child and Under-Five Mortality, Calendar Period 1984-1988 (ZDHS 1988), 1990-1994 (ZDHS 1994), 1995-1999 (ZDHS 1999) and 2001- 2005 (ZDHS 2005-06), Direct Estimates, Zimbabwe



Source: Compilation from various published reports [Zimbabwe Central Statistical Office/ Macro International Inc13,14,21,50]

Table 4.1: Selected Health Indicators, ZDHS 1994, ZDHS 1999 and ZDHS 2005-06, Zimbabwe

Year	Health Indicator			
	Percentage of Vaccine Coverage among Children aged 12-23 Months	**Percentage of Children aged 12-23 Months who Received no Vaccination**	**Height-for-age (Percentage of Children under-5 years below -2 SD)**	**Weight-for-age (Percentage of Children under-5 years below -2 SD)**
1994	80.1	4.1	21.4	15.5
1999	74.8	11.6	26.5	13.0
2005-06	52.6	21.0	29.4	16.6

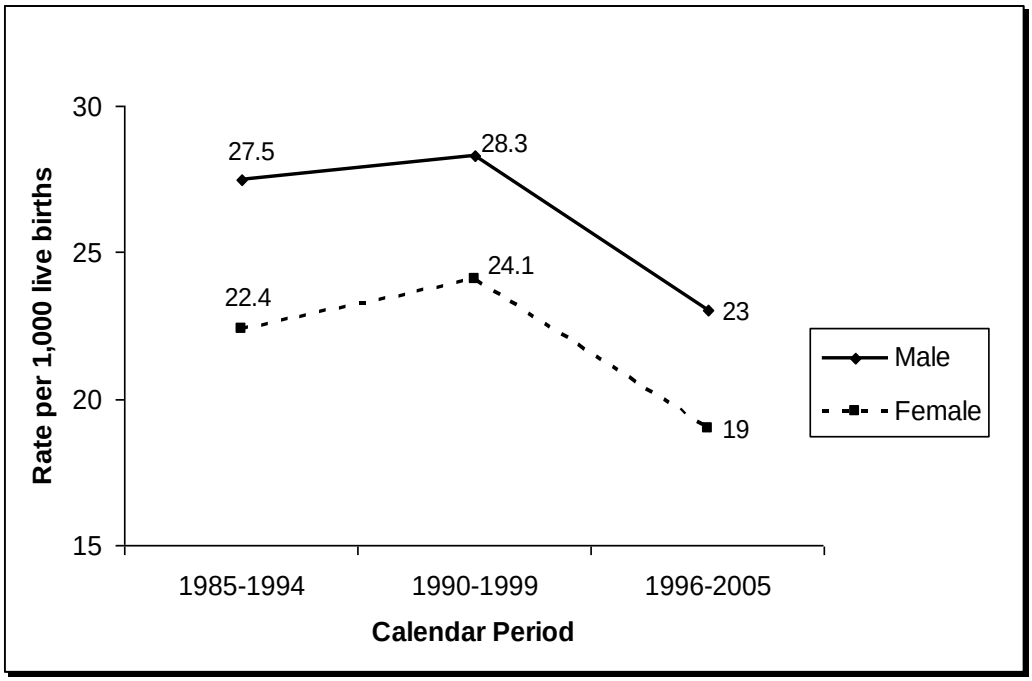
Source: Compilation from various published reports [Zimbabwe Central Statistical Office/ Macro International Inc 13,14,21]

Table 4.2: Assessment of the Comparability of Infant and Under-5 Mortality Rates per 1,000 Live Births across the Four ZDHS Surveys, Zimbabwe

Period in Years Preceding Survey	**1988 ZDHS**	**1994 ZDHS**	**1999 ZDHS**	**2005-06 ZDHS**
Infant Mortality				
0-4	53	53	65	60
5-9	64	50	54	37
Under-5 Mortality				
0-4	75	77	102	82
5-9	104	75	77	54

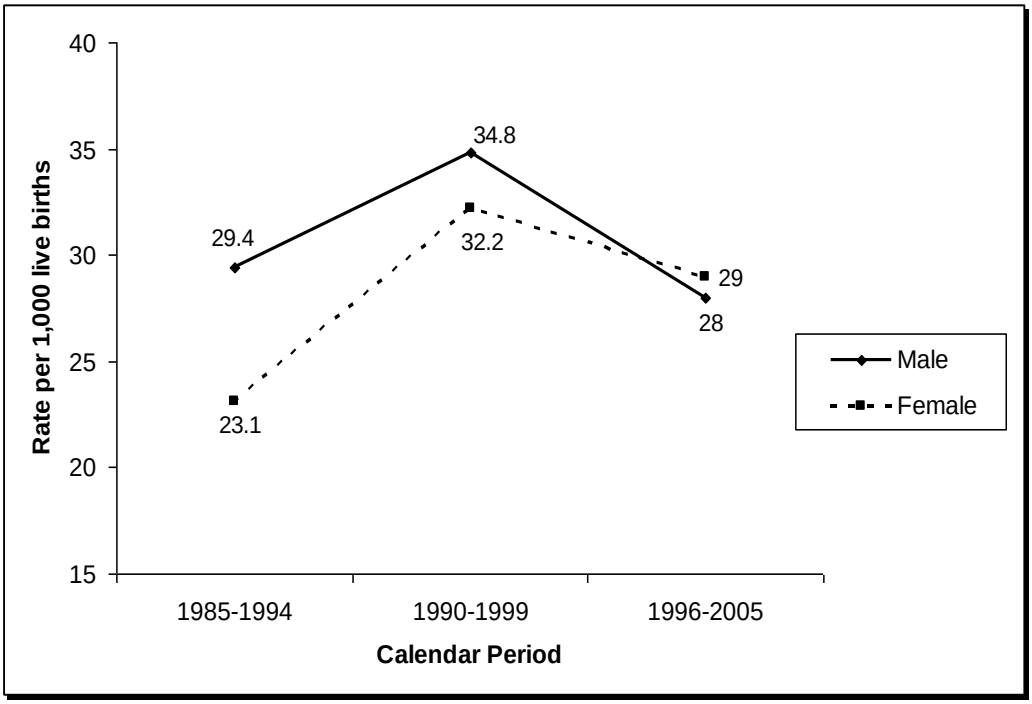
Source: Compilation from various published reports [Zimbabwe Central Statistical Office/ Macro International Inc13,14,21,50]

Figure 4.3: Trends in Neonatal Mortality by Sex of Child for the Calendar Period 1985-1994 (ZDHS 1994), 1990-1999 (ZDHS 1999) and 1996-2005, (ZDHS 2005-06), Direct Estimates, Zimbabwe



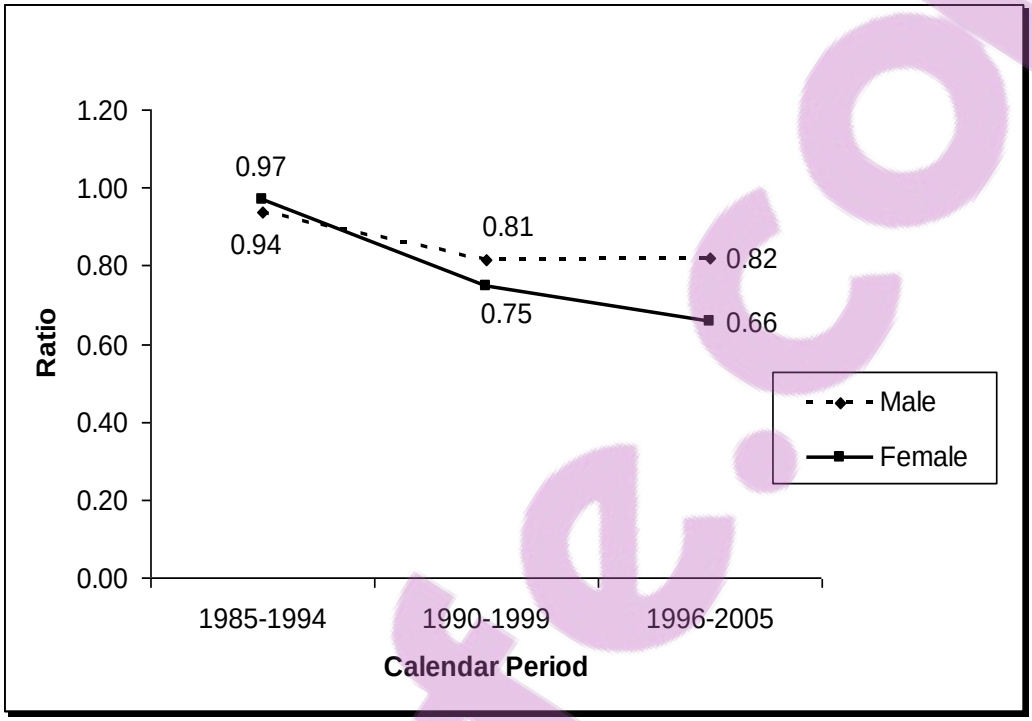
Source: Compilation from various published reports [Zimbabwe Central Statistical Office/ Macro International Inc13,14,21]

Figure 4.4: Trends in Postneonatal Mortality by Sex of Child for the Calendar Period 1985-1994 (ZDHS 1994), 1990-1999 (ZDHS 1999) and 1996-2005 (ZDHS 2005-06), Direct Estimates, Zimbabwe



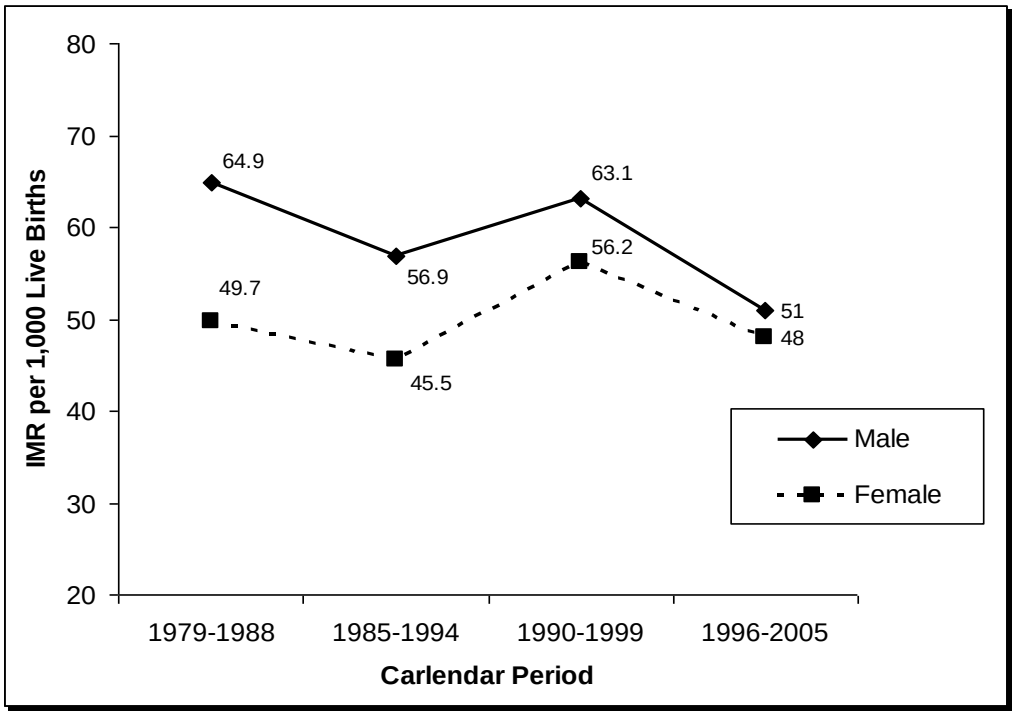
Source: Compilation from various published reports [Zimbabwe Central Statistical Office/ Macro International Inc 13,14,21]

Figure 4.5: Trends in the Ratio of Neonatal to Postneonatal Mortality by Sex of Child for the Calendar Period 1985-1994 (ZDHS 1994), 1990-1999 (ZDHS 1999) and 1996-2005 (ZDHS 2005-06), Direct Estimates, Zimbabwe



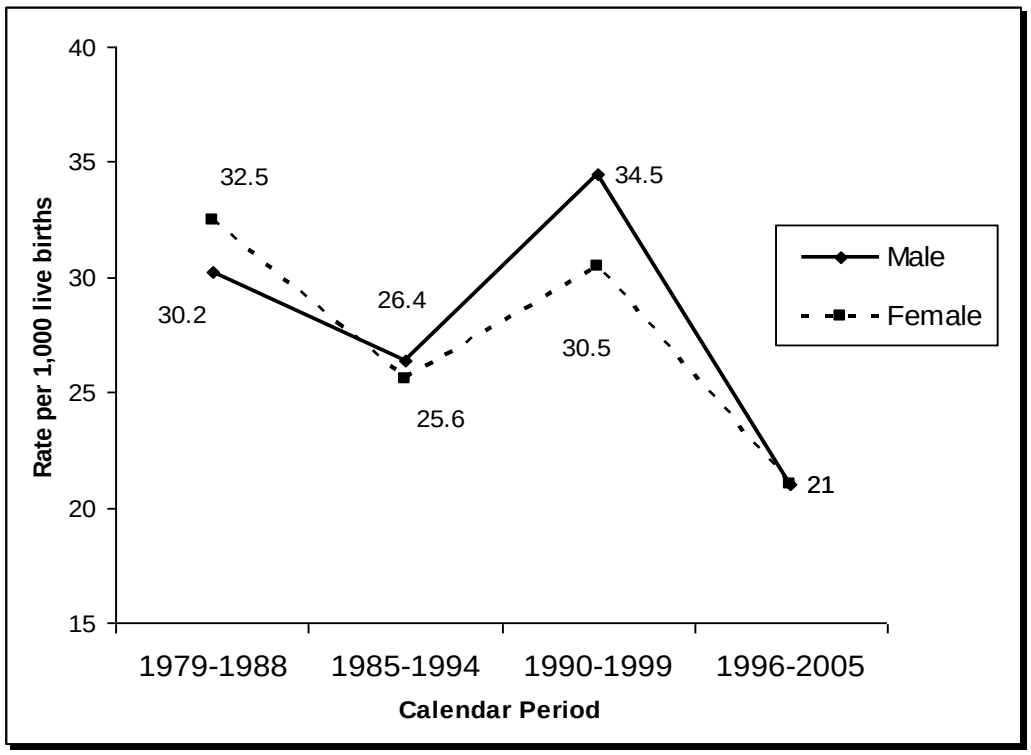
Source: Compilation from various published reports [Zimbabwe Central Statistical Office/ Macro International Inc13,14,21]

Figure 4.6: Trends in Infant Mortality by Sex of Child, for the Calendar Period 1979-1988 (ZDHS 1988), 1985-1994 (ZDHS 1994), 1990-1999 (ZDHS 1999) and 1996-2005 (ZDHS 2005-06), Direct Estimates, Zimbabwe



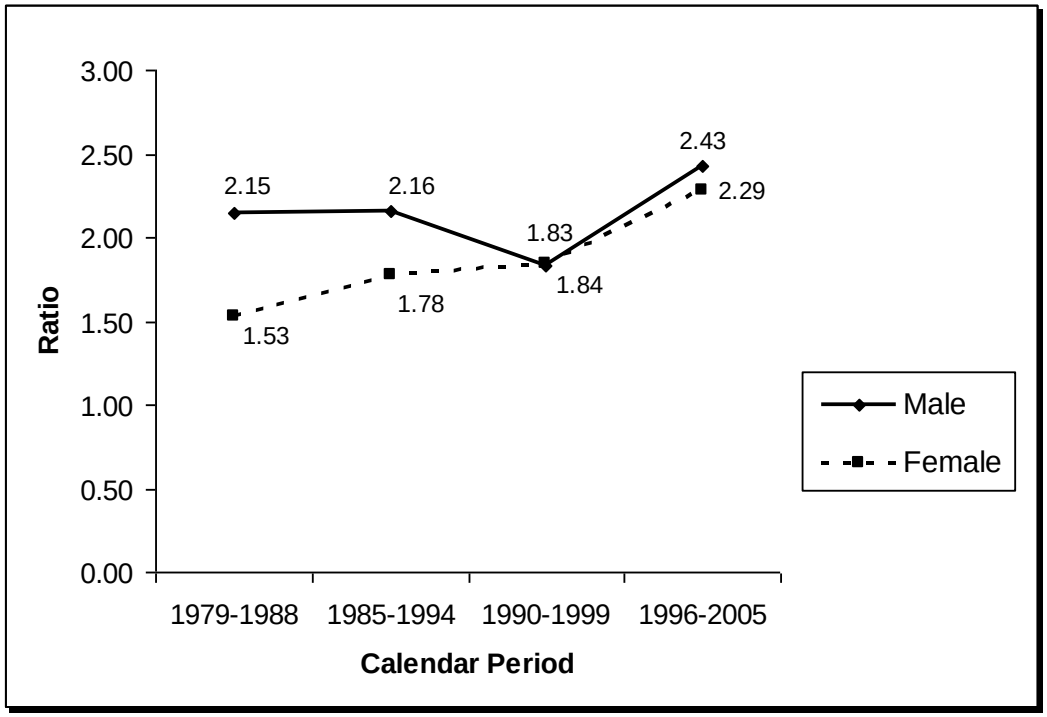
Source: Compilation from various published reports Zimbabwe Central Statistical Office/ Macro InternationalInc13,14,21,50

Figure 4.7: Trends in Child Mortality by Sex of Child, for the Calendar Period 1979-1988 (ZDHS 1988), 1985-1994 (ZDHS 1994), 1990-1999 (ZDHS 1999) and 1996-2005 (ZDHS 2005-06), Direct Estimates, Zimbabwe



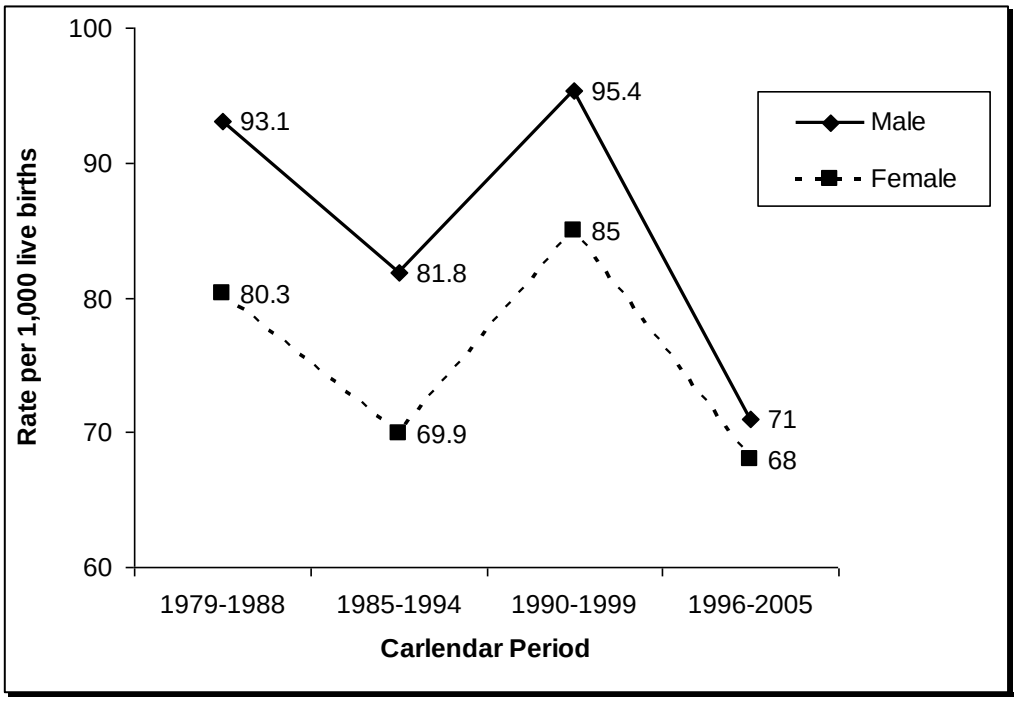
Source: Compilation from various published reports [Zimbabwe Central Statistical Office/ Macro InternationalInc13,14,21,50]

Figure 4.8: Trends in the Ratio of Infant Mortality to Child Mortality for the Calendar Period 1979-1988 (ZDHS 1988), 1985-1994 (ZDHS 1994), 1990-1999 (ZDHS 1999) and 1996-2005 ZDHS 2005-06), Direct Estimates, Zimbabwe



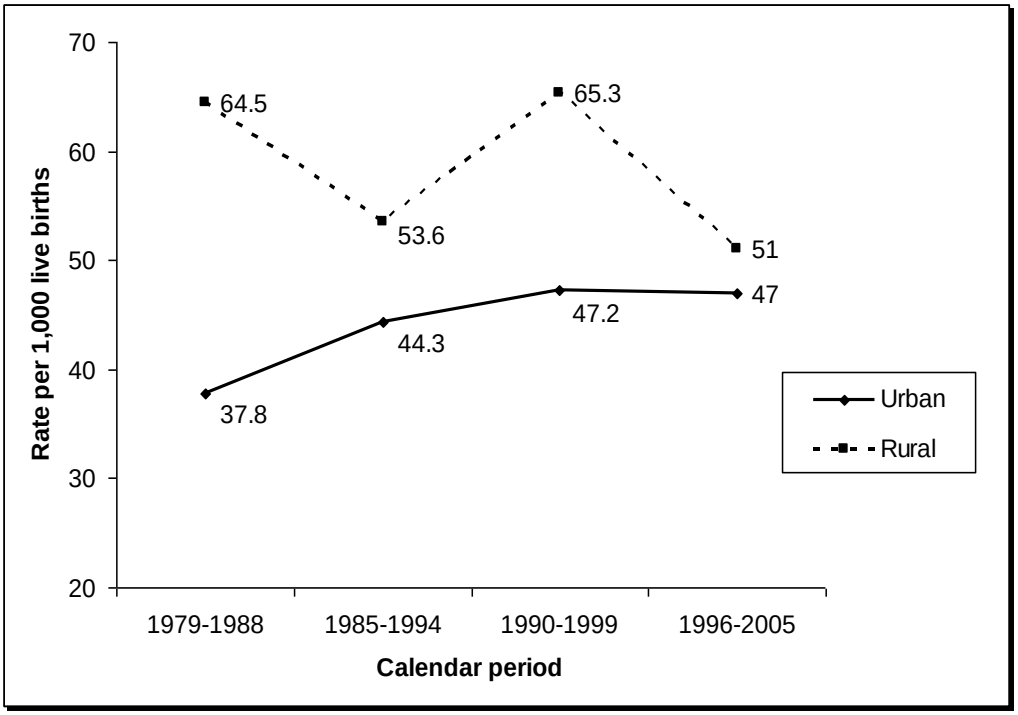
Source: Compilation from various published reports [Zimbabwe Central Statistical Office/ Macro InternationalInc13,14,21,50]

Figure 4.9: Trends in Under-five Mortality by Sex of Child, for the Calendar Period 1979-1988 (ZDHS 1988), 1985-1994 (ZDHS 1994), 1990-1999 (ZDHS 1999) and 1996-2005 (ZDHS 2005-06), Direct Estimates, Zimbabwe



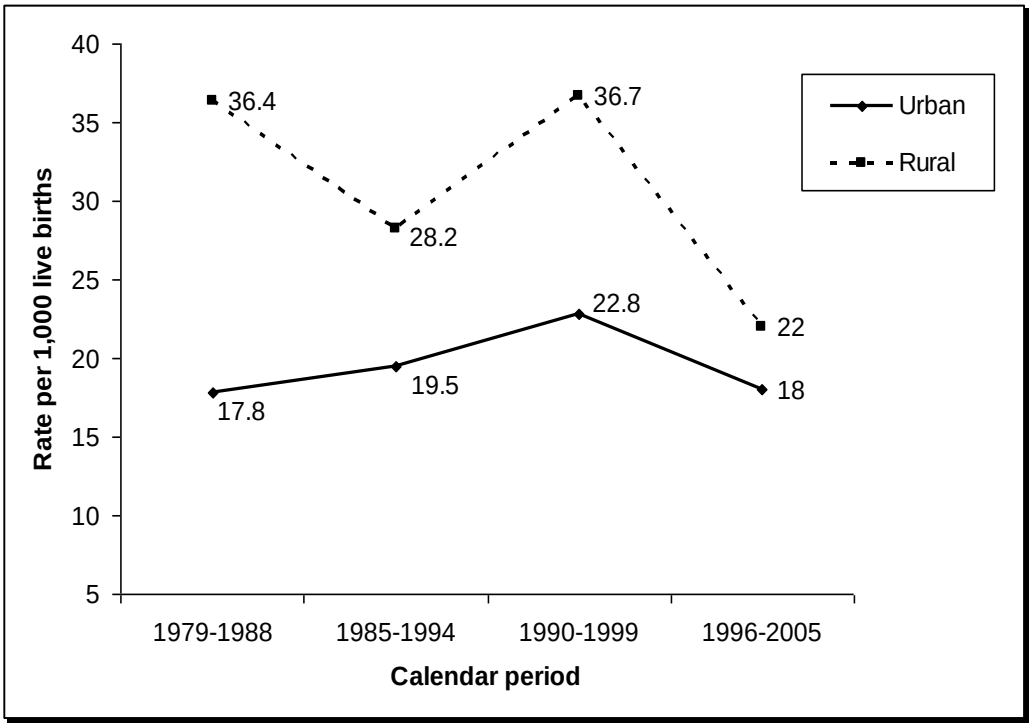
Source: Compilation from various published reports [Zimbabwe Central Statistical Office/ Macro InternationalInc13,14,21,50]

Figure 4.10: Trends in Infant Mortality by Rural and Urban Location, for the Calendar Period 1979-1988 (ZDHS 1988), 1985-1994 (ZDHS 1994), 1990-1999 (ZDHS 1999), and 1996-2005 (ZDHS 2005-06), Direct Estimates, Zimbabwe



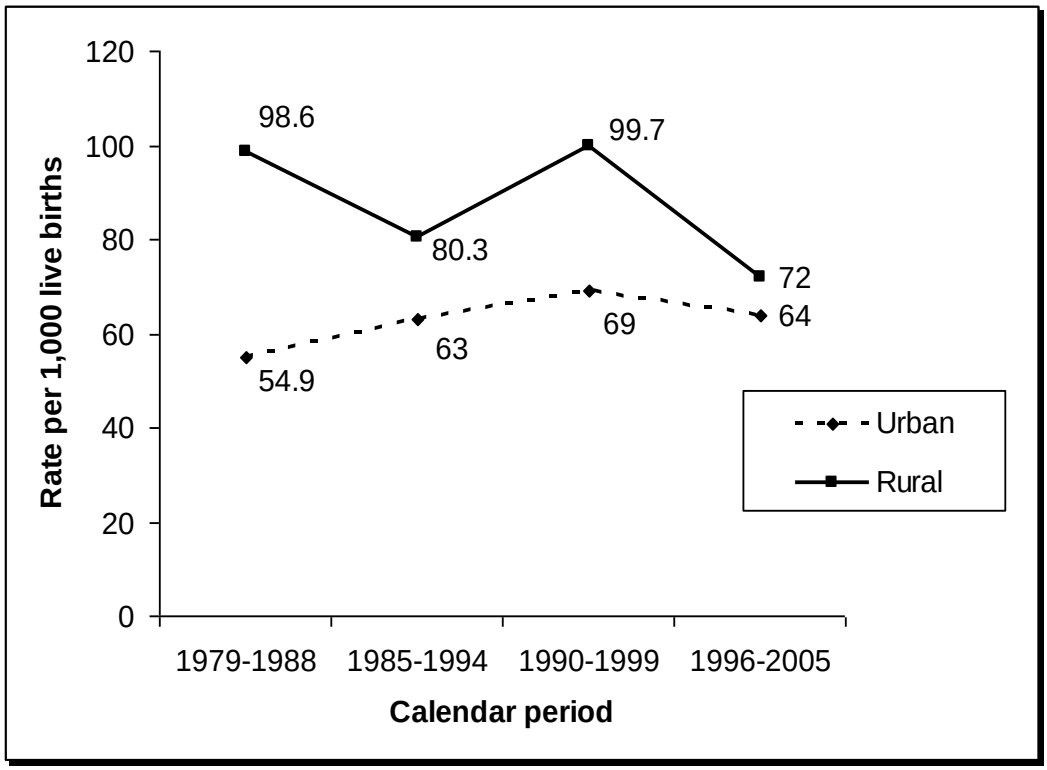
Source: Compilation from various published reports [Zimbabwe Central Statistical Office/ Macro InternationalInc13,14,21,50]

Figure 4.11: Trends in Child Mortality by Rural and Urban Location, for the Calendar Period 1979-1988 (ZDHS 1988), 1985-1994 (ZDHS 1994), 1990-1999 (ZDHS 1999), and 1996-2005 (ZDHS 2005-06), Direct Estimates, Zimbabwe



Source: Compilation from various published reports [Zimbabwe Central Statistical Office/ Macro InternationalInc13,14,21,50]

Figure 4.12: Trends in Under-five Mortality by Rural and Urban Location, for the Calendar Period 1979-1988 (ZDHS 1988), 1985-1994 (ZDHS 1994), 1990-1999 (ZDHS 1999), and 1996-2005 (ZDHS 2005-06), Direct Estimates, Zimbabwe



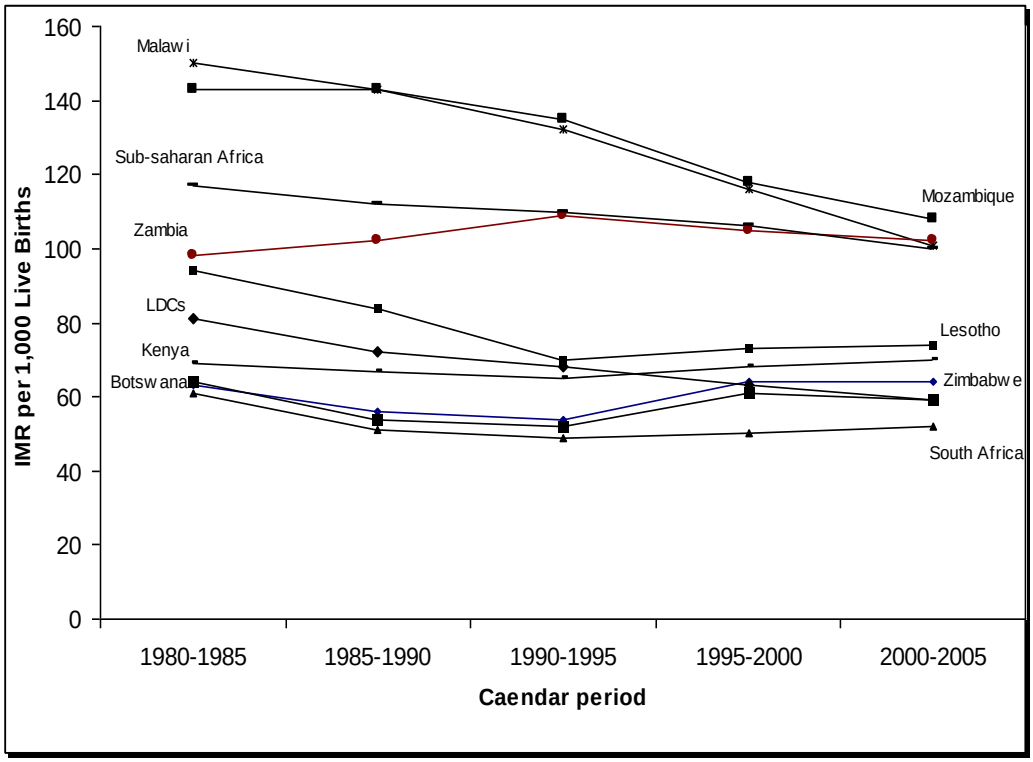
Source: Compilation from various published reports [Zimbabwe Central Statistical Office/ Macro InternationalInc13,14,21,50]

Table 4.3: Trends in Infant, Child and Under-five Mortality per 1,000 Live Births by Province, for the Calendar Period 1990-1999 (ZDHS 1999) and 1996-2005 (ZDHS 2005-06), Direct Estimates, Zimbabwe

Province	**1990-1999**			**1996-2005**		
	Infant mortality Rate	**Child Mortality Rate**	**Under-5 Mortality Rate**	**Infant Mortality Rate**	**Child Mortality Rate**	**Under-5 Mortality Rate**
Manicaland	76	54	126	71	32	100
Mashonaland Central	87	27	111	45	29	73
Mashonaland East	64	39	100	47	25	71
Mashonaland West	53	36	87	56	23	77
Matabeleland North	39	19	57	46	22	67
Matabeleland South	48	22	69	32	14	45
Midlands	70	30	98	53	13	65
Masvingo	47	23	69	42	17	58
Harare	45	27	71	46	20	65
Bulawayo	47	21	66	34	11	45

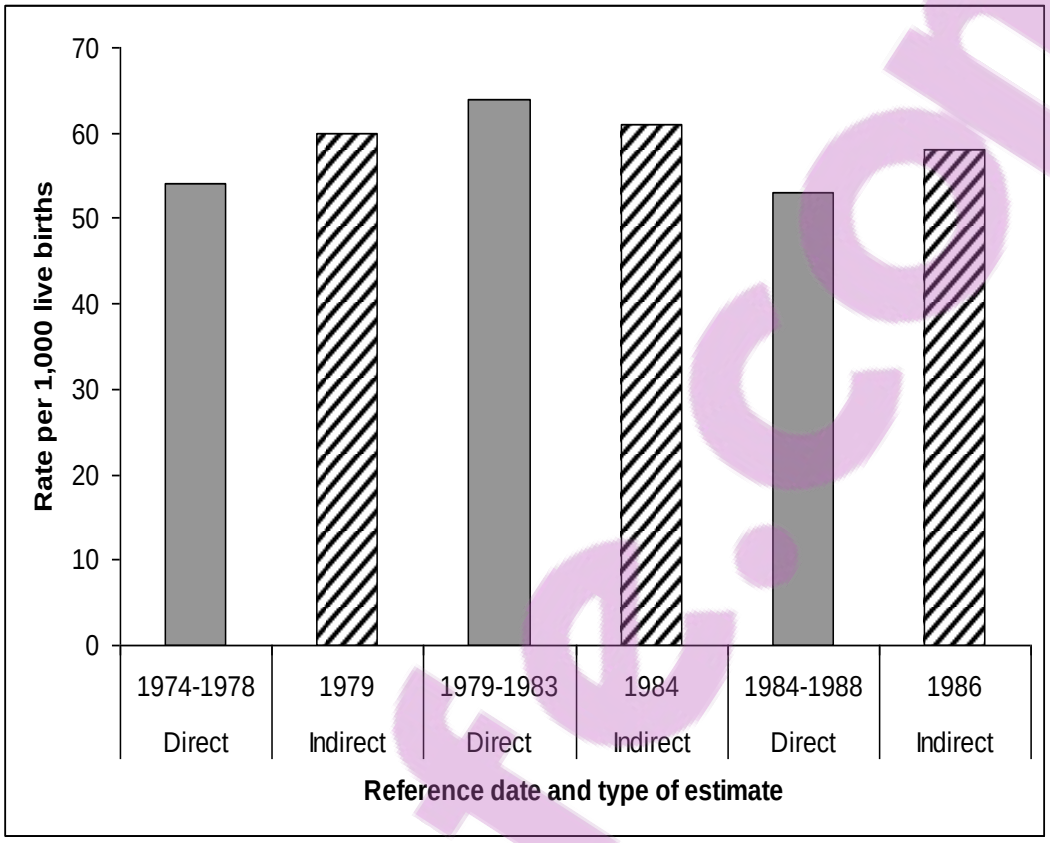
Source: Compilation from various published reports [Zimbabwe Central Statistical Office/ Macro International Inc14,21]

Figure 4.13: Comparison of Trends in Infant Mortality in Selected Neighbouring Countries, Sub-Saharan Africa, Less Developed Countries and Zimbabwe, 1980-1985 to 2000-2005



Source: Compilation from a published report [United Nations67]

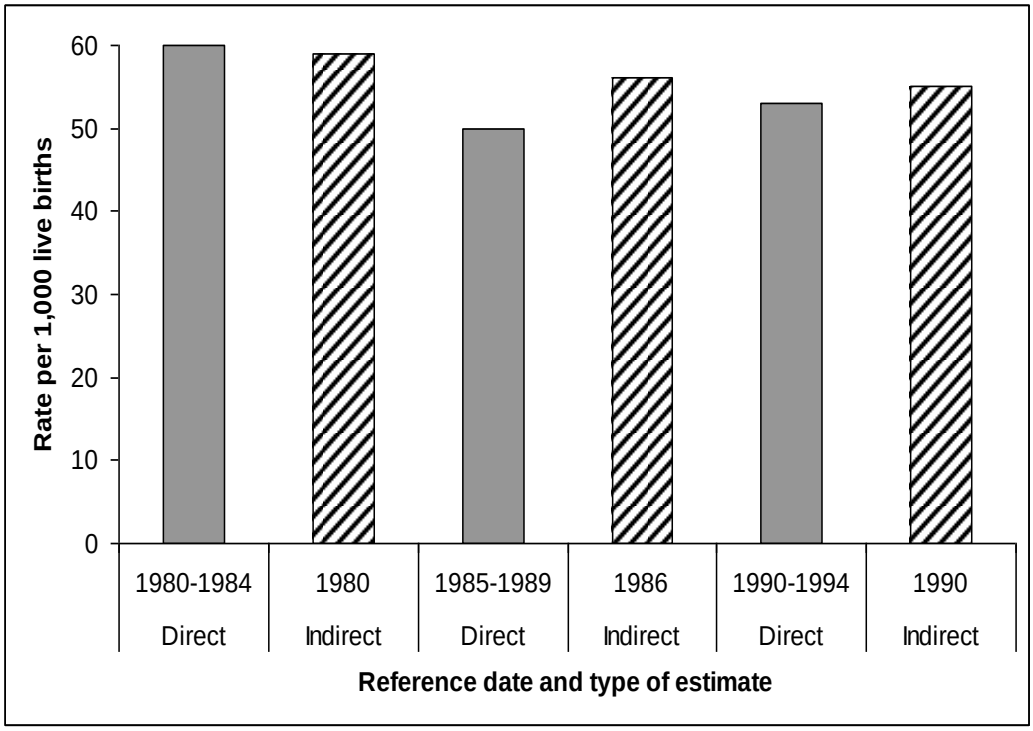
Figure 4.14: Direct and Indirect Infant Mortality Estimates, 1988 ZDHS, Zimbabwe



Source: Direct estimates: Compilation from published report [50] Zimbabwe Central Statistical Office/ Macro International Inc

Indirect estimates: Output from MORTPAK

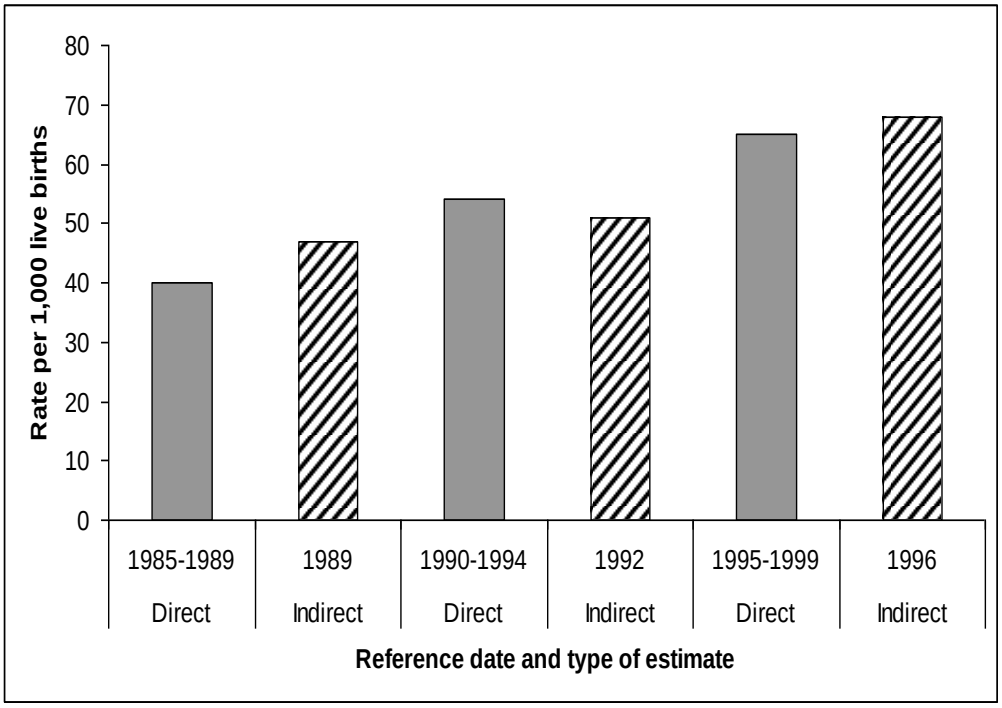
Figure 4.15: Direct and Indirect Infant Mortality Estimates, 1994 ZDHS, Zimbabwe



Source: Direct estimates: Compilation from published report [13] Zimbabwe Central Statistical Office/ Macro International Inc

Indirect estimates: Output from MORTPAK

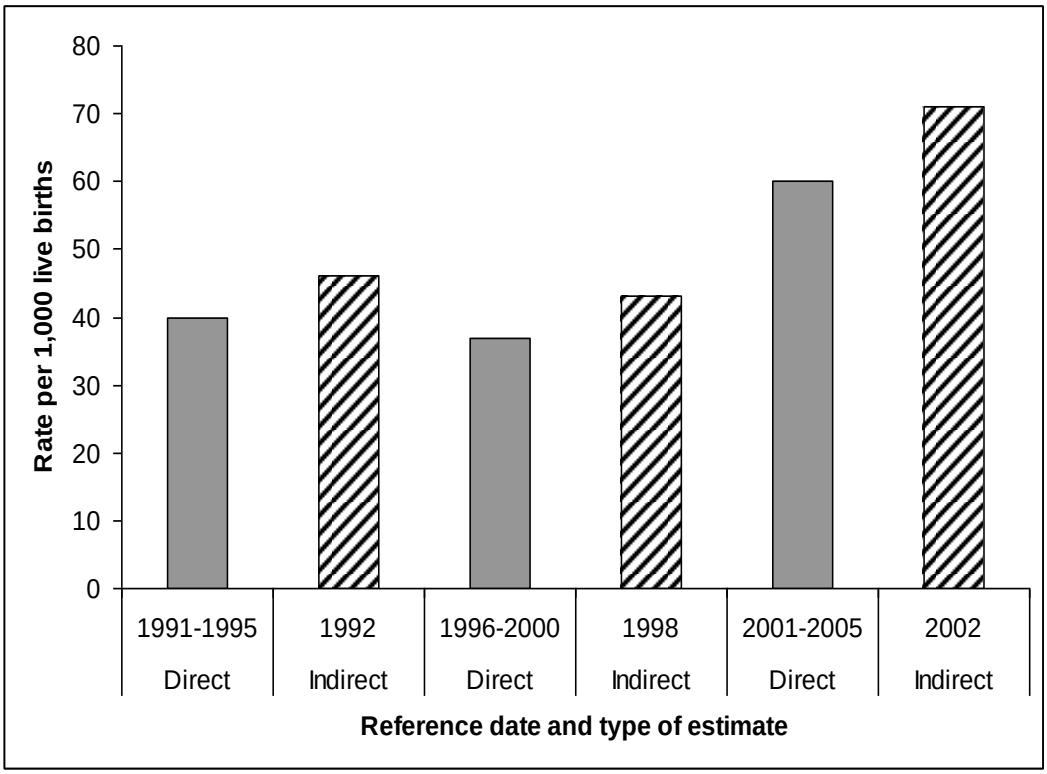
Figure 4.16: Direct and Indirect Infant Mortality Estimates, 1999 ZDHS, Zimbabwe



Source: Direct estimates: Compilation from published report [14] Zimbabwe Central Statistical Office/ Macro International Inc

Indirect estimates: Output from MORTPAK

Figure 4.17: Direct and Indirect Infant Mortality Estimates, 2005-06 ZDHS, Zimbabwe



Source: Direct estimates: Compilation from published report [Zimbabwe Central Statistical Office/ Macro International Inc21]

Indirect estimates: Output from MORTPAK

Table 4.4: Demographic and Health Survey 1988, Direct Estimates, Zimbabwe

Period	**Infant Mortality Rate** $_1q_0$	**Under-five Mortality Rate** $_5q_0$
1984-1988	53	75
1979-1983	64	104
1974-1978	54	92

Source: Compilation from published report [50] Zimbabwe Central Statistical Office/ Macro International Inc

Table 4.5: Demographic and Health Survey 1988, Indirect Estimates, North Model, Zimbabwe

Age of Mother	**Average Parity**	**Proportion of Children Dead**	**Reference Date**	**Infant Mortality Rate** $_1q_0$	**Under-five Mortality Rate** $_5q_0$
20-24	1.300	0.069	1985.9	58	90
25-29	2.890	0.087	1984.1	61	96
30-34	4.350	0.083	1981.8	55	84
35-39	5.540	0.101	1979.3	60	94
40-44	6.400	0.111	1976.7	61	95
45-49	6.870	0.130	1973.8	63	99

Source: Output from MORTPAK

Table 4.6: Demographic and Health Survey 1994, Direct Estimates, Zimbabwe

Period	**Infant Mortality Rate** $_1q_0$	**Under-five Mortality Rate** $_5q_0$
1990-1994	53	77
1985-1989	50	75
1980-1984	60	101

Source: Compilation from published report Zimbabwe Central Statistical Office/ Macro International Inc13

Table 4.7: Demographic and Health Survey 1994, Indirect Estimates, North Model, Zimbabwe

Age of Mother	**Average Parity**	**Proportion of Children Dead**	**Reference Date**	**Infant Mortality Rate** $_1q_0$	**Under-five Mortality Rate** $_5q_0$
20-24	1.10	0.082	1992.5	68	106
25-29	2.36	0.076	1990.7	55	83
30-34	3.89	0.085	1988.6	55	84
35-39	5.13	0.094	1986.2	56	85
40-44	6.08	0.104	1983.5	57	86
45-49	6.57	0.122	1980.6	59	91

Source: Output from MORTPAK

Table 4.8: Demographic and Health Survey 1999, Direct Estimates, Zimbabwe

Period	**Infant Mortality Rate** $_1q_0$	**Under-five Mortality Rate** $_5q_0$
1995-1999	65	102
1990-1994	54	77
1985-1989	40	59

Source: Compilation from published report [14] Zimbabwe Central Statistical Office/ Macro International Inc

Table 4.9: Demographic and Health Survey 1999, Indirect Estimates, North Model, Zimbabwe

Age of Mother	**Average Parity**	**Proportion of Children Dead**	**Reference Date**	**Infant Mortality Rate** $_1q_0$	**Under-five Mortality Rate** $_5q_0$
20-24	1.060	0.085	1996.8	68	109
25-29	2.130	0.099	1994.8	67	108
30-34	3.090	0.078	1992.4	51	77
35-39	4.520	0.075	1989.8	47	70
40-44	5.540	0.096	1987.0	53	81
45-49	6.290	0.119	1984.1	58	90

Source: Output from MORTPAK

Table 4.10: Demographic and Health Survey 2005-06, Direct Estimates, Zimbabwe

Period	**Infant Mortality Rate** $_1q_0$	**Under-five Mortality Rate** $_5q_0$
2001-2005	60	82
1996-2000	37	54
1991-1995	40	58

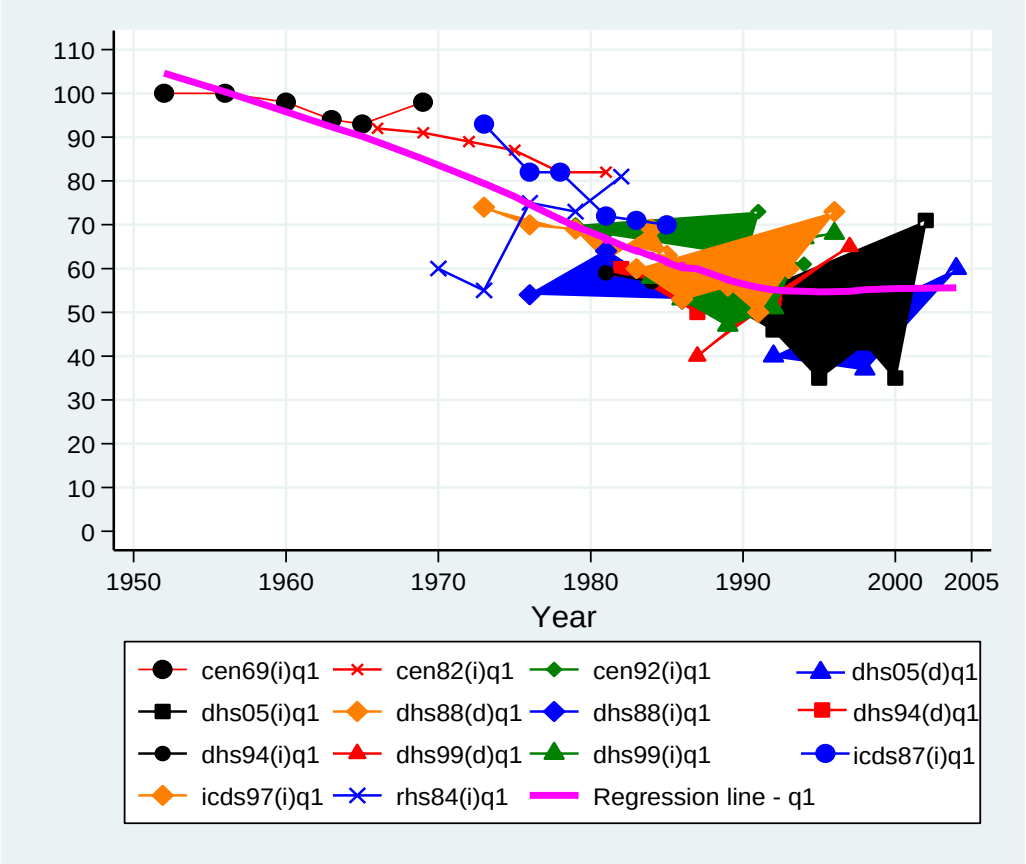
Source: Compilation from published report [21] Zimbabwe Central Statistical Office/ Macro International Inc

Table 4.11: Demographic and Health Survey 2005-06, Indirect Estimates, North Model, Zimbabwe

Age of Mother	**Average Parity**	**Proportion of Children Dead**	**Reference Date**	**Infant Mortality Rate** $_1q_0$	**Under-five Mortality Rate** $_5q_0$
20-24	1.100	0.091	2002.7	71	115
25-29	2.100	0.048	2000.6	35	49
30-34	3.100	0.065	1998.2	43	63
35-39	3.700	0.054	1995.4	35	49
40-44	4.900	0.082	1992.7	46	68
45-49	5.700	0.105	1989.8	52	79

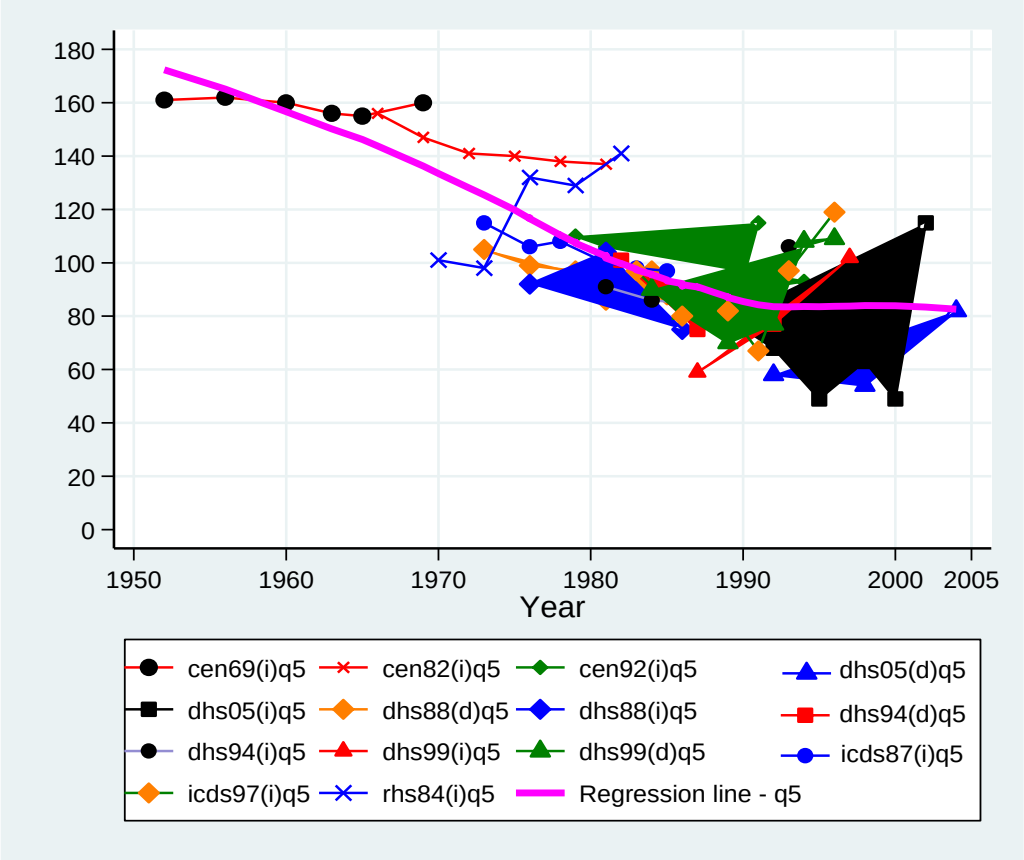
Source: Output from MORTPAK

Figure 4.18: Infant Mortality Data and Estimated Trend, (Direct and Indirect Estimates) 1950-2005, Zimbabwe



Source: Output from Stata based on published mortality rates obtained from various reports.

Figure 4.19: Under-5 Mortality Data and Estimated Trend, 1950-2005 (Direct and Indirect Estimates), Zimbabwe



Source: Output from Stata based on published mortality rates obtained from various reports.

Table 4.12: Age-specific Mortality Rates for Women aged 15-49 years based on the Survivorship of Sisters of Survey Respondents, Zimbabwe

Age	**1996-1999**	**2000-2005**
15-19	2.82	2.69
20-24	6.01	5.47
25-29	11.17	12.25
30-34	14.72	20.42
35-39	15.73	25.04
40-44	12.85	25.23
45-49	13.16	25.48
15-49	**9.14**	**12.66**

Note: Rates are age-standardised and are measured per 1,000 women in each age group. The rates for the 1999 ZDHS refer to the period 0-4 years before the survey and for the 2005-06 ZDHS to the period 0-6 years before the survey.

Source 1: Compilation from published report [Zimbabwe Central Statistical Office/ Macro International Inc14,21]

Table 4.13: HIV Prevalence Rates for Adults aged 15-44 years by Rural and Urban Area, 1996 - 2006, Zimbabwe

Year	Rural	Urban
1996	31.5	35.6
1997	29.9	33.7
1998	28.3	31.8
1999	26.7	29.9
2000	28.1	30.2
2001	20.9	25.3
2002	22.8	24.5
2003	18.8	20.1
2004	16.8	18.3
2005	17.2	18.6
2006	17.6	18.9

Source: 1996 -1999 & 2005 HIV prevalence rates are from author calculations based on estimates from Mahomva A, Greby S, Dube S, et al.[68]

2000 - 2004 HIV prevalence rates Mahomva A, Greby S, Dube S, et al.[68]

2006 HIV prevalence rates Central Statistical Office/ DHS Macro International Inc[21]

CHAPTER 5

RESULTS OF THE BIVARIATE ANALYSIS

5.1 Introduction

Chapter Five presents results of the bivariate Cox proportional hazards models depicting the impact of maternal, socioeconomic, environmental contamination and personal illness control variables on infant and child mortality. This chapter also presents crude mortality rates. These are crude unadjusted mortality rates which have not been calculated through the life table approach. The results on the multivariate hazards models are presented and analysed in Chapter 6.

5.2 Description of the Covariates

5.*2.1 Maternal Variables*

The maternal variables included in this analysis are presented in Table 5.1 and include birth order, preceding birth interval, mother's age at birth, sex of child, type of birth and perceived birth size as these have been demonstrated to be strongly related to infant and child survival.[33,53,58] The Maternal and Child Health care programme in Zimbabwe considers a woman to be at high risk of pregnancy complications if she has (among other factors) a preceding birth interval of less than 24 months and/ or has had five or more births. The two related variables: birth order and preceding birth interval share the category of first births so this creates a problem in that the design matrix would be similar. Specifically the problem is that two variables cannot share a similar category. Combining birth order and the preceding birth interval into a single variable avoids this problem.[33] Sex of the child was included as female infants generally experience lower mortality than males, unless there are strong sex-of-child preferences in favour of males, in which case the position may be reversed. This variable was

included in the group of maternal variables because it has strong links with many of the other maternal variables.

5.2.2 Socioeconomic Variables

Several background measures of socioeconomic status are included in the analysis. These variables are presented in Table 5.2. The variables selected were rural-urban residence, maternal and partner's education, wealth status and province of residence. The inclusion of rural-urban residence and province variables enables the study of geographical effects on infant and child mortality. The Zimbabwe Demographic and Health Surveys have repeatedly shown infant and child mortality variations by province and rural-urban residence in Zimbabwe. Infant and childhood mortality has always been lower in urban than in rural areas of Zimbabwe. [13,14,21,50]

Maternal education not only acts as an indicator of socioeconomic status but is also thought to have a direct effect by influencing maternal behaviour.[24,43] Partner's education may act in a similar way and may be more influential in societies where female education is universally low and where mothers have little or no autonomy.[43] It is further expected that children born to mothers with a low wealth status experience lower survival rates than those born to mothers of middle or high wealth status.

5.2.3 Environmental Contamination Variables

The variables included under environmental contamination are presented in Table 5.3 and include the availability in the household of piped drinking water and flush toilets. The availability of these amenities has a direct effect on infant and child mortality through influencing exposure to water-borne diseases such as cholera, dysentery and blastocystosis (chronic diarrhoea).[69,56]

5.2.4 Personal Illness Control Variables

Variables included in this category are antenatal visits and place of birth of the child. These variables are presented in Table 5.4. We do anticipate a positive relationship between antenatal visits and child survival. The Ministry of Health in Zimbabwe encourages mothers to attend antenatal care as this has direct benefits for the survival of their children. With respect to place of birth, various studies have shown that births that occur in a clinic or hospital have greater chances of survival than those that occur at home.[33,38,58] The children may get better treatment in hospitals during and after delivery, but they are also often high-risk births to begin with. The advantage of treatment in hospitals outweighs that of the selection bias of high risk cases. Therefore we expect births occurring at clinics or hospitals to experience higher survival prospects than those that occur at home.

5.3 Bivariate Proportional Hazards Regression Models

5.3.1 Impact of Maternal Covariates on Infant and Child Mortality

Table 5.5 presents data on the impact of maternal covariates on infant and child mortality. The covariates analysed are birth order and preceding birth interval, mother's age at birth, sex of child, weight of child at birth and type of birth. Relative to children of order 2-5 and long birth interval, children of order 6+ and short birth interval are 2.56 times more likely to die in infancy ($p<0.001$). First births are associated with a 14 percent more chance of dying in infancy relative to births of order 2-5 and long birth interval. Children of birth order 6+ and long birth interval have a 25 percent higher probability of dying in infancy relative to children of order 2-5 and long birth interval. The impact of birth order and preceding birth interval on child mortality is smaller than that on infant mortality. The relative risk of dying in child age for births of order 6+ and short birth interval is 1.11 times more relative to births of order 2-5 and long birth interval. Children of birth order 2-5 and short preceding

birth interval are 1.38 times more likely to die in child age than those of birth order 2-5 and long birth interval. These findings support the hypothesis that birth spacing enhances infant and child survival but it should be added that the differences shown above often did not reach statistical significance.

There is a U-shaped relationship between maternal age and infant mortality. Children born to younger women (below 20 years of age) experience higher mortality in the first year of life relative to those born to women aged 30-39 years (RR = 1.12). There is an even more elevated mortality risk of 1.18 to infants born to older mothers, which is those aged 40-49 years, relative to mothers aged 30-39 years. However, there is hardly any relationship between maternal age and child mortality and the risk ratios are also not statistically significant.

We expected a U-shaped relationship between birth order and mortality and between maternal age and mortality. We find this more or less the case in infancy but not in childhood. We also observe in Table 5.5 very low child mortality among first births (RR =0.70) relative to children of birth order 2-5 and long birth interval and very low mortality of children born to women aged 40-49 years (RR= 0.32) relative to those born to women aged 30-39 years. These last two results are deviations from the expected pattern. These deviations are only observed in the 2005-06 ZDHS survey and not in the other three rounds of the ZDHS surveys.

We also found that female children experience lower mortality risks of dying in infancy than their male counterparts. The risk ratio of dying in infancy for female children is 0.97. We further observe that there is hardly any relationship between sex of child and child mortality.

Multiple births have an elevated risk of death during infancy of a factor of 2.07 ($p<0.001$) relative to singleton births. The impact of the type of birth during the childhood period is diminished and non-significant as compared to the infancy period.

Children perceived to be "average or larger" at birth by their mothers at the time of the survey experience significantly lower mortality relative to those perceived to be "small or very small" at birth. The relative risk of a birth perceived to be "average or larger" is 0.63 ($p<0.001$) relative to a birth perceived to be "small or very small".

5.3.2 Impact of Socioeconomic Covariates on Infant and Child Mortality

In this section we describe the impact of residence, maternal education, paternal education, wealth status and province on infant and child mortality. This data is presented in Table 5.6. The effect of living in a rural area increases the risks of infant and child mortality in Zimbabwe by a factor of 8 percent and 33 percent, respectively. The impact of type of residence is larger on child mortality than on infant mortality.

Maternal education increases the survival prospects of children. However, this could only be shown for child mortality. Children born to mothers with secondary education or more are 0.59 times less likely to die in child age than children born to mothers with no education but this difference did not reach statistical significance.

Paternal education improves child survival prospects. But once more, this is clearer in the childhood period than in infancy. Children born to fathers with secondary education or more have a 0.94 relative risk of dying in infancy and a 0.64 relative risk of dying in child age than those born to fathers who with no education.

Wealth status has a higher impact in childhood than during the infancy period. Children whose mothers were classified as “rich” are 0.83 less likely to die in child age than children born to mothers of “poor” wealth index. That those children whose mothers were classified as “middle” are associated with higher infant and child mortality is unexpected. This differential could be due to use of child care practices.

Provincial differentials on infant and child mortality are also present in Zimbabwe. The impact of province of residence is higher on child mortality than on infant mortality. Living in Matabeleland North province significantly reduces the risks of infant death by 44 percent ($p<0.01$) in relation to living in Manicaland province. Living in Matabeleland South province decreases the risks of child death by a factor of 65 percent ($p<0.05$) relative to living in Manicaland province. Likewise, living in Midlands province decreases the risks of child death by a factor of 54 percent ($p<0.05$) relative to living in Manicaland province. Bulawayo is associated with higher child survival prospects as compared to Harare. Living in Bulawayo significantly reduces the risks of infant death (RR= 0.53) and child death (RR=0.38) relative to living in Manicaland province ($p<0.05$). A similar pattern is observed for Harare province. The increase in child survival is enhanced during the childhood period as compared to the infancy period, but is not statistically significant.

5.3.3 Impact of Environmental Covariates on Infant and Child Mortality

Table 5.7 presents data on the impact of environmental variables on infant and child mortality. Similar to socioeconomic variables, the impact of environmental contamination variables is larger during the childhood age than during the infancy period.

The effects of piped drinking water on infant and child mortality are in the expected direction, although they are not significant. Relative to children born in households without piped drinking water, the relative risks of infant and child death for children born to households with piped drinking water are reduced by a factor of 5 percent and 10 percent, respectively. The presence of a flush toilet in the household reduces infant mortality by 12 percent relative to households without flush toilets. It decreases the odds of child mortality by 34 percent compared to households without flush toilets.

5.3.4 Impact of Personal Illness Control Covariates on Infant and Child Mortality

Finally, Table 5.8 presents data on the impact of personal illness control variables on infant and child mortality. The two variables analysed in this category are antenatal care and place of delivery of the child.

Information on antenatal care is of great value in identifying subgroups of women who do not utilise such services and is useful in planning improvements in the services. The data in Table 5.8 indicates that antenatal care significantly elevates infant survival. Children whose mothers undertook at least one antenatal care visit are 0.59 times less likely to die in infancy than those whose mothers did not use any antenatal care ($p<0.05$).

Proper medical attention and hygienic conditions during delivery can reduce the risks of complications and infections that cause morbidity and mortality to either the mother or the baby. Table 5.8 also presents the relative risks associated with place of delivery of the child. Giving birth at a health facility reduces the likelihood of infant and child mortality by factors of 13 percent and 30 percent ($p<0.05$), respectively.

5.4 Comparison of 2005-06 ZDHS with Two Other ZDHS surveys

In this section we compare the results of the impact of birth order, maternal age and education from the 2005-06 ZDHS survey with results from the 1994 and 1999 surveys. These results are presented in Table 5.9. We do this in order to show the relative change in the impact of these variables on under-five mortality from the period 1990-1994 to the period 2001-2005. The relationship between birth order and under-five mortality is U-shaped indicating higher mortality for first births and higher order births during 1990-1994 and 1995-1999. During 2001-2005 the relationship between birth order and under-five mortality is linear indicating the diminished impact of birth order on under-five mortality. We note that the changes in the relative risks of dying in under-five age are not substantial between 1990-1994 and 2001-2005.

The relationships between maternal age and under-five mortality during 1990-1994 and 1995-1999 are U-shaped. However the U-shaped relationship diminishes and is almost flattened in the 2005-06 survey. For instance, in the 1994 survey the children born to mothers aged less than 20 years experienced 34 percent higher mortality relative to children born to women aged 30-39 years. In the 1999 survey they experienced 21 percent higher mortality, and in the 2005-06 survey the effect of maternal age on under-five mortality is no longer discernible. A similar observation is obtained for the mortality situation of children born to older mothers, that is, those aged 40-49 years. Children born to mothers aged 40-49 years experienced 79 percent higher mortality in the 1994 survey, 61 percent higher mortality in the 1999 survey and 7 percent higher mortality in the 2005-06 survey relative to children born to mothers aged 30-39 years.

Further evidence of the diminishing impact of independent variables on under-five mortality is shown by the changes in the impact of maternal

education on under-five mortality from the 1994 survey to the 2005-06 survey. In the 1994 survey, children born to mothers who had completed secondary and above education experienced 39 percent lower mortality, in the 1999 survey they experienced 57 percent lower mortality and in the 2005-06 survey they experienced 9 percent lower mortality relative to children born to mothers with no education.

5.5 Impact of HIV/AIDS on Infant and Child Mortality

In this section the results of the impact of HIV/AIDS on infant and child mortality are presented. This is done by studying the results from the bivariate Cox regression model that consists of HIV prevalence as the independent variable and mortality as the dependent variable. The results are displayed in Table 5.10. These results indicate that a unit increase in HIV prevalence in Zimbabwe significantly elevates the risk of infant and child death by 10 percent and 50 percent, respectively ($p<0.001$). The results show an association between HIV/AIDS and mortality but not a causal relationship. These results suggest, however, that it is likely that HIV/AIDS has in Zimbabwe influenced the rate of infant and child death directly or indirectly. The association between HIV/AIDS and infant and child mortality in the presence of maternal, socioeconomic and environmental contamination variables in the multivariate analysis will be explored further in Chapter 6.

5.6 Concluding Remarks

The results presented in this chapter deal with the impact of the relationships between maternal, socioeconomic, environmental contamination, personal illness covariates and HIV/AIDS on infant and child mortality. It has been observed that the endogenous or maternal variables are important during the infancy period while exogenous or socioeconomic and environmental contamination variables are central during the childhood stage. Relationships reached statistical significance

for a few of the variables, but not for many others. Relationships of independent variables with dependent variables in the 2005-06 ZDHS survey are often smaller than in the two previous ZDHS surveys, namely the 1994 and the 1999 surveys.

For example, the 1994 and 1999 surveys show a U-shaped relationship between birth order and under-five mortality. But in the 2005-06 survey this U-shaped relationship is flattened. This is a deviation from the expected pattern. The 1994 and 1999 ZDHS surveys also show a larger impact of maternal education on under-five mortality than in the 2005-06 survey. The impact of the education of the mother on under-five mortality completely disappears in 2005-06 in Zimbabwe. These results are rather unexpected and are not in line with observations from other surveys conducted in neighbouring countries such as South Africa.

It could be that these unexpected results are explained by the hypothesis mentioned in Chapter 4 that certain high risk mothers and subsequently their high risk births were missing in the 2005-06 ZDHS survey having died between the time of the 1999 and 2005-06 surveys. It is therefore these “missing mothers” which could explain these observed, unexpected results dealing with the lack of expected relationships between the independent variables and infant and child mortality in the 2005-06 ZDHS survey.

For instance, it could be that there is a group of HIV positive women who are older (30 years and older) and who died and who had children under the age of five years with higher than average mortality. This group could be missing in the 2005-06 ZDHS survey and could not be interviewed. This means that the observed infant and child mortality rates among women 30 years and older are actually too low. These

rates would have been higher if these missing women could have been interviewed.

An argument against this hypothesis is that there is no discernible change in the distribution of women interviewed in the 2005-06 ZDHS in comparison with the previous surveys (see Figure 3.2). It was also found that HIV/AIDS significantly elevates infant and child mortality in Zimbabwe. However, it must be noted that these results suggest a causal relationship; such a causal relationship was not proven. This relationship will be explored further in the multivariate analysis presented in Chapter 6.

The findings presented in this chapter should shed more light on the mortality situation of under-five children in Zimbabwe. The findings are therefore important for appropriate child health targeting and programming that is aimed at improving the survival prospects of under-five children. Chapter 6 presents the results from fitting the multivariate Cox proportional hazard models on infant and child mortality data.

Table 5.1: Absolute and Percent Distribution of Births and Under-five Deaths for Maternal Covariates, 1996-2005, (2005-06 ZDHS)

Maternal Covariate	**Number of Live Births**	**%**	**Number of Deaths**	**%**	**Rate per 1,000 Live Births[1]**
Birth order & preceding birth interval					
First births	3,046	32.1	185	30.6	60.7
2-5 and short	239	2.5	43	7.1	179.9
2-5 and medium	333	3.5	28	4.6	84.1
2-5 and long	4,900	51.6	271	44.9	55.3
6+ and short	61	0.6	15	2.4	245.9
6+ and medium	74	0.8	12	2.0	162.2
6+ and long	836	8.8	51	8.4	61.0
Maternal age					
<20 years	2,018	21.3	131	21.7	64.9
20-29 years	5,266	55.5	318	52.8	60.4
30-39 years	1,953	20.6	135	22.4	69.1
40-49 years	254	2.7	19	3.1	74.8
Sex of child					
Female	4,619	48.7	286	47.4	61.9
Male	4,872	51.3	317	52.6	65.1
Type of birth					
Multiple	277	2.9	51	8.5	184.1
Singleton	9,213	97.1	552	91.5	59.9
Birth size[2],					
Small/ very small	759	14.7	71	20.5	93.5
Average or larger	4,405	85.3	277	79.5	62.9
Total	*5,164*	*100.0*	*348*	*100.0*	*67.4*
Total	**9,491**	**100.0**	**603**	**100.0**	**63.5**

[1] These are crude unadjusted mortality rates and they are not calculated with the life table method.
[2] The 2005-06 ZDHS survey collected information on birth size for under-five children in the period five years before the survey. The total number of under-five births was 5,474. The difference between 5,474 and 5,164 is due to missing values.

Source: Author's calculations

Table 5.2: Absolute and Percent Distribution of Births and Under-five Deaths for Socioeconomic Covariates, 1996-2005, (2005-06 ZDHS)

Socioeconomic Covariate	Number of Live Births	%	Number of Deaths	%	Rate per 1,000 Live Births
Residence					
Rural	6,720	70.8	440	72.9	65.5
Urban	2,770	29.2	163	27.1	58.8
Maternal education					
No education	500	5.3	29	4.8	58.0
Primary	3,689	38.9	247	40.9	67.0
Secondary and higher	5,301	55.9	328	54.3	61.9
Paternal education					
No education	798	8.4	60	10.0	75.2
Primary	2,754	29.0	168	27.9	61.0
Secondary and higher	5,938	62.6	374	62.1	63.0
Wealth status					
Poor	4,292	45.2	285	47.3	66.4
Medium	1,651	17.4	110	18.2	66.6
Rich	3,547	37.4	208	34.5	58.6
Province					
Manicaland	1,185	12.5	114	18.8	96.2
Mashonaland Central	1,018	10.7	62	10.3	60.9
Mashonaland East	766	8.1	50	8.2	65.3
Mashonaland West	977	10.3	67	11.1	68.6
Matabeleland North	612	6.4	37	6.1	60.5
Matabeleland South	452	4.8	18	3.0	39.8
Midlands	1,384	14.6	85	14.0	61.4
Masvingo	1,416	14.9	78	12.9	55.1
Harare	1,211	12.8	73	12.1	60.3
Bulawayo	470	5.0	21	3.4	44.7
Total	**9,491**	**100.0**	**603**	**100.0**	**63.6**

Source: Author's calculations Zimbabwe Central Statistical Office/ Macro International Inc21

Table 5.3: Absolute and Percent Distribution of Births and Under-five Deaths for Environmental Covariates, 1996-2005, (2005-06 ZDHS)

Environmental Contamination Covariate	**Number of births**	**%**	**Number of deaths**	**%**	**Rate per 1,000 Live Births**
Piped drinking water					
Yes	3,182	33.5	194	32.1	61.0
No	6,309	66.5	409	67.9	64.8
Flush toilet					
Yes	2,689	28.3	155	25.7	57.6
No	6,801	71.7	448	74.3	65.9
Total	**9,491**	**100.0**	**603**	**100.0**	**63.5**

Source: Author's calculations [Zimbabwe Central Statistical Office/ Macro International Inc21]

Table 5.4: Absolute and Percent Distribution of Births and Under-five Deaths for Personal Illness Control Covariates, 2001-2005, (2005-06 ZDHS)

Personal Illness Control Covariate[1]	Number of births	%	Number of deaths	%	Rate per 1,000 Live Births
Antenatal visits					
None	206	5.1	19	9.5	92.2
At least one visit	3,846	94.9	179	90.5	46.5
Total	*4,052*	*100.0*	*198*	*100.0*	*48.9*
Place of delivery					
Home	1,627	31.4	135	38.7	83.0
Hospital/ clinic	3,551	68.6	214	61.3	60.3
Total	*5,178*	*100.0*	*349*	*100.0*	*67.4*
Total	**5,474**	**100.0**	**371**	**100.0**	**67.8**

[1] The 2005-06 ZDHS survey collected information on antenatal visits and place of delivery for under-five children born in the period five years before the survey. The total number of under-five births was 5,474.

The difference between 5,474 and the totals for antenatal visits and place of delivery is due to missing values. There were 371 deaths to under-five children born in the period five years before the 2005-06 ZDHS survey.

Source: Author's calculations Zimbabwe Central Statistical Office/ Macro International Inc21

Table 5.5: Impact of Maternal Variables on Infant and Child Mortality, Bivariate Analysis, 1996-2005, (2005-06 ZDHS)

Maternal Covariate	Infant Mortality		Child Mortality	
	Relative Risk	Confidence Interval	Relative Risk	Confidence Interval
Birth order and preceding birth interval				
First births	1.143	0.925-1.412	0.700	0.472-1.038
2-5 and short	1.409	0.994-1.996	1.384	0.562-3.412
2-5 and medium	1.474	0.957-2.271	0.857	0.348-2.113
2-5 and long	1.000	----------	1.000	----------
6+ and short	2.561***	1.490-4.403	1.113	0.155-7.995
6+ and medium	1.003	0.530-1.897	0.672	0.094-4.829
6+ and long	1.246	0.910-1.706	1.024	0.591-1.773
Maternal age				
<20 years	1.120	0.849-1.477	0.893	0.562-1.419
20-29 years	1.032	0.822-1.295	0.748	0.505-1.107
30-39 years	1.000	----------	1.000	----------
40-49 years	1.181	0.724-1.926	0.318	0.077-1.320
Sex of Child				
Female	0.973	0.815-1.163	1.010	0.731-1.395
Male	1.000	----------	1.000	----------
Type of birth				
Multiple	2.068***	1.557-2.748	1.501	0.663-3.399
Singleton	1.000	----------	1.000	----------
Birth size[1]				
Small/very small	1.000	----------	1.000	----------
Average or larger	0.630***	0.476-0.834	0.821	0.440-1.533

*$p < 0.05$, **$p < 0.01$, ***$P < 0.001$

[1] Refers to the five-year period preceding the 2005-06 ZDHS survey.

Table 5.6: Impact of Socioeconomic Variables on Infant and Child Mortality, Bivariate Analysis, 1996-2005, (2005-06 ZDHS)

Socioeconomic Covariate	Infant Mortality		Child Mortality	
	Relative Risk	Confidence Interval	Relative Risk	Confidence Interval
Residence				
Rural	1.080	0.871-1.341	1.326	0.892-1.971
Urban	1.000	----------	1.000	----------
Maternal education				
No education	1.000	----------	1.000	----------
Primary	1.023	0.680-1.539	0.792	0.407-1.541
Secondary and higher	1.008	0.672-1.511	0.587	0.303-1.138
Paternal education				
No education	1.000	----------	1.000	----------
Primary	1.003	0.723-1.393	0.680	0.387-1.195
Secondary and higher	0.938	0.689-1.277	0.636	0.379-1.070
Wealth status				
Poor	1.000	----------	1.000	----------
Middle	1.101	0.869-1.395	1.188	0.783-1.802
Rich	0.972	0.791-1.194	0.830	0.569-1.211
Province				
Manicaland	1.000	----------	1.000	----------
Mashonaland Central	0.815	0.572-1.160	0.600	0.324-1.111
Mashonaland East	0.927	0.632-1.359	0.748	0.384-1.457
Mashonaland West	0.894	0.640-1.248	0.621	0.330-1.166
Matabeleland North	0.563**	0.378-0.838	0.617	0.317-1.202
Matabeleland South	0.678	0.431-1.067	0.349*	0.145-0.836
Midlands	1.136	0.835-1.546	0.461*	0.252-0.843
Masvingo	0.903	0.650-1.255	0.665	0.375-1.177
Harare	0.796	0.553-1.145	0.591	0.327-1.069
Bulawayo	0.533*	0.316-0.898	0.379*	0.148-0.976

*$p < 0.05$, **$p < 0.01$, ***$P < 0.001$

Table 5.7: Impact of Environmental Contamination Variables on Infant and Child Mortality, Bivariate Analysis, 1996-2005, (2005-06 ZDHS)

Environmental Contamination Covariate	Infant Mortality		Child Mortality	
	Relative Risk	Confidence Interval	Relative Risk	Confidence Interval
Piped drinking water				
Yes	0.965	0.791-1.178	0.899	0.629-1.286
No	1.000	----------	1.000	----------
Flush toilet				
Yes	0.876	0.707-1.086	0.663	0.437-1.007
No	1.000	----------	1.000	----------

*$p < 0.05$, **$p < 0.01$, ***$P < 0.001$

Source: Author's calculations Zimbabwe Central Statistical Office/ Macro International Inc21

Table 5.8: Impact of Personal Illness Control Variables on Infant and Child Mortality, Bivariate Analysis, 2001-2005, (2005-06 ZDHS)

Personal Illness Control Covariate[1]	**Infant Mortality**		**Child Mortality**	
	Relative Risk	**Confidence Interval**	**Relative Risk**	**Confidence Interval**
Antenatal visits				
None	1.000	----------	n/a[2]	n/a
At least one visit	0.588*	0.372-0.931	n/a	n/a
Place of delivery				
Home	1.000	----------	1.000	----------
Hospital/ clinic	0.867	0.685-1.096	0.599*	0.370-0.968

**p < 0.05, **p < 0.01, ***P < 0.001*

[1] Relative risks for the five-year period before the 2005-06 ZDHS survey.
[2] Not computed due to relatively smaller numbers available for analysis.

Source: Author's calculations Zimbabwe Central Statistical Office/ Macro International Inc21

Table 5.9: Changes in the Impact of Birth Order, Maternal Age Age and Maternal Education on Under-five Mortality, 1985-1994 (1994 ZDHS), 1990-1999 (1999 ZDHS) and 1996-2005 (2005-06 ZDHS)

Variable	**1985-1994**	**1990-1999**	**1996-2005**
Birth Order	**Relative Risk**		
1	1.068	0.993	0.892
2-3	0.997	0.955	0.919
4-6	1.000	1.000	1.000
7+	1.084	1.223	1.081
Maternal age			
<20	1.343	1.207	0.972
20-29	1.214	1.122	0.944
30-39	1.000	1.000	1.000
40-49	1.794	1.605	1.069
Maternal education			
No education	1.000	1.000	1.000
Primary	0.845	0.790	1.029
Secondary+	0.608	0.434	0.906

Source: Author's calculations Zimbabwe Central Statistical Office/ Macro International Inc21

Table 5.10: Impact of HIV/AIDS on Infant and Child Mortality, Bivariate Analysis, 1996-2005, Zimbabwe

Variable	**Infant Mortality**		**Child Mortality**	
	Relative Risk	**Confidence Interval**	**Relative Risk**	**Confidence Interval**
HIV prevalence in rural/ urban area as at time of birth of child	1.100***	1.080-1.121	1.505***	1.429-1.585

*$p < 0.05$, **$p < 0.01$, ***$P < 0.001$

CHAPTER 6

DETERMINANTS OF INFANT AND CHILD MORTALITY: RESULTS OF MULTIVARIATE HAZARD ANALYSIS

6.1 Introduction

This chapter presents the analysis of the multivariate proportional hazards models on the impact of maternal, socioeconomic and environmental contamination variables on infant mortality (0-11 months) and child mortality (12- 59 months). Personal illness control variables presented in Chapter 5 have been omitted from the multivariate analysis in this chapter because they refer to the five years preceding the 2005-06 ZDHS survey. The analysis of two dependent variables, that is, infant and child mortality, is needed because of the differential impact of maternal, socioeconomic and environmental contamination variables on mortality in infancy and childhood.[27,33]

Sections 6.2 and 6.3 present the results from fitting the Cox proportional hazards models on infant and child mortality data from the 2005-06 ZDHS survey, respectively. Finally, section 6.4 presents some concluding remarks. These results offer an in-depth analysis of the 2005-06 ZDHS data and will be of interest to people working with public health and epidemiological studies of Zimbabwe with respect to infant and child mortality risk. In addition to the maternal, socioeconomic and environmental contamination variables, an estimate of the HIV prevalence as at the year of birth of child was included in the final models. The inclusion of HIV prevalence in the multivariate models should give an indication of the impact of HIV/AIDS on infant and child mortality in Zimbabwe. The results presented in the multivariate models in this chapter should be useful for the formulation of child health policies and child health programming in Zimbabwe. They should also

be useful in determining the direct and/or indirect impact of HIV/AIDS on infant and child mortality.

6.2 Infant Mortality

6.2.1 Impact of Maternal Variables on Infant Mortality

Model I presented in Table 6.1 shows whether introducing maternal age changes the relationship between the birth order and preceding birth interval variable and infant mortality. Comparison with Table 5.5 shows that introducing a control for maternal age decreases the relative risks associated with first births, order 2-5 and short preceding interval group and order 2-5 and medium preceding interval relative to order 2-5 and long preceding interval group. Introducing the same control increases the relative risks associated with order 6+ and short preceding interval, 6+ and medium preceding interval and 6+ and long preceding interval groups relative to infants in the order 2-5 and long preceding interval group. The high significance level ($p<0.001$) of order 6+ and short preceding interval is unaffected in the presence of maternal age. This underlines the importance of birth spacing in enhancing child survival prospects.

Model II, presented in Table 6.1, shows the impact of birth order and preceding birth interval and type of birth on infant mortality. Comparison is drawn again with data in Table 5.5. The impact of the type of birth on infant mortality marginally increases when we control for birth order and preceding birth interval from odds of 2.07 ($p<0.001$) in the absence of maternal age to odds of 2.09 ($p<0.001$) in the presence of any control. The odds of infant death for order 6+ and long preceding birth interval are marginally increased in the presence of type of birth.

Table 6.2 presents results on the impact of birth order and preceding birth interval, maternal age, sex of child and type of birth. In model I

results of three of these maternal reproductive variables and mortality are in the expected direction. The risks of dying are much higher among infants of higher order births and closely spaced. Relative to infants in the order 2-5 and long preceding birth interval group, the relative risk of infant deaths for infants in birth order 6+ and short preceding interval is 2.77 times higher ($p<0.001$). This model that is, model I in Table 6.2, is an extension of model I presented in Table 6.1. This is achieved through the addition of a control for sex of child. When we compare these results with those of Table 5.5 we observe that this control does not introduce any changes in the values nor pattern of the relative risks for birth order and preceding interval and maternal age. The presence of other maternal variables in model I elevates the impact of maternal age on infant mortality. This suggests that maternal age is an important determinant of infant mortality. Controlling for maternal reproductive variables in model I does not alter the U-shaped distribution of the impact of maternal age on infant mortality observed in the bivariate analysis (see Tables 5.5 and 6.2). Infants born to mothers aged less than 20 years and 20-29 years have an elevated mortality risk of 1.18 and 1.13 times, respectively, relative to infants born to mothers aged 30-39 years. These results were not statistically significant.

Model II in Table 6.2 adds the type of birth as a control variable. The odds of dying in infancy associated with birth order and preceding interval are reduced somewhat with the addition of the impact of the type of birth. The odds for sex of child and mortality remain largely unchanged. The U-shaped relationship of maternal age and infant mortality, indicating that younger (< 20 years) and older (40-49 years) mothers are associated with higher infant mortality relative to mothers aged 30-39 years, is not altered in the presence of all other maternal variables.

6.2.2 Impact of Socioeconomic Variables on Infant Mortality

Table 6.3 shows the estimated coefficients from fitting two hazard models on socioeconomic variables and infant mortality. The variables included in model I are type of residence and maternal and paternal education. Model II is extended to include controls for wealth index. In this analysis comparisons are drawn with data in Table 5.6. The impact of type residence and maternal and paternal education on infant mortality remain largely unchanged when these variables control for each other.

Cleland and van Ginneken[24] observed that education of the mother is associated with infant mortality. It is interesting to note that the results in Table 6.3 do not show any discernible impact of maternal education on infant mortality in Zimbabwe during 1995-2006. These results are consistent with those presented in Table 8.3 (p. 112) in the 2005-06 ZDHS survey report which also show lack of the impact of maternal education on infant mortality.[21] We further observe that the addition of wealth status in model II does not change the impact of the socioeconomic variables in model I on infant mortality.

Paternal education appears to have a favourable effect on infant mortality (see model I). Children born to fathers with secondary and higher education were 0.93 times less likely to die in infancy than those born to fathers with no education. The addition of controls for wealth index in model II generally decreases the estimated coefficients for the socioeconomic variables in model I. The small impact of wealth status as observed in Table 5.6 has disappeared in the presence of other socioeconomic variables (see Table 6.3). There is hardly any relationship between wealth status and infant mortality. One would expect infants born to mothers in wealthier households to experience

higher survival prospects than those born to mothers in poor households.

6.2.3 Impact of Environmental Contamination Variables on Infant Mortality

Model I presented In Table 6.4 shows environmental contamination indicators and infant mortality. The variables controlling for each other, included in model I are piped drinking water and flush toilet facility. As previously observed in Table 5.7, the availability of piped drinking water in the household decreases the odds of children dying in infancy by a factor of 4 percent. In the presence of a control for access to a flush toilet, the odds of children dying in infancy are reduced by a factor of 20 percent relative to infants born in households without piped drinking water. We further previously observed in Table 5.7 that access to a flush toilet decreases the odds of dying in infancy by a factor of 12 percent. In the presence of a control for piped drinking water observed in Table 6.4, this impact on infant mortality more than doubles to a factor of 28 percent. The risk ratios depicting the impact of piped drinking water and flush toilet on infant mortality are in the expected direction but are not statistically significant.

6.2.4 Impact of Maternal, Socioeconomic, Environmental Contamination Variables and HIV/AIDS on Infant Mortality

The model consisting of all maternal, socioeconomic, environmental contamination and HIV prevalence variables is presented in Table 6.5. Model I consists of maternal reproductive variables only while model II is an addition of socioeconomic variables to the maternal reproductive variables. Finally, model III adds the environmental contamination variables.

In model I the risk ratios for birth order and preceding birth interval and mortality are in the expected direction. Births of order 6 and more and

short preceding interval have the highest mortality risk. Infants with these characteristics are significantly more likely (2.75 times) to die in infancy relative to births of order 2-5 and long preceding birth interval ($p<0.001$). Infants of order 2-5 and short preceding interval experience 30 percent higher mortality than infants of order 2-5 and long preceding interval. These results underline the importance of parity and birth spacing in determining infant survival. High parity (birth order of 6+) and short preceding birth intervals (intervals of less than or equal to 18 months) predispose children to the risk of dying in infancy. Results in model I further show that the effect of giving birth at less than 20 years of age increases the risk of children dying in infancy by 15 percent relative to giving birth at age 30-39 years. Infants born to women aged 40-49 years experience 3 percent higher mortality risk relative those born to women aged 30-39 years. Giving birth at younger (less than 20 years) and older (40-49 years) maternal ages predisposes children to elevated mortality risks during infancy. Multiple births are associated with an elevated mortality risk. The infant mortality risk associated with multiple births is 2.08 times more relative to singleton births ($p<0.001$).

Model II is an extension of model I by the addition of socioeconomic controls that include place of residence, maternal education, paternal education and wealth index (see Table 6.5). Infants of order 6 and more and short preceding interval continue to exhibit the highest risk to death. The probability of such infants dying in infancy is 2.89 times more relative to infants of order 2-5 and long preceding interval. The U-shaped relationship of maternal age and infant mortality is not altered in the presence of maternal and socioeconomic variables. Model II presented in Table 6.5 also shows the impact of socioeconomic variables after controlling for maternal reproductive variables. We observe that socioeconomic variables do not have a distinct impact on infant mortality.

Model III adds controls for two household amenities namely the presence of piped drinking water and flush toilet. The bivariate analysis results (see Table 5.7) show that the presence of piped drinking water in the dwelling is associated with 3 percent less risk of dying in infancy compared to the reference category. The presence of a flush toilet is associated with 12 percent less risk of dying in infancy relative to the reference category. In the presence of maternal and socioeconomic variables the odds of dying for infants born to mothers in households with access to piped drinking water are reduced by 12 percent relative to infants born to mothers in households without access to piped drinking water. Again, in the presence of maternal and socio-economic variables, infants born to mothers in households with access to a flush toilet are associated with 38 percent less risk of dying in infancy compared to those born to mothers in households without access to a flush toilet. We further observe that although the odds ratios for piped drinking water and flush toilet are in the expected direction they are both not statistically significant.

Model IV is an extension of Model III with the addition of HIV prevalence as at the year of the birth of the child. We observe that one unit change in HIV prevalence significantly increases the hazard of infant death by 10 percent ($p<0.001$) in the presence of maternal, socioeconomic and environmental contamination variables. Introducing HIV prevalence in Model IV also alters, through a downward effect, the size of the impact of maternal, socioeconomic and environmental contamination variables on infant mortality. While association does not necessarily mean causation, the results in Model IV nevertheless suggest that HIV/AIDS influences the level of infant mortality in Zimbabwe either directly and/or indirectly. According to Hill, Bicego and May, the direct effects of HIV/AIDS on infant mortality occur when, for instance, seropositive children die at a higher rate than their seronegative counterparts.[5]

Indirect effects would occur when, for instance, parental care is incapacitated due to ill health due to HIV/AIDS or when the level of opportunistic infections such as tuberculosis is higher in areas with higher HIV prevalence than those with lower HIV prevalence. This would predispose children, both seropositive and seronegative, to the risk of contracting various infectious diseases.[5]

6.3 Child Mortality

6.3.1 Impact of Maternal Variables on Child Mortality

The results for the multivariate analysis for selected maternal variables for child mortality are presented in Table 6.6. Model I demonstrates that parity (with the exception of first births), maternal age and type of birth do not have a significant positive effect on child mortality as was also found with respect to infant mortality. Children of birth order 2-5 and short preceding interval are associated with a mortality risk of 1.29 times more relative to children of birth order 2-5 and long preceding interval. Only first births have a significant impact on child mortality. The odds of dying in child age for first births is 0.55 times less relative to children of order 2-5 and long preceding birth interval ($p<0.05$). The relationship of birth order and preceding interval and child mortality does not follow the expected U-shaped curve. A similar observation is drawn from the relationship between maternal age and child mortality. Children born to younger mothers that are those aged less than 20 years experienced 46 percent higher odds of dying in child age than those born to older mothers aged 30-39 years. Model II shows birth order and birth interval controlled by type of birth. Relationships with mortality are very similar to those of model I, except that the mortality of first-born children is now non-significant.

Model I presented in Table 6.7 shows that the addition of a control for sex of child does not alter the relationship among birth order and

preceding birth interval, maternal age and child mortality. Children of first birth order are significantly associated with 45 percent lower mortality risk ($p<0.05$) than children of birth order 2-5 and long preceding interval. The mortality risks associated with female and male children are nearly similar. The addition of a control for type of birth in model II in Table 6.7 does not also alter the relationship among the other maternal variables and child mortality. It is worthy commenting that being of a multiple births are associated with an elevated risk of child death than being singleton births. Although not significant, children who were of multiple births experienced 43 percent higher risk of child death than those who were singleton births (see Table 6.7).

6.3.2 Impact of Socioeconomic Variables on Child Mortality

Model I of Table 6.8 presents the multivariate analysis of place of residence, maternal and paternal education and wealth status and child mortality. Model II adds a control for wealth status. The results in model II follow a similar pattern to those in model I. We will discuss the results together. An association between residence and child mortality in the expected direction continues to exist in the presence of maternal and paternal education levels and wealth index. Living in rural areas increases the risk of child mortality by 18 percent relative to living in urban areas although the coefficients are not statistically significant. The risk ratios for maternal education imply declining child mortality with an increase in schooling. The impact of maternal and paternal education on child mortality is in the expected direction and is considerably stronger than that observed for infant mortality. Children whose mothers attained secondary and higher education are 36 percent less likely to die in child age relative to children whose mothers had no education (model II). These results are consistent with those observed in Table 8.3 (p. 112) in the 2005-06 ZDHS survey report.[21]

Father's education also has a substantial impact on child mortality; this is also different from results found in the infant period. Attaining secondary and higher education decreases the risks of child deaths by 30 percent relative to having no education (model II). Results of model II show that wealth status appears to have no discernible impact on child mortality in the presence of type of residence, maternal and paternal education.

6.3.3 Impact of Environmental Contamination Variables on Child Mortality

Model I in Table 6.9 shows that, as expected, the availability of piped drinking water and a flush toilet has a substantial impact on child mortality. The availability of piped drinking water in the dwelling significantly decreases the risks of child death by 43 percent ($p<0.05$). The availability of a flush toilet in the dwelling significantly decreases the risk of child mortality by 60 percent ($p<0.01$). The impact of environmental contamination variables is considerably stronger on child mortality than on infant mortality. These findings are of fundamental importance for child health programming in Zimbabwe where only 30 and 40 percent of households have access to piped drinking water and flush toilet facilities, respectively.

6.3.4 Impact of Maternal, Socioeconomic and Environmental Variables and HIV/AIDS on Child Mortality

The results of the impact of all independent variables (maternal, socioeconomic, environmental contamination and HIV prevalence) on child mortality are presented in Table 6.10. It is immediately clear that determinants of child mortality are different in relative importance from those of infant mortality. The results in model I (Table 6.10) are similar to those presented in model I (Table 6.7). Again, the results in model II of Table 6.10 as far as the maternal variables are concerned, are nearly similar to those of model I in the same table. Model III is an extension of

model II by the addition of environmental contamination variables. This does not substantially change the impact of maternal and socioeconomic variables as observed in model II. The results presented in the full model (model III) demonstrate that children who are the first-born have lower mortality than children of other birth orders. Children who are first-born are 0.57 times less likely to die in child age relative to children of birth order 2-5 that follow a long preceding interval. Furthermore, in the full model, order 6 and more and short preceding interval and type of birth do not have any significant effects on child mortality. There was such an impact with respect to infant mortality (see Table 6.5).

There continues to be an association between residence and child mortality in the presence of maternal and environmental contamination variables. Living in rural areas increases the risks of child death by 26 percent relative to children living in urban areas. This was also found in the tables dealing with infant mortality (see Table 6.5). The coefficients depicting the impact of type of residence on infant and child mortality are in both cases not statistically significant.

The effect of maternal education, though not significant, implies a decline in child mortality with increasing maternal schooling. Relative to children whose mothers had no education, the relative risks of child death for children whose mothers completed primary and secondary and higher education are reduced by 24 percent and .41 percent, respectively. Father's education has a substantial effect on child mortality unlike in the infant period. Attaining secondary and higher education reduces the relative risks of child death by 33 percent relative to fathers with no education.

Model III further confirms that environmental contamination variables are more important during the child age than during the infant age. The effect of the availability of piped drinking water in the dwelling is in the expected negative direction even though it is non-significant. The odds of dying in child age for children born in households with access to piped drinking water are reduced by 39 percent relative to those born in households without access to piped drinking water. The effect of the availability of a flush toilet on child mortality is also in the expected negative direction and is significant. Relative to children born in households with no access to a flush toilet, the relative risks of death for children born in households with access to a flush toilet are reduced by 60 percent ($p<0.01$). This underlines the importance of good quality sanitation in preventing diseases such as cholera, diarrhoea and dysentery. Flush toilets ensure the proper disposal of faeces, which is important in preventing the spread of these diseases.

Model IV shows the addition of HIV prevalence to maternal, socioeconomic and environmental contamination variables presented in Model III. HIV prevalence does have a significant impact on child mortality in Zimbabwe. One unit change in HIV prevalence significantly increases the hazard of child mortality in Zimbabwe by 63 percent ($p<0.001$) in the presence of maternal, socioeconomic and environmental contamination variables. However, as previously noted, these results should be treated with caution since association does not necessarily imply causation. What these observations suggest, however, is that HIV/AIDS either directly or indirectly influences the level of child mortality in Zimbabwe. The possible direct and indirect effects have been discussed in section 6.2.4.

6.4 Concluding Remarks

The results of the multivariate analysis presented in this chapter are in broad agreement with those of Chapter 5. In general the strengths of the relationships of the independent (maternal, socioeconomic and environmental contamination) variables with the dependent variables (infant and child mortality) remain much smaller in the 2005-06 ZDHS survey than in the other ZDHS surveys. For instance, the results from the 1994 and 1999 ZDHS surveys show a larger impact of maternal education on infant mortality than in the 2005-06 survey. The impact of the education of the mother on infant mortality completely disappears in 2005-06 in Zimbabwe. These results are rather unexpected and are not in line with observations from other surveys conducted in neighbouring countries such as South Africa. We already commented on these results in the final section of Chapter 5.

The multivariate analysis produced only relatively small changes in the strengths of the relationships between independent and dependent variables compared to the bivariate analysis. In the multivariate analysis we found again a lack of a U-shaped relationship between birth order and mortality and maternal age and mortality both in the bivariate and multivariate analysis.

We expect that children born to young mothers (aged less than 20 years) and those born to older mothers (aged 40-49 years) should have higher mortality than those born to mothers aged 20-39 years. The lower risks to child death among children who are first born and those born to mothers aged 40-49 years found in this chapter are deviations from the expected mortality pattern and require further investigation.

The findings further suggest the following: birth order and preceding birth intervals, maternal age and type of birth are dominant determinants

of infant mortality, but they are less pronounced in child mortality. Maternal schooling has a marginal impact on infant mortality. Both maternal and paternal education affects child mortality.

On sanitation, the findings indicated that the provision of piped drinking water and flush toilets to the households has a stronger impact on child mortality than infant mortality. The findings support the thesis that endogenous factors are dominant during infancy while exogenous factors are dominant during the childhood age. The results on the impact of HIV/AIDS on mortality showed that HIV/AIDS significantly increases the risk of dying during infancy and childhood age in Zimbabwe. These results are consistent with observations made in Kenya by Hill, Bicego and May.[5] Furthermore, the results are important in shaping appropriate strategies for the reduction of infant and child mortality and the control of the spread of the HIV/AIDS epidemic.

We conclude that the findings presented in this chapter provide further evidence on the importance of practicing child spacing methods. Women and men living in urban areas or with higher educational levels are more likely to use a family planning method.[14,21] Thus family and health planning in Zimbabwe should be directed at educating men and women with low educational levels and those in rural areas about the benefits of long birth spacing and encouraging them to use birth spacing methods. Such policies may be expected in the long run to reduce childhood mortality and possibly socioeconomic variations in mortality as well.

Frailty proportional hazard models are presented in Chapter 7. They are extensions of Chapter 6 and allow for the estimation of the effect of unmeasured and immeasurable factors on the risk of infant and child death.

Table 6.1: Impact of Selected Maternal Variables on Infant Mortality, Hazard Model Estimates of Relative Risks (RR), 1996-2005 (2005-06 ZDHS)

Covariate	Model I		Model II	
	Relative Risk	Confidence Interval	Relative Risk	Confidence interval
Birth order and preceding birth interval[1]				
First births	1.093	0.854-1.398	1.149	0.930-1.420
2-5 and short	1.363	0.951-1.954	1.409	0.994-1.996
2-5 and medium	1.423	0.918-2.206	1.519	0.986-2.340
2-5 and long	1.000	----------	1.000	----------
6+ and short	2.772***	1.563-4.916	2.604***	1.515-4.477
6+ and medium	1.081	0.558-2.093	1.065	0.562-2.017
6+ and long	1.345	0.916-1.976	1.251	0.914-1.712
Maternal age				
<20 years	1.178	0.819-1.695	-	-
20-29 years	1.138	0.861-1.503	-	-
30-39 years	1.000	----------	-	-
40-49 years	1.044	0.624-1.746	-	-
Type of birth				
Multiple			2.092***	1.574-2.782
Singleton			1.000	----------

*p<0.05, **p<0.01, ***p<0.001

[1] Preceding birth interval: short <= 18 months, medium 19-23 months, long 24+ months.

Source: Author's calculations

Table 6.2: Impact of All Maternal Variables on Infant Mortality, Hazard Model Estimates of Relative Risks (RR), 1996-2005 (2005-06 ZDHS)

Covariate	Model I		Model II	
	Relative Risk	**Confidence Interval**	**Relative Risk**	**Confidence interval**
Birth order and preceding birth interval[1]				
First births	1.092	0.854-1.397	1.101	0.859-1.411
2-5 and short	1.366	0.953-1.959	1.369	0.955-1.962
2-5 and medium	1.420	0.916-2.202	1.474	0.950-2.286
2-5 and long	1.000	----------	1.000	----------
6+ and short	2.771***	1.562-4.914	2.747***	1.544-4.884
6+ and medium	1.081	0.558-2.093	1.121	0.578-2.172
6+ and long	1.341	0.912-1.971	1.316	0.898-1.929
Maternal age				
<20 years	1.176	0.817-1.692	1.147	0.796-1.653
20-29 years	1.134	0.857-1.500	1.090	0.824-1.443
30-39 years	1.000	----------	1.000	----------
40-49 years	1.043	0.623-1.744	1.032	0.618-1.725
Sex of child				
Female	0.977	0.816-1.170	0.992	0.829-1.187
Male	1.000	----------	1.000	----------
Type of birth				
Multiple			2.080***	1.562-2.768
Singleton			1.000	----------

*p<0.05, **p<0.01, ***p<0.001

[1] Preceding birth interval: short <= 18 months, medium 19-23 months, long 24+ months.

Source: Author's calculations Zimbabwe Central Statistical Office/ Macro International Inc 21

Table 6.3: Impact of Socioeconomic Variables on Infant Mortality, Hazard Model Estimates of Relative Risks (RR), 1996-2005 (2005-06 ZDHS)

Covariate	Model I		Model II	
	Relative Risk	**Confidence Interval**	**Relative Risk**	**Confidence interval**
Residence				
Rural	1.082	0.860-1.362	1.095	0.765-1.568
Urban	1.000	----------	1.000	----------
Maternal education				
No education	1.000	----------	1.000	----------
Primary	1.041	0.691-1.569	1.024	0.678-1.546
Secondary and higher	1.071	0.702-1.634	1.037	0.673-1.598
Paternal education				
No education	1.000	----------	1.000	----------
Primary	1.001	0.721-1.389	1.002	0.722-1.391
Secondary and higher	0.935	0.681-1.283	0.934	0.680-1.283
Wealth status				
Poor			1.000	----------
Middle			1.103	0.866-1.406
Rich			1.048	0.745-1.475

*p<0.05, **p<0.01, ***p<0.001

Source: Author's calculations Zimbabwe Central Statistical Office/ Macro International Inc 21

Table 6.4: Impact of Environmental Contamination Variables on Infant Mortality, Hazard Model Estimates of Relative Risks (RR), 1996-2005 (2005-06 ZDHS)

Covariate	Model I	
	Relative Risk	**Confidence interval**
Piped drinking water		
Yes	0.805	0.571-1.134
No	1.000	----------
Flush toilet		
Yes	0.723	0.499-1.047
No	1.000	----------

*p<0.05, **p<0.01, ***p<0.001

Source: Author's calculations

Table 6.5: Impact of All Independent Variables on Infant Mortality, Hazard Model Estimates of Relative Risks (RR), 1996-2005 (2005-05 ZDHS)

Covariate	Model I		Model II	
	Relative Risk	Confidence Interval	Relative Risk	Confidence interval
Birth order and preceding birth interval				
First births	1.101	0.859-1.411	1.098	0.852-1.416
2-5 and short	1.369	0.955-1.962	1.387	0.958-2.007
2-5 and medium	1.474	0.950-2.286	1.481	0.950-2.310
2-5 and long	1.000	----------	1.000	----------
6+ and short	2.747***	1.544-4.884	2.887***	1.598-5.216
6+ and medium	1.121	0.578-2.172	1.146	0.584-2.250
6+ and long	1.316	0.898-1.929	1.333	0.903-1.968
Maternal age				
<20 years	1.147	0.796-1.653	1.150	0.788-1.678
20-29 years	1.090	0.824-1.443	1.092	0.816-1.461
30-39 years	1.000	----------	1.000	----------
40-49 years	1.032	0.618-1.725	1.080	0.616-1.892
Sex of child				
Female	0.992	0.829-1.187	0.987	0.823-1.185
Male	1.000	----------	1.000	----------
Type of birth				
Multiple	2.080***	1.562-2.768	2.086***	1.563-2.785
Singleton	1.000	----------	1.000	----------
Residence				
Rural			1.020	0.708-1.470
Urban			1.000	----------
Maternal education				
No education			1.000	----------
Primary			1.071	0.658-1.742
Secondary and higher			1.039	0.619-1.742
Paternal education				
No education			1.000	----------
Primary			1.109	0.791-1.556
Secondary and higher			1.117	0.800-1.559
Wealth status				
Poor			1.000	----------
Middle			1.096	0.857-1.402
Rich			1.022	0.723-1.444

Table 6.5 (Continued)

Covariate	Model III		Model IV	
	Relative Risk	Confidence interval	Relative Risk	Confidence interval
Birth order and preceding birth interval[1]				
First births	1.098	0.851-1.416	0.997	0.775-1.282
2-5 and short	1.398	0.966-2.025	1.183	0.812-1.724
2-5 and medium	1.477	0.945-2.308	1.347	0.862-2.105
2-5 and long	1.000	----------	1.000	----------
6+ and short	2.915***	1.613-5.265	2.692**	1.490-4.863
6+ and medium	1.149	0.585-2.256	0.962	0.483-1.919
6+ and long	1.337	0.906-1.975	1.198	0.808-1.778
Maternal age				
<20 years	1.132	0.775-1.653	1.104	0.756-1.614
20-29 years	1.090	0.815-1.459	1.026	0.764-1.378
30-39 years	1.000	----------	1.000	----------
40-49 years	1.081	0.617-1.894	1.172	0.683-2.011
Sex of child				
Female	0.979	0.816-1.176	0.957	0.798-1.149
Male	1.000	----------	1.000	----------
Type of birth				
Multiple	2.060***	1.541-2.754	1.825***	1.362-2.444
Singleton	1.000	----------	1.000	----------
Residence				
Rural	1.323	0.765-2.289	1.065	0.622-1.824
Urban	1.000	----------	1.000	----------
Maternal education				
No education	1.000	----------	1.000	----------
Primary	1.074	0.660-1.748	1.044	0.650-1.676
Secondary and higher	1.055	0.628-1.770	1.142	0.686-1.900
Paternal education				
No education	1.000	----------	1.000	----------
Primary	1.116	0.796-1.566	1.086	0.774-1.524
Secondary and higher	1.121	0.803-1.565	1.111	0.796-1.553
Wealth status				
Poor	1.000	----------	1.000	----------
Middle	1.082	0.845-1.386	1.044	0.815-1.337
Rich	1.086	0.722-1.633	1.080	0.711-1.641

[1] Preceding birth interval: short <= 18 months, medium 19-23 months, long 24+ months.

Table 6.5 (Continued)

Covariate	Model III		Model IV	
	Relative Risk	Confidence interval	Relative Risk	Confidence interval
Piped drinking water				
Yes	0.885	0.597-1.311	0.900	0.597-1.357
No	1.000	----------	1.000	----------
Flush toilet				
Yes	0.629	0.348-1.136	0.618	0.349-1.094
No	1.000	----------	1.000	----------
HIV prevalence in rural/ urban area as at birth of child			1.102***	1.081-1.123

*p<0.05, **p<0.01, ***p<0.001

Source: Author's calculations Zimbabwe Central Statistical Office/ Macro International Inc 21

Table 6.6: Impact of Selected Maternal Variables on Child Mortality, Hazard Model Estimates of Relative Risks (RR), 1996-2005 (2005-06 ZDHS)

Covariate	Model I		Model II	
	Relative Risk	Confidence Interval	Relative Risk	Confidence interval
Birth order and preceding birth interval[1]				
First births	0.547*	0.337-0.885	0.705	0.475-1.045
2-5 and short	1.290	0.521-3.193	1.391	0.564-3.428
2-5 and medium	0.806	0.325-1.998	0.868	0.352-2.140
2-5 and long	1.000	----------	1.000	----------
6+ and short	1.069	0.146-7.834	1.114	0.155-8.000
6+ and medium	0.788	0.108-5.741	0.681	0.095-4.892
6+ and long	1.198	0.631-2.276	1.003	0.578-1.742
Maternal age				
<20 years	1.462	0.795-2.688	-	
20-29 years	0.881	0.559-1.390	-	
30-39 years	1.000	----------	-	
40-49 years	0.295	0.069-1.256	-	
Type of birth				
Multiple			1.418	0.622-3.234
Singleton			1.000	----------

*p<0.05, **p<0.01, ***p<0.001

[1] Preceding birth interval: short <= 18 months, medium 19-23 months, long 24+ months.

Source: Author's calculations

Table 6.7: Impact of Maternal Variables on Child Mortality, Hazard Model Estimates of Relative Risks (RR), 1996-2005 (2005-06 ZDHS)

Covariate	Model I		Model II	
	Relative Risk	Confidence Interval	Relative Risk	Confidence interval
Birth order and preceding birth interval[1]				
First births	0.546*	0.337-0.885	0.549*	0.339-0.890
2-5 and short	1.288	0.520-3.192	1.295	0.523-3.207
2-5 and medium	0.806	0.325-1.998	0.816	0.329-2.022
2-5 and long	1.000	----------	1.000	----------
6+ and short	1.066	0.145-7.825	1.071	0.146-7.858
6+ and medium	0.787	0.108-5.739	0.800	0.110-5.830
6+ and long	1.198	0.631-2.277	1.177	0.619-2.239
Maternal age				
<20 years	1.462	0.796-2.688	1.471	0.800-2.704
20-29 years	0.881	0.559-1.390	0.886	0.561-1.398
30-39 years	1.000	----------	1.000	----------
40-49 years	0.295	0.069-1.256	0.294	0.069-1.253
Sex of child				
Female	1.011	0.732-1.398	1.011	0.732-1.398
Male	1.000	----------	1.000	----------
Type of birth				
Multiple			1.428	0.625-3.259
Singleton			1.000	----------

*p<0.05, **p<0.01, ***p<0.001

[1] Preceding birth interval: short <= 18 months, medium 19-23 months, long 24+ months.

Source: Author's calculations Zimbabwe Central Statistical Office/ Macro International Inc 21

Table 6.8: Impact of Socioeconomic Variables on Child Mortality, Hazard Model Estimates of Relative Risks (RR), 1996-2005 (2005-06 ZDHS)

Covariate	Model I		Model II	
	Relative Risk	Confidence Interval	Relative Risk	Confidence interval
Residence				
Rural	1.185	0.768-1.828	1.177	0.621-2.234
Urban	1.000	----------	1.000	----------
Maternal education				
No education	1.000	----------	1.000	----------
Primary	0.860	0.434-1.703	0.864	0.437-1.710
Secondary and higher	0.655	0.321-1.337	0.641	0.313-1.313
Paternal education				
No education	1.000	----------	1.000	----------
Primary	0.646	0.364-1.147	0.649	0.366-1.151
Secondary and higher	0.717	0.417-1.233	0.705	0.410-1.212
Wealth status				
Poor			1.000	----------
Middle			1.266	0.828-1.937
Rich			1.078	0.593-1.961

*p<0.05, **p<0.01, ***p<0.001

Source: Author's calculations Zimbabwe Central Statistical Office/ Macro International Inc 21

Table 6.9: Impact of Environmental Contamination Variables on Child Mortality, Hazard Model Estimates of Relative Risks (RR), 1996-2005 (2005-06 ZDHS)

Covariate	Model I	
	Relative Risk	**Confidence interval**
Piped drinking water		
Yes	0.573*	0.335-0.978
No	1.000	----------
Flush toilet		
Yes	0.403**	0.216-0.753
No	1.000	----------

*p<0.05, **p<0.01, ***p<0.001

Source: Author's calculations Zimbabwe Central Statistical Office/ Macro International Inc 21

Table 6.10: Impact of All Independent Variables on Child Mortality, Hazard Model Estimates of Relative Risks (RR), 1996-2005 (2005-06 ZDHS)

Covariate	Model I		Model II	
	Relative Risk	Confidence Interval	Relative Risk	Confidence interval
Birth order and preceding birth interval				
First births	0.549*	0.339-0.890	0.566*	0.345- 0.928
2-5 and short	1.295	0.523-3.207	1.317	0.530-3.270
2-5 and medium	0.816	0.329-2.022	0.821	0.331-2.038
2-5 and long	1.000	----------	1.000	----------
6+ and short	1.071	0.146-7.858	0.895	0.121- 6.624
6+ and medium	0.800	0.110-5.830	0.692	0.094- 5.093
6+ and long	1.177	0.619-2.239	0.966	0.496- 1.881
Maternal age				
<20 years	1.471	0.800-2.704	1.461	0.788-2.710
20-29 years	0.886	0.561-1.398	0.905	0.571-1.434
30-39 years	1.000	----------	1.000	----------
40-49 years	0.294	0.069-1.253	0.270	0.063-1.158
Sex of child				
Female	1.011	0.732-1.398	1.019	0.737-1.409
Male	1.000	----------	1.000	----------
Type of birth				
Multiple	1.428	0.625-3.259	1.510	0.660-3.457
Singleton	1.000	----------	1.000	----------
Residence				
Rural			1.135	0.598-2.153
Urban			1.000	----------
Maternal education				
No education			1.000	----------
Primary			0.746	0.364-1.529
Secondary and higher			0.567	0.264-1.218
Paternal education				
No education			1.000	----------
Primary			0.618	0.347-1.099
Secondary and higher			0.675	0.390-1.168
Wealth status				
Poor			1.000	----------
Middle			1.297	0.845-1.989
Rich			1.099	0.603-2.001

Table 6.10 (Continued)

Covariate	Model III		Model IV	
	Relative Risk	Confidence interval	Relative Risk	Confidence interval
Birth order and preceding birth interval[1]				
First births	0.570*	0.347-0.937	0.683	0.416-1.120
2-5 and short	1.307	0.525-3.252	1.611	0.648-4.006
2-5 and medium	0.822	0.331-2.039	0.867	0.348-2.161
2-5 and long	1.000	----------	1.000	----------
6+ and short	0.902	0.122-6.680	1.047	0.140-7.815
6+ and medium	0.719	0.098-5.293	0.195	0.024-1.597
6+ and long	0.977	0.502-1.900	0.960	0.490-1.880
Maternal age				
<20 years	1.416	0.761-2.636	1.076	0.572-2.023
20-29 years	0.889	0.560-1.410	0.750	0.465-1.211
30-39 years	1.000	----------	1.000	----------
40-49 years	0.262	0.061-1.121	0.406	0.094-1.750
Sex of child				
Female	1.021	0.738-1.412	0.958	0.688-1.335
Male	1.000	----------	1.000	----------
Type of birth				
Multiple	1.492	0.651-3.419	1.560	0.675-3.605
Singleton	1.000	----------	1.000	----------
Residence				
Rural	1.260	0.545-2.912	1.371	0.742-3.162
Urban	1.000	----------	1.000	----------
Maternal education				
No education	1.000	----------	1.000	----------
Primary	0.764	0.373-1.564	1.006	0.485-2.083
Secondary and higher	0.594	0.276-1.276	0.857	0.395-1.860
Paternal education				
No education	1.000	----------	1.000	----------
Primary	0.614	0.345-1.091	0.708	0.394-1.270
Secondary and higher	0.670	0.387-1.159	0.851	0.483-1.500
Wealth status				
Poor	1.000	----------	1.000	----------
Middle	1.240	0.806-1.907	1.082	0.692-1.693
Rich	1.064	0.558-2.029	1.098	0.546-2.206

[1] Preceding birth interval: short <= 18 months, medium 19-23 months, long 24+ months.

Table 6.10 (Continued)

Covariate	Model III		Model IV	
	Relative Risk	Confidence interval	Relative Risk	Confidence interval
Piped drinking water				
Yes	0.606	0.330-1.116	0.691	0.352-1.357
No	1.000	----------	1.000	----------
Flush toilet				
Yes				
No	0.401**	0.171 0.940	0.743	0.334-1.651
	1.000	----------	1.000	----------
HIV prevalence in rural/ urban area as at birth of child			1.629***	1.542-1.721

*p<0.05, **p<0.01, ***p<0.001

Source: Author's calculations Zimbabwe Central Statistical Office/ Macro International Inc21

CHAPTER 7

DETERMINANTS OF INFANT AND CHILD MORTALITY: AN ANALYSIS CONTROLLING FOR FAMILY AND COMMUNITY FRAILTY EFFECTS

7.1 Introduction

This chapter analyses data on maternal, socioeconomic and environmental contamination variables associated with infant and child mortality in Zimbabwe during 1996 - 2005, taking into account frailty effects at family and community levels. In particular the chapter examines the extent to which the survival outcomes of siblings are associated net of the observed factors.

These associations with infant and child survival outcomes even after accounting for different known determinants of mortality has been attributed to unobserved heterogeneity or frailty.[45,69] Frailty is the variance in mortality caused by unobserved factors.

Frailty models address the situation where the same individual may experience the hazard more than once, raising the possibility that due to some unmeasured and perhaps unknown cause (that is, a cause of "unobserved heterogeneity"), some subjects may be more likely than others to experience repeated hazards. This likelihood is the ‘frailty’ of these subjects and in standard Cox models are unmeasured effects.[70] Frailty models are supported by STATA but not by SPSS.

7.2 Measurement of the Family and Community Frailty Effect

We outline in this section the statistical estimation of the frailty models for infant and child mortality. The Cox regression frailty equation shown below builds on the standard hazard model equation presented in Chapter 3. We show in the equation below the addition of specific

random effects for family (v_i) and community (w_i) to the standard Cox regression equation to allow for frailty effects. The equation used to estimate the frailty effects is given by:

$$h_{ijk}(t_{ijk} / v_i w_{ij}) = v_i w_i \lambda_{ijk}(t_{ijk}) = v_i w_{ij} \lambda_0(t_{ijk}) \exp(\beta^i x_{ijk})$$

where $\lambda_0(t_{ijk})$ represents the baseline hazard and $\exp(\beta x_{ijk})$ is the relative risk associated with covariates $x_{ijk.}$ We assume that the random effects v_i and w_{ij} follow the gamma distribution with a mean of one. The assumption of the random effects being gamma-distributed follows previous research on unobserved heterogeneity, which makes use of this distribution[70].

We used the STCOX command in STATA to compute the coefficients for the family and community frailty effects for infant and child mortality. We fitted the following two models to the data:

- Model I: Single random effect to allow for clustering by family;
- Model II: Single random effect to allow for clustering by community

The estimated coefficients from the two models were interpreted just as in a standard hazard model, while the estimated parameters describing the distributions of the frailty effects were interpreted as variances of the frailty distribution. If the variance is zero, observations from the same family or community are independent. A larger variance implies greater heterogeneity in frailty across families or communities and greater correlation among individuals belonging to the same family or community. A frailty value of one indicates that the measured covariates in the model do not explain any variation in mortality. In this

case all the variation in mortality is attributable to unmeasured or immeasurable factors.

7.3 Family and Community Frailty Models

Section 7.4.1 reports on the analysis of data on the clustering of infant deaths at the family and community levels. In turn section 7.4.2 analyses family and community frailty for child deaths. The results on the impact of maternal, socioeconomic and environmental factors on infant and child mortality are presented in Tables 7.1 and 7.2, respectively, with two frailty models fitted to these data. Model I includes a single random effect to allow for clustering of deaths by family. Model II is based on clustering of deaths at the level of community.

7.3.1 Infant Mortality

Section 7.4.1 presents frailty models for infant mortality. The results regarding the various relationships between infant mortality and the independent variables are shown in Table 7.1. In this section we draw comparisons with the standard hazard model for infant mortality that was presented in Table 6.5.

7.3.1.1 Family Clustering Model

The frailty effect for infant mortality at the family level is 0.056 (see Table 7.1). This family frailty effect for infant mortality is not statistically significant. This implies that the risks of infant deaths between households in the 2005-06 ZDHS survey sample do not significantly differ even after controlling for a number of unknown determinants of infant mortality. The family frailty effect estimate indicates that the death of one infant in a household due to unobserved family characteristics is associated with a 5.6 percent increase in the risk of the index child dying relative to what it would be if that child were alive. This family frailty

effect is not substantial and further implies that the measured covariates in model I of Table 7.1 account for 94.4 percent of the variation in infant mortality at the family level in the 2005-06 ZDHS survey.

Three patterns emerge when comparing the results from the Cox proportional hazard model of infant mortality presented in model III of Table 6.5 with the hazard model incorporating a single random effect for each family presented in model I of Table 7.1. First, there is a small increase in the magnitude of the coefficients for sex of child, type of birth (singleton or multiple), wealth status and piped drinking water after introducing the family random effect. Second, there is a small decrease in the coefficients for birth order and preceding birth interval, maternal age and flush toilet. Third, the coefficients for place of residence, maternal education and paternal education levels remain largely unchanged.

7.3.1.2 Community Clustering Model

This community frailty effect for infant mortality is 0.101 and this value is not statistically significant (see model II of Table 7.1). This community frailty effect implies that the unexplained variation in infant mortality by the covariates in model II at the community level is 10.1 percent. This further indicates that the covariates in model II explain 89.9 percent of the variation in infant mortality at the community level in the 2005-06 ZDHS survey. The community effect represents the association among children residing in the same community that is a consequence of their shared physical, disease, cultural, and socioeconomic environment.

Overall, the effects of individual - level covariates that are indicative of high risk families tend to be underestimated in the standard model that includes no correction for clustering. Communities characterised by high frailty have more deaths. Covariates that are exogenous and essentially

independent of community factors, most notably child sex and maternal age, change the least between the standard hazard model and the community frailty model.

7.3.2 Child Mortality

Section 7.4.2 presents frailty models for child mortality. The results regarding the various relationships between child mortality and all maternal, socioeconomic and environmental contamination variables are presented in Table 7.2. The standard hazard model for child mortality was presented in Table 6.10.

7.3.2.1 Family Clustering Model

The results of the parameter estimates presented in Table 7.2 are largely in line with theoretical expectations and patterns observed for child mortality. The family frailty effect for child mortality is 0.086 and is non-significant. This implies that the unexplained variation in child mortality by the covariates in the model at the family level is 8.6 percent. The observed maternal, socioeconomic and environmental contamination variables in model I of Table 7.2 explain 91.4 percent of the family variation for child mortality in Zimbabwe. We further observe from comparison of data in Table 7.1 and Table 7.2 that family frailty is larger for child mortality than infant mortality. Overall, a comparison of the strengths of the relationships between model III of Table 6.10 and model I of Table 7.2 shows marginal differences in the relative risks for the covariates in these two models. Two distinct patterns emerge in model I of Table 7.2, which allow us to study the family random effect on child mortality.

First, there is an increase in the coefficients depicting the impact of maternal and environmental contamination variables on child mortality.

Second, there is a decrease in the coefficients depicting the impact of socioeconomic variables on child mortality.

We observe that children of birth order 2-5 and short preceding birth interval are 31 percent more likely to die in child age than those of birth order 2-5 and long preceding birth interval. This relationship is however not significant. The lack of a U-shaped relationship between maternal age and child mortality is maintained in the presence of the random effect for the family in model I. However, giving birth at a young age that is, less than 20 years continues to be a risk factor in the presence of the family random effect. The sex of the child also continues to have a very marginal effect on child mortality even in the presence of the family random effect.

Similar to the results in Table 6.10, the impact of the type of birth variable on child mortality marginally increased though it is not significant. Living in the rural areas similarly increases the risk of child death by a third relative to living in the urban areas. Compared to Table 6.10, the impact of maternal education on child mortality is marginally decreased in the presence of the family random effect. Attaining secondary and higher education for mothers reduces the risk to child death by 41 percent relative to no education.

Unlike in model III of Table 6.10 where attaining secondary and higher education for fathers reduces the risk to child death by 33 percent, attaining secondary and higher education in Table 7.2 reduces the risk to child death by 32 percent in the presence of the family random effect. The coefficients depicting the impact of wealth status on child mortality shows in Table 7.2 that children born to mothers in households classified as “middle” experience 24 percent higher mortality risk of dying in child age than children born to mothers in households classified

as 'poor'. As previously noted in this study, this could be due to differential application of childcare practices.

The impact of the availability of piped water and a flush toilet on child mortality is marginally reduced in the presence of the family random effect as shown in model I of Table 7.2. The availability of piped water for the household reduces child mortality risk by 32 percent in the presence of the family random effect although the relationship is not significant. A similar observation is made for the availability of a flush toilet in the dwelling. Access to a flush toilet significantly reduces the risk to child death by 58 percent ($p<0.01$).

We now turn to section 7.4.2.2 where we present the results on the impact of all the independent variables on child mortality after allowing for the community random effect.

7.3.2.2 Community Clustering Model

Table 7.2 depicts the impact of all maternal, socioeconomic and environmental contamination variables on child mortality allowing for the community frailty effect (model II). We also draw comparisons with the standard model II of Table 6.10 in this section. The community frailty effect for child mortality is 0.155 and is statistically significant ($p< 0.05$). This means that the unexplained variation in child mortality by the covariates in the model at the community level is 15.5 percent. These results imply that the observed measured maternal, socioeconomic and environmental contamination variables in model II of Table 7.2 explain 84.5 percent of the variation in child mortality at community level. These results suggest that there is greater significant variation between communities in the risk of child mortality that is not accounted for by the measured maternal, socioeconomic and environmental contamination

factors in model II than in the standard model. In addition, the community frailty effect is larger in childhood than in infancy.

The differences in the strength of the relationships between the covariates in model III of Table 6.10 and model II of 7.2 are marginal. We further found that model II exhibits marginal increases in the effects of the covariates on child mortality from the preceding model in Table 7.2. Two diverse patterns are similarly observed after introducing the community random effect in model II: an increase in the coefficients for maternal and environmental contamination covariates and a decrease in the coefficients for socioeconomic covariates. The direction of the hazard ratios in model II is analogous to that observed in model I.

The results in model II show that the elevated child mortality risk is associated with children of birth order 2-5 and short intervals, maternal age of less than 20 years, multiple births, living in the rural areas and being born to mothers of 'middle' wealth status. A lower risk to child death is associated with secondary and higher maternal and paternal education, availability of piped water and a flush toilet for the household. The relationships of the covariates with child mortality are largely non-significant after introducing the community frailty effect with the exception of that for flush toilet which is significant at $p<0.01$.

7.4 Concluding Remarks

Chapter 7 presented an analysis of family and community frailty effects. We observed that family and community variance of random effects are higher for child mortality than infant mortality. Only the variance of random effect for child mortality is significant. This indicates that there is substantial variation in the risk of child death among communities in the 2005-06 ZDHS sample that is not taken into account by the covariates of the standard model. We found that there were marginal changes in the coefficients of the covariates for both infant and child

mortality after we introduced the family and community random effects. As observed in the Cox proportional standard hazard models, maternal factors were predominant in the infancy phase while socioeconomic and environmental contamination factors were predominant during the childhood phase. We further found that many of the relationships between the covariates and mortality were not significant, but they were often in the expected direction.

This study has demonstrated that child mortality risks vary due to unobserved factors at the community levels. Unobserved heterogeneity at the community level has been shown to be higher than that at the family level. Children in the same community live under similar climatic, environmental, socioeconomic and cultural conditions and are exposed to the same illness and diseases prevalent at community level.[68] The results of our frailty models suggest that the effects of community factors such the availability of hospitals and natural and economic resources are likely to be important. A major limitation of the DHS data is that it does not collect community information. Future studies should therefore endeavour to include community factors where they are available.

We now turn to Chapter 8, which presents the overall discussion of the findings, conclusions of the study and recommendations. Chapter 8 will also deal with the implications of the findings for child health policy formulation, programming and further research.

Table 7.1: Impact of Maternal, Socioeconomic and Environmental Contamination Variables on Infant Mortality, Controlling for Family and Community Frailty, 1996-2005 (2005-06 ZDHS), Zimbabwe

Covariate	Family Frailty Model (Model I)		Community Frailty Model (Model II)	
	Relative Risk	**Confidence interval**	**Relative Risk**	**Confidence interval**
Birth order and preceding birth interval[1]				
First births	1.090	0.845-1.418	1.090	0.851-1.416
2-5 and short	1.391	0.949-2.027	1.322	0.945-2.021
2-5 and medium	1.477	0.945-2.308	1.477	0.945-2.308
2-5 and long	1.000	----------	1.000	----------
6+ and short	2.851***	1.512-5.134	2.815***	1.626-5.212
6+ and medium	1.132	0.547-2.185	1.190	0.595-2.274
6+ and long	1.323	0.896-1.858	1.374	0.821-1.932
Maternal age				
<20 years	1.145	0.685-1.594	1.149	0.771-1.674
20-29 years	1.088	0.795-1.381	1.012	0.731-1.352
30-39 years	1.000	----------	1.000	----------
40-49 years	1.077	0.611-1.892	1.079	0.617-1.898
Sex of child				
Female	0.988	0.796-1.162	0.962	0.816-1.176
Male	1.000	----------	1.000	----------
Type of birth				
Multiple	2.041***	1.537-2.725	2.187***	1.532-2.742
Singleton	1.000	----------	1.000	----------
Residence				
Rural	1.329	0.761-2.295	1.334	0.765-2.297
Urban	1.000	----------	1.000	----------
Maternal education				
No education	1.000	----------	1.000	----------
Primary	1.082	0.725-1.752	1.085	0.721-1.748
Secondary and higher	1.073	0.632-1.721	1.092	0.615-1.753

[1] Preceding birth interval: short <= 18 months, medium 19-23 months, long 24+ months.

Table 7.1 (Continued)

Covariate	Family Frailty Model (Model I)		Community Frailty Model (Model II)	
	Relative Risk	**Confidence interval**	**Relative Risk**	**Confidence interval**
Paternal education				
No education	1.000	----------	1.000	----------
Primary	1.121	0.784-1.495	1.125	0.781-1.503
Secondary and higher	1.127	0.821-1.575	1.131	0.815-1.582
Wealth index				
Poor	1.000	----------	1.000	----------
Middle	1.089	0.832-1.381	1.093	0.837-1.379
Rich	1.082	0.715-1.629	1.088	0.719-1.639
Piped drinking water				
Yes	0.903	0.523-1.321	0.927	0.539-1.342
No	1.000	----------	1.000	----------
Flush toilet				
Yes	0.610	0.335-1.129	0.636	0.339-1.133
No	1.000	----------	1.000	----------
Variance of Random Effect				
Family Frailty Effect	**0.056**			
Standard Error	0.043			
Community Frailty Effect			**0.101**	
Standard Error			0.037	

*p<0.05, **p<0.01, ***p<0.001

Source: Author's calculations Zimbabwe Central Statistical Office/ Macro International Inc21

Table 7.2: Impact of Maternal, Socioeconomic and Environmental Contamination Variables on Child Mortality, Controlling for Family and Community Frailty, 1996-2005 (2005-06 ZDHS), Zimbabwe

Covariate	Family Frailty Model (Model I)		Community Frailty Model (Model II)	
	Relative Risk	**Confidence interval**	**Relative Risk**	**Confidence interval**
Birth order and preceding birth interval[1]				
First births	0.620*	0.221-0.974	0.633*	0.332-0.968
2-5 and short	1.314	0.515-3.375	1.325	0.511-3.268
2-5 and medium	0.821	0.330-2.037	0.832	0.321-2.029
2-5 and long	1.000	----------	1.000	----------
6+ and short	0.921	0.115-6.672	0.927	0.119-6.675
6+ and medium	0.733	0.085-5.189	0.736	0.091-5.292
6+ and long	0.981	0.496-1.878	0.984	0.498-1.874
Maternal age				
<20 years	1.425	0.776-2.691	1.418	0.754-2.629
20-29 years	0.912	0.571-1.462	0.896	0.552-1.392
30-39 years	1.000	----------	1.000	----------
40-49 years	0.267	0.083-1.132	0.261	0.059-1.117
Sex of child				
Female	1.033	0.751-1.443	1.031	0.735-1.417
Male	1.000	----------	1.000	----------
Type of birth				
Multiple	1.496	0.657-3.423	1.502	0.643-3.433
Singleton	1.000	----------	1.000	----------
Residence				
Rural	1.291	0.541-2.928	1.315	0.561-2.952
Urban	1.000	----------	1.000	----------
Maternal education				
No education	1.000	----------	1.000	----------
Primary	0.761	0.365-1.577	0.752	0.368-1.556
Secondary and higher	0.590	0.281-1.269	0.589	0.269-1.258

*p<0.05, **p<0.01, ***p<0.001

[1] Preceding birth interval: short <= 18 months, medium 19-23 months, long 24+ months.

Table 7.2 (Continued)

Covariate	Family Frailty Model (Model I)		Community Frailty Model (Model II)	
	Relative Risk	**Confidence interval**	**Relative Risk**	**Confidence interval**
Paternal education				
No education	1.000	----------	1.000	----------
Primary	0.625	0.364-1.125	0.619	0.339-1.088
Secondary and higher	0.684	0.375-1.182	0.679	0.363-1.167
Wealth index				
Poor	1.000	----------	1.000	----------
Middle	1.239	0.804-1.901	1.232	0.801-1.909
Rich	1.058	0.542-2.018	1.054	0.558-2.029
Piped drinking water				
Yes	0.683	0.318-1.119	0.689	0.321-1.123
No	1.000	----------	1.000	----------
Flush toilet				
Yes	0.423**	0.163 0.931	0.427**	0.169 0.933
No	1.000	----------	1.000	----------
Variance of Random Effect				
Family Frailty Effect	**0.086**			
Standard Error	0.042			
Community Frailty Effect			**0.155***	
Standard Error			0.045	

*p<0.05, **p<0.01, ***p<0.001

Source: Author's calculations Zimbabwe Central Statistical Office/ Macro International Inc21

CHAPTER 8

DISCUSSION OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

8.1 Introduction

This chapter describes and discusses the major findings of the research. The chapter concludes with recommendations towards health policy and child health programming in Zimbabwe.

8.2 Summary and Discussion of Major Findings

8.2.1 Levels and Trends of Infant and Child Mortality

In this section the findings on levels and trends of infant and child mortality are discussed. Firstly, the direct estimates are discussed, followed by the indirect estimates. Finally, the results obtained from the application of the multiple-spline regression technique to data from multiple demographic sources in Zimbabwe are discussed.

We studied the trends in infant and child mortality with direct estimates from DHS-type surveys conducted in Zimbabwe between 1988 and 2005 and found the following results. Whereas neonatal, infant and child mortality declined during the period 2001-2005, postneonatal mortality stagnated at 36 deaths per 1,000 live births during this period. Under-5 mortality declined from 102 deaths per 1,000 live births during the 1995-1999 period to 82 deaths per 1,000 live births during the 2001-2005 period.[21] The majority of the decline in under-5 mortality would appear to be the result of the decline of 40 percent in child mortality during 2001-2005. Overall, the findings on the decline between 1995-1999 and 2001-2005 were unexpected. Infant and under-five mortality rates were expected to have increased during this period due to the direct and indirect impact of HIV and AIDS and the worsening economic and political conditions in Zimbabwe during the 1995-2006 period.

Several reasons can be mentioned making it likely that the decline in under-5 mortality in the late 1990s and early 2000s in not genuine. First, the vaccination coverage and nutritional status of under-five children in Zimbabwe worsened between 1994 and 2005-06. For instance, the percentage of children aged 12 to 24 months who had not received any vaccinations was more than five times higher in 2005-06 than in 1994 (4 percent and 21 percent, respectively). It is therefore difficult to accept that childhood mortality could have declined between 1999 and 2005 in Zimbabwe.

Second, we found that there is a discrepancy between infant and under-5 mortality estimates referring to the 5-9 year-period preceding the 2005-06 ZDHS survey with those for the 0-4 year-period preceding the 1999 ZDHS survey.[14,21] These rates should be more or less similar, but they are not.

Third, we hypothesise that the difference in mortality estimates between the 1999 and 2005-06 ZDHS surveys could be due to the excess mortality among women of childbearing age that occurred from 1993-1999 to 2000-2005. The 2005-06 ZDHS survey report states that adult mortality has continued to rise between 1996-1999 to 2000-2005 by around 40 percent among women and 20 percent among men. Adult female mortality is highest among women in the 30-39 year age group whose mortality doubled to 23 deaths per 1,000 during the 1993-1999 and 2000-2005 periods. It could be that these mothers are “missing” in the 2005-06 ZDHS survey and this means that their children – with higher than average mortality rates - were also not included.

One interesting observation from this study is that the mortality gap by rural-urban and sex of child differentials in Zimbabwe has narrowed since 1995. For instance, the child mortality rate decreased to 21

deaths per 1,000 live births for both sexes during the period 1995-1999 from levels of 35 and 31 deaths per 1,000 live births during the 1990-1999 period, for males and females, respectively. Under-five mortality decreased to 72 and 64 deaths per 1,000 births from 100 and 69 deaths per 1,000 live births in rural and urban areas, respectively. Similar declines were recorded with respect to all the subcomponents of under-five mortality during 1990-1999.

The closing of the mortality gap between rural and urban areas could possibly be due to the effectiveness of the programmes for equitable distribution of health facilities aimed at removing the discrepancies between rural and urban areas in Zimbabwe. The population in rural areas has had better and improved access to health facilities since independence in 1980 in Zimbabwe. The narrowing of the male-to-female mortality gap could also be partly due to the diminishing gender inequality.

We found that there are still substantial provincial variations in under-five mortality in Zimbabwe. What is intriguing is that the under-five mortality rate in Harare (65 per 1,000 live births) was higher than that for Bulawayo (45 per 1,000 live births).

In order to evaluate the plausibility of the direct estimates, we also computed indirect estimates of infant and under-five mortality. Whereas direct estimates are computed directly from the data, indirect techniques use models and/ or consistency checks to estimate demographic parameters. A comparison of direct and indirect estimates of infant and under-five mortality revealed that although the indirect estimates were somewhat higher than the direct estimates, the differences were small, giving credence to the correctness of the direct estimates.

The results from the multiple-spline regression analysis showed that the data points from the 2005-06 ZDHS survey deviate from the other three rounds of the ZDHS surveys. The regression analysis showed that infant and under-five mortality declined during the period from 1960 to 1990 and that the decline in mortality stalled from the 1990s to 2005.

Having discussed the major findings on the levels and trends of infant and child mortality, we now turn to the next section which discusses the major findings on the determinants of infant and child mortality.

8.2.2 Determinants of Infant and Child Mortality

We used the Cox proportional hazards method to estimate the bivariate and multivariate coefficients on the impact of a number of factors on infant and child mortality. In general, differences in the strength of the relationships using bivariate and multivariate relationships were small which means in the discussion we deal with both of them together. We conducted the bivariate and multivariate analysis in this study for both infant and child mortality. These results will be discussed simultaneously. We will discuss the determinants of infant mortality and add those for child mortality in so far as the results from the determinants of infant mortality are different from those of child mortality.

We found that in many cases the relationships between independent variables and infant and child mortality were in the expected direction but for only a few variables was the relationship statistically significant. This is illustrated in the tables in chapter 6 and 7. There is at the end of this section a hypothesis on why the relationships between the independent and dependent variables were smaller than expected. We now look at the impact of the independent variables on infant and child mortality in more detail.

8.2.2.1 Maternal Variables and Mortality

We found that there is a substantial elevated mortality risk to infants of birth order 6 and more and infants born after short birth intervals, that is, intervals of less than 18 months. What we have found is in accordance with other findings on the influence of birth order and birth spacing.

It has been firmly established in the demographic literature that infant and child mortality are higher for births spaced at short intervals and high parity births. Short birth intervals increase the number of children of more or less similar (comparable) ages in the household. Alam[71] argues that this consequently heightens the susceptibility of children to infectious diseases due to their physical proximity and leads to siblings' competition for household resources including individualised maternal care.

Results from this study indicated that children born to young (less than 20 years) and older (40-49 years) mothers experienced 20 percent higher mortality risk than those born to mothers aged 30-39 years. Maternal age therefore still remains an important factor impacting on infant mortality in Zimbabwe where the median age at childbearing is 26 years.[21] Children born to women in their mid-twenties, which is close to the median age at childbearing in Zimbabwe, exhibit the lowest mortality risks relative to women aged 30-39 years. The effects of maternal age at birth are both physiological and sociopsychological. The immature reproductive systems of young mothers and the depleted physiological systems of older mothers due to repeated pregnancies makes them susceptible to pregnancy complications and bearing low birth weight babies both of which are associated with a higher risk of child death. Family planning could mitigate the negative effects of young and old maternal age at birth on child survival.[72]

We found that female infants are associated with less than 2 percent lower mortality relative to male infants. This is consistent with the observations made earlier that the mortality gap by sex of child differentials in Zimbabwe has narrowed since 1995.

We also found that children from multiple births have an elevated mortality risk of 2.06 and 1.49 times higher during infancy and child age, respectively, compared to singleton births. The relative risk is highly significant for infant mortality and is not significant for child mortality. These findings are consistent with literature documenting the elevated mortality risk associated with twins in infancy.[19]

8.2.2.2 Socioeconomic Variables and Mortality

Living in the rural areas is associated with an elevated risk to child death of 1.26 times high relative to living in the urban areas. These findings are expected given the discrepancies between rural and urban areas in terms of health infrastructure. It was also noted in the study of trends in under-five mortality that the mortality gap by rural-urban differentials in Zimbabwe has narrowed since 1995.

We observed that the impact of education is higher in childhood than in infancy although none of these relationships are statistically significant. Attaining secondary and higher education reduces the risk of child death by 40 and 33 percent for mothers and fathers, respectively, relative to no education. The modest impact of maternal schooling on infant mortality in Zimbabwe during the period 1996-2005 is worth commenting. This finding is consistent with results from an analysis of Egyptian data by Casterline et al[73] where maternal education did not have a discernible impact on infant mortality. The lack of an impact of maternal education on infant mortality seems to be observed only in the 2005-06 ZDHS survey. The data for the other 3 rounds of the ZDHS

surveys conducted in 1988, 1994 and 1999 show that maternal education has a depressing impact on infant and child mortality.

Previous research has identified maternal education as the socioeconomic factor of central importance in determining children's survival chances. Maternal education is often used to indicate mother's level of skills and knowledge to effectively utilise the available health and childcare resources. According to Caldwell, education supplies women with the knowledge and skills to raise healthy children, provides women with higher income through higher earnings or selective mating, increases the value of time, alters preferences, and changes the structure of intrahousehold relationships.[24,43,74] Cleland and van Ginneken[24] further argue that "The inverse education-mortality relationship is found in all major regions of the developing world; the association is very pronounced, but appreciably closer in childhood than in infancy; and even a modest exposure of the mother to formal schooling is associated with reduced risks of death in most contexts. It is thus important both for a better understanding of health determinants and for practical policy reasons, to reassess whether the education-mortality relationship is a causal one, and if so, to identify the pathways of influence" (p.1359). Mothers with more education are also more able to overcome the adverse effects of some factors such as very young and old maternal age and short birth intervals.

We further found that the impact of wealth status on infant mortality is not as discernible as that on child mortality. The impact of wealth status on child mortality revealed that children born to mothers in households of middle wealth status had mortality risk of 1.24 times high relative to those born to mothers in poor households. This relationship was however not significant. This could be due to use of different child-care practices in these two groups.

8.2.2.3 Environmental Contamination Variables and Mortality

Our results revealed that access to sanitation facilities namely piped drinking water and flush toilet, are associated with low infant and child mortality. However, the relationships are only significant for the presence of a flush toilet and only for child mortality. Having access to piped drinking water and flush toilet facilities reduce child mortality by 39 and 60 percent, respectively, relative to having none of these facilities.

Previous research suggests that the type of toilet facility and source of drinking water reflect the level of environmental contamination, which determines the transmission of infectious agents to children.[48,75,76] These factors also serve as a proxy for information unavailable from the survey including household hygiene, standards of cleanliness, food preparation and storage practices.[77,78]

Our study confirms, therefore, that since the majority of the population in Zimbabwe (69 percent) relies on unsafe water sources, conditions of use, including manner of storage and whether families treat the water before using it, are important factors in determining infant and child survival in Zimbabwe.

8.2.2.4 HIV/AIDS and Infant and Child Mortality

The results on the inclusion of HIV/AIDS in the multivariate models indicate that HIV/AIDS does have an influence on infant and child mortality in Zimbabwe. A unit increase in HIV prevalence significantly increases the odds of dying in infancy by 10 percent and in childhood by 62 percent in the presence of maternal, socioeconomic and environmental contamination variables. However, these results should be treated with caution as they only suggest that HIV among mothers has an effect on under-5 mortality. These results are consistent with those by Hill, Bicego and Mahy[5] who found that the prevalence of

HIV/AIDS was strongly associated with elevated mortality child mortality risks in Kenya in the 1990s.

Marindo and Hill[20] however observe that it is difficult to measure the impact of HIV/AIDS on under-5 mortality from surveys that utilise individual reports from the mothers. They observe that for the child to be infected with HIV/AIDS the mothers have to be infected as well. Child mortality estimates are likely to be understated as the mothers of infected children are likely to have died before the time of the survey and are therefore not present to report the deaths of their infected children in the survey (ibid). However, our results are important in as far as they show the potential direct and/or indirect influence that HIV/AIDS could have on infant and child mortality. Programming for child health has to include efforts to reduce the spread of HIV/AIDS in Zimbabwe, especially if the Millennium Development Goal (MDG4) is to be achieved.

As already mentioned in Chapters 4 and 5, we hypothesise that the decline in the under-5 mortality estimates between 1999 and 2005-06 is not genuine and could be due to the increase in mortality among women of reproductive age between 1996-1999 and 2000-2005. We earlier observed in this study that adult mortality among women of childbearing age increased by 40 percent between 1996-1999 and 2000-2005. Close to 60 percent of these extra deaths were to women aged 30-44 years.[21] Therefore, a group of older women who would have had children with higher than average mortality rates were “missing” from the 2005-06 ZDHS survey. It is probably the finding that there were a number of “missing mothers” from the survey which not only led to the possible underestimation of the true levels of infant and child mortality in the 2005-06 ZDHS survey, but also to the lack of expected relationships between infant and child mortality and the independent variables in the

2005-06 ZDHS survey. For example, the 1994 and 1995 ZDHS surveys show a stronger impact of maternal education on under-5 mortality. This impact completely disappears in 2005-06. We elaborated already on this point in the final section of Chapter 5. Further research is required to determine the plausibility of the mortality estimates from the 2005-06 ZDHS survey.

In this section we discussed the major results on the determinants of infant and child mortality. The next section discusses results on the frailty hazard models.

8.2.3 Frailty Hazard Models

Results presented in Chapter 5 and 6 have shown that infant and child mortality vary due to the measured maternal, socioeconomic, environmental contamination and personal illness control factors even though the relationships between the independent variables and mortality were often not statistically significant. In this section we discuss the findings on frailty at the family and community level. Frailty, in the infant and child mortality models presented in Chapter 7, represents a child's susceptibility to the risk of death. It captures the total effect of all factors that influence the child's risk of death that are not included in the baseline hazards presented in chapter 6.

Since the models presented in chapter 6 can account for observed covariates, the frailty effects presented in Chapter 7 represent unmeasured or immeasurable effects on infant and child mortality. Zimbabwe provides one of the better settings in which to estimate the unobserved family and community effect. This is because the capacity to be able to measure the clustering of mortality risk is much greater in settings with relatively high fertility and high mortality.[71,79,80] It is the association among siblings' survival that allows the estimation of the

family and community frailty effect.[81,82] We found that there is marginal difference between the coefficients of the standard models and those representing the effect of frailty for both infant and child mortality. The frailty effects at the family level for infant and child mortality were 5.6 and 8.6 percent, respectively. The frailty effects were not statistically significant. This implies that the risks of infant and child deaths between households in the 2005-06 ZDHS survey sample do not significantly differ even after controlling for a number of known determinants of infant and child mortality.

The frailty effects at the community level for infant and child mortality were 10.1 and 15.6 percent, respectively. We further found that only the frailty effect at community level and for child mortality was statistically significant. This implies that the risks of child deaths between communities in the 2005-06 ZDHS survey sample significantly differ even after controlling for a number of known determinants of child mortality. It further implies that the variables in the child mortality model explained 84.4 percent of the community variation in child deaths in the 2005-06 ZDHS survey sample.

We now compare the results from this study with those of Guo[80] who estimated a family random effects model for infant mortality using Guatemalan data and Zenger[83] who estimated a similar model using data from Bangladesh and Curtis et al[84] who studied family frailty in Brazil.

We find that the family frailty effect is much smaller for Zimbabwe (0.056) than for Guatemala (0.610) and much larger for Bangladesh (close to zero). In contrast, Curtis et al[84] report the presence of large and highly significant family frailty effects in a study of postneonatal mortality in Brazil. All these results call for further research to determine

the effect of unobserved heterogeneity in sub-Saharan Africa. Child health policy and programming in Zimbabwe should focus on those aspects that make some communities more prone to morbidity and mortality relative to other communities.[85]

8.3 Conclusions

The findings from this study on the levels and trends of childhood mortality revealed that infant and under-five mortality declined in Zimbabwe in the period 1999-2005. This decline is difficult to accept and should be treated with caution due to a number of reasons that were mentioned in the previous section. What is also intriguing in our findings in this study is the disappearance of mortality gaps by sex and rural-urban differentials in Zimbabwe. However, we found that provincial differentials in infant and child mortality still exist in Zimbabwe.

The findings on the determinants of childhood mortality illustrate that the maternal variables are more important during the infant age (0-11 months) than during the childhood age (12-59 months). Infant mortality risk is increased for children of higher birth orders and short preceding birth interval. Higher parity and short preceding birth spacing is clearly risky for the child and is also harmful to the mother's health.

We also found that socioeconomic and environmental factors are more important during the childhood age than during infancy but many of these relationships were not statistically significant. This study supports health policy initiatives stimulating the use of family planning methods to increase birth intervals. This would lead to a reduction in infant and child mortality in Zimbabwe. Many women, particularly those living in rural areas or those without formal education are aware of the benefits of family planning, but because of some social, economic, and cultural factors do not practice it. These women may not even be aware of the

advantages of birth spacing using modern contraception. However, women living in urban areas or who have higher educational levels are more likely to use modern family planning methods.

We found that family frailty for both infant and child mortality (5.6 and 8.6 percent) is not substantial and is non-significant. There is however substantial community frailty with respect to infant and child mortality. The magnitude of the unexplained variation in infant mortality by the measured independent variables at community level is 10.1 percent while that for child mortality is 15.6 percent. Only the last finding is statistically significant. These results suggest that there is considerable variation among communities which indicates that child deaths are likely to be clustered in certain communities in Zimbabwe. Appropriate child health programmes should target the most vulnerable communities in Zimbabwe in order to advance child survival prospects and to achieve the Millennium Development Goals.

8.4 Limitations

This section gives an overview of the limitations that could have affected this study. The birth history data in the DHS surveys is collected retrospectively and mothers with greater levels of education are probably less likely to omit births that end in death than are mothers with less education. Hence the effect of education on child survival obtained from the DHS surveys may be underestimated.

The analysis of independent variables in this study is restricted to 10 years before the 2005-06 ZDHS survey, that is, 1996-2005 so that the hazard ratios are based on a sufficient number of cases in each category to ensure statistically reliable estimates. A potential problem with analysing births from a ten-year window period is that many of the independent variables refer to conditions or characteristics at the time of

the survey. These may not be the actual conditions under which the children were exposed to the risk of death. Our analysis however focused on independent variables which are likely to reflect accurately actual conditions under which children were exposed to the risk of death even though they were recorded at the time of the interview.

For example, the maternal variables (birth order, preceding birth interval, maternal age and type of birth) that we analysed are fixed for each child and refer to the situation under which the child was exposed to the risk of death even though the information was collected at the time of the survey. Furthermore, women's education is usually completed before or upon the birth of her first child.

8.5 Recommendations

In this section we provide the recommendations emanating from this research.

1. In the light of the conclusions drawn from this study, we recommend that the DHS programme should consider using not only direct, but also indirect techniques of estimating childhood mortality in order to facilitate comparison with estimates from censuses and other demographic surveys. Indirect mortality estimates refer to a specific time location, which is important in studying mortality levels and trends. The DHS programme uses life-table probability techniques to estimate childhood mortality. These estimates refer to 0-4, 5-9 and 10-14 years preceding the survey. They do not have a clearly defined reference point in time. We assume, therefore, that the DHS mortality estimates refer to the mid-point of the interval in years preceding the survey. This reference point is less precise than in the case of use of indirect techniques.

2. In countries such as Zimbabwe where the HIV prevalence had in 2005-06 declined to 18.1 percent[21] and still very high, we recommend that results of research projects mentioning a decline in under-5 mortality should be interpreted with caution. It may not necessarily be a true reflection of trends in child health.

3. The results suggest that HIV/AIDS either directly or indirectly influences the levels of under-5 mortality in Zimbabwe. Programmes to reduce under-5 morbidity and mortality should be intertwined with those targeting the control of the spread of HIV/AIDS in Zimbabwe.

4. A contraceptive prevalence rate of 58 percent is encouraging for Zimbabwe. Family planning programmes should therefore be aimed at educating women and men with low educational levels and those in rural areas about the potential benefits of long-term birth spacing and encouraging them to use birth spacing methods. These programmes need to be made more accessible to both urban and rural women. Furthermore, given the findings from this study, an improvement in family planning service provision will definitely enhance child survival in Zimbabwe.

5. Policies that weaken and remove the social, economic, and cultural barriers to the use of contraception and promote appropriate breastfeeding and are directed at women in rural areas with low educational levels, are especially needed in Zimbabwe. One such policy is to enhance the training of traditional midwives and also train traditional healers and absorb them into the public health system.

6. The multi-spline robust regression method can ably reconcile differences in values from multiple data sources by extrapolating a linear regression line. On this basis, we recommend use of this method to estimate childhood mortality levels and trends in Zimbabwe.

7. On-going data collection programmes, such as the Demographic and Health Surveys should continue to gather information on morbidity and mortality in under-5 children. These survey programmes continue to contribute to the knowledge-base of child health conditions and use of health services in developing countries.

8. Additional research is needed to determine the plausibility of the recent decline in childhood mortality in Zimbabwe before a conclusion is accepted that mortality declined over the period between the 1999 and 2005-06 ZDHS surveys.

9. Further research is required to test the hypothesis that the unexpected decline in under-5 mortality and the change in the relationships of the covariates with mortality are probably due to the “missing children” and “missing mothers” in the 2005-06 ZDHS survey.

10. The determinants of adult female mortality should also be more thoroughly studied, particularly with the high levels of AIDS - related adult female deaths in countries such as Zimbabwe. A more refined analysis could uncover interesting insights on the impact of independent variables on adult female mortality.

11. Multiple births are strongly negatively associated with infant survival in Zimbabwe independent of other risk factors. This evidence suggests that improving maternal and child health services, screening for high-risk pregnancies and making referral services for these conditions more accessible, particularly to the rural women and children, will be key to improving child survival in Zimbabwe.

12. The results from this study are expected to assist policy makers and programme managers in the child health sector to formulate appropriate strategies and interventions to improve the situation of under-five children in Zimbabwe. In particular, child health interventions should be expanded by means of health programmes such as the Integrated Management of Childhood Illness (IMCI).

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Appendix 1

2005-06 ZIMBABWE DEMOGRAGHIC AND HEALTH SURVEY

WOMAN'S QUESTIONNAIRE

ZIMBABWE
2005 DEMOGRAPHIC AND HEALTH SURVEY
WOMAN'S QUESTIONNAIRE

CENTRAL STATISTICAL OFFICE

IDENTIFICATION

PLACE NAME _____

NAME OF HOUSEHOLD HEAD _____

CLUSTER NUMBER .....

HOUSEHOLD NUMBER .....

PROVINCE .....

LARGE CITY/SMALL CITY/TOWN/RURAL .....
(HARARE=1, SMALL CITY=2, TOWN=3, RURAL=4)

NAME AND LINE NUMBER OF WOMAN _____

INTERVIEWER VISITS

	1	2	3	FINAL VISIT
DATE				DAY / MONTH / YEAR
INTERVIEWER'S NAME				ID NUMBER
RESULT*				RESULT
NEXT VISIT: DATE				TOTAL NUMBER OF VISITS
TIME				

*RESULT CODES:
1 COMPLETED
2 NOT AT HOME
3 POSTPONED
4 REFUSED
5 PARTLY COMPLETED
6 INCAPACITATED
7 OTHER _____ (SPECIFY)

LANGUAGE OF QUESTIONNAIRE: 1 SHONA 2 NDEBELE 3 ENGLISH
LANGUAGE USED FOR INTERVIEW: A SHONA B NDEBELE C ENGLISH X OTHER
TRANSLATOR USED 1 YES 2 NO

SUPERVISOR	FIELD EDITOR	OFFICE EDITOR	KEYED BY
NAME _____	NAME _____		
DATE _____	DATE _____		

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

SECTION 1. RESPONDENT'S BACKGROUND

INTRODUCTION AND CONSENT

INFORMED CONSENT

Hello. My name is _____ and I am working with the Central Statistical Organization. We are conducting a national survey about the health of women, men and children. We would very much appreciate your participation in this survey. I would like to ask you about your health (and the health of your children). This information will help the government to plan health services. The survey usually takes between 45 and 60 minutes to complete. Whatever information you provide will be kept strictly confidential and will not be shown to other persons.

Participation in this survey is voluntary and you can choose not to answer any individual question or all of the questions. However, we hope that you will participate in this survey since your views are important.

At this time, do you want to ask me anything about the survey?
May I begin the interview now?

Signature of interviewer: _____ Date: _____

RESPONDENT AGREES TO BE INTERVIEWED ..... 1 ↓

RESPONDENT DOES NOT AGREE TO BE INTERVIEWED ..... 2 → END

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
101	RECORD THE TIME.	HOUR ..... [ ][ ] MINUTES ..... [ ][ ]	
102	How long have you been living continuously in (NAME OF CURRENT PLACE OF RESIDENCE)? IF LESS THAN ONE MONTH, RECORD '00' MONTHS.	MONTHS ..... 1 [ ][ ] YEARS ..... 2 [ ][ ] ALWAYS ..... 95 VISITOR 96	→ 104
103	Just before you moved here, where did you live? RECORD NAME AND CODE TYPE OF AREA. PROBE: Is that a city, town, communal land or resettlement area? _____ NAME OF PLACE	CITY ..... 1 TOWN ..... 2 COMMUNAL LAND ..... 3 RESETTLEMENT AREA ..... 4 OTHER RURAL AREA ..... 5 ABROAD 6	
104	In the last 12 months, on how many separate occasions have you traveled away from your home community and slept away?	NUMBER OF TRIPS ..... [ ][ ] NONE 00	→ 106
105	In the last 12 months, have you been away from your home community for more than one month at a time?	YES ..... 1 NO 2	
106	In what month and year were you born?	MONTH ..... [ ][ ] DON'T KNOW MONTH ..... 98 YEAR ..... [ ][ ][ ][ ] DON'T KNOW YEAR 9998	
107	How old were you at your last birthday? COMPARE AND CORRECT 106 AND/OR 107 IF INCONSISTENT.	AGE IN COMPLETED YEARS [ ][ ]	
108	Have you ever attended school?	YES ..... 1 NO 2	→ 112

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
109	What is the highest level of school you attended?	PRIMARY ..... 1 SECONDARY ..... 2 HIGHER 3	
110	What is the highest grade (number of years) you completed at that level?	GRADE/YEARS ..... [ ][ ]	
111	CHECK 109: PRIMARY ☐ → SECONDARY OR HIGHER ☐ →		115
112	Now I would like you to read this sentence to me. SHOW CARD TO RESPONDENT. IF RESPONDENT CANNOT READ WHOLE SENTENCE, PROBE: Can you read any part of the sentence to me?	CANNOT READ AT ALL ..... 1 ABLE TO READ ONLY PARTS OF SENTENCE ..... 2 ABLE TO READ WHOLE SENTENCE 3 NO CARD WITH REQUIRED LANGUAGE _____ 4 (SPECIFY LANGUAGE) BLIND/VISUALLY IMPAIRED 5	
113	Have you ever participated in a literacy program or any other program that involves learning to read or write (not including primary school)?	YES ..... 1 NO 2	
114	CHECK 112: CODE '2', '3' OR '4' CIRCLED ☐ → CODE '1' OR '5' CIRCLED ☐ →		116
115	Do you read a newspaper or magazine almost every day, at least once a week, less than once a week or not at all?	ALMOST EVERY DAY ..... 1 AT LEAST ONCE A WEEK ..... 2 LESS THAN ONCE A WEEK ..... 3 NOT AT ALL 4	
116	Do you listen to the radio almost every day, at least once a week, less than once a week or not at all?	ALMOST EVERY DAY ..... 1 AT LEAST ONCE A WEEK ..... 2 LESS THAN ONCE A WEEK ..... 3 NOT AT ALL 4	
117	Do you watch television almost every day, at least once a week, less than once a week or not at all?	ALMOST EVERY DAY ..... 1 AT LEAST ONCE A WEEK ..... 2 LESS THAN ONCE A WEEK ..... 3 NOT AT ALL 4	
118	What is your religion?	TRADITIONAL ..... 01 ROMAN CATHOLIC ..... 02 PROTESTANT ..... 03 PENTECOSTAL ..... 04 APOSTOLIC SECT ..... 05 OTHER CHRISTIAN ..... 06 MUSLIM ..... 07 NONE ..... 08 OTHER _____ 96 (SPECIFY)	→ 201
119	How often have you attended religious services in the past month? RECORD '00' IF DID NOT ATTEND DURING MONTH.	NUMBER OF TIMES ..... [ ][ ] DON'T KNOW/NOT SURE 98	

SECTION 2. REPRODUCTION

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
201	Now I would like to ask about all the births you have had during your life. Have you ever given birth?	YES . . . . . 1 NO 2	→ 206
202	Do you have any sons or daughters to whom you have given birth who are currently living with you?	YES . . . . . 1 NO 2	→ 204
203	How many sons live with you? And how many daughters live with you? IF NONE, RECORD '00'.	SONS AT HOME . . . . . [ ][ ] DAUGHTERS AT HOME . . . [ ][ ]	
204	Do you have any sons or daughters to whom you have given birth who are alive but do not live with you?	YES . . . . . 1 NO 2	→ 206
205	How many sons are alive but do not live with you? And how many daughters are alive but do not live with you? IF NONE, RECORD '00'.	SONS ELSEWHERE . . . . . [ ][ ] DAUGHTERS ELSEWHERE . [ ][ ]	
206	Sometimes babies are born alive and die shortly after birth. Have you ever given birth to a boy or girl who was born alive but later died? IF NO, PROBE: Any baby who cried or showed signs of life but did not survive?	YES . . . . . 1 NO 2	→ 208
207	How many boys have died? And how many girls have died? IF NONE, RECORD '00'.	BOYS DEAD . . . . . [ ][ ] GIRLS DEAD . . . . . [ ][ ]	
208	SUM ANSWERS TO 203, 205, AND 207, AND ENTER TOTAL. IF NONE, RECORD '00'.	TOTAL . . . . . [ ][ ]	
209	CHECK 208: Just to make sure that I have this right: you have had in TOTAL _____ births during your life. Is that correct? YES ☐ ↓ NO ☐ → PROBE AND CORRECT 201-208 AS NECESSARY.		
210	CHECK 208: ONE OR MORE BIRTHS ☐ ↓ NO BIRTHS ☐ →		226

211 Now I would like to record the names of all your births, whether still alive or not, starting with the first one you had.
RECORD NAMES OF ALL THE BIRTHS IN 212. RECORD TWINS AND TRIPLETS ON SEPARATE LINES.

212 What name was given to your (first/next) baby? (NAME)	213 Were any of these births twins?	214 Is (NAME) a boy or a girl?	215 In what month and year was (NAME) born? PROBE: What is his/her birthday?	216 Is (NAME) still alive?	217 IF ALIVE: How old was (NAME) at his/her last birthday? RECORD AGE IN COM-PLETED YEARS.	218 IF ALIVE: Is (NAME) living with you?	219 IF ALIVE: RECORD HOUSE-HOLD LINE NUMBER OF CHILD (RECORD '00' IF CHILD NOT LISTED IN HOUSE-HOLD).	220 IF DEAD: How old was (NAME) when he/she died? IF '1 YR', PROBE: How many months old was (NAME)? RECORD DAYS IF LESS THAN 1 MONTH; MONTHS IF LESS THAN TWO YEARS; OR YEARS.	221 Were there any other live births between (NAME OF PREVIOUS BIRTH) and (NAME), including any children who died after birth?
01	SING 1 MULT 2	BOY 1 GIRL 2	MONTH YEAR	YES . . 1 NO . . . 2 → 220	AGE IN YEARS	YES . . . 1 NO 2	LINE NUMBER (NEXT BIRTH)	DAYS . . . 1 MONTHS . 2 YEARS . . 3	
02	SING 1 MULT 2	BOY 1 GIRL 2	MONTH YEAR	YES . . 1 NO . . . 2 → 220	AGE IN YEARS	YES . . . 1 NO 2	LINE NUMBER (GO TO 221)	DAYS . . . 1 MONTHS . 2 YEARS . . 3	YES . . . . 1 NO 2
03	SING 1 MULT 2	BOY 1 GIRL 2	MONTH YEAR	YES . . 1 NO . . . 2 → 220	AGE IN YEARS	YES . . . 1 NO 2	LINE NUMBER (GO TO 221)	DAYS . . . 1 MONTHS . 2 YEARS . . 3	YES . . . . 1 NO 2
04	SING 1 MULT 2	BOY 1 GIRL 2	MONTH YEAR	YES . . 1 NO . . . 2 → 220	AGE IN YEARS	YES . . . 1 NO 2	LINE NUMBER (GO TO 221)	DAYS . . . 1 MONTHS . 2 YEARS . . 3	YES . . . . 1 NO 2
05	SING 1 MULT 2	BOY 1 GIRL 2	MONTH YEAR	YES . . 1 NO . . . 2 → 220	AGE IN YEARS	YES . . . 1 NO 2	LINE NUMBER (GO TO 221)	DAYS . . . 1 MONTHS . 2 YEARS . . 3	YES . . . . 1 NO 2
06	SING 1 MULT 2	BOY 1 GIRL 2	MONTH YEAR	YES . . 1 NO . . . 2 → 220	AGE IN YEARS	YES . . . 1 NO 2	LINE NUMBER (GO TO 221)	DAYS . . . 1 MONTHS . 2 YEARS . . 3	YES . . . . 1 NO 2
07	SING 1 MULT 2	BOY 1 GIRL 2	MONTH YEAR	YES . . 1 NO . . . 2 → 220	AGE IN YEARS	YES . . . 1 NO 2	LINE NUMBER (GO TO 221)	DAYS . . . 1 MONTHS . 2 YEARS . . 3	YES . . . . 1 NO 2

212 What name was given to your next baby? (NAME)	213 Were any of these births twins?	214 Is (NAME) a boy or a girl?	215 In what month and year was (NAME) born? PROBE: What is his/her birthday?	216 Is (NAME) still alive?	217 IF ALIVE: How old was (NAME) at his/her last birthday? RECORD AGE IN COM-PLETED YEARS.	218 IF ALIVE: Is (NAME) living with you?	219 IF ALIVE: RECORD HOUSE-HOLD LINE NUMBER OF CHILD (RECORD '00' IF CHILD NOT LISTED IN HOUSE-HOLD).	220 IF DEAD: How old was (NAME) when he/she died? IF '1 YR', PROBE: How many months old was (NAME)? RECORD DAYS IF LESS THAN 1 MONTH; MONTHS IF LESS THAN TWO YEARS; OR YEARS.	221 Were there any other live births between (NAME OF PREVIOUS BIRTH) and (NAME), including any children who died after birth?
08	SING 1 MULT 2	BOY 1 GIRL 2	MONTH YEAR	YES . . 1 NO . . . 2 → 220	AGE IN YEARS	YES . . . 1 NO 2	LINE NUMBER (GO TO 221)	DAYS . . . 1 MONTHS . 2 YEARS . . 3	YES . . . . 1 NO 2
09	SING 1 MULT 2	BOY 1 GIRL 2	MONTH YEAR	YES . . 1 NO . . . 2 → 220	AGE IN YEARS	YES . . . 1 NO 2	LINE NUMBER (GO TO 221)	DAYS . . . 1 MONTHS . 2 YEARS . . 3	YES . . . . 1 NO 2
10	SING 1 MULT 2	BOY 1 GIRL 2	MONTH YEAR	YES . . 1 NO . . . 2 → 220	AGE IN YEARS	YES . . . 1 NO 2	LINE NUMBER (GO TO 221)	DAYS . . . 1 MONTHS . 2 YEARS . . 3	YES . . . . 1 NO 2
11	SING 1 MULT 2	BOY 1 GIRL 2	MONTH YEAR	YES . . 1 NO . . . 2 → 220	AGE IN YEARS	YES . . . 1 NO 2	LINE NUMBER (GO TO 221)	DAYS . . . 1 MONTHS . 2 YEARS . . 3	YES . . . . 1 NO 2
12	SING 1 MULT 2	BOY 1 GIRL 2	MONTH YEAR	YES . . 1 NO . . . 2 → 220	AGE IN YEARS	YES . . . 1 NO 2	LINE NUMBER (GO TO 221)	DAYS . . . 1 MONTHS . 2 YEARS . . 3	YES . . . . 1 NO 2

222	Have you had any live births since the birth of (NAME OF LAST BIRTH)?	YES . . . . . 1 NO 2

223 COMPARE 208 WITH NUMBER OF BIRTHS IN HISTORY ABOVE AND MARK:

NUMBERS ARE SAME ☐ ↓ NUMBERS ARE DIFFERENT ☐ → (PROBE AND RECONCILE)

CHECK:
- FOR EACH BIRTH: YEAR OF BIRTH IS RECORDED. ☐
- FOR EACH LIVING CHILD: CURRENT AGE IS RECORDED. ☐
- FOR EACH DEAD CHILD: AGE AT DEATH IS RECORDED. ☐
- FOR AGE AT DEATH 12 MONTHS OR 1 YEAR: PROBE TO DETERMINE EXACT NUMBER OF MONTHS. ☐

224 CHECK 215 AND ENTER THE NUMBER OF BIRTHS IN 2000 OR LATER. IF NONE, RECORD '0'. ☐

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
225	FOR EACH BIRTH SINCE JANUARY 1, 2000, ENTER 'B' IN THE MONTH OF BIRTH IN COLUMN 1 OF THE CALENDAR. FOR EACH BIRTH, ASK THE NUMBER OF MONTHS THE PREGNANCY LASTED AND RECORD 'P' IN EACH OF THE PRECEDING MONTHS ACCORDING TO THE DURATION OF PREGNANCY. (NOTE: THE NUMBER OF 'P's MUST BE ONE LESS THAN THE NUMBER OF MONTHS THAT THE PREGNANCY LASTED.) WRITE THE NAME OF THE CHILD TO THE LEFT OF THE 'B' CODE.		
226	Are you pregnant now?	YES ..... 1 NO ..... 2 UNSURE 8	→ 229
227	How many months pregnant are you? RECORD NUMBER OF COMPLETED MONTHS. ENTER 'P's IN COLUMN 1 OF CALENDAR, BEGINNING WITH THE MONTH OF INTERVIEW AND FOR THE TOTAL NUMBER OF COMPLETED MONTHS.	MONTHS	
228	At the time you became pregnant did you want to become pregnant then, did you want to wait until later, or did you not want to have any (more) children at all?	THEN ..... 1 LATER ..... 2 NOT AT ALL 3	
229	Have you ever had a pregnancy that miscarried, was aborted, or ended in a stillbirth?	YES ..... 1 NO 2	→ 237
230	When did the last such pregnancy end?	MONTH ..... YEAR	
231	CHECK 230: LAST PREGNANCY ENDED IN JANUARY 2000 OR LATER LAST PREGNANCY ENDED BEFORE JANUARY 2000		→ 237
232	How many months pregnant were you when the last such pregnancy ended? RECORD NUMBER OF COMPLETED MONTHS. ENTER 'T' IN COLUMN 1 OF CALENDAR IN THE MONTH THAT THE PREGNANCY TERMINATED AND 'P' FOR THE REMAINING NUMBER OF COMPLETED MONTHS.	MONTHS	
233	Have you ever had any other pregnancies that did not result in a live birth?	YES ..... 1 NO 2	→ 237
234	ASK THE DATE AND THE DURATION OF PREGNANCY FOR EACH EARLIER NON-LIVE BIRTH PREGNANCY BACK TO JANUARY 2000. ENTER 'T' IN COLUMN 1 OF CALENDAR IN THE MONTH THAT EACH PREGNANCY TERMINATED AND 'P' FOR THE REMAINING NUMBER OF COMPLETED MONTHS.		
235	Did you have any pregnancies that terminated before 2000 that did not result in a live birth?	YES ..... 1 NO 2	→ 237
236	When did the last such pregnancy that terminated before 2000 end?	MONTH ..... YEAR	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
237	When did your last menstrual period start? _____ (DATE, IF GIVEN)	DAYS AGO ..... 1 [ ][ ] WEEKS AGO ..... 2 [ ][ ] MONTHS AGO ..... 3 [ ][ ] YEARS AGO ..... 4 [ ][ ] IN MENOPAUSE/ HAS HAD HYSTERECTOMY . 994 BEFORE LAST BIRTH ..... 995 NEVER MENSTRUATED 996	
238	From one menstrual period to the next, are there certain days when a woman is more likely to become pregnant if she has sexual relations?	YES ..... 1 NO ..... 2 DON'T KNOW 8	→ 240
239	Is this time just before her period begins, during her period, right after her period has ended, or halfway between two periods?	JUST BEFORE HER PERIOD BEGINS ..... 1 DURING HER PERIOD ..... 2 RIGHT AFTER HER PERIOD HAS ENDED ..... 3 HALFWAY BETWEEN TWO PERIODS ..... 4 OTHER _____ (SPECIFY) 6 DON'T KNOW 8	
240	Are you the primary care giver for any children?	YES ..... 1 NO 2	→ 301
241	Are any of these children for whom you are the primary caregiver under the age of 18?	YES ..... 1 NO 2	→ 301
242	Now I would like to ask you about the children who are under the age of 18 and for whom you are the primary caregiver. Have you made arrangements for someone to care for these children in the event that you fall sick or are unable to care for them?	YES ..... 1 NO ..... 2 UNSURE 8	

SECTION 3. CONTRACEPTION

Now I would like to talk about family planning - the various ways or methods that a couple can use to delay or avoid a pregnancy. CIRCLE CODE 1 IN 301 FOR EACH METHOD MENTIONED SPONTANEOUSLY. THEN PROCEED DOWN COLUMN 301, READING THE NAME AND DESCRIPTION OF EACH METHOD NOT MENTIONED SPONTANEOUSLY. CIRCLE CODE 1 IF METHOD IS RECOGNIZED, AND CODE 2 IF NOT RECOGNIZED. THEN, FOR EACH METHOD WITH CODE 1 CIRCLED IN 301, ASK 302.

301	Which ways or methods have you heard about? FOR METHODS NOT MENTIONED SPONTANEOUSLY, ASK: Have you ever heard of (METHOD)?		302 Have you ever used (METHOD)?
01	FEMALE STERILIZATION Women can have an operation to avoid having any more children.	YES ..... 1 NO 2	Have you ever had an operation to avoid having any more children? YES ..... 1 NO 2
02	MALE STERILIZATION Men can have an operation to avoid having any more children.	YES ..... 1 NO 2	Have you ever had a partner who had an operation to avoid having any more children? YES ..... 1 NO 2
03	PILL Women can take a pill every day to avoid becoming pregnant.	YES ..... 1 NO 2	YES ..... 1 NO 2
04	IUD (LOOP) Women can have a loop or coil placed inside them by a doctor or a nurse.	YES ..... 1 NO 2	YES ..... 1 NO 2
05	INJECTION Women can have an injection by a health provider that stops them from becoming pregnant for one or more months.	YES ..... 1 NO 2	YES ..... 1 NO 2
06	IMPLANT Women can have small rods placed in their upper arm by a doctor or nurse which can prevent pregnancy for one or more years.	YES ..... 1 NO 2	YES ..... 1 NO 2
07	MALE CONDOM Men can put a rubber sheath on their penis before sexual intercourse.	YES ..... 1 NO 2	YES ..... 1 NO 2
08	FEMALE CONDOM Women can place a sheath in their vagina before sexual intercourse.	YES ..... 1 NO 2	YES ..... 1 NO 2
11	LACTATIONAL AMENORRHEA METHOD (LAM)	YES ..... 1 NO 2	YES ..... 1 NO 2
12	RHYTHM METHOD Every month that a woman is sexually active she can avoid pregnancy by not having sexual intercourse on the days of the month she is most likely to get pregnant	YES ..... 1 NO 2	YES ..... 1 NO 2
13	WITHDRAWAL Men can be careful and pull out before climax.	YES ..... 1 NO 2	YES ..... 1 NO 2
14	EMERGENCY CONTRACEPTION (MORNING AFTER PILL/POSTINO 2) Women can take pills up to three days after sexual intercourse to avoid becoming pregnant.	YES ..... 1 NO 2	YES ..... 1 NO 2
15	Have you heard of any other ways or methods that women or men can use to avoid pregnancy?	YES ..... 1 _____ (SPECIFY) _____ (SPECIFY) NO 2	YES ..... 1 NO ..... 2 YES ..... 1 NO 2
303	CHECK 302: NOT A SINGLE "YES" (NEVER USED) →	AT LEAST ONE "YES" (EVER USED) →	307

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
304	Have you ever used anything or tried in any way to delay or avoid getting pregnant?	YES ..... 1 NO 2	→ 306
305	ENTER '0' IN COLUMN 1 OF CALENDAR IN EACH BLANK MONTH.	→	330
306	What have you used or done? CORRECT 302 AND 303 (AND 301 IF NECESSARY).		
307	Now I would like to ask you about the first time that you did something or used a method to avoid getting pregnant. How many living children did you have at that time, if any? IF NONE, RECORD '00'.	NUMBER OF CHILDREN ... ☐☐	
308	CHECK 302 (01): WOMAN NOT STERILIZED ☐ ↓ WOMAN STERILIZED ☐ →		311A
309	CHECK 226: NOT PREGNANT OR UNSURE ☐ ↓ PREGNANT ☐ →		322
310	Are you currently doing something or using any method to delay or avoid getting pregnant?	YES ..... 1 NO 2	→ 322
311 311A	Which method are you using? CIRCLE ALL MENTIONED. IF MORE THAN ONE METHOD MENTIONED, FOLLOW SKIP INSTRUCTION FOR HIGHEST METHOD ON LIST. CIRCLE 'A' FOR FEMALE STERILIZATION.	FEMALE STERILIZATION ..... A MALE STERILIZATION ..... B → 316 PILL ..... C IUD ..... D INJECTION ..... E IMPLANT ..... F MALE CONDOM ..... G → 315 FEMALE CONDOM ..... H DIAPHRAGM ..... I FOAM/JELLY ..... J LACTATIONAL AMEN. METHOD ... K RHYTHM METHOD ..... L WITHDRAWAL ..... M → 319A OTHER _____ X (SPECIFY)	
312	May I see the package of pills you are using? RECORD NAME OF BRAND.	PACKAGE SEEN ..... 01 PACKAGE NOT SEEN ..... 02 →	313A
313	MARK CODE FOR BRAND NAME.	OVRETTE ..... 01 LO-FEMENAL ..... 02 MICRONOR ..... 03 MICRONOVUM ..... 04 MARVELLON ..... 05 DUOFEM ..... 06 EXCLUTON ..... 07 OTHER _____ ... 96 (SPECIFY)	→ 314

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
313A	Do you know the brand name of the pills you are using? RECORD NAME OF BRAND.	OVRETTE ..... 01 LO-FEMENAL ..... 02 MICRONOR ..... 03 MICRONOVUM ..... 04 MARVELLON ..... 05 DUOFEM ..... 06 EXCLUTON ..... 07 OTHER _____ ... 96 (SPECIFY) DON'T KNOW 98	
314	How many pill cycles did you get the last time?	NUMBER OF CYCLES/PACKAGES ☐☐☐ DON'T KNOW 998	
315	The last time you obtained (CURRENT METHOD IN 311), how much did you pay in total, including the cost of the method and any consultation you may have had?	COST ... ☐☐☐☐☐☐ FREE ..... 999995 DON'T KNOW 999998	→ 319A
316	In what facility did the sterilization take place? IF SOURCE IS HOSPITAL, HEALTH CENTER, OR CLINIC, WRITE THE NAME OF THE PLACE. PROBE TO IDENTIFY THE TYPE OF SOURCE AND CIRCLE THE APPROPRIATE CODE. _____ (NAME OF PLACE)	PUBLIC SECTOR CENTRAL HOSPITAL ..... 11 PROVINCIAL HOSPITAL ..... 12 DISTRICT/RURAL HOSPITAL . 13 ZNFPC CLINIC ..... 14 OTHER PUBLIC _____ 16 (SPECIFY) MISSION FACILITY ..... 21 PRIVATE MEDICAL SECTOR PRIVATE HOSPITAL/CLINIC ... 31 PRIVATE DOCTOR'S SURGERY.. 32 OTHER PRIVATE DOCTOR _____ 36 (SPECIFY) OTHER _____ 96 (SPECIFY)	
317	CHECK 311/311A: CODE 'A' CIRCLED → Before your sterilization operation, were you told that you would not be able to have any (more) children because of the operation? CODE 'B' CIRCLED → Before the sterilization operation, was your husband/partner told that he would not be able to have any (more) children because of the operation?	YES ..... 1 NO ..... 2 DON'T KNOW 8	
318	How much did you (your husband/partner) pay in total for the sterilization, including any consultation you (he)may have had?	COST ... ☐☐☐☐☐☐ FREE ..... 999995 DON'T KNOW 999998	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
319	In what month and year was the sterilization performed?	MONTH ..... YEAR	→ 320
319A	In what month and year did you start using (CURRENT METHOD) continuously? PROBE: For how long have you been using (CURRENT METHOD) now without stopping?	MONTH ..... YEAR	
320	CHECK 319/319A, 215, 230 AND CALENDAR: ANY BIRTH OR PREGNANCY TERMINATION AFTER MONTH AND YEAR OF START OF USE OF CONTRACEPTION IN 319/319A GO BACK TO 319/319A, PROBE AND RECORD MONTH AND YEAR AT START OF CONTINUOUS USE OF CURRENT METHOD (MUST BE AFTER LAST BIRTH OR PREGNANCY TERMINATION).	YES ☐ NO ☐	
321	CHECK 319/319A: YEAR IS 2000 OR LATER ☐ ENTER CODE FOR METHOD USED IN MONTH OF INTERVIEW IN COLUMN 1 OF THE CALENDAR AND IN EACH MONTH BACK TO THE DATE STARTED USING. ASK ABOUT SOURCE OF METHOD AT THE START OF USE AND ENTER METHOD SOURCE CODE IN COLUMN 2 OF CALENDAR IN MONTH USE STARTED. THEN CONTINUE WITH 322. YEAR IS 1999 OR EARLIER ☐ ENTER CODE FOR METHOD USED IN MONTH OF INTERVIEW IN COLUMN 1 OF THE CALENDAR AND EACH MONTH BACK TO JANUARY 2000. THEN SKIP TO → 328		

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
322	I would like to ask you some questions about the times you or your partner may have used a method to avoid getting pregnant during the last few years. USE CALENDAR TO PROBE FOR EARLIER PERIODS OF USE AND NONUSE, STARTING WITH MOST RECENT USE, BACK TO JANUARY 2000. USE NAMES OF CHILDREN, DATES OF BIRTH, AND PERIODS OF PREGNANCY AS REFERENCE POINTS. **IN COLUMN 1**, ENTER METHOD USE CODE OR '0' FOR NONUSE IN EACH BLANK MONTH. ILLUSTRATIVE QUESTIONS: COLUMN 1: * When was the last time you used a method? Which method was that? * When did you start using that method? How long after the birth of (NAME)? * How long did you use the method then? **IN COLUMN 2**, ENTER METHOD SOURCE CODE IN FIRST MONTH OF EACH USE. ILLUSTRATIVE QUESTIONS: COLUMN 2: * Where did you obtain the method when you started using it? * Where did you get advice on how to use the method [for LAM, rhythm, or withdrawal] **IN COLUMN 3**, ENTER CODES FOR DISCONTINUATION NEXT TO LAST MONTH OF USE. NUMBER OF CODES IN COLUMN 3 MUST BE SAME AS NUMBER OF INTERRUPTIONS OF METHOD USE IN COLUMN 1. ASK WHY SHE STOPPED USING THE METHOD. IF A PREGNANCY FOLLOWED, ASK WHETHER SHE BECAME PREGNANT UNINTENTIONALLY WHILE USING THE METHOD OR DELIBERATELY STOPPED TO GET PREGNANT. ILLUSTRATIVE QUESTIONS: COLUMN 3: * Why did you stop using the (METHOD)? * Did you become pregnant while using (METHOD), or did you stop to get pregnant, or did you stop for some other reason? IF DELIBERATELY STOPPED TO BECOME PREGNANT, ASK: * How many months did it take you to get pregnant after you stopped using (METHOD)? AND ENTER '0' IN EACH SUCH MONTH IN COLUMN 1.		
323	CHECK 311/311A: CIRCLE METHOD CODE. IF MORE THAN ONE METHOD CODE CIRCLED IN 311/311A, CIRCLE CODE FOR HIGHEST METHOD IN LIST.	NO CODE CIRCLED ..... 00 FEMALE STERILIZATION ..... 01 MALE STERILIZATION ..... 02 PILL ..... 03 IUD ..... 04 INJECTION ..... 05 IMPLANT ..... 06 MALE CONDOM ..... 07 FEMALE CONDOM ..... 08 DIAPHRAGM ..... 09 FOAM/JELLY ..... 10 LACTATIONAL AMEN. METHOD 11 RHYTHM METHOD ..... 12 WITHDRAWAL ..... 13 OTHER METHOD 96	→ 330 → 332 → 329 → 326 → 332
324	You obtained (CURRENT METHOD) from (SOURCE OF METHOD FROM CALENDAR) in (DATE). At the time you obtained the method, were you told about side effects or problems you might have with the method?	YES ..... 1 NO 2	→ 326
325	Were you told what to do if you experienced side effects or problems?	YES ..... 1 NO 2	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
326	CHECK 324: CODE '1' CIRCLED → At that time, were you told about other methods of family planning that you could use? CODE '1' NOT CIRCLED → When you obtained (CURRENT METHOD) from (SOURCE OF METHOD FROM CALENDAR) in (DATE), were you told about other methods of family planning that you could use?	YES ..... 1 NO 2	→ 328
327	Were you ever told by a health or family planning worker about other methods of family planning that you could use?	YES ..... 1 NO 2	
328	CHECK 311/311A: CIRCLE METHOD CODE:	FEMALE STERILIZATION ..... 01 MALE STERILIZATION ..... 02 PILL ..... 03 IUD ..... 04 INJECTION ..... 05 IMPLANT ..... 06 MALE CONDOM ..... 07 FEMALE CONDOM ..... 08 DIAPHRAGM ..... 09 FOAM/JELLY ..... 10 LACTATIONAL AMEN. METHOD 11 RHYTHM METHOD ..... 12 WITHDRAWAL ..... 13 OTHER METHOD 96	02 → 332 11, 12, 13, 96 → 332
329	Where did you (or your partner) obtain (CURRENT METHOD) the last time? IF SOURCE IS HOSPITAL, HEALTH CENTER, OR CLINIC, WRITE THE NAME OF THE PLACE. PROBE TO IDENTIFY THE TYPE OF SOURCE AND CIRCLE THE APPROPRIATE CODE. _____ (NAME OF PLACE)	**PUBLIC SECTOR** GOVT. HOSPITAL/CLINIC ..... 11 RURAL/MUNICIPAL CLINIC ... 12 RURAL HEALTH CENTRE ..... 13 ZNFPC CLINIC ..... 14 MOH MOBILE CLINIC ..... 16 ZNFPC CBD/DEPOT HOLDER 17 OTHER PUBLIC _____ (SPECIFY) 18 **MISSION FACILITY** ..... 21 **PRIVATE MEDICAL SECTOR** PRIVATE HOSPITAL/CLINIC ... 31 PHARMACY ..... 32 PRIVATE DOCTOR ..... 33 CBD ..... 34 OTHER PRIVATE DOCTOR _____ (SPECIFY) 36 **RETAIL OUTLET** GENERAL DEALER ..... 41 SUPERMARKET ..... 42 TUCK SHOP ..... 43 SERVICE STATION ..... 44 OTHER RETAIL _____ (SPECIFY) 46 **OTHER PRIVATE SOURCE** CHURCH ..... 51 FRIEND/RELATIVE ..... 52 **OTHER** _____ (SPECIFY) 96	11, 12, 13, 14, 16, 17, 18, 21, 31, 32, 33, 34, 36, 41, 42, 43, 44, 46, 51, 52, 96 → 332
330	Do you know of a place where you can obtain a method of family planning?	YES ..... 1 NO 2	→ 332

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
331	Where is that? IF SOURCE IS HOSPITAL, HEALTH CENTER, OR CLINIC, WRITE THE NAME OF THE PLACE. PROBE TO IDENTIFY THE TYPE OF SOURCE AND CIRCLE THE APPROPRIATE CODE. _____ (NAME OF PLACE) Any other place? RECORD ALL PLACES MENTIONED.	**PUBLIC SECTOR** GOVT. HOSPITAL/CLINIC ..... A RURAL/MUNICIPAL CLINIC ... B RURAL HEALTH CENTRE ..... C ZNFPC CLINIC ..... D MOH MOBILE CLINIC ..... E ZNFPC CBD/DEPOT HOLDER F OTHER PUBLIC _____ G (SPECIFY) **MISSION FACILITY** ..... H **PRIVATE MEDICAL SECTOR** PRIVATE HOSPITAL/CLINIC ... I PHARMACY ..... J PRIVATE DOCTOR ..... K CBD ..... L OTHER PRIVATE DOCTOR _____ M (SPECIFY) **RETAIL OUTLET** GENERAL DEALER ..... N SUPERMARKET ..... O TUCK SHOP ..... P SERVICE STATION ..... Q OTHER RETAIL _____ R (SPECIFY) **OTHER PRIVATE SOURCE** CHURCH ..... S FRIEND/RELATIVE ..... T **OTHER** _____ X (SPECIFY)	
332	In the last 12 months, were you visited by a CBD who talked to you about family planning?	YES ..... 1 NO 2	
333	In the last 12 months, have you visited a health facility for care for yourself (or your children)?	YES ..... 1 NO 2	→ 335
334	Did any staff member at the health facility speak to you about family planning methods?	YES ..... 1 NO 2	
335	CHECK 301 (07) KNOWS MALE CONDOM YES ☐ NO ☐ →		337
336	If a male condom is used correctly, do you think that it protects against pregnancy most of the time, only sometimes, or not at all?	MOST OF THE TIME ..... 1 SOMETIMES ..... 2 NOT AT ALL ..... 3 DON'T KNOW/UNSURE 8	
337	CHECK 301 (08) KNOWS FEMALE CONDOM YES ☐ NO ☐ →		401
338	If a female condom is used correctly, do you think that it protects against pregnancy most of the time, only sometimes, or not at all?	MOST OF THE TIME ..... 1 SOMETIMES ..... 2 NOT AT ALL ..... 3 DON'T KNOW/UNSURE 8	

SECTION 4 PREGNANCY, POSTNATAL CARE AND NUTRITION

401	CHECK 224: ONE OR MORE BIRTHS IN 2000 OR LATER ☐ ↓ NO BIRTHS IN 2000 OR LATER ☐ → 601	

402 ENTER IN THE TABLE THE LINE NUMBER, NAME, AND SURVIVAL STATUS OF EACH BIRTH IN 2000 OR LATER. ASK THE QUESTIONS ABOUT ALL OF THESE BIRTHS. BEGIN WITH THE LAST BIRTH. (IF THERE ARE MORE THAN 3 BIRTHS, USE LAST 2 COLUMNS OF ADDITIONAL QUESTIONNAIRES).

Now I would like to ask you some questions about the health of all your children born in the last five years. (We will talk about each separately.)

		LAST BIRTH	NEXT-TO-LAST BIRTH	SECOND-FROM-LAST BIRTH
403	LINE NUMBER FROM 212	LINE NUMBER ... ☐☐	LINE NUMBER ... ☐☐	LINE NUMBER ... ☐☐
404	FROM 212 AND 216	NAME _____ LIVING ☐ ↓ DEAD ☐ ↓	NAME _____ LIVING ☐ ↓ DEAD ☐ ↓	NAME _____ LIVING ☐ ↓ DEAD ☐ ↓
405	At the time you became pregnant with (NAME), did you want to become pregnant then, did you want to wait until later, or did you not want to have any (more) children at all?	THEN ..... 1 (SKIP TO 407) ↵ LATER ..... 2 NOT AT ALL ..... 3 (SKIP TO 407) ↵	THEN ..... 1 (SKIP TO 431) ↵ LATER ..... 2 NOT AT ALL ..... 3 (SKIP TO 431) ↵	THEN ..... 1 (SKIP TO 431) ↵ LATER ..... 2 NOT AT ALL ..... 3 (SKIP TO 431) ↵
406	How much longer would you like to have waited?	MONTHS 1 ☐☐ YEARS 2 ☐☐ DON'T KNOW ... 998	MONTHS 1 ☐☐ YEARS 2 ☐☐ DON'T KNOW ... 998 (GO TO 431)	MONTHS 1 ☐☐ YEARS 2 ☐☐ DON'T KNOW ... 998 (GO TO 431)
407	Did you see anyone for antenatal care for this pregnancy? IF YES: Whom did you see? Anyone else? PROBE FOR THE TYPE OF PERSON AND RECORD ALL PERSONS SEEN.	**HEALTH PROFESSIONAL** DOCTOR ..... A NURSE/MIDWIFE B **TRADITIONAL MIDWIFE** TRAINED ..... C UNTRAINED ..... D UNSURE ABOUT TRAINING ..... E **OTHER** _____ X (SPECIFY) NO ONE ..... Y (SKIP TO 414) ↵		
408	Where did you receive antenatal care for this pregnancy? Anywhere else? IF SOURCE IS HOSPITAL, HEALTH CENTER, OR CLINIC, WRITE THE NAME OF THE PLACE. PROBE TO IDENTIFY THE TYPE OF SOURCE AND CIRCLE THE APPROPRIATE CODE. RECORD ALL MENTIONED. _____ _____ (NAME OF PLACE(S))	**HOME** YOUR HOME ..... A OTHER HOME ..... B **PUBLIC SECTOR** CENTRAL HSP ... C PROVINCIAL HSP . D DIST/RURAL HSP. . E RURAL/MUNCPL CL. . . F RURAL HLTH CNTR. . G OTHER PUBLIC _____ H (SPECIFY) **MISSION FACILITY** . . I **PRIVATE MED. SECTOR** PRIVATE HSP/CLC. J OTHER PRIV. MED. K **OTHER** _____ X (SPECIFY)		

		LAST BIRTH NAME _____	NEXT-TO-LAST BIRTH NAME _____	SECOND-FROM-LAST BIRTH NAME _____
409	How many months pregnant were you when you first received antenatal care for this pregnancy?	MONTHS ... [ ] DON'T KNOW 98		
410	How many times did you receive antenatal care during this pregnancy?	NUMBER OF TIMES ... [ ] DON'T KNOW 98		
411	As part of your antenatal care during this pregnancy, were any of the following done at least once?	YES NO		
	Were you weighed?	WEIGHT 1 2		
	Was your blood pressure measured?	BP 1 2		
	Did you give a urine sample?	URINE 1 2		
	Did you give a blood sample?	BLOOD 1 2		
412	During (any of) your antenatal care visit(s), were you told about the signs of pregnancy complications?	YES ..... 1 NO ..... 2 (SKIP TO 414) DON'T KNOW..... 8		
413	Were you told where to go if you had these complications?	YES ..... 1 NO ..... 2 DON'T KNOW ... 8		
414	During this pregnancy, were you given an injection in the arm to prevent the baby from getting tetanus, that is, convulsions after birth?	YES ..... 1 NO ..... 2 (SKIP TO 417) DON'T KNOW ... 8		
415	During this pregnancy, how many times did you get this injection?	NUMBER OF TIMES ..... [ ] DON'T KNOW 8		
416	CHECK 415:	2 OR MORE TIMES (SKIP TO 421) [ ] OTHER [ ]		
417	Did you receive any tetanus injections at any time before this pregnancy?	YES ..... 1 NO ..... 2 (SKIP TO 421) DON'T KNOW 8		
418	How many times did you get a tetanus injection before this pregnancy? IF 7 OR MORE TIMES, RECORD '7'.	NUMBER OF TIMES ..... [ ] DON'T KNOW 8		
419	In what month and year did you receive the last tetanus injection before this pregnancy?	MONTH ..... [ ] DK MONTH ..... 98 YEAR [ ][ ][ ][ ] (SKIP TO 421) DK YEAR 9998		
420	How many years ago did you receive that tetanus injection?	YEARS AGO ..... [ ]		

		LAST BIRTH NAME ______	NEXT-TO-LAST BIRTH NAME ______	SECOND-FROM-LAST BIRTH NAME ______
421	During this pregnancy, were you given or did you buy any iron/ folic acid tablets or iron syrup? SHOW TABLETS/SYRUP.	YES . . . . 1 NO . . . . 2 (SKIP TO 423) DON'T KNOW 8		
422	During the whole pregnancy, for how many days did you take the tablets or syrup? IF ANSWER IS NOT NUMERIC, PROBE FOR APPROXIMATE NUMBER OF DAYS.	NUMBER OF DAYS . . . [ ][ ][ ] DON'T KNOW . . . 998		
423	During this pregnancy, did you have difficulty with your vision during the daylight?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8		
424	During this pregnancy, did you suffer from night blindness?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8		
425	During this pregnancy, did you take any drugs to prevent you from getting malaria?	YES . . . . 1 NO . . . . 2 (SKIP TO 431) DON'T KNOW 8		
426	What drugs did you take? RECORD ALL MENTIONED. IF TYPE OF DRUG IS NOT DETERMINED, SHOW TYPICAL ANTIMALARIAL DRUGS TO RESPONDENT.	SP/FANSIDAR . . . . . A CHLOROQUINE . . . B DELTAPRIM . . . . . . C OTHER ______ X (SPECIFY) DON'T KNOW . . . . . Z		
427	CHECK 426: DRUGS TAKEN FOR MALARIA PREVENTION.	CODE 'A' CIRCLED [ ] CODE 'A' NOT CIRCLED [ ] (SKIP TO 431)		
428	How many times did you take SP/Fansidar during this pregnancy?	NUMBER OF TIMES . . . . . [ ][ ]		
429	CHECK 407: ANTENATAL CARE FROM HEALTH PROFESSIONAL DURING PREGNANCY	CODES 'A' OR 'B' CIRCLED [ ] OTHER [ ] (SKIP TO 431)		
430	Did you get the SP/Fansidar during an antenatal visit, during another visit to a health facility or from some other source?	ANTENATAL VISIT 1 OTHER FACILITY VISIT . . . . 2 OTHER SOURCE . 3		
431	When (NAME) was born, was he/she very large, larger than average, average, smaller than average, or very small?	VERY LARGE . . . . . 1 LARGER THAN AVERAGE . . . . . 2 AVERAGE . . . . 3 SMALLER THAN AVERAGE . . . . . 4 VERY SMALL . . . . . 5 DON'T KNOW 8	VERY LARGE . . . . . 1 LARGER THAN AVERAGE . . . . . 2 AVERAGE . . . . 3 SMALLER THAN AVERAGE . . . . . 4 VERY SMALL . . . . . 5 DON'T KNOW 8	VERY LARGE . . . . . 1 LARGER THAN AVERAGE . . . . . 2 AVERAGE . . . . 3 SMALLER THAN AVERAGE . . . . . 4 VERY SMALL . . . . . 5 DON'T KNOW 8
432	Was (NAME) weighed at birth?	YES . . . . 1 NO . . . . 2 (SKIP TO 434) DON'T KNOW 8	YES . . . . 1 NO . . . . 2 (SKIP TO 434) DON'T KNOW 8	YES . . . . 1 NO . . . . 2 (SKIP TO 434) DON'T KNOW 8

		LAST BIRTH NAME ____________	NEXT-TO-LAST BIRTH NAME ____________	SECOND-FROM-LAST BIRTH NAME ____________
433	How much did (NAME) weigh? ASK FOR HEALTH CARD. RECORD WEIGHT IN KILOGRAMS FROM HEALTH CARD, IF AVAILABLE.	KG FROM CARD 1 [ ] . [ ][ ][ ] KG FROM RECALL 2 [ ] . [ ][ ][ ] DON'T KNOW . 99.998	KG FROM CARD 1 [ ] . [ ][ ][ ] KG FROM RECALL 2 [ ] . [ ][ ][ ] DON'T KNOW . 99.998	KG FROM CARD 1 [ ] . [ ][ ][ ] KG FROM RECALL 2 [ ] . [ ][ ][ ] DON'T KNOW . 99.998
434	Who assisted with the delivery of (NAME)? Anyone else? PROBE FOR THE TYPE OF PERSON AND RECORD ALL PERSONS ASSISTING. IF RESPONDENT SAYS NO ONE ASSISTED, PROBE TO DETERMINE WHETHER ANY ADULTS WERE PRESENT AT THE DELIVERY.	**HEALTH PROFESSIONAL** DOCTOR .... A NURSE/MIDWIFE B **TRADITIONAL MIDWIFE** TRAINED .... C UNTRAINED ..... D UNSURE ABOUT TRAINING .... E **OTHER** ________ X (SPECIFY) NO ONE .... Y	**HEALTH PROFESSIONAL** DOCTOR .... A NURSE/MIDWIFE B **TRADITIONAL MIDWIFE** TRAINED .... C UNTRAINED ..... D UNSURE ABOUT TRAINING .... E **OTHER** ________ X (SPECIFY) NO ONE .... Y	**HEALTH PROFESSIONAL** DOCTOR .... A NURSE/MIDWIFE B **TRADITIONAL MIDWIFE** TRAINED .... C UNTRAINED ..... D UNSURE ABOUT TRAINING .... E **OTHER** ________ X (SPECIFY) NO ONE .... Y
435	Where did you give birth to (NAME)? IF SOURCE IS HOSPITAL, HEALTH CENTER, OR CLINIC, WRITE THE NAME OF THE PLACE. PROBE TO IDENTIFY THE TYPE OF SOURCE AND CIRCLE THE APPROPRIATE CODE. ________________ (NAME OF PLACE)	**HOME** YOUR HOME 11 (SKIP TO 444) OTHER HOME ...... 12 **PUBLIC SECTOR** CENTRAL HSP ... 21 PROVINCIAL HSP 22 DIST/RURAL HSP . 23 RURAL/MUNCPL CL. . . 24 RURAL HLTH CNTR. . 25 OTHER PUBLIC ________ 26 (SPECIFY) **MISSION FACILITY** . . 31 **PRIVATE MED. SECTOR** PRIVATE HSP/CLC. 41 OTHER PRIVATE MED.________ 42 (SPECIFY) **OTHER** ________ 96 (SPECIFY) (SKIP TO 444)	**HOME** YOUR HOME 11 (SKIP TO 444) OTHER HOME ...... 12 **PUBLIC SECTOR** CENTRAL HSP ... 21 PROVINCIAL HSP 22 DIST/RURAL HSP 23 RURAL/MUNCPL CL. . . 24 RURAL HLTH CNTR. . 25 OTHER PUBLIC ________ 26 (SPECIFY) **MISSION FACILITY** . . 31 **PRIVATE MED. SECTOR** PRIVATE HSP/CLC. 41 OTHER PRIVATE MED.________ 42 (SPECIFY) (SKIP TO 438) **OTHER** ________ 96 (SPECIFY) (SKIP TO 445)	**HOME** YOUR HOME 11 (SKIP TO 444) OTHER HOME ...... 12 **PUBLIC SECTOR** CENTRAL HSP ... 21 PROVINCIAL HSP 22 DIST/RURAL HSP . 23 RURAL/MUNCPL CL. . . 24 RURAL HLTH CNTR. . 25 OTHER PUBLIC ________ 26 (SPECIFY) **MISSION FACILITY** . . 31 **PRIVATE MED. SECTOR** PRIVATE HSP/CLC. 41 OTHER PRIVATE MED.________ 42 (SPECIFY) (SKIP TO 438) **OTHER** ________ 96 (SPECIFY) (SKIP TO 445)
436	How many hours after your labor pains began, did you get to the facility? IF MORE THAN 24 HOURS RECORD '25'. RECORD '00' IF LESS THAN ONE HOUR.	HOURS ..... [ ][ ] 25 HOURS OR MORE .... 25 DON'T KNOW 98		
437	How long after you arrived at the facility, did a health professional check on you? IF MORE THAN 24 HOURS RECORD '25'. RECORD '00' IF LESS THAN ONE HOUR.	HOURS ..... [ ][ ] 25 HOURS OR MORE .... 25 DON'T KNOW 98		
438	Was (NAME) delivered by caesarean section?	YES .... 1 NO 2	YES .... 1 NO 2	YES .... 1 NO 2

		LAST BIRTH NAME _____	NEXT-TO-LAST BIRTH NAME _____	SECOND-FROM-LAST BIRTH NAME _____
439	How long after (NAME) was delivered did you stay there? IF LESS THAN ONE DAY, RECORD HOURS. IF LESS THAN ONE WEEK, RECORD DAYS.	HOURS . 1 ☐☐ DAYS .. 2 ☐☐ WEEKS . 3 ☐☐ DON'T KNOW ... 998	HOURS . 1 ☐☐ DAYS .. 2 ☐☐ WEEKS . 3 ☐☐ DON'T KNOW ... 998	HOURS . 1 ☐☐ DAYS .. 2 ☐☐ WEEKS . 3 ☐☐ DON'T KNOW ... 998
440	Before you were discharged after (NAME) was born, did any health personnel check on your health?	YES ..... 1 NO ..... 2 (SKIP TO 443)	YES ..... 1 (SKIP TO 455) NO ..... 2 (SKIP TO 443)	YES ..... 1 (SKIP TO 455) NO ..... 2 (SKIP TO 443)
441	How many hours, days or weeks after delivery did the first check take place? IF LESS THAN ONE DAY, RECORD HOURS. IF LESS THAN ONE WEEK, RECORD DAYS.	HOURS . 1 ☐☐ DAYS .. 2 ☐☐ WEEKS . 3 ☐☐ DON'T KNOW... 998		
442	Who checked on your health at that time? PROBE FOR MOST QUALIFIED PERSON.	**HEALTH PERSONNEL** DOCTOR ..... 11 NURSE/MIDWIFE .. 12 **TRADITIONAL MIDWIFE** TRAINED ..... 21 UNTRAINED ..... 22 UNSURE ABOUT TRAINING ..... 23 **OTHER** _____ (SPECIFY) 96 (SKIP TO 453)		
443	After you were discharged, did any health care provider or a traditional birth attendant check on your health?	YES ..... 1 (SKIP TO 446) NO ..... 2 (SKIP TO 453)	YES ..... 1 (SKIP TO 455) NO 2	YES ..... 1 (SKIP TO 455) NO 2
444	Why didn't you deliver in a health facility? PROBE: Any other reason? RECORD ALL MENTIONED.	COST TOO MUCH ... A FACILITY NOT OPEN . B TOO FAR/NO TRANS-PORTATION ..... C DON'T TRUST FACILITY/POOR QUALITY SERVICE . D NO FEMALE PROVID-ER AT FACILITY ... E HUSBAND/FAMILY DID NOT ALLOW . F NOT NECESSARY ... G NOT CUSTOMARY ... H OTHER _____ (SPECIFY) X		
445	After (NAME) was born did a health professional or a traditional birth attendant check on your health?	YES ..... 1 NO ..... 2 (SKIP TO 449)	YES ..... 1 NO ..... 2 (SKIP TO 455)	YES ..... 1 NO ..... 2 (SKIP TO 455)
446	How many hours, days or weeks after delivery did the first check take place? IF LESS THAN ONE DAY, RECORD HOURS. IF LESS THAN ONE WEEK, RECORD DAYS.	HOURS . 1 ☐☐ DAYS .. 2 ☐☐ WEEKS . 3 ☐☐ DON'T KNOW... 998		

		LAST BIRTH NAME _____	NEXT-TO-LAST BIRTH NAME _____	SECOND-FROM-LAST BIRTH NAME _____
447	Who checked on your health at that time? PROBE FOR MOST QUALIFIED PERSON.	**HEALTH PERSONNEL** DOCTOR . . . . . 11 NURSE/MIDWIFE . . 12 **TRADITIONAL MIDWIFE** TRAINED . . . . . 21 UNTRAINED . . . . . 22 UNSURE ABOUT TRAINING . . . . . 23 **OTHER** _____ 96 (SPECIFY)		
448	Where did this first check of (NAME) take place? IF SOURCE IS HOSPITAL, HEALTH CENTER, OR CLINIC, WRITE THE NAME OF THE PLACE. PROBE TO IDENTIFY THE TYPE OF SOURCE AND CIRCLE THE APPROPRIATE CODE. _____ (NAME OF PLACE)	**HOME** YOUR HOME . . . . . 11 OTHER HOME . . . . . 12 **PUBLIC SECTOR** CENTRAL HSP . . . 21 PROVINCIAL HSP . 22 DIST/RURAL HSP . 23 RURAL/MUNCPL CL. . . 24 RURAL HLTH CNTR. . 25 OTHER PUBLIC _____ 26 (SPECIFY) **MISSION FACILITY** . . 31 **PRIVATE MED. SECTOR** PRIVATE HSP/CLC. 41 OTHER PRIVATE 42 _____ (SPECIFY) **OTHER** _____ 96 (SPECIFY)		
448A	CHECK 443:	YES ☐ NOT ASKED ☐ (SKIP TO 453)		
449	In the two months after (NAME) was born, did a health care provider or traditional birth attendant check on his/her health?	YES . . . . . 1 NO 2 (SKIP TO 453) ← DON'T KNOW 8		
450	How many hours, days or weeks after the birth of (NAME) did the first check take place? IF LESS THAN ONE DAY, RECORD HOURS. IF LESS THAN ONE WEEK, RECORD DAYS.	HOURS . 1 ☐☐ DAYS . . 2 ☐☐ WEEKS. . 3 ☐☐ DON'T KNOW . . . 998		
451	Who checked on (NAME)'s health at that time? PROBE FOR MOST QUALIFIED PERSON.	**HEALTH PERSONNEL** DOCTOR . . . . . 11 NURSE/MIDWIFE . . 12 **TRADITIONAL MIDWIFE** TRAINED . . . . . 21 UNTRAINED . . . . . 22 UNSURE ABOUT TRAINING . . . . . 23 **OTHER** _____ 96 (SPECIFY)		

		LAST BIRTH NAME _____	NEXT-TO-LAST BIRTH NAME _____	SECOND-FROM-LAST BIRTH NAME _____
452	Where did this first check of (NAME) take place? IF SOURCE IS HOSPITAL, HEALTH CENTER, OR CLINIC, WRITE THE NAME OF THE PLACE. PROBE TO IDENTIFY THE TYPE OF SOURCE AND CIRCLE THE APPROPRIATE CODE. _____ (NAME OF PLACE)	**HOME** YOUR HOME ..... 11 OTHER HOME ..... 12 **PUBLIC SECTOR** CENTRAL HSP ... 21 PROVINCIAL HSP . 22 DIST/RURAL HSP . 23 RURAL/MUNCPL CL. . . 24 RURAL HLTH CNTR. . 25 OTHER PUBLIC _____ 26 (SPECIFY) **MISSION FACILITY** . . 31 **PRIVATE MED. SECTOR** PRIVATE HSP/CLC. 41 OTHER PRIVATE 42 _____ (SPECIFY) **OTHER** _____ 96 (SPECIFY)		
453	In the first two months after delivery, did you receive a vitamin A dose like this? SHOW AMPULE/CAPSULE/ SYRUP.	YES ..... 1 NO 2		
454	Has your period returned since the birth of (NAME)?	YES ..... 1 (SKIP TO 456) NO ..... 2 (SKIP TO 457)		
455	Did your period return between the birth of (NAME) and your next pregnancy?		YES ..... 1 NO ..... 2 (SKIP TO 459)	YES ..... 1 NO ..... 2 (SKIP TO 459)
456	For how many months after the birth of (NAME) did you not have a period?	MONTHS ... ☐☐ DON'T KNOW 98	MONTHS ... ☐☐ DON'T KNOW 98	MONTHS ... ☐☐ DON'T KNOW 98
457	CHECK 226: IS RESPONDENT PREGNANT?	NOT PREG-NANT ☐ PREGNANT OR ☐ UNSURE (SKIP TO 459)		
458	Have you resumed sexual relations since the birth of (NAME)?	YES ..... 1 NO ..... 2 (SKIP TO 460)		
459	For how many months after the birth of (NAME) did you not have sexual relations? PROBE FOR LOCAL BELIEFS AND PRACTICES.	MONTHS ... ☐☐ DON'T KNOW 98	MONTHS ... ☐☐ DON'T KNOW 98	MONTHS ... ☐☐ DON'T KNOW 98
460	Did you ever breastfeed (NAME)?	YES ..... 1 NO ..... 2 (SKIP TO 467)	YES ..... 1 NO ..... 2 (SKIP TO 467)	YES ..... 1 NO ..... 2 (SKIP TO 467)
461	How long after birth did you first put (NAME) to the breast? IF LESS THAN 1 HOUR, RECORD '00' HOURS. IF LESS THAN 24 HOURS, RECORD HOURS. OTHERWISE, RECORD DAYS.	IMMEDIATELY ... 000 HOURS 1 ☐☐ DAYS 2 ☐☐	IMMEDIATELY ... 000 HOURS 1 ☐☐ DAYS 2 ☐☐	IMMEDIATELY ... 000 HOURS 1 ☐☐ DAYS 2 ☐☐

		LAST BIRTH NAME ______	NEXT-TO-LAST BIRTH NAME ______	SECOND-FROM-LAST BIRTH NAME ______
462	In the first three days after delivery, was (NAME) given anything to drink other than breast milk?	YES . . . . 1 NO . . . . 2 (SKIP TO 464)	YES . . . . 1 NO . . . . 2 (SKIP TO 464)	YES . . . . 1 NO . . . . 2 (SKIP TO 464)
463	What was (NAME) given to drink? Anything else? RECORD ALL LIQUIDS MENTIONED.	MILK (OTHER THAN BREAST MILK) . A PLAIN WATER . . . B SUGAR OR GLUCOSE WATER . . . C GRIPE WATER . . . D SUGAR-SALT-WATER SOLUTION . . . . . E FRUIT JUICE . . . . . F INFANT FORMULA . G TEA/INFUSIONS . . . H HONEY . . . . I OTHER ______ X (SPECIFY)	MILK (OTHER THAN BREAST MILK) . A PLAIN WATER . . . B SUGAR OR GLUCOSE WATER . C GRIPE WATER . . . D SUGAR-SALT-WATER SOLUTION . . . . . E FRUIT JUICE . . . . . F INFANT FORMULA . G TEA/INFUSIONS . . . H HONEY . . . . I OTHER ______ X (SPECIFY)	MILK (OTHER THAN BREAST MILK) . A PLAIN WATER . . . B SUGAR OR GLUCOSE WATER . C GRIPE WATER . . . D SUGAR-SALT-WATER SOLUTION . . . . . E FRUIT JUICE . . . . . F INFANT FORMULA . G TEA/INFUSIONS . . . H HONEY . . . . I OTHER ______ X (SPECIFY)
464	CHECK 404: IS CHILD LIVING?	LIVING DEAD (SKIP TO 466)	LIVING DEAD (SKIP TO 466)	LIVING DEAD (SKIP TO 466)
465	Are you still breastfeeding (NAME)?	YES . . . . 1 (SKIP TO 468) NO 2	YES . . . . 1 (SKIP TO 470) NO 2	YES . . . . 1 (SKIP TO 470) NO 2
466	For how many months did you breastfeed (NAME)?	MONTHS DON'T KNOW . . . 98	MONTHS DON'T KNOW . . . 98	MONTHS DON'T KNOW . . . 98
467	CHECK 404: IS CHILD LIVING?	LIVING DEAD (GO BACK TO 405 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 472) (SKIP TO 470)	LIVING DEAD (GO BACK TO 405 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 472) (SKIP TO 470)	LIVING DEAD (GO BACK TO 405 IN NEXT-TO-LAST COLUMN OF NEW QUESTIONNAIRE; OR, IF NO MORE BIRTHS, GO TO 472) (SKIP TO 470)
468	How many times did you breastfeed last night between sunset and sunrise? IF ANSWER IS NOT NUMERIC, PROBE FOR APPROXIMATE NUMBER.	NUMBER OF NIGHTTIME FEEDINGS		
469	How many times did you breastfeed yesterday during the daylight hours? IF ANSWER IS NOT NUMERIC, PROBE FOR APPROXIMATE NUMBER.	NUMBER OF DAYTIME FEEDINGS		
470	Did (NAME) drink anything from a feeding bottle yesterday or last night?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	YES . . . . 1 NO . . . . 2 DON'T KNOW 8
471		GO BACK TO 405 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 472.	GO BACK TO 405 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 472.	GO BACK TO 405 IN NEXT-TO-LAST COLUMN OF NEW QUESTIONNAIRE; OR, IF NO MORE BIRTHS, GO TO 472.

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
472	CHECK 215 AND 218: HAS AT LEAST ONE CHILD BORN IN 2002 OR LATER AND LIVING WITH HER ☐ RECORD NAME OF YOUNGEST CHILD LIVING WITH HER AND CONTINUE WITH 473 _____ (NAME) DOES NOT HAVE ANY CHILDREN BORN IN 2002 OR LATER AND LIVING WITH HER ☐		→ 501

473	Now I would like to ask you about the food (NAME FROM 472) and you ate yesterday during the day or at night, either separately or combined with other foods. ASK ABOUT EACH FOOD TYPE. FOR THOSE ITEMS WHERE INFORMATION IS SOUGHT FOR BOTH THE CHILD AND THE MOTHER, ASK ABOUT THE CHILD FIRST AND THEN THE MOTHER.		473A CHILD Yesterday, during the day or night, did (NAME FROM 473) eat/drink:			473B MOTHER And you yourself, yesterday during the day or night, did you eat/drink:		
			YES	NO	DK	YES	NO	DK
a.	Commercially produced infant formula?	a.	1	2	8			
b.	Any maize or meal-meal porridge or gruel?	b.	1	2	8			
c.	Any Cerelac, Proneutro, or other commercially fortified baby food?	c.	1	2	8			
d.	Any sadza, bread, rice, noodles, or any foods made from grains?	d.	1	2	8	1	2	8
e.	Any pumpkin, carrots, squash, or yams or sweet potatoes that are yellow or orange inside?	e.	1	2	8	1	2	8
f.	Any white potatoes, white yams, manioc, cassava, or any other foods made from roots?	f.	1	2	8	1	2	8
g.	Any dark, green, leafy vegetables such as spinach, pumkin or okra leaves?	g.	1	2	8	1	2	8
h.	Any ripe mangoes or paw paw?	h.	1	2	8	1	2	8
i.	Any other fruits or vegetables?	i.	1	2	8	1	2	8
j.	Any liver, kidney, heart or other organ meats?	j.	1	2	8	1	2	8
k.	Any beef, pork, lamb, goat, rabbit or any game meat.	k.	1	2	8	1	2	8
l.	Any chicken, duck or other birds?	l.	1	2	8	1	2	8
m.	Any eggs?	m.	1	2	8	1	2	8
n.	Any fresh or dried fish or shellfish?	n.	1	2	8	1	2	8
o.	Any foods made from cowspeas, beans, other peas, or lentils?	o.	1	2	8	1	2	8
p.	Any peanut butter or other food from nuts?	p.	1	2	8	1	2	8
q.	Any cheese, yogurt, or milk products?	q.	1	2	8	1	2	8
r.	Any foods made with other oil, fat, or butter?	r.	1	2	8	1	2	8
s.	Any sugary foods such as pastries, cakes, chocolates, sweets, or candies?	s.	1	2	8	1	2	8
t.	Any other solid or semi-solid food?	t.	1	2	8	1	2	8
u.	Plain water?	u.	1	2	8	1	2	8
v.	Milk, such as tinned, powdered, or fresh animal milk?	v.	1	2	8	1	2	8
w.	Any sugary drinks such as mahewu, sodas or fruit juices?	w.	1	2	8	1	2	8
x.	Tea or coffee?	x.	1	2	8	1	2	8
y.	Any other liquids?	y.	1	2	8	1	2	8

474	CHECK 473A: AT LEAST ONE "YES" ☐	NOT A SINGLE "YES" ☐ → 501	
475	How many times did (NAME) eat solid, semisolid, or soft foods other than liquids yesterday during the day or at night? IF 7 OR MORE TIMES, RECORD '7'.	NUMBER OF TIMES ..... ☐ DON'T KNOW 8	

SECTION 5. IMMUNIZATION AND CHILD HEALTH

501	ENTER IN THE TABLE THE LINE NUMBER, NAME, AND SURVIVAL STATUS OF EACH BIRTH IN 2000 OR LATER. ASK THE QUESTIONS ABOUT ALL OF THESE BIRTHS. BEGIN WITH THE LAST BIRTH. (IF THERE ARE MORE THAN 3 BIRTHS, USE LAST 2 COLUMNS OF ADDITIONAL QUESTIONNAIRES).			
502	LINE NUMBER FROM 212	LAST BIRTH LINE NUMBER	NEXT-TO-LAST BIRTH LINE NUMBER	SECOND-FROM-LAST BIRTH LINE NUMBER .....
503	FROM 212 AND 216	NAME_____ LIVING ☐ DEAD ☐ → (GO TO 503 IN NEXT COLUMN OR, IF NO MORE BIRTHS, GO TO 561)	NAME_____ LIVING ☐ DEAD ☐ → (GO TO 503 IN NEXT COLUMN OR, IF NO MORE BIRTHS, GO TO 561)	NAME_____ LIVING ☐ DEAD ☐ → (GO TO 503 IN NEXT-TO-LAST COLUMN OF NEW QUESTIONNAIRE; OR IF NO MORE BIRTHS, GO TO 561)
504	Has (NAME) ever received a vitamin A dose like this? SHOW AMPULE/ CAPSULE/SYRUP.	YES ..... 1 NO ..... 2 (SKIP TO 506) DON'T KNOW 8	YES ..... 1 NO ..... 2 (SKIP TO 506) DON'T KNOW 8	YES ..... 1 NO ..... 2 (SKIP TO 506) DON'T KNOW 8
505	How many months ago did (NAME) take the last dose?	MONTHS AGO ..... DON'T KNOW 98	MONTHS AGO ..... DON'T KNOW 98	MONTHS AGO ..... DON'T KNOW 98
506	Do you have a child health card where (NAME'S) vaccinations are written down? IF YES: May I see it please?	YES, SEEN ..... 1 (SKIP TO 508) YES, NOT SEEN ..... 2 (SKIP TO 510) NO CARD 3	YES, SEEN ..... 1 (SKIP TO 508) YES, NOT SEEN ..... 2 (SKIP TO 510) NO CARD 3	YES, SEEN ..... 1 (SKIP TO 508) YES, NOT SEEN ..... 2 (SKIP TO 510) NO CARD 3
507	Did you ever have a child health card for (NAME)?	YES ..... 1 (SKIP TO 510) NO 2	YES ..... 1 (SKIP TO 510) NO 2	YES ..... 1 (SKIP TO 510) NO 2

508 (1) COPY VACCINATION DATE FOR EACH VACCINE FROM THE CARD.
(2) WRITE '44' IN 'DAY' COLUMN IF CARD SHOWS THAT A VACCINATION WAS GIVEN, BUT NO DATE IS RECORDED.

	LAST BIRTH DAY	LAST BIRTH MONTH	LAST BIRTH YEAR	NEXT-TO-LAST BIRTH DAY	NEXT-TO-LAST BIRTH MONTH	NEXT-TO-LAST BIRTH YEAR	SECOND-FROM-LAST BIRTH DAY	SECOND-FROM-LAST BIRTH MONTH	SECOND-FROM-LAST BIRTH YEAR
BCG				BCG			BCG		
POLIO 1				P1			P1		
POLIO 2				P2			P2		
POLIO 3				P3			P3		
POLIO 4 BOOSTER				P4			P4		
DPT 1				D1			D1		
DPT 2				D2			D2		
DPT 3				D3			D3		
DPT 4 BOOSTER				D4			D4		
HEPATITIS B 1				HB1			HB1		
HEPATITIS B 2				HB2			HB2		
HEPATITIS B 3				HB3			HB3		
MEASLES 1				MEA1			MEA1		
MEASLES 2				MEA2			MEA2		
VITAMIN A (MOST RECENT)				VIT A			VIT A		
VITAMIN A (2nd MOST RECENT)				VIT A			VIT A		

		LAST BIRTH NAME ________	NEXT-TO-LAST BIRTH NAME ________	SECOND-FROM-LAST BIRTH NAME ________
509	Has (NAME) received any vaccinations that are not recorded on this card, including vaccinations received in a national immunization day campaign? RECORD 'YES' ONLY IF RESPONDENT MENTIONS BCG, POLIO 1-3, DPT 1-4, HEPATITIS B 1-3 AND/OR MEASLES 1-2 VACCINES	YES . . . . . 1 (PROBE FOR VACCINATIONS AND WRITE '66' IN THE CORRESPONDING DAY COLUMN IN 508) (SKIP TO 520) NO . . . . . 2 (SKIP TO 520) DON'T KNOW 8	YES . . . . . 1 (PROBE FOR VACCINATIONS AND WRITE '66' IN THE CORRESPONDING DAY COLUMN IN 508) (SKIP TO 520) NO . . . . . 2 (SKIP TO 520) DON'T KNOW 8	YES . . . . . 1 (PROBE FOR VACCINATIONS AND WRITE '66' IN THE CORRESPONDING DAY COLUMN IN 508) (SKIP TO 520) NO . . . . . 2 (SKIP TO 520) DON'T KNOW 8
510	Did (NAME) ever receive any vaccinations to prevent him/her from getting diseases, including vaccinations received in a national immunization day campaign?	YES . . . . . 1 NO . . . . . 2 (SKIP TO 522) DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 (SKIP TO 522) DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 (SKIP TO 522) DON'T KNOW 8
511	Please tell me if (NAME) received any of the following vaccinations:			
511A	A BCG vaccination against tuberculosis, that is, an injection in the arm that usually causes a scar?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8
512	Polio vaccine, that is, drops in the mouth?	YES . . . . . 1 NO . . . . . 2 (SKIP TO 515) DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 (SKIP TO 515) DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 (SKIP TO 515) DON'T KNOW 8
514	How many times was the polio vaccine received?	NUMBER OF TIMES . . . . . ☐	NUMBER OF TIMES . . . . . ☐	NUMBER OF TIMES . . . . . ☐
515	A DPT vaccination, that is, an injection given in the right thigh, sometimes at the same time as polio drops?	YES . . . . . 1 NO . . . . . 2 (SKIP TO 517) DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 (SKIP TO 517) DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 (SKIP TO 517) DON'T KNOW 8
516	How many times?	NUMBER OF TIMES . . . . . ☐	NUMBER OF TIMES . . . . . ☐	NUMBER OF TIMES . . . . . ☐
517	A hepatitis B vaccination, that is, an injection given in the left thigh?	YES . . . . . 1 NO . . . . . 2 (SKIP TO 519) DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 (SKIP TO 519) DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 (SKIP TO 519) DON'T KNOW 8
518	How many times?	NUMBER OF TIMES . . . . . ☐	NUMBER OF TIMES . . . . . ☐	NUMBER OF TIMES . . . . . ☐
519	An injection to prevent measles?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 8
520	Were any of the vaccinations (NAME) received during the last two years given as part of a national immunization day campaign?	YES . . . . . 1 NO . . . . . 2 NO VACCINATION IN THE LAST 2 YRS. 3 DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 NO VACCINATION IN THE LAST 2 YRS. 3 DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 NO VACCINATION IN THE LAST 2 YRS. 3 DON'T KNOW 8

		LAST BIRTH NAME ____________	NEXT-TO-LAST BIRTH NAME ____________	SECOND-FROM-LAST BIRTH NAME ____________
522	Has (NAME) had diarrhea in the last 2 weeks?	YES .... 1 NO .... 2 (SKIP TO 535) DON'T KNOW 8	YES .... 1 NO .... 2 (SKIP TO 535) DON'T KNOW 8	YES .... 1 NO .... 2 (SKIP TO 535) DON'T KNOW 8
523	Was there any blood in the stools?	YES.................. 1 NO .... 2 DON'T KNOW.......... 8	YES.................. 1 NO .... 2 DON'T KNOW.......... 8	YES.................. 1 NO .... 2 DON'T KNOW.......... 8
524	Now I would like to know how much (NAME) was given to drink during the diarrhea. Was he/she offered less than usual to drink, about the same amount, or more than usual to drink? IF LESS, PROBE: Was he/she offered much less than usual to drink or somewhat less?	MUCH LESS .... 1 SOMEWHAT LESS . 2 ABOUT THE SAME . 3 MORE .... 4 NOTHING TO DRINK 5 DON'T KNOW 8	MUCH LESS .... 1 SOMEWHAT LESS . 2 ABOUT THE SAME . 3 MORE .... 4 NOTHING TO DRINK 5 DON'T KNOW 8	MUCH LESS .... 1 SOMEWHAT LESS . 2 ABOUT THE SAME . 3 MORE .... 4 NOTHING TO DRINK 5 DON'T KNOW 8
525	When (NAME) had diarrhea, was he/she given less than usual to eat, about the same amount, more than usual, or nothing to eat? IF LESS, PROBE: Was he/she offered much less than usual to eat or somewhat less?	MUCH LESS .... 1 SOMEWHAT LESS .. 2 ABOUT THE SAME .. 3 MORE .... 4 STOPPED FOOD .. 5 NEVER GAVE FOOD 6 DON'T KNOW 8	MUCH LESS .... 1 SOMEWHAT LESS .. 2 ABOUT THE SAME .. 3 MORE .... 4 STOPPED FOOD .. 5 NEVER GAVE FOOD 6 DON'T KNOW 8	MUCH LESS .... 1 SOMEWHAT LESS .. 2 ABOUT THE SAME .. 3 MORE .... 4 STOPPED FOOD .. 5 NEVER GAVE FOOD 6 DON'T KNOW 8
526	Did you seek advice or treatment for the diarrhea from any source?	YES.................. 1 NO .... 2 (SKIP TO 531)	YES.................. 1 NO .... 2 (SKIP TO 531)	YES.................. 1 NO .... 2 (SKIP TO 531)
527	Where did you seek advice or treatment? Anywhere else? IF SOURCE IS A HOSPITAL, HEALTH CENTER, OR CLINIC, WRITE THE NAME OF THE PLACE. PROBE TO IDENTIFY THE TYPE OF SOURCE AND CIRCLE THE APPROPRIATE CODE. RECORD ALL PLACES MENTIONED. ____________ ____________ (NAME OF PLACE(S))	**PUBLIC SECTOR** CENTRAL HSP....... A PROVINCIAL HSP .. B DIST/RURAL HSP. . C RURAL HLTH CNTR. . D MUNCPL CLINIC . E VILLAGE COMMNITY/ HEALTH WORKER F OTHER PUBLIC ____________ G (SPECIFY) **MISSION FACILITY** .. H **PRIVATE SECTOR** PRIVATE HSP/CLC . I PRIVATE DOCTOR . H PHARMACY ..... J OTHER PRIVATE MED. ________ K (SPECIFY) **OTHER SOURCE** SHOP .... L TRADITIONAL PRACTITIONER .. M OTHER ________ X (SPECIFY)	**PUBLIC SECTOR** CENTRAL HSP....... A PROVINCIAL HSP .. B DIST/RURAL HSP. . C RURAL HLTH CNTR. . D MUNCPL CLINIC E VILLAGE COMMNITY/ HEALTH WORKER F OTHER PUBLIC ____________ G (SPECIFY) **MISSION FACILITY** .. H **PRIVATE SECTOR** PRIVATE HSP/CLC . I PRIVATE DOCTOR . H PHARMACY ..... J OTHER PRIVATE MED. ________ K (SPECIFY) **OTHER SOURCE** SHOP .... L TRADITIONAL PRACTITIONER .. M OTHER ________ X (SPECIFY)	**PUBLIC SECTOR** CENTRAL HSP....... A PROVINCIAL HSP .. B DIST/RURAL HSP. . C RURAL HLTH CNTR. . D MUNCPL CLINIC E VILLAGE COMMNITY/ HEALTH WORKER F OTHER PUBLIC ____________ G (SPECIFY) **MISSION FACILITY** .. H **PRIVATE SECTOR** PRIVATE HSP/CLC . I PRIVATE DOCTOR . H PHARMACY ..... J OTHER PRIVATE MED. ________ K (SPECIFY) **OTHER SOURCE** SHOP .... L TRADITIONAL PRACTITIONER .. M OTHER ________ X (SPECIFY)

		LAST BIRTH NAME ______	NEXT-TO-LAST BIRTH NAME ______	SECOND-FROM-LAST BIRTH NAME ______
528	CHECK 527:	TWO OR MORE CODES CIRCLED ☐ ↓ ONLY ONE CODE CIRCLED ☐ (SKIP TO 530)	TWO OR MORE CODES CIRCLED ☐ ↓ ONLY ONE CODE CIRCLED ☐ (SKIP TO 530)	TWO OR MORE CODES CIRCLED ☐ ↓ ONLY ONE CODE CIRCLED ☐ (SKIP TO 530)
529	Where did you first seek advice or treatment? USE LETTER CODE FROM 527.	FIRST PLACE . . . . . ☐	FIRST PLACE . . . . . ☐	FIRST PLACE . . . . . ☐
530	How many days after the diarrhea began did you first seek advice or treatment for (NAME)? IF THE SAME DAY, RECORD '00'.	DAYS . . . . . ☐☐	DAYS . . . . . ☐☐	DAYS . . . . . ☐☐
531	Does (NAME) still have diarrhea?	YES . . . . 1 NO 2	YES . . . . 1 NO 2	YES . . . . 1 NO 2
532	Was he/she given any of the following to drink at any time since he/she started having the diarrhea: a. An ORS satchet b. A homemade sugar-salt-water solution (SSS)? c. Any other liquid?	YES NO DK ORS 1 2 8 SUGAR-SALT-WATER . . 1 2 8 OTHER LIQUID . . 1 2 8	YES NO DK ORS 1 2 8 SUGAR-SALT-WATER . . 1 2 8 OTHER LIQUID . . 1 2 8	YES NO DK ORS 1 2 8 SUGAR-SALT-WATER . . 1 2 8 OTHER LIQUID . . 1 2 8
533	Was anything (else) given to treat the diarrhea?	YES . . . . 1 NO . . . . 2 (SKIP TO 535) ← DON'T KNOW 8	YES . . . . 1 NO . . . . 2 (SKIP TO 535) ← DON'T KNOW 8	YES . . . . 1 NO . . . . 2 (SKIP TO 535) ← DON'T KNOW 8
534	What (else) was given to treat the diarrhea? Anything else? RECORD ALL TREATMENTS GIVEN.	**PILL OR SYRUP** ANTIBIOTIC . . . . A ANTIMOTILITY . . . . B OTHER TYPE OF PILL/SYRUP . . . . C UNKNOWN PILL/ SYRUP . . . . D **INJECTION** ANTIBIOTIC . . . . E NON-ANTIBIOTIC G UNKNOWN F INJECTION . . . . G **(IV) INTRAVENOUS** . H **HOME REMEDY/** HERBAL MED-ICINE . . . . I **OTHER** ______ X (SPECIFY)	**PILL OR SYRUP** ANTIBIOTIC . . . . A ANTIMOTILITY . . . . B OTHER TYPE OF PILL/SYRUP . . . . C UNKNOWN PILL/ SYRUP . . . . D **INJECTION** ANTIBIOTIC . . . . E NON-ANTIBIOTIC G UNKNOWN F INJECTION . . . . G **(IV) INTRAVENOUS** . H **HOME REMEDY/** HERBAL MED-ICINE . . . . I **OTHER** ______ X (SPECIFY)	**PILL OR SYRUP** ANTIBIOTIC . . . . A ANTIMOTILITY . . . . B OTHER TYPE OF PILL/SYRUP . . . . C UNKNOWN PILL/ SYRUP . . . . D **INJECTION** ANTIBIOTIC . . . . E NON-ANTIBIOTIC G UNKNOWN F INJECTION . . . . G **(IV) INTRAVENOUS** . H **HOME REMEDY/** HERBAL MED-ICINE . . . . I **OTHER** ______ X (SPECIFY)
535	Has (NAME) been ill with a fever at any time in the last 2 weeks?	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	YES . . . . 1 NO . . . . 2 DON'T KNOW 8	YES . . . . 1 NO . . . . 2 DON'T KNOW 8

		LAST BIRTH NAME ____________	NEXT-TO-LAST BIRTH NAME ____________	SECOND-FROM-LAST BIRTH NAME ____________
536	Has (NAME) had an illness with a cough at any time in the last 2 weeks?	YES . . . . 1 NO . . . . 2 (SKIP TO 539) DON'T KNOW 8	YES . . . . 1 NO . . . . 2 (SKIP TO 539) DON'T KNOW 8	YES . . . . 1 NO . . . . 2 (SKIP TO 539) DON'T KNOW 8
537	When (NAME) had an illness with a cough, did he/she breathe faster than usual with short, rapid breaths or have difficulty breathing?	YES . . . . 1 NO . . . . 2 (SKIP TO 540) DON'T KNOW 8	YES . . . . 1 NO . . . . 2 (SKIP TO 540) DON'T KNOW 8	YES . . . . 1 NO . . . . 2 (SKIP TO 540) DON'T KNOW 8
538	When (NAME) had this illness, did he/she have a problem in the chest or a blocked or runny nose?	CHEST . . . . 1 NOSE . . . . 2 BOTH . . . . 3 OTHER ____________ 6 (SPECIFY) DON'T KNOW . . . . 8 (SKIP TO 540)	CHEST . . . . 1 NOSE . . . . 2 BOTH . . . . 3 OTHER ____________ 6 (SPECIFY) DON'T KNOW . . . . 8 (SKIP TO 540)	CHEST . . . . 1 NOSE . . . . 2 BOTH . . . . 3 OTHER ____________ 6 (SPECIFY) DON'T KNOW . . . . 8 (SKIP TO 540)
539	CHECK 535: HAD FEVER?	"YES" ☐ OTHER ☐ (SKIP TO 557)	"YES" ☐ OTHER ☐ (SKIP TO 557)	"YES" ☐ OTHER ☐ (SKIP TO 557)
540	Now I would like to know how much (NAME) was given to drink during the (fever/cough/ rapid breathing). Was he/she offered less than usual to drink, about the same amount, or more than usual to drink? IF LESS, PROBE: Was he/she offered much less than usual to drink or somewhat less?	MUCH LESS . . . . 1 SOMEWHAT LESS . 2 ABOUT THE SAME . 3 MORE . . . . 4 NOTHING TO DRINK 5 DON'T KNOW 8	MUCH LESS . . . . 1 SOMEWHAT LESS . 2 ABOUT THE SAME . 3 MORE . . . . 4 NOTHING TO DRINK 5 DON'T KNOW 8	MUCH LESS . . . . 1 SOMEWHAT LESS . 2 ABOUT THE SAME . 3 MORE . . . . 4 NOTHING TO DRINK 5 DON'T KNOW 8
541	When (NAME) had (fever/cough/ rapid breathing), was he/she given less than usual to eat, about the same amount, more than usual, or nothing to eat? IF LESS, PROBE: Was he/she offered much less than usual to eat or somewhat less?	MUCH LESS . . . . 1 SOMEWHAT LESS . 2 ABOUT THE SAME . 3 MORE . . . . 4 STOPPED FOOD . 5 NEVER GAVE FOOD 6 DON'T KNOW 8	MUCH LESS . . . . 1 SOMEWHAT LESS . 2 ABOUT THE SAME . 3 MORE . . . . 4 STOPPED FOOD . 5 NEVER GAVE FOOD 6 DON'T KNOW 8	MUCH LESS . . . . 1 SOMEWHAT LESS . 2 ABOUT THE SAME . 3 MORE . . . . 4 STOPPED FOOD . 5 NEVER GAVE FOOD 6 DON'T KNOW 8
542	Did you seek advice or treatment for the illness from any source?	YES . . . . 1 NO . . . . 2 (SKIP TO 547)	YES . . . . 1 NO . . . . 2 (SKIP TO 547)	YES . . . . 1 NO . . . . 2 (SKIP TO 547)

		LAST BIRTH NAME _____	NEXT-TO-LAST BIRTH NAME _____	SECOND-FROM-LAST BIRTH NAME _____
543	Where did you seek advice or treatment? Anywhere else? RECORD ALL SOURCES MENTIONED.	**PUBLIC SECTOR** CENTRAL HSP. . . . . A PROVINCIAL HSP . . B DIST/RURAL HSP. . C RURAL HLTH CNTR. . D MUNCPL CLINIC . E VILLAGE COMMNITY/ HEALTH WORKER F OTHER PUBLIC _____ G (SPECIFY) **MISSION FACILITY** . . H **PRIVATE SECTOR** PRIVATE HSP/CLC . I PRIVATE DOCTOR . H PHARMACY . . . . . J OTHER PRIVATE MED. _____ K (SPECIFY) **OTHER SOURCE** SHOP . . . . . L TRADITIONAL PRACTITIONER . . M OTHER _____ X (SPECIFY)	**PUBLIC SECTOR** CENTRAL HSF. . . . . A PROVINCIAL HSP . . B DIST/RURAL HSP. . C RURAL HLTH CNTR. . D MUNCPL CLINIC . E VILLAGE COMMNITY/ HEALTH WORKER F OTHER PUBLIC _____ G (SPECIFY) **MISSION FACILITY** . . H **PRIVATE SECTOR** PRIVATE HSP/CLC . I PRIVATE DOCTOR . H PHARMACY . . . . . J OTHER PRIVATE MED. _____ K (SPECIFY) **OTHER SOURCE** SHOP . . . . . L TRADITIONAL PRACTITIONER . . M OTHER _____ X (SPECIFY)	**PUBLIC SECTOR** CENTRAL HSP. . . . . A PROVINCIAL HSP . . B DIST/RURAL HSP. . C RURAL HLTH CNTR. . D MUNCPL CLINIC . E VILLAGE COMMNITY/ HEALTH WORKER F OTHER PUBLIC _____ G (SPECIFY) **MISSION FACILITY** . . H **PRIVATE SECTOR** PRIVATE HSP/CLC . I PRIVATE DOCTOR . H PHARMACY . . . . . J OTHER PRIVATE MED. _____ K (SPECIFY) **OTHER SOURCE** SHOP . . . . . L TRADITIONAL PRACTITIONER . . M OTHER _____ X (SPECIFY)
544	CHECK 543:	TWO OR MORE CODES CIRCLED ☐ / ONLY ONE CODE CIRCLED ☐ → (SKIP TO 546)	TWO OR MORE CODES CIRCLED ☐ / ONLY ONE CODE CIRCLED ☐ → (SKIP TO 546)	TWO OR MORE CODES CIRCLED ☐ / ONLY ONE CODE CIRCLED ☐ → (SKIP TO 546)
545	Where did you first seek advice or treatment? USE LETTER CODE FROM 543.	FIRST PLACE . . . . . ☐	FIRST PLACE . . . . . ☐	FIRST PLACE . . . . . ☐
546	How many days after the illness began did you first seek advice or treatment for (NAME)? IF THE SAME DAY, RECORD '00'.	DAYS . . . . . ☐☐	DAYS . . . . . ☐☐	DAYS . . . . . ☐☐
547	Is (NAME) still sick with a (fever/ cough)?	FEVER ONLY . . . . . 1 COUGH ONLY . . . . . 2 BOTH COUGH AND FEVER . . . . . 3 NO, NEITHER . . . . . 4 DON'T KNOW 8	FEVER ONLY . . . . . 1 COUGH ONLY . . . . . 2 BOTH COUGH AND FEVER . . . . . 3 NO, NEITHER . . . . . 4 DON'T KNOW 8	FEVER ONLY . . . . . 1 COUGH ONLY . . . . . 2 BOTH COUGH AND FEVER . . . . . 3 NO, NEITHER . . . . . 4 DON'T KNOW 8
548	At any time during the illness, did (NAME) take any drugs for the illness?	YES . . . . . 1 NO . . . . . 2 (SKIP TO 557) ← DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 (SKIP TO 557) ← DON'T KNOW 8	YES . . . . . 1 NO . . . . . 2 (SKIP TO 557) ← DON'T KNOW 8

		LAST BIRTH NAME ________	NEXT-TO-LAST BIRTH NAME ________	SECOND-FROM-LAST BIRTH NAME ________
549	What drugs did (NAME) take? RECORD ALL MENTIONED.	**ANTIMALARIAL DRUGS** SP/FANSIDAR ..... A CHLOROQUINE . . B QUININE .... C COMBINATION WITH ARTEMISININ .. D OTHER ANTI-MALARIAL .... E **ANTIBIOTIC** COTRAMOXAZOLE F ERYTHROMYCINE G AMOXICILLIN H AMPICILLIN I CHLORAMPHENOCOL J OTHER ANTIBIOTIC K **OTHER DRUGS** ASPIRIN .... L ACETAMINOPHEN M IBUPROFEN .... N **OTHER** ________ X (SPECIFY) DON'T KNOW .... Z	**ANTIMALARIAL DRUGS** SP/FANSIDAR ..... A CHLOROQUINE . . B QUININE .... C COMBINATION WITH ARTEMISININ .. D OTHER ANTI-MALARIAL .... E **ANTIBIOTIC** COTRAMOXAZOLE F ERYTHROMYCINE G AMOXICILLIN H AMPICILLIN I CHLORAMPHENOCOL J OTHER ANTIBIOTIC K **OTHER DRUGS** ASPIRIN .... L ACETAMINOPHEN M IBUPROFEN .... N **OTHER** ________ X (SPECIFY) DON'T KNOW .... Z	**ANTIMALARIAL DRUGS** SP/FANSIDAR ..... A CHLOROQUINE . . B QUININE .... C COMBINATION WITH ARTEMISININ .. D OTHER ANTI-MALARIAL .... E **ANTIBIOTIC** COTRAMOXAZOLE F ERYTHROMYCINE G AMOXICILLIN H AMPICILLIN I CHLORAMPHENOCOL J OTHER ANTIBIOTIC K **OTHER DRUGS** ASPIRIN .... L ACETAMINOPHEN M IBUPROFEN .... N **OTHER** ________ X (SPECIFY) DON'T KNOW .... Z
550	Did you already have (NAME OF DRUG FROM 549) at home when the child became ill? IF YES, CIRCLE CODE FOR THAT DRUG. ASK SEPARATELY FOR EACH DRUG GIVEN IN 549.	**ANTIMALARIAL DRUGS** SP/FANSIDAR ..... A CHLOROQUINE . . B QUININE .... C COMBINATION WITH ARTEMISININ .. C OTHER ANTI-MALARIAL .... E **ANTIBIOTIC** COTRAMOXAZOLE F ERYTHROMYCINE G AMOXICILLIN H AMPICILLIN I CHLORAMPHENOCOL J OTHER ANTIBIOTIC K **OTHER DRUGS** ASPIRIN .... L ACETAMINOPHEN M IBUPROFEN .... N **OTHER** ________ X (SPECIFY) DON'T KNOW .... Z	**ANTIMALARIAL DRUGS** SP/FANSIDAR ..... A CHLOROQUINE . . B QUININE .... C COMBINATION WITH ARTEMISININ .. D OTHER ANTI-MALARIAL .... E **ANTIBIOTIC** COTRAMOXAZOLE F ERYTHROMYCINE G AMOXICILLIN H AMPICILLIN I CHLORAMPHENOCOL J OTHER ANTIBIOTIC K **OTHER DRUGS** ASPIRIN .... L ACETAMINOPHEN M IBUPROFEN .... N **OTHER** ________ X (SPECIFY) DON'T KNOW .... Z	**ANTIMALARIAL DRUGS** SP/FANSIDAR ..... A CHLOROQUINE . . B QUININE .... C COMBINATION WITH ARTEMISININ .. D OTHER ANTI-MALARIAL .... E **ANTIBIOTIC** COTRAMOXAZOLE F ERYTHROMYCINE G AMOXICILLIN H AMPICILLIN I CHLORAMPHENOCOL J OTHER ANTIBIOTIC K **OTHER DRUGS** ASPIRIN .... L ACETAMINOPHEN M IBUPROFEN .... N **OTHER** ________ X (SPECIFY) DON'T KNOW .... Z
551	CHECK 549: SP/FANISDAR	CODE 'A' CIRCLED CODE 'A' NOT CIRCLED (SKIP TO 554)	CODE 'A' CIRCLED CODE 'A' NOT CIRCLED (SKIP TO 554)	CODE 'A' CIRCLED CODE 'A' NOT CIRCLED (SKIP TO 554)
552	How long after the fever started did (NAME) first take SP/Fansidar?	SAME DAY .... 0 NEXT DAY .... 1 TWO DAYS AFTER THE FEVER .... 2 THREE OR MORE DAYS AFTER THE FEVER .... 3 DON'T KNOW 8	SAME DAY .... 0 NEXT DAY .... 1 TWO DAYS AFTER THE FEVER .... 2 THREE OR MORE DAYS AFTER THE FEVER .... 3 DON'T KNOW 8	SAME DAY .... 0 NEXT DAY .... 1 TWO DAYS AFTER THE FEVER .... 2 THREE OR MORE DAYS AFTER THE FEVER .... 3 DON'T KNOW 8

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		LAST BIRTH NAME ______	NEXT-TO-LAST BIRTH NAME ______	SECOND-FROM-LAST BIRTH NAME ______
553	For how many days did (NAME) take the SP/Fansidar? IF 7 OR MORE DAYS, RECORD '7'.	DAYS .... [ ] DON'T KNOW 8	DAYS .... [ ] DON'T KNOW 8	DAYS .... [ ] DON'T KNOW 8
554	CHECK 549: CHLOROQUINE	CODE 'B' CIRCLED [ ] CODE 'B' NOT CIRCLED [ ] (SKIP TO 557)	CODE 'B' CIRCLED [ ] CODE 'B' NOT CIRCLED [ ] (SKIP TO 557)	CODE 'B' CIRCLED [ ] CODE 'B' NOT CIRCLED [ ] (SKIP TO 557)
555	How long after the fever started did (NAME) first take chloroquine?	SAME DAY .... 0 NEXT DAY .... 1 TWO DAYS AFTER THE FEVEF .... 2 THREE OR MORE DAYS AFTER THE FEVER .... 3 DON'T KNOW 8	SAME DAY .... 0 NEXT DAY .... 1 TWO DAYS AFTER THE FEVEF .... 2 THREE OR MORE DAYS AFTER THE FEVER .... 3 DON'T KNOW 8	SAME DAY .... 0 NEXT DAY .... 1 TWO DAYS AFTER THE FEVEF .... 2 THREE OR MORE DAYS AFTER THE FEVER .... 3 DON'T KNOW 8
556	For how many days did (NAME) take chloroquine? IF 7 OR MORE DAYS, RECORD '7'.	DAYS .... [ ] DON'T KNOW 8	DAYS .... [ ] DON'T KNOW 8	DAYS .... [ ] DON'T KNOW 8
557	CHECK 536: HAD FEVER	"YES" [ ] OTHER [ ] (SKIP TO 561)	"YES" [ ] OTHER CIRCLED [ ] (SKIP TO 561)	"YES" [ ] OTHER CIRCLED [ ] (SKIP TO 561)
558	Did (NAME) get any injection or suppository for the (fever/cough/ rapid breathing)?	INJECTION .... A SUPPOSITORY ..... B NONE .... Y DON'T KNOW .... Z	INJECTION .... A SUPPOSITORY ..... B NONE .... Y DON'T KNOW .... Z	INJECTION .... A SUPPOSITORY ..... B NONE .... Y DON'T KNOW .... Z
559	Was anything else done about (NAME'S) fever?	YES .... 1 NO .... 2 (SKIP TO 561) DON'T KNOW 8	YES .... 1 NO .... 2 (SKIP TO 561) DON'T KNOW 8	YES .... 1 NO .... 2 (SKIP TO 561) DON'T KNOW 8
560	What was done about (NAME'S) fever?	CONSULTED TRADITIONAL HEALER .... A GAVE TEPID SPONGING .... B GAVE HERBS .... C OTHER ______ Y (SPECIFY) DON'T KNOW .... Z (GO BACK TO 503 IN NEXT COLUMN; IF NO MORE BIRTHS, GO TO 561)	CONSULTED TRADITIONAL HEALER .... A GAVE TEPID SPONGING .... B GAVE HERBS .... C OTHER ______ Y (SPECIFY) DON'T KNOW .... Z (GO BACK TO 503 IN NEXT COLUMN; IF NO MORE BIRTHS, GO TO 561)	CONSULTED TRADITIONAL HEALER .... A GAVE TEPID SPONGING .... B GAVE HERBS .... C OTHER ______ Y (SPECIFY) DON'T KNOW .... Z (GO BACK TO 503 IN NEXT COLUMN; IF NO MORE BIRTHS, GO TO 561)

561	CHECK 215 AND 218, ALL ROWS: NUMBER OF CHILDREN BORN IN 2000 OR LATER LIVING WITH THE RESPONDENT ONE OR MORE [ ] NONE [ ] →		601
562	The last time (NAME OF YOUNGEST CHILD) passed stools, what was done to dispose of the stools?	CHILD USED TOILET OR LATRINE . 01 PUT/RINSED INTO TOILET OR LATRINE ..... 02 PUT/RINSED INTO DRAIN OR DITCH .... 03 THREW INTO GARBAGE .... 04 BURIED .... 05 LEFT IN THE OPEN .... 06 OTHER ______ 96 (SPECIFY) DON'T KNOW 98	

SECTION 6. MARRIAGE AND SEXUAL ACTIVITY

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
601	Are you currently married or living together with a man as if married?	YES, CURRENTLY MARRIED ..... 1 YES, LIVING WITH A MAN ..... 2 NO, NOT IN UNION 3	→ 605
602	Have you ever been married or lived together with a man as if married?	YES, FORMERLY MARRIED ..... 1 YES, LIVED WITH A MAN ..... 2 NO 3	→ 604
603	ENTER '0' IN COLUMN 4 OF CALENDAR IN THE MONTH OF INTERVIEW, AND IN EACH MONTH BACK TO JANUARY 2000. →		619
604	What is your marital status now: are you widowed, divorced, or separated?	WIDOWED ..... 1 DIVORCED ..... 2 SEPARATED 3	→ 610
605	Is your husband/partner living with you now or is he staying elsewhere?	LIVING WITH HER ..... 1 STAYING ELSEWHERE 2	
606	RECORD THE HUSBAND'S/PARTNER'S NAME AND LINE NUMBER FROM THE HOUSEHOLD QUESTIONNAIRE. IF HE IS NOT LISTED IN THE HOUSEHOLD, RECORD '00'.	NAME _____ LINE NO.	
607	Besides yourself, does your husband/partner have other wives, does he live with other women as if married, or does he maintain a small house?	YES ..... 1 NO ..... 2 DON'T KNOW 8	→ 610
608	How many other wives or partners does your husband live with now?	NUMBER OF OTHER WIVES AND LIVE-IN PARTNERS ..... DON'T KNOW 98	
609	Are you the first, second, ... wife?	RANK	
610	Have you been married or lived with a man only once or more than once?	ONLY ONCE ..... 1 MORE THAN ONCE 2	
611	CHECK 610: MARRIED/ LIVED WITH A MAN ONLY ONCE → In what month and year did you start living with your husband/partner? MARRIED/ LIVED WITH A MAN MORE THAN ONCE → Now I would like to ask about when you married or began living with a man as if married for the very first time. In what month and year did you first marry or start living with a man as if married?	MONTH ..... DON'T KNOW MONTH ..... 98 YEAR ..... DON'T KNOW YEAR 9998	→ 613
612	How old were you when you first started living with him?	AGE	
613	DETERMINE MONTHS MARRIED OR LIVING WITH A MAN SINCE JANUARY 2000. ENTER 'X' IN COLUMN 4 OF CALENDAR FOR EACH MONTH MARRIED OR LIVING WITH A MAN, AND ENTER '0' FOR EACH MONTH NOT MARRIED/NOT LIVING WITH A MAN, SINCE JANUARY 2000. FOR WOMEN WITH MORE THAN ONE UNION: PROBE FOR DATE WHEN CURRENT UNION STARTED AND, IF APPROPRIATE, FOR STARTING AND TERMINATION DATES OF ANY PREVIOUS UNIONS. FOR WOMEN NOT CURRENTLY IN UNION: PROBE FOR DATE WHEN LAST UNION STARTED AND FOR TERMINATION DATE AND, IF APPROPRIATE, FOR THE STARTING AND TERMINATION DATES OF ANY PREVIOUS UNIONS.		

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
614	CHECK 604: NOT ASKED OR NOT WIDOWED ↓	WIDOWED →	617
615	CHECK 610. MARRIED MORE THAN ONCE ↓	MARRIED ONLY ONCE →	619
616	How did your previous marriage or union end?	DEATH/WIDOWHOOD ..... 1 DIVORCE/SEPARATION 2	→ 619
617	To whom did most of your late husband's property go?	RESPONDENT ..... 1 OTHER WIFE ..... 2 SPOUSE'S CHILDREN ..... 3 SPOUSE'S FAMILY ..... 4 OTHER _____ 5 (SPECIFY) NO PROPERTY 6	→ 619
618	Did you receive any of your late husband's assets or valuables?	YES ..... 1 NO 2	
619	CHECK FOR THE PRESENCE OF OTHERS. BEFORE CONTINUING, MAKE EVERY EFFORT TO ENSURE PRIVACY.		
620	Now I need to ask you some questions about sexual activity in order to gain a better understanding of some family life issues. How old were you when you had sexual intercourse for the very first time?	NEVER ..... 00 AGE IN YEARS ..... ☐☐ FIRST TIME WHEN STARTED LIVING WITH (FIRST) HUSBAND/PARTNER 95	→ 622 → 622
621	Do you intend to wait until you get married to have sexual intercourse for the first time?	YES ..... 1 NO ..... 2 DON'T KNOW/UNSURE 8	→ 647
622	CHECK 107: 15-24 YEARS OLD ↓ 25-49 YEARS OLD →		627
623	The first time you had sexual intercourse, was a condom used?	YES ..... 1 NO ..... 2 DON'T KNOW/DON'T REMEMBER 8	
624	How old was the person you first had sexual intercourse with?	AGE OF PARTNER ..... ☐☐ DON'T KNOW 98	→ 627
625	Was this person older than you, younger than you, or about the same age as you?	OLDER ..... 1 YOUNGER ..... 2 ABOUT THE SAME AGE ..... 3 DON'T KNOW/DON'T REMEMBER 8	→ 627
626	Would you say this person was ten or more years older than you or less than ten years older than you?	TEN OR MORE YEARS OLDER ... 1 LESS THAN TEN YEARS OLDER . 2 OLDER, UNSURE HOW MUCH ... 3	
627	When was the last time you had sexual intercourse? RECORD 'YEARS AGO' ONLY IF LAST INTERCOURSE WAS ONE OR MORE YEARS AGO. IF 12 MONTHS OR MORE, ANSWER MUST BE RECORDED IN YEARS.	DAYS AGO ..... 1 ☐☐ WEEKS AGO ..... 2 ☐☐ MONTHS AGO ..... 3 ☐☐ YEARS AGO ..... 4 ☐☐	→ 629 → 641

		LAST SEXUAL PARTNER	SECOND-TO-LAST SEXUAL PARTNER	THIRD-TO-LAST SEXUAL PARTNER
628	When was the last time you had sexual intercourse with this (second or third) person?		DAYS ... 1 MONTHS .. 2 YEARS 3	DAYS ... 1 MONTHS .. 2 YEARS 3
629	The last time you had sexual intercourse with this (second/ third) person, was a condom used?	YES .... 1 NO .... 2 (SKIP TO 631)	YES .... 1 NO .... 2 (SKIP TO 631)	YES .... 1 NO .... 2 (SKIP TO 631)
630	What was the main reason you used a condom on that occasion?	PREVENT STD/HIV .. 1 PREVENT PREGNANCY ... 2 PREVENT BOTH ... 3 PARTNER INSISTED 4 OTHER ______ 6 (SPECIFY) DON'T KNOW 8	PREVENT STD/HIV .. 1 PREVENT PREGNANCY ... 2 PREVENT BOTH ... 3 PARTNER INSISTED 4 OTHER ______ 6 (SPECIFY) DON'T KNOW 8	PREVENT STD/HIV .. 1 PREVENT PREGNANCY ... 2 PREVENT BOTH ... 3 PARTNER INSISTED 4 OTHER ______ 6 (SPECIFY) DON'T KNOW 8
631	The last time you had sexual intercourse with this (second/ third) person, did you or this person drink alcohol?	YES .... 1 NO .... 2 (SKIP TO 633)	YES .... 1 NO .... 2 (SKIP TO 633)	YES .... 1 NO .... 2 (SKIP TO 633)
632	Were you or your partner drunk at that time? IF YES: Who was drunk?	RESPNDNT ONLY 1 PARTNER ONLY .. 2 RESPONDENT AND PARTNER BOTH . 3 NEITHER 4	RESPNDNT ONLY 1 PARTNER ONLY .. 2 RESPONDENT AND PARTNER BOTH . 3 NEITHER 4	RESPNDNT ONLY 1 PARTNER ONLY .. 2 RESPONDENT AND PARTNER BOTH . 3 NEITHER 4
633	What was your relationship to this person with whom you had sexual intercourse? IF RESPONDENT IS GIRLFRIEND: Were you living together as if married? IF YES, CIRCLE '02' IF NO, CIRCLE '03'	SPOUSE .... 01 (SKIP TO 638) LIVE-IN PARTNER .. 02 BOYFRIEND NOT LIVING WITH RESPONDENT .. 03 CASUAL ACQUAINTANCE . 04 COMMERCIAL SEX WORKER .. 05 OTHER ______ 96 (SPECIFY)	SPOUSE .... 01 (SKIP TO 638) LIVE-IN PARTNER .. 02 BOYFRIEND NOT LIVING WITH RESPONDENT .. 03 CASUAL ACQUAINTANCE . 04 COMMERCIAL SEX WORKER .. 05 OTHER ______ 96 (SPECIFY)	SPOUSE .... 01 (SKIP TO 638) LIVE-IN PARTNER .. 02 BOYFRIEND NOT LIVING WITH RESPONDENT .. 03 CASUAL ACQUAINTANCE . 04 COMMERCIAL SEX WORKER .. 05 OTHER ______ 96 (SPECIFY)
634	For how long (have you had/did you have) sexual relations with this person? IF ONLY HAD SEXUAL RELATIONS WITH THIS PERSON ONCE, RECORD '01' DAYS.	DAYS ... 1 MONTHS . 2 YEARS .. 3	DAYS ... 1 MONTHS . 2 YEARS .. 3	DAYS ... 1 MONTHS . 2 YEARS .. 3
635	CHECK 107:	15-24 Y. OLD 25-49 Y. OLD (SKIP TO 639)	15-24 Y. OLD 25-49 Y. OLD (SKIP TO 639)	15-24 Y. OLD 25-49 Y. OLD (SKIP TO 639)
636	How old is this person?	AGE OF PARTNER (SKIP TO 639) DON'T KNOW 98	AGE OF PARTNER (SKIP TO 639) DON'T KNOW 98	AGE OF PARTNER (SKIP TO 639) DON'T KNOW 98
637	Is this person older than you, younger than you, or about the same age?	OLDER .... 1 YOUNGER ..... 2 SAME AGE ..... 3 DON'T KNOW ... 8 (SKIP TO 639)	OLDER .... 1 YOUNGER ..... 2 SAME AGE ..... 3 DON'T KNOW ... 8 (SKIP TO 639)	OLDER .... 1 YOUNGER ..... 2 SAME AGE ..... 3 DON'T KNOW ... 8 (SKIP TO 639)
638	Would you say this person is ten or more years older than you or less than ten years older than you?	TEN OR MORE YEARS OLDER . 1 LESS THAN TEN YEARS OLDER . 2 OLDER, UNSURE HOW MUCH ... 3	TEN OR MORE YEARS OLDER . 1 LESS THAN TEN YEARS OLDER . 2 OLDER, UNSURE HOW MUCH ... 3	TEN OR MORE YEARS OLDER . 1 LESS THAN TEN YEARS OLDER . 2 OLDER, UNSURE HOW MUCH ... 3
639	Apart from [this person/these two people], have you had sexual intercourse with any other person in the last 12 months?	YES .... 1 (GO BACK TO 628 IN NEXT COLUMN) NO .... 2 (SKIP TO 641)	YES .... 1 (GO BACK TO 628) IN NEXT COLUMN) NO .... 2 (SKIP TO 641)	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
640	In total, with how many different people have you had sexual intercourse in the last 12 months? IF NON-NUMERIC ANSWER, PROBE TO GET AN ESTIMATE. IF NUMBER OF PARTNERS IS GREATER THAN 95, WRITE '95.'	NUMBER OF PARTNERS LAST 12 MONTHS ..... ☐☐ DON'T KNOW 98	
641	In total, how many different people have you had sexual intercourse with in your lifetime? IF NON-NUMERIC ANSWER, PROBE TO GET AN ESTIMATE. IF NUMBER OF PARTNERS IS GREATER THAN 95, WRITE '95.'	NUMBER OF PARTNERS IN LIFETIME ..... ☐☐ DON'T KNOW 98	
642	CHECK 629 COLUMN 1 (CONDOM USE WITH LAST SEXUAL PARTNER) YES ☐ NO OR BLANK ☐		→ 647
643	You told me you used a condom the last time you had sexual intercourse. What brand of condom did you use that time?	**MALE CONDOMS** CHOICE ASSORTED ..... 1 DUREX ..... 2 ECSTASY ..... 3 PROTECTA ..... 4 PUBLIC SECTOR DIST. (BLUE CONDOM OR KAREX ... 5 ROUGH RIDER ..... 6 OTHER _____ ... 7 (SPECIFY) MALE CONDOM, DK ... 8 **FEMALE CONDOMS** CARE ..... 9 OTHER _____ ... 10 (SPECIFY) FEMALE CONDOM, DK 12	
644	How many condoms did you (your spouse/partner) get that time?	NUMBER ..... ☐☐ DON'T KNOW 98	
645	How much did the condom(s) cost?	COST ... ☐☐☐☐☐☐☐ FREE ..... 995 DON'T KNOW 998	
646	From where was the condom obtained? IF SOURCE IS HOSPITAL, HEALTH CENTER, OR CLINIC, WRITE THE NAME OF THE PLACE. PROBE TO IDENTIFY THE TYPE OF SOURCE AND CIRCLE THE APPROPRIATE CODE. _____ (NAME OF PLACE)	**PUBLIC SECTOR** GOVT. HOSPITAL/CLINIC ..... 11 RURAL/MUNICIPAL CLINIC ... 12 RURAL HEALTH CENTRE ..... 13 ZNFPC CLINIC ..... 14 MOH MOBILE CLINIC ..... 15 ZNFPC CBD/DEPOT HOLDER ... 16 VILLAGE/FARM HEALTH WORKER 17 OTHER PUBLIC _____ 18 (SPECIFY) **MISSION FACILITY** ..... 21 **PRIVATE MEDICAL SECTOR** PRIVATE HOSPITAL/CLINIC ... 31 PHARMACY ..... 32 PRIVATE DOCTOR ..... 33 CBD ..... 34 OTHER PRIVATE DOCTOR _____ 35 (SPECIFY) **RETAIL OUTLET** GENERAL DEALER ..... 41 SUPERMARKET ..... 42 TUCK SHOP ..... 43 SERVICE STATION ..... 44 OTHER RETAIL _____ 45 (SPECIFY) **OTHER PRIVATE SOURCE** CHURCH ..... 46 FRIEND/RELATIVE ..... 47 **OTHER** _____ 96 (SPECIFY) DON'T KNOW/NOT SURE 98	→ 651 → 647

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
647	CHECK 301 (07) KNOWS MALE CONDOM YES ☐ NO ☐ → 651		
648	Do you know of any place where a person can get a male condom?	YES . . . . . 1 NO . . . . . 2 → 651	
649	Where is that? IF SOURCE IS HOSPITAL, HEALTH CENTER, OR CLINIC, WRITE THE NAME OF THE PLACE. PROBE TO IDENTIFY THE TYPE OF SOURCE AND CIRCLE THE APPROPRIATE CODE. _____ _____ (NAME OF PLACE(S)) Any other place? RECORD ALL SOURCES MENTIONED.	**PUBLIC SECTOR** GOVT. HOSPITAL/CLINIC . . . . . A RURAL/MUNICIPAL CLINIC . . . B RURAL HEALTH CENTRE . . . . . C ZNFPC CLINIC . . . . . D MOH MOBILE CLINIC . . . . . E ZNFPC CBD/DEPOT . . . . . F VILLAGE/FARM HEALTH WORKER G OTHER PUBLIC _____ H (SPECIFY) **MISSION FACILITY** . . . . . I **PRIVATE MEDICAL SECTOR** PRIVATE HOSPITAL/CLINIC . . . J PHARMACY . . . . . K PRIVATE DOCTOR . . . . . L CBD . . . . . M OTHER PRIVATE DOCTOR _____ N (SPECIFY) **RETAIL OUTLET** GENERAL DEALER . . . . . O SUPERMARKET . . . . . P TUCK SHOP . . . . . Q SERVICE STATION . . . . . R OTHER RETAIL _____ S (SPECIFY) **OTHER PRIVATE SOURCE** CHURCH . . . . . T FRIEND/RELATIVE . . . . . U **OTHER** _____ X (SPECIFY)	
650	If you wanted to, could you yourself get a male condom?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW/UNSURE 8	
651	CHECK 301 (08) KNOWS FEMALE CONDOM YES ☐ NO ☐ → 701		

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
652	Do you know of any place where a person can get a female condom?	YES ..... 1 NO 2	→ 701
653	Where is that? IF SOURCE IS HOSPITAL, HEALTH CENTER, OR CLINIC, WRITE THE NAME OF THE PLACE. PROBE TO IDENTIFY THE TYPE OF SOURCE AND CIRCLE THE APPROPRIATE CODE. _____ _____ (NAME OF PLACE(S)) Any other place? RECORD ALL SOURCES MENTIONED.	**PUBLIC SECTOR** GOVT. HOSPITAL/CLINIC ..... A RURAL/MUNICIPAL CLINIC ... B RURAL HEALTH CENTRE ..... C ZNFPC CLINIC ..... D MOH MOBILE CLINIC ..... E ZNFPC CBD/DEPOT ..... F VILLAGE/FARM HEALTH WORKER G OTHER PUBLIC _____ H (SPECIFY) **MISSION FACILITY** ..... I **PRIVATE MEDICAL SECTOR** PRIVATE HOSPITAL/CLINIC ... J PHARMACY ..... K PRIVATE DOCTOR ..... L CBD ..... M OTHER PRIVATE DOCTOR _____ N (SPECIFY) **RETAIL OUTLET** GENERAL DEALER ..... O SUPERMARKET ..... P TUCK SHOP ..... Q SERVICE STATION ..... R OTHER RETAIL _____ S (SPECIFY) **OTHER PRIVATE SOURCE** CHURCH ..... T FRIEND/RELATIVE ..... U **OTHER** _____ X (SPECIFY)	
654	If you wanted to, could you yourself get a female condom?	YES ..... 1 NO ..... 2 DON'T KNOW/UNSURE 8	

SECTION 7. FERTILITY PREFERENCES

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
701	CHECK 311/311A: NEITHER STERILIZED ☐ ↓ HE OR SHE STERILIZED ☐ →		713
702	CHECK 226: NOT PREGNANT OR UNSURE ☐ ↓ Now I have some questions about the future. Would you like to have (a/another) child, or would you prefer not to have any (more) children? PREGNANT ☐ ↓ Now I have some questions about the future. After the child you are expecting now, would you like to have another child, or would you prefer not to have any more children?	HAVE (A/ANOTHER) CHILD ..... 1 NO MORE/NONE ..... 2 → 704 SAYS SHE CAN'T GET PREGNANT 3 → 713 UNDECIDED/DON'T KNOW: AND PREGNANT ..... 4 → 709 AND NOT PREGNANT OR UNSURE ..... 5 → 708	
703	CHECK 226: NOT PREGNANT OR UNSURE ☐ ↓ How long would you like to wait from now before the birth of (a/another) child? PREGNANT ☐ ↓ After the birth of the child you are expecting now, how long would you like to wait before the birth of another child?	MONTHS ..... 1 ☐☐ YEARS ..... 2 ☐☐ SOON/NOW ..... 993 → 708 SAYS SHE CAN'T GET PREGNANT 994 → 713 AFTER MARRIAGE ..... 995 OTHER _____ 996 → 708 (SPECIFY) DON'T KNOW 998	
704	CHECK 226 NOT PREGNANT OR UNSURE ☐ ↓ PREGNANT ☐ →		709
705	CHECK 310: NOT ASKED ☐ ↓ NOT CURRENTLY USING ☐ ↓ CURRENTLY USING ☐ →		713
706	CHECK 703: NOT ASKED ☐ ↓ 24 OR MORE MONTHS OR 02 OR MORE YEARS ☐ ↓ 00-23 MONTHS OR 00-01 YEAR ☐ →		709

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
707	CHECK 702: WANTS TO HAVE A/ANOTHER CHILD ⚑ You have said that you do not want (a/another) child soon, but you are not using any method to avoid pregnancy. Can you tell me why you are not using a method? Any other reason? WANTS NO MORE/ NONE ⚑ You have said that you do not want any (more) children, but you are not using any method to avoid pregnancy. Can you tell me why you are not using a method? Any other reason? RECORD ALL REASONS MENTIONED.	NOT MARRIED ..... A FERTILITY-RELATED REASONS NOT HAVING SEX ..... B INFREQUENT SEX ..... C MENOPAUSAL/HYSTERECTOMY D SUBFECUND/INFECUND ..... E POSTPARTUM AMENORRHEIC . F BREASTFEEDING ..... G FATALISTIC ..... H OPPOSITION TO USE RESPONDENT OPPOSED ..... I HUSBAND/PARTNER OPPOSED J OTHERS OPPOSED ..... K RELIGIOUS PROHIBITION ..... L LACK OF KNOWLEDGE KNOWS NO METHOD ..... M KNOWS NO SOURCE ..... N METHOD-RELATED REASONS HEALTH CONCERNS ..... O FEAR OF SIDE EFFECTS ..... P LACK OF ACCESS/TOO FAR ... Q COSTS TOO MUCH ..... R INCONVENIENT TO USE ..... S INTERFERES WITH BODY'S NORMAL PROCESSES ..... T OTHER _____ X (SPECIFY) DON'T KNOW ..... Z	
708	CHECK 310: NOT ASKED ⚑ NO, NOT CURRENTLY USING ⚑ YES, CURRENTLY USING ☐		→ 713
709	Do you think you will use a contraceptive method to delay or avoid pregnancy at any time in the future?	YES ..... 1 NO ..... 2 DON'T KNOW 8	→ 711
710	Which contraceptive method would you prefer to use?	FEMALE STERILIZATION ..... 01 MALE STERILIZATION ..... 02 PILL ..... 03 IUD ..... 04 INJECTABLES ..... 05 IMPLANTS ..... 06 MALE CONDOM ..... 07 FEMALE CONDOM ..... 08 DIAPHRAGM ..... 09 FOAM/JELLY ..... 10 LACTATIONAL AMEN. METHOD ... 11 RHYTHM METHOD ..... 12 WITHDRAWAL ..... 13 OTHER _____ 96 (SPECIFY) UNSURE 98	→ 713

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
711	What is the main reason that you think you will not use a contraceptive method at any time in the future?	NOT MARRIED ..... 11 FERTILITY-RELATED REASONS INFREQUENT SEX/NO SEX ... 22 MENOPAUSAL/HYSTERECTOMY 23 SUBFECUND/INFECUND ... 24 WANTS AS MANY CHILDREN AS POSSIBLE ..... 26 OPPOSITION TO USE RESPONDENT OPPOSED ... 31 HUSBAND/PARTNER OPPOSED 32 OTHERS OPPOSED ..... 33 RELIGIOUS PROHIBITION ... 34 LACK OF KNOWLEDGE KNOWS NO METHOD ..... 41 KNOWS NO SOURCE ..... 42 METHOD-RELATED REASONS HEALTH CONCERNS ..... 51 FEAR OF SIDE EFFECTS ..... 52 LACK OF ACCESS/TOO FAR . 53 COSTS TOO MUCH ..... 54 INCONVENIENT TO USE ..... 55 INTERFERES WITH BODY'S NORMAL PROCESSES ... 56 OTHER _____ 96 (SPECIFY) DON'T KNOW 98	→ 713
712	Would you ever use a contraceptive method if you were married?	YES ..... 1 NO ..... 2 DON'T KNOW 8	
713	CHECK 216: HAS LIVING CHILDREN ☐ → If you could go back to the time you did not have any children and could choose exactly the number of children to have in your whole life, how many would that be? NO LIVING CHILDREN ☐ → If you could choose exactly the number of children to have in your whole life, how many would that be? PROBE FOR A NUMERIC RESPONSE.	NONE ..... 00 → 715 NUMBER ..... ☐☐ OTHER _____ 96 → 715 (SPECIFY)	
714	How many of these children would you like to be boys, how many would you like to be girls and for how many would the sex not matter?	BOYS GIRLS EITHER NUMBER ☐☐ ☐☐ ☐☐ OTHER _____ 96 (SPECIFY)	
715	In the last few months have you heard about family planning: On the radio? On the television? In a newspaper or magazine?	YES NO RADIO ..... 1 2 TELEVISION ..... 1 2 NEWSPAPER OR MAGAZINE . 1 2	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
716	CHECK 601: YES, CURRENTLY MARRIED ☐ ↓ / YES, LIVING WITH A MAN ☐ ↓ / NO, NOT IN UNION ☐ →		722
717	CHECK 311/311A: NEITHER CODE B, G, NOR L CIRCLED, BUT ANY OTHER CODE(S) CIRCLED ☐ ↓ / CODE B, G, OR L CIRCLED ☐ → / NO CODE CIRCLED ☐ →		719 721
718	Does your husband/partner know that you are using a method of family planning?	YES ..... 1 NO ..... 2 DON'T KNOW 8	720
719	Would you say that using contraception is mainly your decision, mainly your husband's decision, or did you both decide together?	MAINLY RESPONDENT ..... 1 MAINLY HUSBAND/PARTNER . 2 JOINT DECISION ..... 8 OTHER _____ 6 (SPECIFY)	
720	CHECK 311/311A: NEITHER STERILIZED ☐ ↓ / HE OR SHE STERILIZED ☐ →		722
721	Do you think your husband/partner wants the same number of children that you want, or does he want more or fewer than you want?	SAME NUMBER ..... 1 MORE CHILDREN ..... 2 FEWER CHILDREN ..... 3 DON'T KNOW 8	
722	Husbands and wives do not always agree on everything. Please tell me if you think a wife is justified in refusing to have sex with her husband when:	YES NO DK	
	She knows her husband has a sexually transmitted disease?	HAS STD 1 2 8	
	She knows her husband has sex with other women?	OTHER WOMEN 1 2 8	
	She is tired or not in the mood?	TIRED/NOT IN MOOD . 1 2 8	
723	When a wife knows her husband has a sexually transmitted disease, is she justified in asking that he use a condom?	YES ..... 1 NO ..... 2 DON'T KNOW 8	
724	CHECK 601: CURRENTLY MARRIED/ LIVING WITH A MAN ☐ ↓ / NOT IN UNION ☐ →		801
725	Can you say no to your husband/partner if you do not want to have sexual intercourse?	YES ..... 1 NO ..... 2 DEPENDS/UNSURE 8	
726	Could you ask your husband/partner to use a condom it you wanted him to?	YES ..... 1 NO ..... 2 DEPENDS/UNSURE 8	

SECTION 8. HUSBAND'S BACKGROUND AND WOMAN'S WORK

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
801	CHECK 601 AND 602: CURRENTLY MARRIED/ LIVING WITH A MAN ↓ ; FORMERLY MARRIED/ LIVED WITH A MAN → 803 ; NEVER MARRIED AND NEVER LIVED WITH A MAN → 807		
802	How old was your husband/partner on his last birthday?	AGE IN COMPLETED YEARS ☐☐	
803	Did your (last) husband/partner ever attend school?	YES ..... 1 NO 2	→ 806
804	What was the highest level of school he attended: primary, secondary, or higher?	PRIMARY ..... 1 SECONDARY ..... 2 HIGHER ..... 3 DON'T KNOW 8	→ 806
805	What was the highest (grade/form/year) he completed at that level?	GRADE ..... ☐☐ DON'T KNOW 98	
806	CHECK 801: CURRENTLY MARRIED/ LIVING WITH A MAN ↓ : What is your husband's/ partner's occupation? That is, what kind of work does he mainly do? FORMERLY MARRIED/ LIVED WITH A MAN ↓ : What was your (last) husband's/ partner's occupation? That is, what kind of work did he mainly do?	_____ ☐☐ _____ _____	
807	Aside from your own housework, have you done any work in the last seven days?	YES ..... 1 NO 2	→ 811
808	As you know, some women take up jobs for which they are paid in cash or kind. Others sell things, have a small business or work on the family farm or in the family business. In the last seven days, have you done any of these things or any other work?	YES ..... 1 NO 2	→ 811
809	Although you did not work in the last seven days, do you have any job or business from which you were absent for leave, illness, vacation, maternity leave or any other such reason?	YES ..... 1 NO 2	→ 811
810	Have you done any work in the last 12 months?	YES ..... 1 NO 2	→ 818
811	What is your occupation, that is, what kind of work do you mainly do?	_____ ☐☐	
812	CHECK 811: WORKS IN AGRICULTURE ↓ ; DOES NOT WORK IN AGRICULTURE → 814		
813	Do you work mainly on your own land or on family land, or do you work on land that you rent from someone else, or do you work on someone else's land?	OWN LAND ..... 1 FAMILY LAND ..... 2 RENTED LAND ..... 3 SOMEONE ELSE'S LAND 4	
814	Do you do this work for a member of your family, for someone else, or are you self-employed?	FOR FAMILY MEMBER ..... 1 FOR SOMEONE ELSE ..... 2 SELF-EMPLOYED 3	
815	Do you usually work at home or away from home?	HOME ..... 1 AWAY 2	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
816	Do you usually work throughout the year, or do you work seasonally, or only once in a while?	THROUGHOUT THE YEAR ..... 1 SEASONALLY/PART OF THE YEAR 2 ONCE IN A WHILE 3	
817	Are you paid in cash or kind for this work or are you not paid at all?	CASH ONLY ..... 1 CASH AND KIND ..... 2 IN KIND ONLY ..... 3 NOT PAID 4	→ 823
818	CHECK 601: CURRENTLY MARRIED/LIVING WITH A MAN ☐ NOT CURRENTLY MARRIED ☐		→ 824
819	CHECK 817: CODE 1 OR 2 CIRCLED ☐ OTHER ☐		→ 822
820	Who decides how the money you earn will be used: mainly you, mainly your husband/partner, or you and your husband/partner jointly?	RESPONDENT ..... 1 HUSBAND/PARTNER ..... 2 RESPONDENT AND HUSBAND/PARTNER JOINTLY . 3 OTHER 6	
821	Would you say that the money that you bring into the household is more than what your husband/partner brings in, less than what he brings in, or about the same?	MORE THAN HIM ..... 1 LESS THAN HIM ..... 2 ABOUT THE SAME ..... 3 HUSBAND/PARTNER DOESN'T BRING IN ANY MONEY ..... 4 DON'T KNOW 8	→ 823
822	Who decides how your husband's/partner's earnings will be used: mainly you, mainly your husband/partner, or you and your husband/partner jointly?	RESPONDENT ..... 1 HUSBAND/PARTNER ..... 2 RESPONDENT AND HUSBAND/PARTNER JOINTLY . 3 OTHER 6	
823	Who usually makes the following decisions: mainly you, mainly your husband/partner, you and you husband/partner jointly, or someone else?	RESPONDENT = 1 HUSBAND/PARTNER = 2 RESPONDENT & HUSBAND/PARTNER JOINTLY = 3 SOMEONE ELSE = 4 OTHER = 5	
	Who usually makes decisions about health care for yourself?	1 2 3 4 5	
	Who usually makes decisions about making major household purchases?	1 2 3 4 5	
	Who usually makes decisions about making purchases for daily household needs?	1 2 3 4 5	
	Who usually makes decisions about visits to your family or relatives?	1 2 3 4 5	
824	PRESENCE OF OTHERS AT THIS POINT (PRESENT AND LISTENING, PRESENT BUT NOT LISTENING, OR NOT PRESENT)	PRES/ LISTEN. / PRES/ NOT LISTEN. / NOT PRES CHILDREN < 10 ..... 1 2 8 HUSBAND ..... 1 2 8 OTHER MALES ..... 1 2 8 OTHER FEMALES ... 1 2 8	
825	Now I would like your opinion about married couples. Sometimes a husband is annoyed or angered by things that his wife does. In your opinion, is a husband justified in hitting or beating his wife in the following situations:	YES / NO / DK	
	If she goes out without telling him?	GOES OUT 1 2 8	
	If she neglects the children?	NEGL. CHILDREN ... 1 2 8	
	If she argues with him?	ARGUES 1 2 8	
	If she refuses to have sex with him?	REFUSES SEX 1 2 8	
	If she burns the food?	BURNS FOOD 1 2 8	

SECTION 9. HIV/AIDS

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
901	Now I would like to talk about something else. Have you ever heard of HIV or an illness called AIDS?	YES ..... 1 NO 2	→ 1001
902	Can people reduce their chances of getting HIV, the virus that causes AIDS, by having just one sex partner who is not infected and who has no other partners?	YES ..... 1 NO ..... 2 DON'T KNOW 8	
903	Can people get HIV from mosquito bites?	YES ..... 1 NO ..... 2 DON'T KNOW 8	
904	Can people reduce their chances of getting HIV by using a condom every time they have sex?	YES ..... 1 NO ..... 2 DON'T KNOW 8	
905	Can people get HIV by sharing food with a person who has AIDS?	YES ..... 1 NO ..... 2 DON'T KNOW 8	
906	Can people reduce their chance of getting HIV by abstaining from sexual intercourse?	YES ..... 1 NO ..... 2 DON'T KNOW 8	
907	Can people get HIV because of witchcraft or other supernatural means?	YES ..... 1 NO ..... 2 DON'T KNOW 8	
908	Is there anything (else) a person can do to avoid or reduce the chances of getting HIV?	YES ..... 1 NO ..... 2 DON'T KNOW 8	→ 910
909	What can a person do? Anything else? RECORD ALL WAYS MENTIONED.	ABSTAIN FROM SEX ..... A USE CONDOMS ..... B LIMIT SEX TO ONE PARTNER/STAY FAITHFUL TO ONE PARTNER ... C LIMIT NUMBER OF SEXUAL PARTNERS ..... D AVOID SEX WITH PROSTITUTES ... E AVOID SEX WITH PERSONS WHO HAVE MANY PARTNERS ..... F AVOID SEX WITH HOMOSEXUALS . G AVOID SEX WITH PERSONS WHO INJECT DRUGS . H AVOID BLOOD TRANSFUSIONS ... I AVOID INJECTIONS ..... J AVOID SHARING RAZORS/BLADES . K AVOID KISSING ..... L AVOID MOSQUITO BITES ..... M SEEK PROTECTION FROM TRADITIONAL PRACTITIONER . N OTHER _____ (SPECIFY) W OTHER _____ (SPECIFY) X DON'T KNOW ..... Z	
910	Do you think your risk of getting infected with HIV is low, medium or high, or do you have no risk at all?	LOW ..... 1 MEDIUM ..... 2 HIGH ..... 3 NO RISK ..... 4 DON'T KNOW 8	
911	Is it possible for a healthy-looking person to have HIV?	YES ..... 1 NO ..... 2 DON'T KNOW 8	
912	Can HIV be transmitted from a mother to her baby: During pregnancy? During delivery? By breastfeeding?	YES NO DK DURING PREG. ..... 1 2 8 DURING DELIVERY ... 1 2 8 BREASTFEEDING ... 1 2 8	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
913	CHECK 912: AT LEAST ONE 'YES' ☐ OTHER ☐	→ 915	
914	Are there any special medications that a doctor or a nurse can give to a woman infected with HIV to reduce the risk of transmission to the baby?	YES ..... 1 NO ..... 2 DON'T KNOW 8	
915	Is there any special medication that people infected with HIV can get from a doctor or a nurse?	YES ..... 1 NO ..... 2 DON'T KNOW 8	
916	CHECK 215: NO BIRTHS ☐	→ 926	
	LAST BIRTH SINCE JANUARY 2002 ☐ LAST BIRTH BEFORE JANUARY 2002 ☐	→ 926	
917	CHECK 407: YES, PERSON SEEN ☐ NO ONE ☐	→ 926	
918	During any of the antenatal visits for that pregnancy, did anyone talk to you about: Babies getting HIV from their mother? Things that you can do to prevent getting HIV? Getting tested for HIV?	YES NO DK HIV FROM MOTHER 1 2 8 THINGS TO DO 1 2 8 TESTED FOR HIV 1 2 8	
919	Were you tested for HIV as part of your antenatal care?	YES ..... 1 NO 2	→ 925
920	Did you yourself ask for the test, was it offered to you and you accepted, or was it required?	ASKED FOR THE TEST ..... 1 OFFERED AND ACCEPTED ..... 2 REQUIRED 3	
921	Did you get the results of the test?	YES ..... 1 NO 2	
922	Where was the test done? IF SOURCE IS HOSPITAL, HEALTH CENTER, OR CLINIC, WRITE THE NAME OF THE SOURCE. PROBE TO IDENTIFY THE TYPE OF SOURCE AND CIRCLE THE APPROPRIATE CODE. _____ (NAME OF PLACE)	**PUBLIC SECTOR** CENTRAL HOSPITAL ..... 11 PROVINCIAL HOSPITAL ..... 12 DISTRICT/RURAL HOSPITAL .... 13 RURAL HEALTH CENTRE ..... 14 MUNICIPLE CLINIC ..... 15 OTHER PUBLIC _____ (SPECIFY) 16 **MISSION FACILITY** ..... 21 **PRIVATE MEDICAL SECTOR** PRIVATE HOSPITAL/CLINIC ..... 31 NEW START CENTRE ..... 32 OTHER PRIVATE VCT CENTRE .. _____ (SPECIFY) 33 OTHER PRIVATE DOCTOR _____ (SPECIFY) 36 **OTHER** _____ (SPECIFY) 96	
923	Have you been tested for HIV since that time you were tested during your pregnancy?	YES ..... 1 NO 2	→ 933
924	When was the last time you were tested for HIV?	LESS THAN 12 MONTHS AGO ..... 1 12 - 23 MONTHS AGO ..... 2 2 OR MORE YEARS AGO 3	→ 928
925	Were you offered a test for HIV as part of your antenatal care?	YES ..... 1 NO 2	
926	Have you ever been tested to see if you have been infected with HIV?	YES ..... 1 NO 2	→ 933
927	When was the last time you were tested?	LESS THAN 12 MONTHS AGO ..... 1 12 - 23 MONTHS AGO ..... 2 2 OR MORE YEARS AGO 3	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
928	The last time you had the test, did you yourself ask for the test, was it offered to you and you accepted, or was it required?	ASKED FOR THE TEST ..... 1 OFFERED AND ACCEPTED ..... 2 REQUIRED 3	
929	Did you get the results of the test?	YES ..... 1 NO 2	
930	Where was the test done? IF SOURCE IS HOSPITAL, HEALTH CENTER, OR CLINIC, WRITE THE NAME OF THE PLACE. PROBE TO IDENTIFY THE TYPE OF SOURCE AND CIRCLE THE APPROPRIATE CODE. _____ (NAME OF PLACE)	**PUBLIC SECTOR** CENTRAL HOSPITAL ..... 11 PROVINCIAL HOSPITAL ..... 12 DISTRICT/RURAL HOSPITAL .... 13 RURAL HEALTH CENTRE ..... 14 MUNICIPLE CLINIC ..... 15 OTHER PUBLIC _____ 16 (SPECIFY) **MISSION FACILITY** ..... 21 **PRIVATE MEDICAL SECTOR** PRIVATE HOSPITAL/CLINIC ..... 31 NEW START CENTRE ..... 32 OTHER PRIVATE VCT CENTRE .. _____ 33 (SPECIFY) OTHER PRIVATE DOCTOR _____ 36 (SPECIFY) **OTHER** _____ 96 (SPECIFY)	
931	CHECK 921 AND 929: GOT THE RESULTS OF HIV TEST YES ☐ ↓	NO ☐ →	936
932	Did you tell your husband/partner the result of your test?	YES ..... 1 NO ..... 2 NO HUSBAND/PARTNER 3	→ 936
933	What is the main reason you have not been tested for HIV?	CAN'T AFFORD IT ..... 01 DON'T KNOW WHERE TO GO ..... 02 TESTING SITE DIFFICULT TO GET TO 03 AFRAID OF TEST RESULT ..... 04 FATALISTIC/NOTHING CAN BE DONE 05 CONCERNED ABOUT CONFIDENTIALITY ..... 06 NO RISK/NOT SEXUALLY ACTIVE 07 OTHER _____ 96 (SPECIFY) DON'T KNOW 98	→ 936
934	Do you know of a place where people can go to get tested for HIV, the virus that causes AIDS?	YES ..... 1 NO 2	→ 936
935	Where is that? RECORD ALL SOURCES MENTIONED. IF SOURCE IS HOSPITAL, HEALTH CENTER, OR CLINIC, WRITE THE NAME OF THE PLACE. PROBE TO IDENTIFY THE TYPE OF SOURCE AND CIRCLE THE APPROPRIATE CODE. _____ _____ (NAME OF PLACE(S)) Any other place?	**PUBLIC SECTOR** CENTRAL HOSPITAL ..... A PROVINCIAL HOSPITAL ..... B DISTRICT/RURAL HOSPITAL .... C RURAL HEALTH CENTRE ..... D MUNICIPLE CLINIC ..... E OTHER PUBLIC _____ F (SPECIFY) **MISSION FACILITY** ..... G **PRIVATE MEDICAL SECTOR** PRIVATE HOSPITAL/CLINIC ..... H NEW START CENTRE ..... I OTHER PRIVATE VCT CENTRE .. _____ J (SPECIFY) OTHER PRIVATE DOCTOR _____ K (SPECIFY) **OTHER** _____ X (SPECIFY)	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
936	CHECK 601: CURRENTLY MARITAL STATUS CURRENTLY MARRIED/ LIVING WITH A MAN ☐ OTHER ☐ → 939		
937	Did your husband/partner ever have a test for HIV?	YES ..... 1 NO ..... 2 DON'T KNOW ..... 8 → 939	
938	Did he tell you the result of his test?	YES ..... 1 NO 2	
939	Would you buy fresh vegetables from a shopkeeper or vendor if you knew that this person had HIV?	YES ..... 1 NO ..... 2 DON'T KNOW 8	
940	If a member of your family got infected with HIV, would you want others to know about it?	YES ..... 1 NO ..... 2 DK/NOT SURE/DEPENDS 8	
941	If a relative of yours became sick with HIV, would you be willing to care for her or him in your own household?	YES ..... 1 NO ..... 2 DK/NOT SURE/DEPENDS 8	
942	If a female teacher has HIV but is not sick, should she be allowed to continue teaching in the school?	SHOULD BE ALLOWED ..... 1 SHOULD NOT BE ALLOWED ..... 2 DK/NOT SURE/DEPENDS 8	
942A	If a male teacher has HIV but is not sick, should he be allowed to continue teaching in the school?	SHOULD BE ALLOWED ..... 1 SHOULD NOT BE ALLOWED ..... 2 DK/NOT SURE/DEPENDS 8	
943	Do you personally know someone who has been denied health services in the last 12 months because he or she is suspected to have HIV or AIDS?	YES ..... 1 NO ..... 2 DK ANYONE WITH AIDS ..... 8 → 948	
944	Do you personally know someone who has been denied involvement in social events, religious services, or community events in the last 12 months because he or she is suspected to have HIV or AIDS?	YES ..... 1 NO 2	
945	Do you personally know someone who has been verbally abused or teased in the last 12 months because he or she is suspected to have HIV or AIDS?	YES ..... 1 NO 2	
946	CHECK 943, 944, AND 945 OTHER ☐ AT LEAST ONE 'YES' ☐ → 948		
947	Do you personally know someone who is suspected to have HIV or who has AIDS?	YES ..... 1 NO 2	
948	Do you agree or disagree with the following statement: People with HIV should be ashamed of themselves.	AGREE ..... 1 DISAGREE ..... 2 DON'T KNOW/NO OPINION 8	
949	Do you agree or disagree with the following statement: People with HIV should be blamed for bringing the disease into the community.	AGREE ..... 1 DISAGREE ..... 2 DON'T KNOW/NO OPINION 8	
950	Do you agree or disagree with the following statement: In a marriage, it is possible for one partner to be infected with HIV and the other person not be infected.	AGREE ..... 1 DISAGREE ..... 2 DON'T KNOW/NO OPINION 8	
951	Should children age 12-14 be taught about using a condom to avoid HIV infection?	YES ..... 1 NO ..... 2 DK/NOT SURE/DEPENDS 8	
952	Should children age 12-14 be taught to wait until they get married to have sexual intercourse in order to avoid HIV infection?	YES ..... 1 NO ..... 2 DK/NOT SURE/DEPENDS 8	

SECTION 10. OTHER HEALTH CARE ISSUES

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1001	CHECK 901: HEARD ABOUT AIDS → Apart from AIDS, have you heard about other infections that can be transmitted through sexual contact? NOT HEARD ABOUT AIDS → Have you heard about infections that can be transmitted through sexual contact?	YES ..... 1 NO 2	
1002	CHECK 620: HAS HAD SEXUAL INTERCOURSE HAS NOT HAD SEXUAL INTERCOURSE	→	1010
1003	CHECK 1001: HEARD ABOUT INFECTION TRANSMITTED THROUGH SEXUAL CONTACT HAS NOT HEARD ABOUT INFECTION TRANSMITTED THROUGH SEXUAL CONTACT	→	1005
1004	Now I would like to ask you some questions about your health in the last 12 months. During the last 12 months, have you had a disease which you got through sexual contact?	YES ..... 1 NO ..... 2 DON'T KNOW 8	
1005	Sometimes women experience a bad smelling abnormal genital discharge. During the last 12 months, have you had a bad-smelling, abnormal genital discharge?	YES ..... 1 NO ..... 2 DON'T KNOW 8	
1006	Sometimes women have a genital sore or ulcer. During the last 12 months, have you had a genital sore or ulcer?	YES ..... 1 NO ..... 2 DON'T KNOW 8	
1007	CHECK 1004,1005, AND 1006 HAS HAD AN INFECTION (ANY 'YES') HAS NOT HAD AN INFECTION OR DOES NOT KNOW	→	1010
1008	The last time you had (PROBLEM FROM 1004/1005/1006), did you seek any kind of advice or treatment?	YES ..... 1 NO 2	→ 1010
1009	Where did you go? Any other place? RECORD ALL SOURCES MENTIONED.	**PUBLIC SECTOR** CENTRAL HOSPITAL ..... A PROVINCIAL HOSPITAL ..... B DISTRICT/RURAL HOSPITAL .... C RURAL HEALTH CENTRE ..... D RURAL/MUNICIPLE CLINIC ..... E VILLAGE/FARM HEALTH WORKER F OTHER PUBLIC _____ G (SPECIFY) **MISSION FACILITY** ..... H **PRIVATE MEDICAL SECTOR** PRIVATE HOSITAL/CLINIC ..... I PHARMACY ..... J OTHER PRIVATE MEDICAL _____ K (SPECIFY) **OTHER SOURCE** SHOP ..... L RELATIVE/FRIEND ..... M TRADITIONAL HEALER ..... N OTHER _____ X (SPECIFY)	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1010	CHECK 901 AND 1001 KNOWS ABOUT AIDS AND/OR OTHER STI ☐ ↓ DOES NOT KNOW ☐ →		1015
1011	CHECK 301 (07) KNOWS MALE CONDOM YES ☐ ↓ NO ☐ →		1013
1012	Some people use male condoms to prevent sexually transmitted diseases. If a male condom is used correctly, do you think that it protects against these diseases most of the time, only sometimes, or not at all?	MOST OF THE TIME ..... 1 SOMETIMES ..... 2 NOT AT ALL ..... 3 DON'T KNOW/UNSURE 8	
1013	CHECK 301 (08) KNOWS FEMALE CONDOM YES ☐ ↓ NO ☐ →		1015
1014	Some people use female condoms to prevent sexually transmitted diseases. If a female condom is used correctly, do you think that it protects against these diseases most of the time, only sometimes, or not at all?	MOST OF THE TIME ..... 1 SOMETIMES ..... 2 NOT AT ALL ..... 3 DON'T KNOW/UNSURE 8	
1015	Now I would like to ask some questions about medical care for yourself. Many different factors can prevent women from getting medical advice or treatment for themselves. When you are sick and want to get medical advice or treatment, is each of the following a big problem or not?	BIG PROB-LEM / NOT A BIG PROB-LEM	
	Getting permission to go.	PERMISSION TO GO ... 1 2	
	Getting money needed for treatment.	GETTING MONEY 1 2	
	The distance to the health facility.	DISTANCE 1 2	
	Having to take transport.	TAKING TRANSPORT ... 1 2	
	Not wanting to go alone.	GO ALONE 1 2	
	Concern that there may not be a female health provider.	NO FEMALE PROVIDER . 1 2	
	Concern that there may not be any health provider.	NO HEALTH PROVIDER . 1 2	
	Concern that there may not be drugs available.	NO DRUGS AVAILABLE . 1 2	
1016	Do you have medical aid?	YES ..... 1 NO 2	→ 1018
1017	What type of medical aid do you have?	PRIVATELY PURCHASED BY INDIVIDUAL ..... 1 THROUGH EMPLOYER ONLY ..... 2 PARTIALLY THROUGH EMPLOYER . 3 NONE ..... 4 OTHER _____ 6 (SPECIFY) DON'T KNOW/UNSURE 8	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1018	Now I would like to ask you some questions about any injections you have had in the last six months. Have you had an injection for any reason in the last six months? IF YES: How many injections have you had? IF NUMBER OF INJECTIONS IS GREATER THAN 94, OR DAILY FOR 3 MONTHS OR MORE, RECORD '95'. IF NON-NUMERIC ANSWER, PROBE TO GET AN ESTIMATE.	NUMBER OF INJECTIONS ... ☐☐ NONE 00	→ 1022
1019	Among these injections, how many were administered by a doctor, a nurse, a pharmacist, a dentist, or any other health worker? IF NUMBER OF INJECTIONS IS GREATER THAN 94, OR DAILY FOR 3 MONTHS OR MORE, RECORD '95'. IF NON-NUMERIC ANSWER, PROBE TO GET AN ESTIMATE.	NUMBER OF INJECTIONS ... ☐☐ NONE 00	→ 1022
1020	The last time you had an injection given to you by a health worker, where did you go to get the injection?	**PUBLIC SECTOR** CENTRAL HOSPITAL ..... 11 PROVINCIAL HOSPITAL ..... 12 DISTRICT/RURAL HOSPITAL .... 13 RURAL HEALTH CENTRE ..... 14 MUNICIPLE CLINIC ..... 15 OTHER PUBLIC 16 _____ (SPECIFY) **MISSION FACILITY** ..... 21 **PRIVATE MEDICAL SECTOR** PRIVATE HOSPITAL/CLINIC ..... 31 NEW START CENTRE ..... 32 OTHER PRIVATE VCT CENTRE .. _____ 33 (SPECIFY) OTHER PRIVATE DOCTOR _____ 34 (SPECIFY) **OTHER** _____ 96 (SPECIFY)	
1021	Did the person who gave you that injection take the syringe and needle from a new, unopened package?	YES ..... 1 NO ..... 2 DON'T KNOW 8	
1022	Do you currently smoke cigarettes?	YES ..... 1 NO 2	→ 1024
1023	In the last 24 hours, how many cigarettes did you smoke?	CIGARETTES ..... ☐☐	
1024	Do you currently smoke or use any other type of tobacco?	YES ..... 1 NO 2	→ 1026
1025	What (other) type of tobacco do you currently smoke or use? PROBE: Any other? RECORD ALL MENTIONED.	PIPE ..... A CHEWING TOBACCO ..... B SNUFF ..... C OTHER _____ X (SPECIFY)	
1026	Now I would like to ask you some questions about tuberculosis. Have you ever heard of an illness called tuberculosis or TB?	YES ..... 1 NO 2	→ 1101

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1027	How does tuberculosis spread from one person to another? PROBE: Any other ways? RECORD ALL MENTIONED.	THROUGH THE AIR WHEN COUGHING OR SNEEZING ..... A THROUGH SHARING UTENSILS ... B THROUGH TOUCHING A PERSON WITH TB ..... C THROUGH FOOD ..... D THROUGH SEXUAL CONTACT ..... E THROUGH MOSQUITO BITES ..... F OTHER _____ X (SPECIFY) DON'T' KNOW ..... Z	
1028	Can tuberculosis be cured?	YES ..... 1 NO ..... 2 DON'T KNOW 8	
1029	If a member of your family got tuberculosis, would you want others to know about it?	YES ..... 1 NO ..... 2 DON'T KNOW/NOT SURE/ DEPENDS 8	

Section 11: DOMESTIC VIOLENCE

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1101	CHECK COVER PAGE OF WOMAN'S QUESTIONNAIRE. WOMAN SELECTED FOR THIS SECTION ⚑ WOMAN NOT SELECTED ☐ →		GO TO 1201
1102	CHECK FOR PRESENCE OF OTHERS: DO NOT CONTINUE UNTIL EFFECTIVE PRIVACY IS ENSURED. PRIVACY OBTAINED .... 1 PRIVACY ABSOLUTELY NOT POSSIBLE ..... 2 →		1138
	READ TO THE RESPONDENT Now I would like to ask you questions about some other important aspects of a woman's life. I know that some of these questions are very personal. However, your answers are crucial for helping to understand the condition of women in Zimbabwe. Let me assure you that your answers are completely confidential and will not be told to anyone and no one else will know that you were asked these questions.		
1103	CHECK 601 AND 602: CURRENTLY MARRIED/ LIVING WITH A MAN ⚑ FORMERLY MARRIED/ LIVED WITH A MAN (READ IN PAST TENSE) ⚑ NEVER MARRIED/ NEVER LIVED WITH A MAN ☐ →		1117
1104	First, I am going to ask you about some situations which happen to some women. Please tell me if these apply to your relationship with your (last) husband/partner? a) He (is/was) jealous or angry if you (talk/talked) to other men? b) He frequently (accuses/accused) you of being unfaithful? c) He (does/did) not permit you to meet your female friends? d) He (tries/tried) to limit your contact with your family? e) He (insists/insisted) on knowing where you (are/were) at all times? f) He (does/did) not trust you with any money?	JEALOUS ..... YES 1 NO 2 DK 8 ACCUSES ..... YES 1 NO 2 DK 8 NOT MEET FRIENDS YES 1 NO 2 DK 8 NO FAMILY ..... YES 1 NO 2 DK 8 WHERE YOU ARE .... YES 1 NO 2 DK 8 MONEY ..... YES 1 NO 2 DK 8	
1105	A (Does/did) your (last) husband/partner ever:	1105B **CHECK 601: ASK ONLY IF RESPONDENT IS CURRENTLY MARRIED/LIVING WITH A MAN, SEPERATED, OR DIVORCED. EXCLUDE WIDOWED WOMEN.** How often did this happen during the last 12 months: often, only sometimes, or not at all?	

		OFTEN	SOME-TIMES	NOT AT ALL
a) say or do something to humiliate you in front of others?	YES 1 → NO 2	1	2	3
b) threaten to hurt or harm you or someone close to you?	YES 1 → NO 2	1	2	3
c) insult you or make you feel bad about yourself?	YES 1 → NO 2	1	2	3

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1106A	(Does/did) your (last) husband/partner ever do any of the following things to you:	1106B **CHECK 601: ASK ONLY IF RESPONDENT IS CURRENTLY MARRIED/LIVING WITH A MAN SEPERATED, OR DIVORCED. EXCLUDE WIDOWED WOMEN.** How often did this happen during the last 12 months: often, only sometimes, or not at all?	

			OFTEN	SOME-TIMES	NOT AT ALL
a)	push you, shake you, throw something at you, or twist your arm or pull your hair?	YES 1 → NO 2 ↓	1	2	3
b)	slap you?	YES 1 → NO 2 ↓	1	2	3
c)	punch you with his fist or with something that could hurt you, kick you, drag you, or beat you up?	YES 1 → NO 2 ↓	1	2	3
d)	try to choke you or burn you on purpose?	YES 1 → NO 2 ↓	1	2	3
e)	threaten you with a knife, gun, or any other weapon?	YES 1 → NO 2 ↓	1	2	3
f)	attack you with a knife, gun, or any other weapon?	YES 1 → NO 2 ↓	1	2	3
g)	physically force you to have sexual intercourse with him?	YES 1 → NO 2 ↓	1	2	3
h)	force you to perform any other sexual acts?	YES 1 → NO 2 ↓	1	2	3

1107	CHECK 1106A (a-h): AT LEAST ONE 'YES' ☐ ↓ ALL ANSWERS ARE 'NO' ☐ →		1114A
1108	How long after you first got married to/started living with your (last) husband/partner did this (any of these things) first happen to you? IF LESS THAN ONE YEAR, RECORD '00'.	NUMBER OF YEARS ☐☐ BEFORE MARRIAGE/BEFORE LIVING TOGETHER 95	→ 1110
1109	How long before you got married to/started living with your (last) husband/partner did this (any of these things) first happen to you?	WEEKS ..... 1 ☐☐ MONTHS ..... 2 ☐☐ YEARS ..... 3 ☐☐ DON'T KNOW 98	
1110	Does (did) your husband/partner drink alcohol or use other intoxicating substances?	YES ..... 1 NO 2	→ 1113
1111	How often does (did) he get drunk: often, only sometimes, or never?	OFTEN ..... 1 SOMETIMES ..... 2 NEVER 3	
1112	When he has (had) been drinking or using other intoxicating substances, how often do (did) these things happen to you?	OFTEN ..... 1 SOMETIMES ..... 2 NEVER 3	
1113	Did the following ever happen as a result of what your (last) husband/partner did to you:		
	a) You had cuts, bruises or aches?	YES ..... 1 NO 2	
	b) You had eye injuries, sprains, dislocations, or burns?	YES ..... 1 NO 2	
	c) You had deep wounds, broken bones, broken teeth, or any other serious injury?	YES ..... 1 NO 2	
	d) You were late or unable to go to work?	YES ..... 1 NO 2	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1114A	Have you ever done any of the following to your husband/ partner at times when he was not already emotionally or physically hurting you?	1114B **CHECK 601: ASK ONLY IF RESPONDENT IS CURRENTLY MARRIED/LIVING WITH A MAN SEPERATED, OR DIVORCED. EXCLUDE WIDOWED WOMEN.** How often did this happen during the last 12 months: often, only sometimes, or not at all?	
		SOME-TIMES / OFTEN / NOT AT ALL	
	a) say or do something to humiliate him in front of others?	YES 1→ 1 2 3 NO 2 ↓	
	b) threaten to hurt or harm him or someone close to him?	YES 1→ 1 2 3 NO 2 ↓	
	c) insult him or make him feel bad about himself?	YES 1→ 1 2 3 NO 2 ↓	
	d) hit, slapped, kicked, or done anything else to physically hurt him?	YES 1→ 1 2 3 NO 2 ↓	
1115	CHECK 1114A a, b, c and d: AT LEAST ONE 'YES' FOR ANY OF a, b, c, or d ↓ / ALL ANSWERS ARE 'NO' FOR EACH OF a, b, c, and d →		1117
1116	Have you done any of these things to your husband/partner in the last 12 months?	YES ..... 1 NO 2	
1117	CHECK 601 AND 602: EVER MARRIED/LIVED WITH A MAN: From the time you were 15 years old has anyone other than your (current/last) husband/partner ever: NEVER MARRIED/ NEVER LIVED WITH A MAN: From the time you were 15 years old has anyone ever:		
	1117a. slapped, hit, kicked, or done anything to physically hurt you?	YES ..... 1 NO ..... 2 REFUSED TO ANSWER/ NO ANSWER 3 →	1117b
	1117b. insulted, humiliated, or done anything to emotionally hurt you?	YES ..... 1 NO ..... 2 REFUSED TO ANSWER/ NO ANSWER 3 →	1120A
1118	Who has hurt you in this way? Anyone else? RECORD ALL MENTIONED.	MOTHER/STEP-MOTHER ..... A FATHER/STEP-FATHER ..... B SISTER/BROTHER ..... C DAUGHTER/SON ..... D OTHER RELATIVE ..... E FORMER HUSBAND/PARTNER .. F CURRENT BOYFRIEND ..... G FORMER BOYFRIEND ..... H MOTHER-IN-LAW ..... I FATHER-IN-LAW ..... J OTHER IN-LAW ..... K TEACHER ..... L EMPLOYER/SOMEONE AT WORK . M POLICE/SOLDIER ..... N OTHER _____ (SPECIFY) X	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1120A	CHECK 201, 226 and 229: EVER BEEN PREGNANT/GIVEN BIRTH YES ☐ NO ☐ → 1123		
1121	Has any one ever hit, slapped, kicked, or done anything else to hurt you physically while you were pregnant?	YES ..... 1 NO ..... 2 → 1123	
1122	Who has done any of these things to physically hurt you while you were pregnant? Anyone else? RECORD ALL MENTIONED.	CURRENT HUSBAND/PARTNER ..... A MOTHER/STEP-MOTHER ..... B FATHER/STEP-FATHER ..... C SISTER/BROTHER ..... D DAUGHTER/SON ..... E OTHER RELATIVE ..... F FORMER HUSBAND/PARTNER ..... G CURRENT BOYFRIEND ..... H FORMER BOYFRIEND ..... I MOTHER-IN-LAW ..... J FATHER-IN-LAW ..... K OTHER IN-LAW ..... L TEACHER ..... M EMPLOYER/SOMEONE AT WORK ..... N POLICE/SOLDIER ..... O OTHER _____ X (SPECIFY)	
1123	CHECK 620: EVER HAD SEX? HAS EVER HAD SEX ☐ NEVER HAD SEX ☐ → 1128		
1124	The first time you had sexual intercourse, would you say that you had it because you wanted to, or because you were forced to have it against your will?	WANTED TO ..... 1 FORCED TO ..... 2 REFUSED TO ANSWER/ NO RESPONSE 3	
1125	CHECK 601 AND 602: EVER MARRIED/LIVED WITH A MAN: In the last 12 months, has anyone other than your (current/last) husband/ partner forced you to have sexual intercourse against your will? NEVER MARRIED/ NEVER LIVED WITH A MAN: In the last 12 months has anyone forced you to have sexual intercourse against your will?	YES ..... 1 NO ..... 2 REFUSED TO ANSWER/ NO ANSWER 3	
1126	CHECK 1124 AND 1125: 1124 ='1' OR '3' **AND** 1125 ='2' OR '3' ☐ OTHER ☐ → 1129		
1127	CHECK 1106A(g) and 1106A(h): 1106A(g) IS NOT '1' **AND** 1106A(h) IS NOT '1' ☐ OTHER ☐ → 1131		
1128	At any time in your life, as a child or as an adult, has anyone ever forced you in any way to have sexual intercourse or perform any other sexual acts?	YES ..... 1 NO ..... 2 REFUSED TO ANSWER/ NO ANSWER ..... 3 → 1131	
1129	How old were you the first time you were forced to have sexual intercourse or perform any other sexual acts?	AGE IN COMPLETED YEARS ... ☐☐ DON'T KNOW 98	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1130	Who was the person who forced you at that time?	CURRENT HUSBAND/PARTNER . 01 FORMER HUSBAND/PARTNER .. 02 CURRENT/FORMER BOYFRIEND . 03 FATHER ..... 04 STEP FATHER ..... 05 OTHER RELATIVE ..... 06 IN-LAW ..... 07 OWN FRIEND/ACQUAINTANCE .. 08 FAMILY FRIEND ..... 09 TEACHER ..... 10 EMPLOYER/SOMEONE AT WORK . 13 POLICE/SOLDIER ..... 11 PRIEST/RELIGIOUS LEADER ..... 12 STRANGER ..... 14 OTHER _____ . 96 (SPECIFY)	
1131	CHECK1106A (a-h), 1117a-b, 1125 AND 1128: AT LEAST ONE 'YES' ⌐ NOT A SINGLE 'YES' ☐ →		1136
1132	Have you ever tried to seek help to stop (the/these) person(s) from doing this to you again?	YES ..... 1 NO 2	→ 1134
1133	From whom have you sought help? Anyone else? RECORD ALL MENTIONED.	OWN FAMILY ..... A HUSBAND/PARTNER'S FAMILY .... B CURRENT/LAST/LATE HUSBAND/PARTNER ..... C CURRENT/FORMER BOYFRIEND . D FRIEND ..... E NEIGHBOR ..... F RELIGIOUS LEADER ..... G DOCTOR/MEDICAL PERSONNEL . H POLICE ..... I LAWYER ..... J SOCIAL SERVICE ORGANIZATION . K OTHER _____ X (SPECIFY)	→ 1136
1134	What is the main reason you did not seek help?	DON'T KNOW WHO TO GO TO ... 01 NO USE/FATALISTIC ..... 02 PART OF LIFE ..... 03 AFRAID OF DIVORCE/DESERTION . 04 AFRAID OF FURTHER ABUSE 05 AFRAID OF GETTING PERSON ABUSING HER IN TROUBLE ..... 06 EMBARASSED ..... 07 DON'T WANT TO DISGRACE FAMILY 08 OTHER _____ 96 (SPECIFY)	
1135	Have you ever told any one else about this?	YES ..... 1 NO 2	
1136	As far as you know, did your father ever beat your mother?	YES ..... 1 NO ..... 2 DON'T KNOW 8	

THANK THE RESPONDENT FOR HER COOPERATION AND REASSURE HER ABOUT THE CONFIDENTIALITY OF HER ANSWERS. FILL OUT THE QUESTIONS BELOW WITH REFERENCE TO THE DOMESTIC VIOLENCE MODULE ONLY.

1137	DID YOU HAVE TO INTERRUPT THE INTERVIEW BECAUSE SOME ADULT WAS TRYING TO LISTEN, OR CAME INTO THE ROOM, OR INTERFERED IN ANY OTHER WAY?		YES ONCE	YES, MORE THAN ONCE	NO
		HUSBAND	1	2	3
		OTHER MALE ADULT	1	2	3
		FEMALE ADULT	1	2	3
1138	INTERVIEWER'S COMMENTS / EXPLANATION FOR NOT COMPLETING THE DOMESTIC VIOLENCE MODULE _____ _____ _____				

SECTION 12. MATERNAL AND ADULT MORTALITY

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1201	Now I would like to ask you some questions about your brothers and sisters, that is, all of the children born to your natural mother, including those who are living with you, those living elsewhere and those who have died. How many children did your mother give birth to, including you?	NUMBER OF BIRTHS TO NATURAL MOTHER ..... ☐☐	
1202	CHECK 1201: TWO OR MORE BIRTHS ☐↓ ONLY ONE BIRTH (RESPONDENT ONLY) ☐→		1214
1203	How many of these births did your mother have before you were born?	NUMBER OF PRECEDING BIRTHS ..... ☐☐	

		(1)	(2)	(3)	(4)	(5)	(6)
1204	What was the name given to your oldest (next oldest) brother or sister?	_____	_____	_____	_____	_____	_____
1205	Is (NAME) male or female?	MALE 1 FEMALE 2	MALE 1 FEMALE 2	MALE 1 FEMALE 2	MALE 1 FEMALE 2	MALE 1 FEMALE 2	MALE 1 FEMALE 2
1206	Is (NAME) still alive?	YES ... 1 NO ... 2 (GO TO 1208) DK ... 8 (GO TO (2))	YES ... 1 NO ... 2 (GO TO 1208) DK ... 8 (GO TO (3))	YES ... 1 NO ... 2 (GO TO 1208) DK ... 8 (GO TO (4))	YES ... 1 NO ... 2 (GO TO 1208) DK ... 8 (GO TO (5))	YES ... 1 NO ... 2 (GO TO 1208) DK ... 8 (GO TO (6))	YES ... 1 NO ... 2 (GO TO 1208) DK ... 8 (GO TO (7))
1207	How old is (NAME)?	☐☐ GO TO (2)	☐☐ GO TO (3)	☐☐ GO TO (4)	☐☐ GO TO (5)	☐☐ GO TO (6)	☐☐ GO TO (7)
1208	How many years ago did (NAME) die?	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
1209	How old was (NAME) when he/she died?	☐☐ IF MALE OR DIED BEFORE 12 YEARS OF AGE GO TO (2)	☐☐ IF MALE OR DIED BEFORE 12 YEARS OF AGE GO TO (3)	☐☐ IF MALE OR DIED BEFORE 12 YEARS OF AGE GO TO (4)	☐☐ IF MALE OR DIED BEFORE 12 YEARS OF AGE GO TO (5)	☐☐ IF MALE OR DIED BEFORE 12 YEARS OF AGE GO TO (6)	☐☐ IF MALE OR DIED BEFORE 12 YEARS OF AGE GO TO (7)
1210	Was (NAME) pregnant when she died?	YES ... 1 (GO TO 1213) NO ... 2 DK ... 8	YES ... 1 (GO TO 1213) NO ... 2 DK ... 8	YES ... 1 (GO TO 1213) NO ... 2 DK ... 8	YES ... 1 (GO TO 1213) NO ... 2 DK ... 8	YES ... 1 (GO TO 1213) NO ... 2 DK ... 8	YES ... 1 (GO TO 1213) NO ... 2 DK ... 8
1211	Did (NAME) die during childbirth?	YES ... 1 (GO TO 1214) NO ... 2	YES ... 1 (GO TO 1214) NO ... 2	YES ... 1 (GO TO 1214) NO ... 2	YES ... 1 (GO TO 1214) NO ... 2	YES ... 1 (GO TO 1214) NO ... 2	YES ... 1 (GO TO 1214) NO ... 2
1212	Did (NAME) die within two months after the end of a pregnancy or childbirth?	YES ... 1 NO ... 2	YES ... 1 NO ... 2	YES ... 1 NO ... 2	YES ... 1 NO ... 2	YES ... 1 NO ... 2	YES ... 1 NO ... 2
1213	Was (NAME)'S death due to an accident or violence?	YES ... 1 NO ... 2	YES ... 1 NO ... 2	YES ... 1 NO ... 2	YES ... 1 NO ... 2	YES ... 1 NO ... 2	YES ... 1 NO ... 2

IF NO MORE BROTHERS OR SISTERS, GO TO 1214.

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES						SKIP
1204	What was the name given to your oldest (next oldest) brother or sister?	(7) _____	(8) _____	(9) _____	(10) _____	(11) _____	(12) _____	
1205	Is (NAME) male or female?	MALE 1 FEMALE 2	MALE 1 FEMALE 2	MALE 1 FEMALE 2	MALE 1 FEMALE 2	MALE 1 FEMALE 2	MALE 1 FEMALE 2	
1206	Is (NAME) still alive?	YES ... 1 NO ... 2 (GO TO 1208) DK ... 8 (GO TO (8))	YES ... 1 NO ... 2 (GO TO 1208) DK ... 8 (GO TO (9))	YES ... 1 NO ... 2 (GO TO 1208) DK ... 8 (GO TO (10))	YES ... 1 NO ... 2 (GO TO 1208) DK ... 8 (GO TO (11))	YES ... 1 NO ... 2 (GO TO 1208) DK ... 8 (GO TO (12))	YES ... 1 NO ... 2 (GO TO 1208) DK ... 8 (GO TO (13))	
1207	How old is (NAME)?	☐☐ GO TO (8)	☐☐ GO TO (9)	☐☐ GO TO (10)	☐☐ GO TO (11)	☐☐ GO TO (12)	☐☐ GO TO (13)	
1208	How many years ago did (NAME) die?	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	
1209	How old was (NAME) when he/she died?	☐☐ IF MALE OR DIED BEFORE 12 YEARS OF AGE GO TO [8]	☐☐ IF MALE OR DIED BEFORE 12 YEARS OF AGE GO TO (9)	☐☐ IF MALE OR DIED BEFORE 12 YEARS OF AGE GO TO (10)	☐☐ IF MALE OR DIED BEFORE 12 YEARS OF AGE GO TO (11)	☐☐ IF MALE OR DIED BEFORE 12 YEARS OF AGE GO TO (12)	☐☐ IF MALE OR DIED BEFORE 12 YEARS OF AGE GO TO (13)	
1210	Was (NAME) pregnant when she died?	YES ... 1 (GO TO 1213) NO ... 2	YES ... 1 (GO TO 1213) NO ... 2	YES ... 1 (GO TO 1213) NO ... 2	YES ... 1 (GO TO 1213) NO ... 2	YES ... 1 (GO TO 1213) NO ... 2	YES ... 1 (GO TO 1213) NO ... 2	
1211	Did (NAME) die during childbirth?	YES ... 1 (GO TO 1213) NO ... 2	YES ... 1 (GO TO 1213) NO ... 2	YES ... 1 (GO TO 1213) NO ... 2	YES ... 1 (GO TO 1213) NO ... 2	YES ... 1 (GO TO 1213) NO ... 2	YES ... 1 (GO TO 1213) NO ... 2	
1212	Did (NAME) die within two months after the end of a pregnancy or childbirth?	YES ... 1 NO ... 2	YES ... 1 NO ... 2	YES ... 1 NO ... 2	YES ... 1 NO ... 2	YES ... 1 NO ... 2	YES ... 1 NO ... 2	
1213	Was (NAME)'S death due to an accident or violence?	YES ... 1 NO ... 2	YES ... 1 NO ... 2	YES ... 1 NO ... 2	YES ... 1 NO ... 2	YES ... 1 NO ... 2	YES ... 1 NO ... 2	
IF NO MORE BROTHERS OR SISTERS, GO TO 1214.								
1214	RECORD THE TIME.	HOURS ..... ☐☐ MINUTES ..... ☐☐						

SECTION 13. ANTHROPOMETRY, ANAEMIA AND HIV TESTING

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
	ANTHROPOMETRY		
1301	RECORD WEIGHT IN KILOGRAMS.	WEIGHT . . . . . ☐☐☐.☐	
1302	RECORD HEIGHT IN CENTIMETERS.	HEIGHT . . . . . ☐☐☐.☐	
1303	RECORD RESULT FOR ANTHROPOMETRIC MEASUREMENT. (SPECIFY)	MEASURED . . . . . 1 REFUSED . . . . . 2 ABSENT . . . . . 3 OTHER _____ 6	
	CONSENT FOR ANAEMIA AND HIV TESTS FOR NEVER-MARRIED YOUTH AGE 15-17 ASK CONSENT FOR THE ANEMIA AND HIV TESTS. FOR NEVER-IN-UNION RESPONDENTS AGE 15-17, YOU MUST FIRST OBTAIN THE CONSENT OF A PARENT OR OTHER ADULT RESPONSIBLE FOR THE YOUTH AT THE TIME OF YOUR VISIT.		
1304	CHECK 106: **AGE** AGE 15-17 ☐ ↓ AGE 18-49 ☐ → 1310		
1305	CHECK 601 AND 602: **RESPONDENT NEVER EVER-MARRIED AND NEVER LIVED TOGETHER WITH A MAN** CODE 3 IN BOTH QUESTIONS 601 AND 602 ☐ ↓ CODE 1 OR CODE 2 IN QUESTION 601 OR IN QUESTION 602 ☐ → 1310		
1306	CHECK HOUSEHOLD SCHEDULE (COLUMN 1) AND RECORD LINE NUMBER OF THE PARENT OR OTHER ADULT FROM WHOM CONSENT WILL BE REQUESTED. IF PARENT OR OTHER RESPONSIBLE ADULT IS NOT IN A HOUSEHOLD MEMBER, WRITE "00"	LINE NUMBER OF PARENT/OTHER ADULT . . . . . ☐☐	
1307	READ THE **ANAEMIA CONSENT STATEMENT** TO THE PARENT OR ADULT RESPONSIBLE FOR THE CHILD. As part of this survey, we are trying to find out more about anaemia, that is, low blood levels, in men, women, and children. To know more about this problem in Zimbabwe, we are asking people in this survey all over the country to take a test. For the test, I will take a few drops of blood from (NAME OF ADOLECENT'S) finger. The test uses clean and completely safe equipment that is used only once and then thrown away. The blood will be tested with new equipment. The result will be given to (NAME) right after the test is done. We will not tell anyone else the results of the test. Do you have any questions? You can say yes or you can say no; it is up to you. If you say yes, it will help the country to develop programs to fight the problem of anaemia. Do you agree that (NAME) may give blood for the anaemia test? CIRCLE CODE AND SIGN. FURTHER DISCUSS ANAEMIA TESTING PROCESS TO PUT RESPONDENT AT EASE.	**CONSENT OF PARENT/OTHER ADULT FOR ANEMIA TEST** CONSENTED_____ . . . 1 SIGN REFUSED . . . . . 2 PARENT/ADULT NOT PRESENT . 8	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1308	READ THE **HIV CONSENT STATEMENT** TO THE PARENT OR ADULT RESPONSIBLE FOR THE CHILD. We are also asking people in this survey to help us find out how big the HIV problem is in Zimbabwe. We would like (NAME OF ADOLESCENT) to take part in the HIV test by allowing us to collect a few more drops of blood from her finger. This blood will be tested later in the laboratory. We will not keep any name with the blood. Because there will be no name with the blood when it is tested, we will not be able to give (NAME) the result of the test and no one will be able to trace the test back to (NAME). If (NAME) wants to know her HIV status, I can tell (NAME) where to go to get tested for HIV. Do you have any questions? You can say yes or you can say no; it is up to you. If you say yes, it will help the country to develop programs to fight the problem of HIV and AIDS. Do you agree that (NAME) may give blood for the HIV test? CIRCLE CODE AND SIGN. FURTHER DISCUSS ANAEMIA TESTING PROCESS TO PUT RESPONDENT AT EASE.	**CONSENT OF PARENT/OTHER ADULT FOR HIV TEST** CONSENT_____ . . . 1 SIGN REFUSED . . . . . 2 PARENT/ADULT NOT PRESENT . 8	→ 1310
1309	READ THE **BLOOD STORAGE CONSENT STATEMENT** TO THE PARENT OR ADULT RESPONSIBLE FOR THE CHILD. Some of the blood that (NAME) gives may be left after the HIV test. We would like to keep that blood at the laboratory to use for other tests later on. Again, you can say yes or you can say no; it is up to you. If you say yes, it may help the country later to develop programs to fight HIV/AIDS and other health problems. Will you agree that we do other tests on (NAME'S) blood later? CIRCLE CODE AND SIGN FURTHER DISCUSS STORAGE PROCESS TO PUT RESPONDENT AT EASE.	**CONSENT OF PARENT/OTHER ADULT FOR STORAGE OF BLOOD** CONSENT_____ . . . 1 SIGN REFUSED 2	

RESPONDENT CONSENT FOR ANAEMIA AND HIV TESTS

ASK CONSENT FOR THE ANEMIA AND HIV TESTS FROM RESPONDENT. FOR NEVER-IN-UNION RESPONDENTS AGE 15-17, ASK FOR CONSENT ONLY IF PARENT OR OTHER ADULT RESPONSIBLE FOR THE YOUTH AT THE TIME OF YOUR VISIT HAS GRANTED CONSENT OR THE PARENT OR OTHER ADULT WAS NOT PRSENT.

1310	CHECK 1304 AND 1305: RESPONDENT'S AGE AND UNION STATUS AGE 15-17 AND NEVER-IN-UNION ☐ ↓ OTHER ☐ → 1312	
1311	CHECK 1307: **PARENTAL/ADULT CONSENT FOR ANAEMIA TEST** CONSENT FOR ANAEMIA TEST OBTAINED FROM PARENT/OTHER ADULT RESPONSIBLE FOR ADOLESCENT ☐ ↓ PARENT/ OTHER ADULT NOT PRESENT ☐ ↓ PARENT/ OTHER ADULT REFUSED ☐ → 1313	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1312	READ THE **ANAEMIA CONSENT STATEMENT** TO THE RESPONDENT. As part of this survey, we are trying to find out more about anaemia, that is, low blood levels, in men, women, and children. To know more about this problem in Zimbabwe, we are asking people in this survey all over the country to take a test. For the test, I will take a few drops of blood from your finger. The test uses clean and completely safe equipment that is used only once and then thrown away. The blood will be tested with new equipment. The result will be given to you right after the test is done. We will not tell anyone else the results of the test. Do you have any questions? You can say yes or you can say no; it is up to you. If you say yes, it will help the country to develop programs to fight the problem of anaemia. Do you agree to give blood for the anaemia test? CIRCLE CODE AND SIGN. FURTHER DISCUSS ANAEMIA TESTING PROCESS TO PUT RESPONDENT AT EASE. CIRCLE CODE AND SIGN. FURTHER DISCUSS ANAEMIA TESTING PROCESS TO PUT RESPONDENT AT EASE.	CONSENT_____ (SIGN) ... 1 REFUSED 2	
1313	CHECK 1304 AND 1305: RESPONDENT'S AGE AND UNION STATUS AGE 15-17 AND NEVER-IN-UNION ☐ OTHER ☐ →		1315
1314	CHECK 1308: **PARENTAL/ADULT CONSENT FOR HIV TEST** CONSENT FOR HIV TEST OBTAINED FROM PARENT/OTHER ADULT RESPONSIBLE FOR ADOLESCENT ☐ PARENT/ OTHER ADULT NOT PRESENT ☐ PARENT/ OTHER ADULT REFUSED ☐ →		1317
1315	READ THE **HIV CONSENT STATEMENT** TO THE RESPONDENT. We are also asking people in this survey to help us find out how big the HIV problem is in Zimbabwe. We would like you to take part in the HIV test by allowing us to collect a few more drops of blood from your finger. This blood will be tested later in the laboratory. We will not keep any name with the blood. Because there will be no name with the blood when it is tested, we will not be able to give you the result of the test and no one will be able to trace the test back to you. If you want to know your HIV status, I can tell you where to go to get tested for HIV. Do you have any questions? You can say yes or you can say no; it is up to you. If you say yes, it will help the country to develop programs to fight the problem of HIV and AIDS. Do you agree to give blood for the HIV test? CIRCLE CODE AND SIGN. FURTHER DISCUSS ANAEMIA TESTING PROCESS TO PUT RESPONDENT AT EASE. CIRCLE CODE AND SIGN FURTHER DISCUSS HIV TESTING PROCESS TO PUT RESPONDENT AT EASE.	CONSENT_____ (SIGN) ... 1 REFUSED ..... 2 →	1317

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1316	READ THE **BLOOD STORAGE CONSENT STATEMENT** TO THE RESPONDENT. Some of the blood that you give may be left after the HIV test. We would like to keep that blood at the laboratory to use for other tests later on. Again, you can say yes or you can say no; it is up to you. If you say yes, it may help the country later to develop programs to fight HIV/AIDS and other health problems. Will you agree that we do other tests on your blood later? CIRCLE CODE AND SIGN FURTHER DISCUSS STORAGE PROCESS TO PUT RESPONDENT AT EASE.	CONSENT_____ (SIGN) ... 1 REFUSED 2	
1317	May I provide you with an informational brochure about voluntary HIV testing from the nearest facility offering VCT? PROVIDE BROCURE TO ALL RESPONDENTS WHO WANT IT.	ACCEPTED ..... 1 REFUSED 2	
1318	CHECK 1307, 1308, 1312 AND 1315 AND INDICATE THE TESTS FOR WHICH CONSENT HAS BEEN GRANTED. IF BOTH REFUSED, COMPLETE QUESTIONS 1320 AND 1322.	CONSENTED TO BOTH ..... 1 ANAEMIA TEST ONLY ..... 2 HIV TEST ONLY ..... 3 BOTH REFUSED 4	
1319	FOR ALL RESPONDENTS WHERE CONSENT WAS OBTAINED, FOLLOW INSTRUCTIONS FOR PASTING THE BAR CODE LABELS AND TAKING THE DBS SPECIMEN.	PASTE FIRST LABEL HERE PASTE SECOND LABEL ON FILTER PAPER PASTE THIRD LABEL ON BLOOD TRANSMITTAL FORM.	
1320	OUTCOME OF HIV TEST	BLOOD SPECIMEN COLLECTED 1 REFUSED ..... 2 ABSENT ..... 3 TECHNICAL PROBLEM ..... 4 OTHER _____ (SPECIFY) 6	
1321	RECORD HEMOGLOBIN LEVEL	G/DL ..... ☐☐.☐	
1322	OUTCOME OF ANAEMIA TEST	BLOOD SPECIMEN COLLECTED 1 REFUSED ..... 2 ABSENT ..... 3 TECHNICAL PROBLEM ..... 4 OTHER _____ (SPECIFY) 6	→ 1326

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1323	CHECK 226 RECORD IF RESPONDENT IS CURRENTLY PREGNANT OR OR NOT.	WOMAN PREGNANT ..... 1 WOMAN NOT PREGNANT/ NOT SURE 2	
1324	CHECK 1321: THE CUTOFF POINT IS 9 G/DL FOR PREGNANT WOMEN AND 7 G/DL FOR WOMEN WHO ARE NOT PREGNANT (OR WHO DON'T KNOW IF THEY ARE PREGNANT). HEMOGLOBIN LEVEL BELOW THE CUTOFF POINT → GIVE EACH WOMAN/PARENT/RESPONSIBLE ADULT RESULT OF HEMOGLOBIN MEASUREMENT AND CONTINUE WITH 1325. HEMOGLOBIN LEVEL AT OR ABOVE CUTOFF → GIVE EACH WOMAN/PARENT/RESPONSIBLE ADULT RESULT OF HEMOGLOBIN MEASUREMENT AND PROCEED TO 1326.		
1325	We detected a low level of hemoglobin in your blood. This indicates that you have developed severe anaemia, which is a serious health problem. We would like to inform the clinic at _____ about your condition. This will assist you in obtain help. AGREES TO REFERRAL? YES ..... 1 NO 2		
1326	THANK THE RESPONDENT.		

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INTERVIEWER'S OBSERVATIONS

TO BE FILLED IN AFTER COMPLETING INTERVIEW

COMMENTS ABOUT RESPONDENT:

COMMENTS ON SPECIFIC QUESTIONS:

ANY OTHER COMMENTS:

SUPERVISOR'S OBSERVATIONS

NAME OF THE SUPERVISOR: _____ DATE: _____

EDITOR'S OBSERVATIONS

NAME OF EDITOR: _____ DATE: _____

INSTRUCTIONS:

ONLY ONE CODE SHOULD APPEAR IN ANY BOX.
FOR COLUMNS 1 AND 4, ALL MONTHS SHOULD BE FILLED IN.

INFORMATION TO BE CODED FOR EACH COLUMN

COL. 1: BIRTHS, PREGNANCIES, CONTRACEPTIVE USE

- B BIRTHS
- P PREGNANCIES
- T TERMINATIONS

- 0 NO METHOD
- 1 FEMALE STERILIZATION
- 2 MALE STERILIZATION
- 3 PILL
- 4 IUD
- 5 INJECTION
- 6 IMPLANT
- 7 MALE CONDOM
- 8 FEMALE CONDOM
- 9 DIAPHRAGM
- J FOAM/JELLY
- K LACTATIONAL AMEN. METHOD
- L RHYTHM METHOD
- M WITHDRAWAL
- X OTHER _____ (SPECIFY)

COL. 2: SOURCE OF CONTRACEPTION

- 1 GOVT. HOSPITAL/CLINIC
- 2 RURAL/MUNICIPAL CLINIC
- 3 RURAL HEALTH CENTRE
- 4 ZNFPC CLINIC
- 5 MOH MOBILE CLINIC
- 6 ZNFPC CBD/DEPOT HOLDER
- 7 OTHER PUBLIC _____ (SPECIFY)
- 8 MISSION FACILITY
- A PRIVATE HOSPITAL/CLINIC
- B PHARMACY
- C PRIVATE DOCTOR
- D GENERAL DEALER
- E SUPERMARKET
- F TUCK SHOP
- G SERVICE STATION
- H OTHER RETAIL _____ (SPECIFY)
- J OTHER PRIVATE MEDICAL _____ (SPECIFY)
- K CHURCH
- L FRIEND/RELATIVE
- X OTHER _____ (SPECIFY)

COL. 3: DISCONTINUATION OF CONTRACEPTIVE USE

- 0 INFREQUENT SEX/HUSBAND AWAY
- 1 BECAME PREGNANT WHILE USING
- 2 WANTED TO BECOME PREGNANT
- 3 HUSBAND/PARTNER DISAPPROVED
- 4 WANTED MORE EFFECTIVE METHOD
- 5 HEALTH CONCERNS
- 6 SIDE EFFECTS
- 7 LACK OF ACCESS/TOO FAR
- 8 COSTS TOO MUCH
- 9 INCONVENIENT TO USE
- F FATALISTIC
- A DIFFICULT TO GET PREGNANT/MENOPAUSAL
- D MARITAL DISSOLUTION/SEPARATION
- X OTHER _____ (SPECIFY)
- Z DON'T KNOW

COL. 4: MARRIAGE/UNION

- X IN UNION (MARRIED OR LIVING TOGETHER)
- 0 NOT IN UNION

				1	2	3	4			
2	04	APR	01					01	APR	2
0	03	MAR	02					02	MAR	0
0	02	FEB	03					03	FEB	0
6	01	JAN	04					04	JAN	6
	12	DEC	05					05	DEC	
	11	NOV	06					06	NOV	
	10	OCT	07					07	OCT	
	09	SEP	08					08	SEP	
2	08	AUG	09					09	AUG	2
0	07	JUL	10					10	JUL	0
0	06	JUN	11					11	JUN	0
5	05	MAY	12					12	MAY	5
	04	APR	13					13	APR	
	03	MAR	14					14	MAR	
	02	FEB	15					15	FEB	
	01	JAN	16					16	JAN	
	12	DEC	17					17	DEC	
	11	NOV	18					18	NOV	
	10	OCT	19					19	OCT	
	09	SEP	20					20	SEP	
2	08	AUG	21					21	AUG	2
0	07	JUL	22					22	JUL	0
0	06	JUN	23					23	JUN	0
4	05	MAY	24					24	MAY	4
	04	APR	25					25	APR	
	03	MAR	26					26	MAR	
	02	FEB	27					27	FEB	
	01	JAN	28					28	JAN	
	12	DEC	29					29	DEC	
	11	NOV	30					30	NOV	
	10	OCT	31					31	OCT	
	09	SEP	32					32	SEP	
2	08	AUG	33					33	AUG	2
0	07	JUL	34					34	JUL	0
0	06	JUN	35					35	JUN	0
3	05	MAY	36					36	MAY	3
	04	APR	37					37	APR	
	03	MAR	38					38	MAR	
	02	FEB	39					39	FEB	
	01	JAN	40					40	JAN	
	12	DEC	41					41	DEC	
	11	NOV	42					42	NOV	
	10	OCT	43					43	OCT	
	09	SEP	44					44	SEP	
2	08	AUG	45					45	AUG	2
0	07	JUL	46					46	JUL	0
0	06	JUN	47					47	JUN	0
2	05	MAY	48					48	MAY	2
	04	APR	49					49	APR	
	03	MAR	50					50	MAR	
	02	FEB	51					51	FEB	
	01	JAN	52					52	JAN	
	12	DEC	53					53	DEC	
	11	NOV	54					54	NOV	
	10	OCT	55					55	OCT	
	09	SEP	56					56	SEP	
2	08	AUG	57					57	AUG	2
0	07	JUL	58					58	JUL	0
0	06	JUN	59					59	JUN	0
1	05	MAY	60					60	MAY	1
	04	APR	61					61	APR	
	03	MAR	62					62	MAR	
	02	FEB	63					63	FEB	
	01	JAN	64					64	JAN	
	12	DEC	65					65	DEC	
	11	NOV	66					66	NOV	
	10	OCT	67					67	OCT	
	09	SEP	68					68	SEP	
2	08	AUG	69					69	AUG	2
0	07	JUL	70					70	JUL	0
0	06	JUN	71					71	JUN	0
0	05	MAY	72					72	MAY	0
	04	APR	73					73	APR	
	03	MAR	74					74	MAR	
	02	FEB	75					75	FEB	
	01	JAN	76					76	JAN	

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Appendix 2

UNIVERSITY OF PRETORIA ETHICS COMMITTEE APPROVAL LETTER

The Research Ethics Committee, Faculty Health Sciences, University of Pretoria comply with ICH-GCP guidelines and has US Federalwide Assurance. FWA 00002567, Approved dd 22 May 2002 and Expires 24 Jan 2009.
IRB 0000 2235 IORG0001762 Approved dd Jan 2006 and Expires 21 Nov 2008.

Universiteit van Pretoria
University of Pretoria

Faculty of Health Sciences Research Ethics Committee
University of Pretoria
HW Snyman Building, (South)
Level 2-34
Pretoria

Private Bag X169
Pretoria
0001

Date: 3/01/2008

PROTOCOL NO.	**166/2007**
PROTOCOL TITLE	Social and Economic Factors Influencing Under-Fife Mortality in Zimbabwe During 2001-2005.
INVESTIGATOR	**Person:**Mr J Kembo **Phone:**.012-3022744 / 0542084 **Fax:**.012-3542071 **E-Mail:** jkembo@hsrc.ac.za
DEPARTMENT	School of Health Systems and Public Health ; University of Pretoria
STUDY DEGREE	PHD (Epidemiology)
SUPERVISOR	Prof J K van Ginneken
SPONSOR	None.
MEETING DATE	21/11/2007

This Protocol has been considered by the Faculty of Health Sciences Research Ethics Committee, University of Pretoria on 21/11/2007 and found to be acceptable.

*Advocate AG Nienaber	(female)BA(Hons) (Wits); LLB; LLM (UP); Dipl.Datametrics (UNISA)
*Prof V.O.L. Karusseit	MBChB; MFGP (SA); M.Med (Chir); FCS (SA): Surgeon
*Prof M Kruger	(female) MB.ChB.(Pret); Mmed.Paed.(Pret); PhDd. (Leuven)
Dr N K Likibi	MB.BCh.; Med.Adviser (Gauteng Dept.of Health)
*Snr Sr J. Phatoli	(female) BCur (Et.Al) Senior Nursing-Sister
*Dr L Schoeman	(female) Bpharm, BA Hons (Psy), PhD
Prof J.R. Snyman	MBChB, M.Pharm.Med: MD: Pharmacologist
*Dr R Sommers	(female) MBChB; M.Med (Int); MPhar.Med;
Prof TJP Swart	BChD, MSc (Odont), MChD (Oral Path) Senior Specialist; Oral Pathology
*Dr A P van Der Walt	BChD, DGA (Pret) Director: Clinical Services of the Pretoria Academic Hospital
Prof C W van Staden	MBChB; Mmed (Psych); MD; FTCL; UPLM; Dept of Psychiatry

DR R SOMMERS; MBChB; M.Med (Int); MPhar.Med.
SECRETARIAT of the Faculty of Health Sciences Research Ethics Committee - University of Pretoria

* = Members attended the meeting on 21/11/2007.
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UNIVERSITY OF PRETORIA APPROVAL OF CHANGE OF PART OF TOPIC LETTER

100 1908 - 2008
UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Health Sciences
School of Health Systems and Public Health

30 June 2008

Mr J Kembo
27621074
PhD

Dear Mr Kembo

Approval Academic Advisory Committee

This serves to confirm that your change of title was served and approved at the Academic Advisory Committee on 24 June 2008.

Please note that your title was approved as:

Social and Economic factors influencing under-five mortality in Zimbabwe in 1996-2005

Please ensure that your protocol is amended with the above title. Also, please ensure that you advise the Ethics Committee of this change.

Sincerely

Prof C de Jager
Chairperson
SHSPH Academic Advisory Committee

P O Box 667, PRETORIA, 0001, RSA
5th Floor, HW Snyman North, 31 Bophelo Road, Gezina
Tel: +27 12 354 1472
http://shsph.up.ac.za

Inspiring public health excellence in Africa

DATA USE AGREEMENT LETTER FROM DHS MACRO INTERNATIONAL, UNITED STATES OF AMERICA

MACRO
Macro International Inc.
Headquarters
11785 Beltsville Drive
Calverton, MD 20705 USA
T: (301) 572-0200 F: (301) 572-0999
www.orcmacro.com

MEASURE DHS

December 20, 2006

Mr. Joshua Kembo
Senior Researcher
Social Aspects of HIV/AIDS Research Alliance
Human Sciences Research Council of South Africa
Pvt Bag X41
34 Pretorius Street
Pretoria 0001

Dear Mr.Kembo,

You have been authorized to use the Zimbabwe DHS data for your research titled "**Social and Economic Factors Influencing Under-Five Mortality in Zimbabwe During 2001-2005**".

The DHS files you will download from our website, do not give you access to any identifiers that can link these data to the respondents. Therefore, no risk of compromising respondent confidentiality will be present.

However, if you request access to geographic (GPS) data files in the future, you will be required to sign our conditions of use statement, agreeing that no attempt will be made to identify or contact survey respondents etc.

The DHS data sets must not be passed on to other researchers without the written consent of DHS. Users are requested to submit an abstract or project description to the DHS Data Archive for each new project, stating which datasets will be used. Copies of all reports and publications based on the requested data SHOULD be sent to the DHS Data Archive in sufficient number for DHS to forward copies to the countries whose data have been used.

Sincerely,

Bridgette James

Bridgette James
Data Archive Administrator
MEASURE DHS
Demographic and Health Surveys
E-mail: archive@measuredhs.com

DATA USE AGREEMENT LETTER FROM CENTRAL STATISTICAL OFFICE, HARARE, ZIMBABWE

27-11-07 13:01 CENTRAL STATISTICS OFFICE ID= 2634794757 P01/01

Telephone No. . . . 706681/8
703971/7
Facsimile No. . . . 728529
Telegraphic Address "GOVSTAT"

All communications should be
Addressed to "THE DIRECTOR"

ZIMBABWE

CENTRAL STATISTICAL OFFICE
P.O. Box CY342
Causeway
Zimbabwe

TO WHOM IT MAY CONCERN

We hereby authorize Joshua Kembo to use data from the 2005/6 Zimbabwe Demographic and Health Survey for his study entitled " Social and Economic Factors influencing under-5 Mortality in Zimbabwe During 2001 – 2005"

We hope such an in-depth analysis will shed more light on the mortality situation of children.

CENTRAL STATISTICS OFFICE
19 NOV 2007
P.O. BOX CY 342, CAUSEWAY
ZIMBABWE

Yours sincerely

W.T. Mapeta
Population Census Manager,
Survey Director, 2005/6 ZDHS

Appendix 3

PROOF OF ARTICLE ACCEPTANCE

Chapter 6

From: office@demographic-research.org [mailto:office@demographic-research.org]
Sent: 22 July 2009 03:45 PM
To: Kembo, Joshua
Subject: Acceptance of manuscript #851

Dear Joshua,

I have now heard back from Reviewer A of *"Determinants of infant and child mortality in Zimbabwe: Results of multivariate hazard analysis".* S/He really likes the revisions you made to the manuscript and would now like to change her vote to an *"accept".* Reviewer A is really pleased with this version. The editor also approves of the current version of the paper. **That is why it is now my pleasure to let you know that your paper is accepted for publication in Demographic Research. Congratulations!**

Now that the SRB is happy, we can proceed to the "housekeeping" part, where we prepare your work for publication. Here are two things you should now do...

1) If you have not already done so, print out a copy of the publication agreement (attached here as a PDF). You need to fill it in and sign in ink, and mail it to us by normal air mail (no need to send express or anything fancy, just normal mail).

2) Re-work any parts of the paper you want to improve or correct. If you want to change anything, including updating references, changing section numbers, or inserting a paragraph, please do so now.

After we format the paper for publication you will be getting a proof copy in a PDF, so you will able to check for small typos or other minor items there, but it is much easier for all of us if you take care of the major work now. Once we have assigned page numbers and done the layout, it is more difficult to move things around. When you are finished with any and all changes you might want, please send us a new word file, calling it "851 ready to format" or something, and we will format that.
So, that is all. If you have any questions, please let me know and I will try to help. Congratulations again! Have a fantastic day!

All the very best,
Jana

Jana Tetzlaff
Assistant Managing Editor
Demographic Research Editorial Office
mailto: office@demographic-research.org
http://www.demographic-research.org
Max-Planck-Institute for Demographic Research
http://www.demogr.mpg.de

Appendix 4

CURRICULUM VITAE AND SUMMARY OF PURPOSE AND CONTENTS OF RESEARCH

Joshua Kembo is a Senior Researcher in the Bureau of Market Research (BMR) at the University of South Africa (Unisa). He holds an Msc in Population Studies obtained from the University of Zimbabwe in 1992. He is currently completing his PhD in Epidemiology in the School of Health Systems and Public Health at the University of Pretoria. His areas of research interest include mortality, morbidity and statistical and mathematical demographic projections. He has been involved in over 20 research and evaluation projects in the demographic and public health disciplines.

Mr. Kembo recently submitted an article entitled *"The consequences of HIV and AIDS on children"* for publication in the SAHARA Journal. He was one of three authors whose paper entitled "*A review of National AIDS Councils in selected countries in Africa"* was published in the *SAHARA Journal* in December 2008. A paper drawn from chapter 6 of his doctoral thesis was recently accepted for publication in an international journal, namely, *Demographic Research.* Mr. Kembo is publishing this paper with his doctoral thesis supervisor, Professor Jeroen K. van Ginneken. The paper is entitled: *"Determinants of infant and child mortality in Zimbabwe: results of multivariate hazard analysis."*

In his doctoral research Mr. Kembo focuses on the levels and trends of under-five mortality and the impact of maternal and socioeconomic variables on childhood mortality. His primary findings are that survival for all under-fives in Zimbabwe remained more or less constant from 1990-1994 to 1995-1999 and improved from 1995-1999 to 2001-2005.

This trend was unexpected. Determinants of child mortality were different in relative importance from those of infant mortality. His research contributes greatly to existing knowledge on under-five mortality by showing that the recent decline in under-five mortality in Zimbabwe was unexpected and is not genuine. The results from Mr. Kembo's research will assist policy makers in the child health sector to formulate strategies to improve the situation of under-5 children.

Promoter: Prof. Jeroen K. van Ginneken

2 April 2009
Date