SOCIO-ECONOMIC DIFFERENTIALS IN FERTILITY IN ZIMBABWE FROM 1980 TO 2005

By

Garikayi Bernard Chemhaka

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ABSTRACT

The study utilises four Demographic and Health Surveys (DHSS) conducted in 1988, 1994, 1999, and 2005 in Zimbabwe to examine the socioeconomic differentials in fertility over time. The period fertility (age-specific and total fertility) rates, cohort-period fertility rates (CPFRs), projected parity progression ratios (projected PPRs), and logistic regression methods are used in the analysis, overall, to assess the nature of fertility transition.

All the measures of fertility indicate an ongoing fertility decline in Zimbabwe among all parities and age groups mainly as a result of an increase in modern contraceptive uptake. Overall, fertility decline has been much more rapidly in the in the 1980 decade and slowed since 1990. The analysis shows an inverse association between urban residence, education and economic status, measured by ownership of household assets, and fertility based on the total fertility (TFR), CPFRs and projected PPRs estimates. Further analysis of the net effects of economic status and education using multivariate logistic regressions suggests the odds of having a child (not having a child) decreases (increases) with economic status and education. Overall, even after controlling for various socioeconomic variables fertility decreases with a rising level in education and/or economic status.

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CHAPTER 1: INTRODUCTION

1.1 Background

Substantial effort has been made in investigating the socioeconomic factors underlying fertility change across several African countries at the micro- and macro-level (Cohen, 1993; Kirk and Fillet, 1998; Agadjanian and Praia, 2002; Kravdal, 2002; Rutstein, 2002), but studies which investigates the socioeconomic fertility differentials overtime/across periods within countries are rare. Macro-level refers to differences at the national level by level of development/modernisation whereas micro-level refers to differences between women in different socioeconomic groups. This study focuses on the micro-level where individual decisions on fertility are made and advance on the micro-level effects of socioeconomic status on fertility in Zimbabwe.

Zimbabwe is amongst the first African countries to have begun fertility transition. Mhloyi (1992) estimates that fertility decline began in the late 1960s, following the introduction of a segmented family planning in 1953 among blacks (Kaler, 1998) and due to war (Muhwava and Timaus, 1996) leading to delayed or postponement of births. The post-independent period is characterised by a baby boom and a period of stability with sustained fall in fertility as a result of huge investments in health and education, active family planning to the whole population, amongst other factors (Muhwava and Timaus , 1996; Guilkey and Jayne, 1997). Although fertility transition is underway in Zimbabwe, recent evidence indicates that fertility decline has slowed down or possibly stalled probably due to the recent economic and political crisis (Bongaarts, 2008).

As with the experience of several African countries in the 1970s which were affected by economic crises (National Academy of Sciences, 1993), economic conditions in Zimbabwe in recent years have also deteriorated markedly (Cooney, Clausen, Funke *et al.,* 2007). It is not yet known, however, how socioeconomic differences in fertility (or desired fertility) vary across the periods of economic development and deterioration in Zimbabwe. At a national level, few studies on fertility differentials have been done. The ones which exist, for example Zanamwe (1988) and Mazur and Mhloyi (1994) were carried out a long time ago. The specified gap is filled in this study by using the 1988, 1994, 1999 and the

recent 2005 Zimbabwe Demographic Health Surveys (ZDHS) to examine differentials in actual fertility and fertility preferences by socioeconomic status from 1988 to 2005.

The body of knowledge on fertility has a common conclusion that indicates all effects on fertility outcomes must operate through one or a set of proximate determinants, such as contraception, postpartum infecundability and marriage (van de Kaa, 1996; Kirk and Fillet, 1998; National Academy of Sciences, 2004). Thus the relationship between socioeconomic status and fertility is not direct but acts through proximate determinants, but the direction of the impact of socioeconomic status in the fertility determination process can either be positive or negative.

1.2 Statement of the problem

The level of fertility differs by socioeconomic status. There is always the need to understand why fertility differs within population subgroups exposed to different or the same socioeconomic environment. It is much less clear to what extent the sudden and recent economic setbacks may have influenced, or are associated with, fertility outcomes, since fertility adjustments to such causes are not immediate, universal or consistent. These adjustments grin use of contraceptives, entry into marriage, and timing of births, amongst others) in turn may be influenced by socioeconomic differentials. Hence planners should take into account these fertility differences among subgroups of the population in order to determine the path for fertility decline in Zimbabwe.

1.3 Objectives and significance of the study

The study has two specific objectives. First is to quantify and analyse socioeconomic (urban-rural residence, and education) differentials in fertility over time by using period fertility (i.e., age-specific and total fertility) rates, cohort-period fertility rates and projected parity progression ratios. Fertility differentials by economic status, a DHS index measure of wealth, are measured by period fertility rates. Second, in addition to these demographic techniques, a multivariate statistical procedure is employed in order to broaden the understanding of the effects of socioeconomic status on fertility while controlling for the effects of other variables. The hypothesis of the study is that economic status, education and urban residence arc negatively associated with fertility.

For development planning, governments and policy makers need data on the socioeconomic characteristics of the population, and any changes that may take place in future. Research has shown that socioeconomic factors such as education, urbanisation and economic status are associated with the values, practices, and behaviour towards fertility outcomes or preferences (Cohen, 1993; van de Kaa, 1996; Skirbekk, 2008). In sub-Saharan Africa, the concern of governments which have adopted family planning services is that fertility is still high and lags behind that of developed countries despite the effort to reduce high population growth. In addition, in Zimbabwe the rate at which fertility is declining has slowed down in recent years and due to this delayed fertility transition there is a need to know which particular population subgroups arc influencing the direction of fertility change or have high levels of fertility and possibly to determine the future course of fertility. In developing countries, poor socioeconomic conditions in general and among women are thought to influence fertility behaviour. It is important, therefore, to examine fertility transition in its socioeconomic context rather than to generalise across countries or the region, in order to forecast or predict fertility and fertility preferences.

1.4 Organisation of the dissertation

This study is made up of six chapters. Chapter 2 reviews the literature related to the study. Chapter 3 describes the data, outlines the methods used for analyses to answer the research objectives and presents the descriptive statistics of the variables used in the study, and comparisons from the different data sources are done to check for consistency. Chapter 4 further evaluates the data and discusses the possible link between fertility trends and economic conditions. The methods that arc used to identify periodic shifts and patterns of variations in fertility outcomes are also discussed. In Chapter 5, the logistic regression results on differentials in fertility by socioeconomic status controlling for other factors are presented, analysed and discussed. Chapter 6 gives an assessment of findings of the study, limitations of the study and future directions for research.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature on fertility in the context of economic transition in Zimbabwe. Section 2.2 and 2.3 discusses the theoretical frameworks, and determinants of fertility change, respectively. Section 2.4 and 2.5 details the recent demographic history, and economic history of Zimbabwe, respectively. The gap filled by this study is specified in Section 2.6.

2.2 Theories of fertility decline or change

The demographic transition theory explains fertility decline in relation to socioeconomic development or modernisation. Industrialisation and urbanisation are seen as the preconditions to fertility decline. In Europe, modernisation improved living conditions, the supply of food, sanitation and public health systems among other things, thereby reducing mortality among children. Due to the increasing chances of survival among children the need to have more children among couples phased away, and hence fertility declined (Kirk, 1996; van de Kaa, 1996). The demographic transition theory does not provide a functional relationship between mortality and fertility which is consistent among countries, fails to predict the timing of fertility decline, and does not explain why fertility may stop going down. These shortcomings of the demographic transition theory as an explanation to fertility transition in less developed countries has led to the search for alternative explanations for fertility decline, which have been discussed broadly by Hirschman (1994) and van de Kaa (1996).

The theories of fertility decline have been classified by van de Kaa into classical narratives, biological/technological, economic, social and cultural categories. Most of these theories are elaborations of the classical demographic transition theory which has been explained earlier.

The most notable biological fertility narrative is the Davis and Blake framework proposed in 1956. Davis and Blake (1956) posit that a woman must complete three stages to have a live birth, which are; sexual intercourse, conception and gestation. They presented

eleven proximate determinants (factors which directly affect or modify fertility) which fit well into the three stages classified above. Other variables (background/socioeconomic variables) influence fertility either positively or negatively through one or a set of the proximate factors. However, the theory does not explain the origins of social and cultural influences that constrain fertility in high fertility settings.

Social and cultural narratives such as Caldwell's wealth flows theory, innovation/diffusion and ideational/cultural change (van de Kaa, 1996) have also not gone unchallenged. According to Caldwell's theory of intergenerational wealth flows, fertility is low as a result of economic benefits to children and high as a result of parents receiving economic benefits from their children. Fertility will decline when parents cease to get economic benefits from children, although the measurement and timing of wealth flows is difficult to determine. The innovation and diffusion, and ideational and cultural change arguments are rather similar in their interpretation. Fertility change is attributed to the spread of information, perceptions, practices, birth control technology, social norms and aspirations. The greater the diffusion the more likely is the anticipated fertility decline. However, diffusion of birth control techniques such as the use of modern contraceptives may not lead to fertility limitation especially in Africa where women highly regard childbearing as a symbol of social standing, but rather contraceptives may be used as a means of birth spacing (Hirschman, 1994; van de Kan, 1996) or even for postponing births (Timaus and Moultrie, 2008). It remains a challenge to quantify the innovation and cultural factors, such as norms and aspirations and it appears that they occur not in isolation with economic factors.

The Easterlin model is one theory which illustrates that relationship, and according to van de Kaa (1996:412), it combines the demand and supply factors "in one model to arrive at a synthesis of the economics and sociology of fertility". The most acknowledged economic theories of fertility change arc the new home economics theory and the Easterlin framework. The proponents of the demand oriented (number of children desired) new home economics theory, Becker in 1960 and Schultz in 1981 ascribes fertility decline to couple's income, the utility of children compared to that of other status goods and relative costs of children compared to other consumable goods. Based on their quality and quantity of children tradeoffs, a rise in income during economic development reduces the utility of

having an additional child. With increasing income, parents would opt to invest more on a particular child (quality of a child) rather than on many children (quantity of children). Hence fertility drops when parents expect less utility and satisfaction from having an extra child. The new home economics theory, however, neglects the supply side (actual number of surviving children) which was incorporated by Easterlin in 1975 in his framework. Easterlin incorporates tastes and preferences in determining fertility outcomes. He put in the proximate causes of fertility change as the demand for children, the supply of children and the cost of fertility regulation in which socioeconomic, cultural, and biological factors influence the total number of children ever born. The demand for children is influenced by aspects of modernisation which includes the following; urbanisation, education, new goods, family planning programs and medical care which either influence positively or negatively the number of children ever born. The supply side depends on natural fertility and the survival prospects of infants and children until they reach adulthood. The costs of fertility regulation are both direct (time and money) and indirect (psychic) costs that concerns the use of contraception. Fertility decline occurs when the supply side exceeds the demand side. Further, actual fertility change depends on how the desire to limit fertility compares with the cost of fertility regulation; the lower the cost of birth control the greater is the motivation to limit fertility. Individuals and couples may delay childbearing and marriage if standards of living deteriorate (I lirschman, 1994; van de Kaa, 1996).

In Europe fertility declines occurred during economic development whereas in Africa it has been argued that a new type of fertility transition may be underway in several African countries driven by problems associated with failure of structural adjustment programmes, diseases (HIV/AIDS), political instability and shortage of economical and natural resources such as employment and land. The crisis-led fertility decline 'transition' notion has stimulated research among several scholars for African countries which have undergone socioeconomic and political crisis such as Botswana, Kenya, Ghana, Nigeria, Angola, and Eritrea, to mention a few (National Academy of Sciences, 1993; Lesthaeghe and Jolly, 1995; Zaba and Gregson, 1998; Agadjanian and Praia, 2002; National Academy of Sciences, 2004; Woldemicacl, 2008). According to Lesthaeghe and Jolly (1995), falling standards of living due to crises may contribute to fertility decline since it would not be favourable to continue childbearing. Inflation, declines in income and wages, higher unemployment, poverty,

increase in mortality, particularly due to HIV/AIDS and worsened job security amongst others factors induce individuals to delay or postpone childbearing (or marriage). They argue that prior to fertility decline as a consequence of increased costs of childrearing a rise in fertility may occur as a result of reduced child spacing among women. The most important feature of a crisis is that it causes uncertainty which may motivate women to shape their reproductive decision and behaviour.

The manner in which crises may affect fertility and fertility decision making among couples and individuals appears to be complex. The response of fertility to crisis depends on the progression and duration of the crisis. Short-term effects of a crisis tend to be large whereas long-term effects appear to be diverse since the fertility levels of the affected populations might be similar to those of the not affected population as in the case of Angola (National Academy of Sciences, 2004). Further, the effects of crisis on fertility appear to depend on the affected population characteristics, the phase of fertility transition and adverse consequences experienced, that is, shortage of food, unavailability of health services, exposure to a number of socioeconomic hardships among other things (National Academy of Sciences, 2004). Garenne and Joseph (2002) argue that limited opportunities may stimulate a desire for a small family size or a postponement of marriage and births in urban areas while in rural areas fertility may tend to rise at the same time. It appears that women who are poor or living in rural areas may value children as a source of labour and economic security for old age hence they tend to desire for more children in times of economic crisis.

Given this background, three fertility trends may be observed during a crisis according a woman's social status. First, an increase in marriage rates may have a positive influence on fertility due to people turning back to earlier norms and practices which value childbearing, that is, pronatalist attitudes. Second, entry into marriage may decline due to economic shocks and greater external cultural influence such as "westernization" leading to a reduction in fertility and third, no change might be expected during crisis period (and post-crisis period) relative to the pre-crisis period, hence economic crisis may have little impact on fertility probably due to the low fertility levels already achieved prior.

2.3 Proximate determinants of fertility, and socioeconomic differentials in fertility

The proximate determinants of fertility provide a suitable framework by which socioeconomic variables (such as education, place of residence, and economic status) can be understood to influence the number of children ever bon) or fertility. The simplified and quantifiable four proximate determinants from the Davis-Blake framework of eleven factors are; age at marriage, postpartum infecundability, contraception and abortion (Bongaarts, Frank and Lesthaeghe, 1984). Bongaarts, Frank and Lesthaeghe note that, overall, an increase in abortion, age at marriage and use of contraceptives has a negative effect on fertility whereas the shortening of postpartum infecundability has a positive effect on fertility.

Marriage is a major determinant of fertility where pre-marital sex is rare or discouraged (Woldemicael, 2008). However, it has been found in several Southern African countries by Garrene and Joseph (2002) that non-marital unions may contribute significantly to fertility outcomes as a result of increased premarital fertility, particularly if contraceptive use is limited. Further, during economic hardships rather than choosing marriage, couples or individuals may opt to cohabit to avoid the payment of bridewealth (Philipov, 2002).

Infecundity, that is, the inability to procreate, may occur voluntarily due to breastfeeding or involuntarily as a consequence of starvation or disease (National Academy of Sciences, 2004). The extent and duration of breastfeeding might be short during economic crisis relative to normal times as traditional breastfeeding practices might be abandoned as a result of severe malnutrition, especially among the poor (Palloni, Hill and Aguirre, 1996). If contraception is not used fertility may increase. In an earlier study in sub-Saharan Africa, Bongaarts, Frank and Lesthaeghe (1984) note that gonorrhoea had a significant negative effect on fertility and recent studies (Gregson, Zhuwau, Anderson *et al,* 1997; Zaba and Gregson, 1998; Gregson, Terceira, Kakowa *et al,* 2002; Lewis, Ronsmans, Ezeh *et al,* 2004; Yeatman, 2007) have shown that HIV/AIDS

Yeatman argues that HIV may influence positively or negatively the decision making about childbearing through many pathways. The effects of HIV on fertility could be caused by biological, and behavioural effects which involuntarily or voluntarily result in change in

behaviour among infected women (Gregson, Zhuwau, Anderson *et al,* 1997; Zaba and Gregson, 1998). primary premise is that the desire to have a child may be changed when one knows his or her HIV status, although Zaba and Gregson observed that the majority of people are unaware of their status. They argue that HIV , positive women have a marked lower fertility than HIV negative women since their biological mechanisms might be altered through infecundability. Similarly, Lewis, Ronsmans, Ezeh *et al* (2004) argue that the death and illness of one's partner may lower fertility among HIV-infected women.

Where excess infant mortality prevails, as a longer-term measure, HIV-infected women are likely to have a risk insurance and replacement approach of having more children and some women may even seek to have many children in a short span of time before the progression of the disease. While, on the other hand, the fear of infecting the child with the disease when giving birth or breastfeeding, deteriorating one's health through further childbearing and that the child may be orphaned tend to reduce fertility and fertility aspirations among infected women (Zaba and Gregson, 1998; Yeatman, 2007).

Lesthaeghe and Jolly (1995) note that contraceptive uptake in sub-Saharan Africa accelerated during the periods of economic downturns as opposed to the experience of Europe where fertility dropped during the periods of economic growth as a result of an increase in birth control measures. As a result of economic hardships, individuals and couples may control their family size by delaying or stopping childbearing through the use of contraceptives and hence ultimately fertility declines. Conversely, Peracca (2002) states that as a result of economic reversals, the use of contraceptives could be abandoned as a result of either their increased cost or their unavailability and as a consequence fertility may rise. Moreover, if the use of contraceptives is not widely accepted among women fertility may not decline.

Abortion is illegal, and not well documented in Zimbabwe. Deteriorating living standards may undermine the health and nutrition of pregnant women leading to an increase in both induced (voluntary) and spontaneous (involuntar•) abortions, infecundity and still births, hence a fertility decline (Palloni, Hill and Aguirre, 1996). In addition to unreported spontaneous abortions, which occur as a result of famines or severe shortage of food, their impact on fertility levels is of minimal effect (National Academy of Sciences, 2004). A recent study in sub-Saharan Africa, however, has observed that the effect of

induced abortion on fertility regulation has become a major concern due to unwanted fertility which could be increasing as a consequence of economic difficulties individuals or couples experience (Garenne and Joseph, 2002), and this has a negative implication for fertility.

These proximate factors account for most of the variation in fertility among populations and population subgroups, in particular contraceptive use and age at marriage are common measures in comparative studies. Education and urban-residence, unmistakably, among other socioeconomic factors have been widely incorporated in differential fertility studies and to some extent as proxy measures of socioeconomic status/economic status (Bollen, Glanville and Stecklov, 2002; Rutstein, 2002). According to Bollen, Glanville and Stecklov, economic status which is a measure of inequality/social ranking, has different meanings, measurements, and varies with context. Although not the focus of this project, this study adopts their measurement and definition of economic status based on wealth. Based on their empirical study using data from Peru and Ghana they conclude that a better proxy for economic status is one based on ownership of selected weighted consumer durable goods, usually constructed from the application of Principal Components Analysis technique compared to other proxy measures such as occupation, education, consumption, and sum or value of goods owned. This procedure has been corroborated by Rutstein (2008) and Schoumaker (2004) who further proposed weights and categories which can be used for comparative purposes when using DHS data.

Schoumaker (2004) argues that positive correlations between economic status and fertility have occurred in some sub-Saharan countries or societies as a result of lower fertility preferences, longer breastfeeding practices, frequent marital dissolutions due to widowhood and divorces, higher foetal loss and sterility among the poor and very poor. On the other hand, he notes that more often economic status is inversely related to fertility because the poor tend to have an insurance strategy towards childbearing probably as a result of regarding children as a means of old age support, their lower levels of education and access to modern contraceptives amongst other factors. According to Skirbekk (2008), the rich/elite have low fertility as a result of their individualism and higher levels of education, income, aspirations, contraceptive use, and participation in labour force amongst other factors which inhibit fertility.

More educated women typically have fewer children than less educated women regardless of economic circumstances as a result of their delayed entry into marriage and participation in paid work which competes with childrearing (Cohen, 1993; Agadjanian and Prata, 2002; Kravdal, 2002; Rutstein, 2002). With education, a woman's status may be enhanced and her bargaining power in controlling family size may improve as a result of new aspirations amongst other factors (Potts and Marks, 2001). In a study in sub-Saharan Africa, Cohen (1993) find that women with a little education have higher fertility than uneducated women. Cohen argues that small amounts of education may break down birth spacing practices, reduce long breastfeeding intervals and postpartum abstinence, without necessarily lowering fertility desires or increasing the age at marriage. This finding is corroborated by Rutstein (2002) for several sub-Saharan countries. In a comparative study in Nepal between 2001 and 2006 fertility gaps between uneducated women and educated women narrowed significantly, as a result of a large fertility decline among uneducated women due to their increased use of contraceptives, increase in age at marriage and reduced fertility aspirations (Karki and Radha, 2008). In addition, uneducated women tend to imitate the fertility behaviour of the educated in their neighbourhood and therefore behaviour can become more common, especially towards limiting fertility (Kravdal, 2002).

Urban residence, due to its dependency on the monetary economy, is associated with lower fertility when compared to rural areas. Economic hardships in urban areas more often have a negative effect on fertility (National Academy of Sciences, 1993; Eloundou-Enyegue, Stokes and Cornwell, 2000). In addition, urban women tend to be more educated, participate in employed work, and exposed to modern contraceptives than rural women (Cohen 1993).

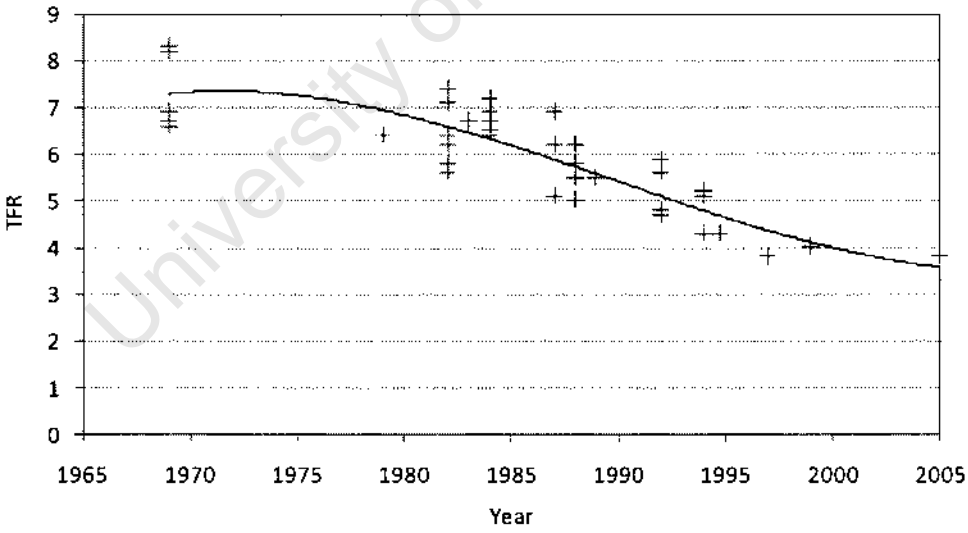
Haines (1989) suggests that the stage of fertility transition influences fertility differentials. In a European-oriented study, he found that the early phases of fertility transition are prone to widened fertility differentials whereas during the later stages of fertility transition fertility differentials tend to converge, especially at replacement level fertility (i.e., a total fertility rate of slightly more than 2 children per woman). Overall, in early phases of fertility decline the middle and upper classes began their fertility transition much more rapidly than the lower classes (Raines, 1989; Skirbekk, 2008). Whereas most European countries have reached (or are below replacement level fertility) and began their

fertility transition much earlier than developing countries, in sub-Saharan region fertility transition has been delayed and high fertility is still the norm. Caldwell and Caldwell (2002) state that Southern Africa is targeted to have attained replacement level fertility in two decades to come. Thus socioeconomic differences in fertility exist and there is need to address fertility transition in Southern African countries towards a much more rapid fertility decline in order to realise national fertility regulation policy targets.

2.4 Fertility decline in Zimbabwe

Muhwava and Timaeus (1996) estimate that fertility began to fall during the Civil War of the 1970s, and after independence in 1980 there was a slight baby boom after which a sustained fertility decline began in the mid-1980s and continued in the post 1990 era. Figure 2.1 and Table 2.1 show the trend in the total fertility rate (TFR) over time in Zimbabwe estimated using direct and indirect techniques from various data sources; Census, Zimbabwe Reproductive and Health Survey (ZRHS), Intercensal Demographic Survey (ICDS), and Zimbabwe Demographic and Health Survey (ZDHS).

Figure 2.1: Total Fertility Rate from different sources: Zimbabwe, 1969-2005



Source: Potts and Marks (2001); ZDHS surveys (1988; 1994; 1999; 2005); Muhwava and Timaeus (1996); Thomas and Muvandi (1994); Mhloyi (1992); Blanc and Rutstein (1994)

The reported estimates indicate that fertility fell from 6.7 to 3.8 children per woman in two decades (Figure 2.1 and Table 2.1). The pace of fertility decline was faster in the

1980s and slowed after 1990. It is well documented that increase in contraceptive use is one major determinant in reducing fertility in Zimbabwe (Mhloyi, 1992; Kravdal, 2002). Although research on the causes of a fertility stall (slowing down of fertility decline) is still a neglected area, Bongaarts (2008) posits that poor performing economies, rising mortality, particularly due to HIV/AIDS, and weakening family planning program efforts to reduce unwanted fertility could have caused fertility to stall in some sub-Saharan countries. Since the late 1980s or the early 1990s mortality began to increase due to HIV/AIDS in Zimbabwe (Gregson, Zhuwau, Anderson *of al.* 1997; Feeney, 2001; Tabutin and Schoumaker, 2004). HIV prevalence is estimated to have risen from a little above 10 per cent in 1990 to 24.6 per cent in 2003 and 20.1 per cent in 2005 (MOHCW , 2005; UNAIDS, 2005). Terceira, Gregson, Zaba *el al* (2003) estimate that about a quarter of fertility decline from the late 1980s to the late 1990s in Zimbabwe may be attributed to

dissolutions amongst other factors. In addition, the possible effect of migration out of the urban areas (both in terms of women with few children migrating, as well the reduction of the numbers living in urban areas) could have led to stagnating fertility decline in Zimbabwe.

Table 2.1: Total Fertility Rate by data sources and method of estimation

Method	Census 1969	Census 1982	ZRHS 1984	ZDHS 1984	ICDS 1987	ZDHS 1988	Census 1992	ZDHS 1994	ZDHS 1999	ZDHS 2005
Reported	6.7	5.6	6.5	6.7	5.1	5.5	4.7	4.3	4.0	3.8
Unadjusted [a]	6.6	5.6	6.5		5.1	5	4.8	4.3		
Relational Gompertz [a]	6.9	6.2	6.9		6.2	5.8	5.6	5.2		
P/F Ratio [a]	8.3	6.4	6.9		6.9	6.2	5.9	5.1		
P/F Ratio [b]	8.2	7.1	6.5			5.5				
P/F Ratio [c]		7.4	7.2							
Brass birth order [c]		5.8	6.5							
Adjusted TFR [d]			6.4	6.4						

Source: (a) Muhwava and Timaeus (1996); (b)Thomas and Muvandi (1994); (c) Mhloyi (1992); (d) Blanc and Rutstein (1994); Potts and Marks (2001); ZDHS surveys (1988; 1994; 1999; 2005)
Note: the total fertility rate estimates apply to the same year of the census or survey

The quality of survey and census data in Africa is rather poor (Cohen, 1993; Cleland, 1996) and to aggravate the problem the application of the estimation techniques on fertility measurement is not consistent amongst researchers. Direct and indirect estimates from the same data source may differ, and using the same or different indirect techniques, may give

different estimates from the same data set, as can be seen in Table 2.1. Using the P/F ratios method, Mhloyi (1992), Thomas and Muvandi (1994), and Muhwava and Timaeus (1996) estimated the total fertility rate for the same year using the 1984 ZRHS to be 74, 7.1 and 6.4 children per woman, respectively and these results differ from the estimate of 6.2 obtained from the Relational Gompertz model by Muhwava and Timaeus. In addition, Blanc and Rutstein (1994) and Thomas and Muvandi (1994) differ on whether or not the data from the 1984 ZRHS and 1988 ZDHS surveys are comparable or capture the same population subgroups. Thomas and Muvandi are of the view that survey methodology between the two surveys are different and hence acceleration of fertility decline in the period was overstated whereas Blanc and Rutstein are of the opposite opinion, and argue that the procedure Thomas and Muvandi used is inappropriate and hence the magnitude of fertility decline between the two surveys does not need any adjustment. Thus, comparative fertility differentials studies within and across countries may not be dependable if different measures or methods are not carefully applied to data.

2.5 Economic history, causes and consequences

This section gives background information on economic change in Zimbabwe in the post-independence era, in order to place the current study in context.

The 1980 decade has been described by Brett (2005) as a period when structuralist policies were implemented in Zimbabwe, which saw the state and the political authorities exercising extensive influence on the market, leading to a centralised economy. Heavily subsidised education and primary health care services were introduced and expanded to rural areas. Towards the late 1980s most social indicators had improved and poverty, especially among rural dwellers, had been reduced (Alwang, Mills and Taruvinga, 2002).

After 1990, a trade liberalisation of the economy was implemented to enable free market competition. However the economic reforms which were launched in Zimbabwe, Economic Structural Adjustment Programme (ESAP) in 1991, Zimbabwe Programme for Economic and Social Transformation (ZIMPREST) in 1998 amongst others, failed to meet or realise their targets or objectives. The failure to implement these economic reforms is mainly attributed by Brett (2005) to the government's inefficiency or failure to deal with the challenges associated with the collapse of the economy; lack and mismanagement of

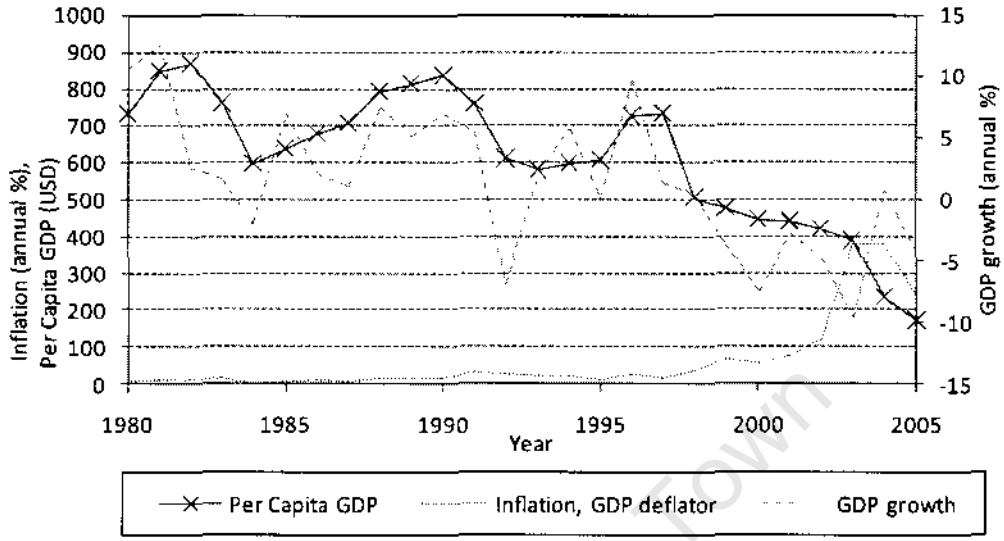
resources to mention a few. During the 1990s due to an onset of economic decline some key social indicators which had improved in the previous decade started to deteriorate, thereby worsening inequality and poverty among people. Poverty and inequality increased among households in the mid 1990s due to increased job losses. Aggravating the bad economic conditions were droughts, floods, global fall in commodity prices and the HIV/AIDS epidemic (Alwang, Mills and Taruvinga, 2002; UNDP , 2004; Brett, 2005).

Brett (2005:4) mentions that "counter-productive political decisions were taken from 1997" such as the chaotic land resettlement which undermined commercial agricultural production, and the financing of military activities in Democratic Republic of Congo (DRC) by the political authorities among other factors. The political instability and bad economic policies exacerbated the deterioration of the economy and inequality among individuals (Economic Commission for Africa, 2002; Coorey, Clausen, Funke *et al.,* 2007; Magaramombe, 2007).

Since 1999 the country has experienced a politically-driven deep economic crisis. A hyper-inflationary environment, corruption, price distortions and regulations, minimal development aid, increase in external debt, shortage of foreign currency reserves, recurring droughts, deteriorating standards of living and a loss of investments, amongst other factors, contributed to the crumbling of the economy (Economic Commission for Africa, 2002; UNDP, 2004; Coorey, Clausen, Bunke *et al.,* 2007).

Figure 2.2 shows trends in the macroeconomic (annual GDP per capita, GDP growth and inflation) indicators in Zimbabwe over the period 1980-2005. Overall, the period 1980-1990 may be described as a decade of social and economic development where inflation was relatively stable and the gross domestic product (GDP), a measure of economic wellbeing, was rising, particularly after 1982. The post 1990 era marks the onset of economic decline in the early to mid 1990s and the acute crisis period in the late 1990s and into the recent years. Figure 2.2 shows that the GDP per capita has declined continuously since 1997, and GDP growth rate has been negative for most years since 1997.

Figure 2.2: Annual GDP Per Capita, GDP growth, and Inflation: Zimbabwe, 1980-2005



Source: GDP and Inflation: The World Bank. 2009. World Development Indicators. Available online: http://devdata.worldbank.org/dataonline. Accessed 9 march 2009.

2.6 Discussion

The literature reveals that fertility (or fertility differentials) may be influenced by, or correlated with, the socioeconomic setting and/or the stage of fertility transition in a given population. Most differential fertility studies within countries look at periods of either socioeconomic growth or deterioration/crises, however, studies which examine how fertility differentials vary with socioeconomic changes are rare. Zimbabwe provides a setting where economic upturns and downturns have occurred in succession since the post-independence era and fertility transition is clearly ongoing although recently overall fertility has slowed down. It is less clear whether the socioeconomic fertility differentials varies with time, that is, whether the differences in fertility (or fertility preferences) among socioeconomic subgroups are narrowing or have remained the same over time in Zimbabwe and if childbearing decisions have been influenced by socioeconomic changes. In addition, since fertility differentials by economic status as measured by wealth, have not been explored in Zimbabwe, less is known about the nature of fertility differentials especially with respect to economic status. This specified gap is filled by using four ZDHS

surveys to construct socioeconomic fertility differentials over time using methods highlighted in the next chapter.

There are several reasons why socioeconomic differentials in fertility exists, although this study briefly summarised them, it is most important to note that research into fertility differentials by economic status is less common. For comparative purposes; survey data are becoming more available and standardised within countries, and methods of measurement are being refined with time.

CHAPTER 3: DATA AND METHODS

3.1 Introduction

The objectives of this chapter are two-fold: first, to describe the data sources and variables used in the study and second, to assess the data quality using descriptive statistics to understand the distribution of the data used in the study.

3.2 Data sources and quality

In developing countries, Demographic and Health Surveys (DHS) have become the gold standard for the analysis of birth histories, which are essential for the detailed analysis of trends and determinants of fertility (Cleland, 1996; Garenne and Joseph, 2002; Schoumaker and Hayford, 2004). The Zimbabwe Demographic and Health Survey (ZDHS) data for 1988, 1994, 1999, and 2005 obtained from the Measure DHS on line database (www.measuredhs.com) are used in the analysis. The principle of collecting data and sampling procedure is essentially the same for all the ZDHS surveys hence they can be used for comparative purposes. Data were collected through the use of individual and household level questionnaires. Household questionnaires are used to gather information on all household members including background characteristics, household size, household characteristics, and ownership of consumer goods. The individual questionnaire was used to collect information on women's birth or reproductive history, fertility preferences, contraceptive use and knowledge, and women's work.

The DI IS surveys are conducted using a two-stage sampling procedure. The DHS surveys use an individual weight variable to adjust for sample design errors and non-response (Croft, 2007). At the first stage of sample selection, Enumeration Areas (EAs) were stratified by region of residence, which consists of ten provinces and urban-rural residence. The EAs were chosen with a probability proportionate to size. At the second stage, households in each EA were randomly selected. All women aged 15-49 within the households were eligible to be interviewed. A total sample of 4,201, 6,128, 5,907 and 8,907 women aged 15-49 from the 1988, 1994, 1999, and 2005 surveys, respectively, were interviewed (Central Statistical Office and Macro international Inc, 1989, 1995, 2000, 2007).

Over the years, the sample size increased with each succeeding survey and therefore the confidence interval surrounding the estimates obtained from these data should improve or increase with time.

Birth history data from DHS surveys can be used to provide a full account of births that occurred among women aged 15-49 at the time of the survey. The data collected in the DHS surveys, however, are affected by selection effects and recall bias. Selection effects arise due to the fact that women with more children (or with short birth intervals) contribute more to fertility and hence they are over represented in the analysis. Recall bias results from the omission of recent births or displacements of births from the time they actually occurred (National Academy of Sciences, 1993; Cleland, 1996). However, Cleland (1996) argues that the quality of birth history data from DHS surveys has improved over the years since the questionnaires are highly standardised and designed to minimise errors.

The DHS surveys collect current status information since they are designed to be cost effective. Hence this creates a current status variable problem in the study of fertility since some events are collected at the time of the survey instead of when they actually occurred. This is particularly a problem for older cohorts of women who might have changed residence at the time of the survey. Hence the current status of a woman's residence may not truly reflect her residence at the time she actually had her children. Employment status is also another current status variable which applies at the time of the survey hence the variable may not reflect the woman's working status at periods before the survey when a woman really had her birth. To minimise the current status variable problems, the period analysis of births events has been restricted to the last five years before the survey, rather than looking at lifetime events in statistical models.

3.3 Description and construction of variables

Table 3.1 shows the list of key variables included in the study and their distribution in the data sets to check for consistency. These include; age, age at first marriage and birth, marital status, place and region of residence, education, number of living children, employment status, knowledge and current use of modern contraceptives. Economic status is another key variable as shall be discussed later. All the variables have been chosen based on their theoretical importance.

Table 3.1: Key descriptive statistics of women aged 15-49, 1988-2005 ZDHS

	1988		1994		1999		2005	
Variable	%	N	%	N	%	N	%	N
Age								
15-19	24.3	1,021	24.0	1,486	24.5	1,468	24.2	2,130
20-24	20.0	840	20.7	1,231	21.9	1,232	21.9	1,945
25-29	16.2	679	14.9	911	17.5	1,011	16.5	1,439
30-34	14.0	589	14.2	876	11.3	650	13.7	1,212
35-39	11.0	464	10.8	666	10.8	672	9.4	843
40-44	7.6	318	8.7	542	7.9	492	7.8	719
45-49	6.9	290	6.6	416	6.1	382	6.6	619
Mean age at marriage (years)		18.1		18.4		18.7		18.6
Mean age at first birth (years)		18.8		18.9		19.2		19.3
Marital status								
Never married	27.0	1,133	26.9	1,663	27.7	1,683	27.0	2,452
Currently married	62.9	2,643	61.8	3,777	61.1	3,553	57.7	5,118
Formerly married	10.1	425	11.3	688	11.2	671	15.3	1,337
Widowed	2.5	105	3.5	208	4.2	249	7.5	660
Divorced	7.6	320	7.8	478	7.0	422	7.7	677
Place of residence								
Urban	33.5	1,407	32.2	1,745	38.6	1,809	39.3	3,203
Rural	66.5	2,794	67.8	4,383	61.4	4,098	60.7	5,704
Region of residence								
Manicaland	12.5	527	13.7	550	14.9	556	11.7	1,039
Mashonaland Central	6.9	288	8.3	627	8.1	567	9.3	751
Mashonaland East	12.9	543	9.4	580	7.8	464	8.0	696
Mashonaland West	11.8	495	10.3	589	9.5	491	9.3	777
Matebeleland North	4.5	189	6.0	681	5.1	601	6.0	672
Matebeleland South	6.7	282	5.0	587	5.4	631	4.9	630
Midlands	15.6	656	13.2	716	12.5	673	13.4	1,128
Masvingo	11.8	497	10.6	604	10.7	633	12.8	974
Harare	8.2	345	17.1	608	18.2	562	16.8	1,395
Bulawayo	9.0	379	6.3	586	7.7	729	7.8	845
Education								
No education	13.5	566	11.1	712	6.7	437	4.3	380
Primary	55.9	2,349	47.3	2,961	40.2	2,518	32.6	2,971
Secondary	29.7	1,249	40.0	2,377	50.2	2,803	60.1	5,297
Higher	0.9	37	1.6	78	2.8	149	3.0	259
Number of living children								
0	29.4	1,233	30.5	1,813	31.4	1,783	30.6	2,719
1	14.3	602	16.2	1,012	20.1	1,174	19.6	1,704
2	12.3	516	13.5	837	15.1	868	17.4	1,540
3	10.3	434	9.9	611	10.5	639	11.5	1,041
4+	33.7	1,416	29.9	1,855	23.0	1,443	20.9	1,903
Total	100	4,201	100	6,128	100	5,907	100	8,907

Table 3.1 continued

Variable	1988 %	1988 N	1994 %	1994 N	1999 %	1999 N	2005 %	2005 N
Employment status								
Not working	66.4	2,788	49.1	3,163	50.6	3,081	63.0	5,628
Working	33.6	1,410	50.8	2,959	49.4	2,826	36.9	3,264
Missing	0.1	3	0.1	6	0.0	0	0.2	15
Knowledge of any method								
No method	3.7	156	2.2	151	3.1	187	2.2	225
Folkloric	0.0	0	0.1	4	0.1	6	0.0	4
Traditional	0.9	38	0.2	14	0.1	5	0.1	8
Modern	95.4	4,007	97.5	5,959	96.7	5,709	97.7	8,670
Current use by method type								
No method	67.8	2,849	64.9	4,027	62.3	3,741	59.9	5,360
Folkloric	0.0	0	1.2	80	0.4	29	0.3	27
Traditional	5.0	209	2.8	160	1.7	100	0.8	84
Modern	27.2	1,143	31.1	1,861	35.6	2,037	39.1	3,436
Total	100	4,201	100	6,128	100	5,907	100	8,907

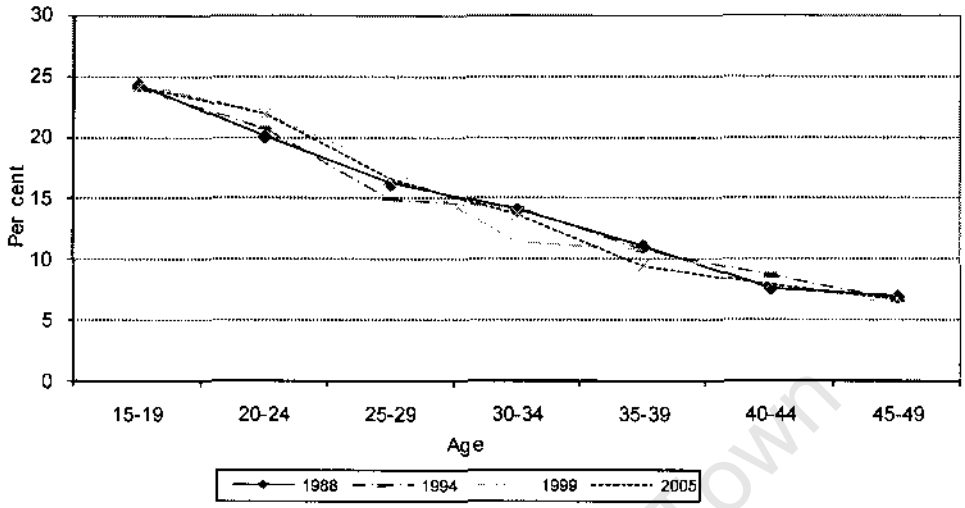
Note: % refers to weighted per cent while N refers to the unweighted number of observations

This section describes how the variables used in the study are standardised (or recoded) in each DHS for Zimbabwe to facilitate comparisons across the surveys.

3.3.1 Age

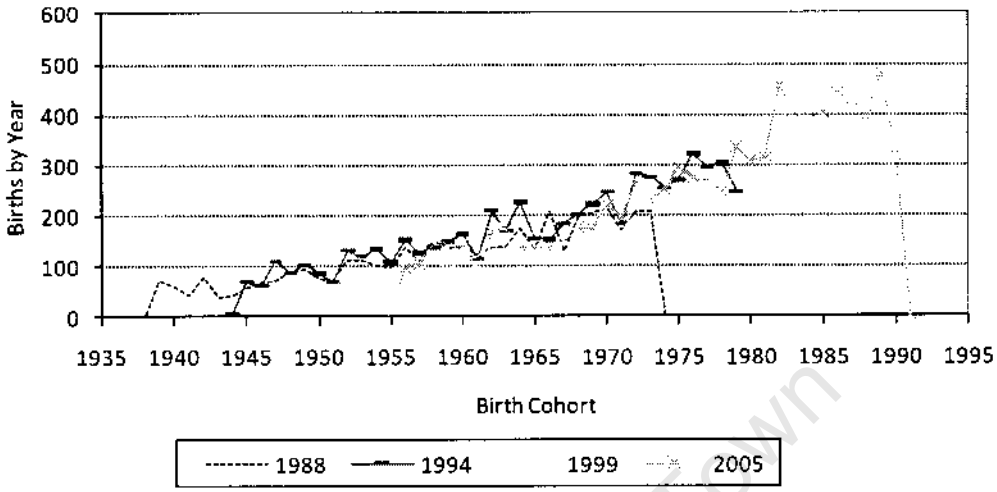
Age is measured in five year age groups from age 15 to 49 which is conventionally treated as a woman's reproductive life span. The variable captures cohort effects for older women versus younger women in terms of actual fertility behaviour and fertility intentions. Figure 3.1 shows that, overall, there is consistency in the distribution of age across all the ZDHS surveys. In the 1988, 1994, 1999 and 2005 ZDHS surveys fewer women aged 20-24, 25-29, 30-34 and 35-39, respectively were interviewed relative to the other surveys.

Figure 3.1: Age distribution of women aged 15-49 by age group and survey



Plotting the individual birth cohorts of women aged 15-49 for each survey show a consistent drop in the number of women born around 1967 (Figure 3.2). This sudden dip in the late 1960s might have been caused by the emergence of war "Second Chimurenga" and partly due to economic hardships among the majority of people since the country was under economic sanctions. A delay or postponement of births could have occurred as both men and childbearing women migrated to urban areas and neighbouring countries during the war period.

Figure 3.2: Distribution of women aged 15-49 by year of birth and survey



Both the mean age at first birth and marriage have increased over the years, albeit marginally. The mean has the disadvantaged that it can be distorted by outliers', that is, by higher ages which tend to inflate the mean and/or smaller ages which may deflate the mean. A better measure would be the median which is not affected by outliers. The median age at first birth and marriage have remained the same over time at age 19 and 18, respectively (data are not shown). The age at first marriage has not been included in regression models because it is highly correlated with age at first birth. The age at first birth marks the beginning of exposure to the risk of childbearing. For the purpose of the statistical modelling exercise, it has been divided into five segments; '<15', '15-17', '18-19', '20-24' and '25+'. The category /<15' is included to capture women who have had their first birth before attaining age 15. In recent years, the timing of age at first birth and age at marriage appears not to have been influenced markedly by the changes in societal and economic conditions, even when the data are disaggregated by age group (data not shown). This suggests a tendency for early childbearing among women, regardless of the time period or changes in socioeconomic conditions.

3.3.2 Marital status

The DHS defines marriage as including cohabitation, hence marital status has three levels; `never married', 'currently married' and 'formerly married'. The unchanging distribution

over time of this variable indicates that generally there is some stability in unions in the country, although in 2005 there was a slight decrease in the proportion of currently married women. The rise in formerly married women is associated with an increase in widowhood gable 3.1), since divorce has changed only marginally over the period. This increase in widowhood, among women aged 15-49 might be indicative of the spread of HIV, since estimated prevalence increased from about 4 per cent to 22 per cent among women aged 15-49 between 1988 and 2005 (MOHCW, 2005).

3.3.3 Place of residence

Place of residence is used to assess the differences in fertility dynamics between the urban and rural populations. Overall, urban areas have been receiving areas while rural areas have been sending areas over the whole study period, since the proportion of urbanised women increased from 33.5 per cent to 39.3 per cent between 1988 and 2005. The majority of people live in rural areas (Table 3.1).

3.3.4 Region of residence

Region of residence is a categorical variable with ten provinces in which two provinces; Bulawayo and Harare are the major urban cities in the country. The variable has been included in the analysis to capture some socio-cultural variation since no information was collected on ethnicity for the 1999 and 2005 surveys. The division of provinces in 1979/1980 was done considering *the* ethnic background of people; therefore the study assumes that this distribution has not changed much except in the two major cities. Overall, during the 1988-2005 Mashonaland central, Masvingo, Matebeleland north and Harare were the receiving areas while the rest were sending areas.

3.3.5 Education

Education is a categorical variable with three segments; `no education', 'primary', `secondary or higher education'. In this study, the secondary and higher educated segments are combined due to small numbers of the higher educated women. Between 1988 and 2005 the proportion of women with no education and primary education decreased whereas the proportion of women with secondary or higher education increased in the

same period. The data are consistent with literacy rates which also increased over the years as a result of the government's commitment to expansion of education.

3.3.6 Employment status

Woman's working status is an indicator of labour market participation. The dummy variable has been coded '1' for working and '0' for not working. Overall, the proportion of women participating in the labour force increased between 1988 and 1999. Between 1999 and 2005 the proportion of women employed decreased by a quarter. The decline is associated with the period of severe economic crises, which have contributed to an increase in unemployment as a result of economic recession amongst other factors.

3.3.7 Number of living children

In statistical models, the variable has five levels; '0' for no living child; '1' for one living child, '2' for two living children, '3' for three living children and `4-l' for four or more living children among all women aged 15-49 and four levels which excludes the '0' category among all women who have begun childbearing. The proportion of women with four or more children has decreased over time (Table 3.1).

3.3.8 Knowledge and current use of contraceptives

Knowledge and current use of contraceptives variables are proxy measures for availability or access to family planning services. Due to the fewer cases of the folk and traditional methods responses, the variables were renamed as knowledge and current use of modern contraceptives and recoded `no' for no method, folk and traditional methods and `yes' for modern methods. Knowledge of contraceptives is very high and consistent in all the surveys, and this may have contributed to a 43.5 per cent increase in uptake of modern contraceptives between 1988 and 2005 from 27.2 per cent to 39.1 per cent (Table 3.1).

3.3.9 Economic status

The economic status variable is constructed as a index from ownership of selected consumer durables and housing quality/characteristics as proposed by Schoumaker (2004). In a comparative study for sub-Saharan countries, Schoumaker developed the wealth index using a weighted sum of eight binary variables measuring ownership of household items.

The items and weights estimated using Principal Component Analysis (PCA) technique are shown in Table 3.2. The same variables and weights proposed by Schoumaker were adopted in the analysis of the four ZDHS survey data.

Table 3.2: Computation of economic status index for Zimbabwe DHS surveys

Household item	Weight	Description	Code
Radio	0.198	Has	1
		Does not have	0
Television	0.782	Has	1
		Does not have	0
Refrigerator	0.802	Has	1
		Does not have	0
Motorcycle	0.113	Has	1
		Does not have	0
Car	0.420	Has	1
		Does not have	0
Piped water	0.299	Piped water	1
		Surface water, well, spring, pond, borehole, tanker, other	0
Finished floor	0.286	Finished (vinyl/asphalt, ceramic, tiles, carpet, cement, parquet)	1
		Natural, rudimentary floor, earth, sand, dung, other	0
Flushing toilet	0.560	Flush toilet	1
		Bush/field, nofacility, bucket, pit latrine, Blair toilet, composting, other	0

Source: Schoumaker (2004)

The wealth index was computed using a series of dichotomous variables which arc weighted giving a value of '1' in each case to an individual who has a radio, television, refrigerator, motorcycle, car, piped water, finished floor and a flushing toilet, and '0' otherwise. Each of the eight binary variables in Table 3.2 for each ZDHS data is multiplied by its' corresponding weight and the product of the eight variables is summed to generate economic status/wealth index. The index range for economic status vary from 0 to 146 with five categories indicating 0 for poorest, 0.01-0.32 for very poor, 0.33-0.79 for poor, 0.80-113 for middle 'richer', and 2.14-3.46 for better off 'richest' as classified by Schoumaker (2004) . Schoumaker posits that these categories act as a basis for comparison across and within countries.

The distribution of economic status over time is shown in Error! Reference source not found.. According to Rutstein (2008), this variable is useful in the analysis of DRS data as corroborated by Bollen, Glanville and Stecklov (2002), and it is intended to measure the influence of inequalities of economic hardships on the timing of birth events and fertility intentions. Although economic status is measured at the time of the survey, the variable is an indicator for the general economic status of a woman since it is constructed from

ownership of stable features of the household which are usually not changed in the short term.

Table 3.3: Economic status of women aged 15-49, 1988-2005 ZDHS

	1988		1994		1999		2005	
Variable	%	N	%	N	%	N	%	N
Poorest	24.7	1,033	26.2	1,708	16.8	1,138	21.2	1,934
Very poor	22.4	938	24.5	1,529	22.6	1,406	20.8	1,880
Poor	15.5	651	14.8	917	16.5	1,003	11.1	1,000
Richer	22.4	936	22.6	1,280	25.9	1,198	23.2	1,871
Richest	15.0	630	11.9	647	18.3	875	23.6	1,941
Mean score		1.81		1.69		2.06		2.07
Total	100	4,188	100	6,081	100	5,620	100	8,626

Note: % refers to weighted per cent while N refers to the unweighted number of observations

The data for the distribution of economic status indicate that the richer and richest have the greatest chance of living in urban areas whereas the poorest, very poor and poor have the greatest probability of living in rural areas in all the surveys. The poorest are likely to be uneducated, the very poor are likely to have primary education, and the richer and richest are likely to have secondary or higher education. This finding is consistent in all the surveys. The distribution of the poor appears somewhat the same across the levels of economic status in all the years except in 1999 where women with secondary or higher education are much fewer than those with no education and primary education. Even if there are some changes, it appears there is not a consistent trend or pattern on how the women's economic status has changed over time. The mean scores for economic status for the 1988 and 1994 surveys are very different and smaller from the scores in the 1999 and 2005 surveys, which are almost the same.

3.4 Derivation of dependent variables

In order to examine how fertility could have changed according to economic status, two dependent variables presented in Table 3.4 are used: fertility preferences (or desired fertility), and occurrence of a birth in the past five years immediately before the survey. The study examines how fertility preferences change over time: "whether or not a woman intends to space/delay childbearing", and "whether or not a woman intends to limit childbearing". The responses were scored into binary with a positive answer coded '1' for

yes while a negative answer or those who were undecided were coded '0' for no. Only a small proportion of respondents gave an uncertain response, and women who were sterilised or declared infecund were excluded in the analysis of fertility desires. The occurrence of a live birth during the previous five years was coded '0' for a negative response and '1' for a positive response. It has been observed that the birth occurrence indicator (having a birth in the period considered) is a good measure of fertility (or reproductive choice) in DHS surveys (Agadjanian, Dommaraju and Glick, 2007). A detailed operationalisation of the dependent variables is provided later in Chapter 5.

Table 3.4: Key dependent variables of women aged 15-49, 1988-2005 ZDHS

	1988		1994		1999		2005	
Variable	%	N	%	N	%	N	%	N
Number of births in last 5 years (all women)								
0	46.4	1,948	51.6	3,104	53.1	3,089	54.0	4,833
1	30.7	1,288	33.5	2,054	34.7	2,063	34.4	3,007
2	19.8	832	13.6	880	11.2	689	10.6	969
3	3.0	126	1.3	86	1.0	63	0.9	91
4	0.2	7	0.1	3	0.0	2	0.1	6
5	0.0	0	0.0	1	0.0	1	0.0	1
Total	100	4,201	100	6,128	100	5,907	100	8,907
Desired fertility (all women)								
Wants soon (within 2 years)	23.2	598	20.6	948	15.8	892	12.5	1,055
Wants later (after 2+ years)	36.1	933	35.2	1,636	38.4	2,177	35.8	3,137
Wants, unsure timing	1.2	30	1.9	87	6.2	333	8.4	678
Undecided	6.1	157	2.7	134	5.6	290	4.8	406
Wants no more	33.5	865	39.7	1,889	33.9	2,019	38.4	3,374
Total	100	2,583	100	4,694	100	5,711	100	8,650
Desired fertility (with at least a child)								
Wants soon (within 2 years)	20.9	504	16.6	666	13.0	518	10.7	624
Wants later (after 2+ years)	36.6	882	34.7	1,406	31.4	1,221	27.9	1,658
Wants, unsure timing	1.0	23	1.4	60	2.3	91	2.2	114
Undecided	6.1	148	2.8	122	5.8	195	5.4	316
Wants no more	35.5	856	44.6	1,862	47.5	1,918	53.9	3,256
Total	100	2,413	100	4,116	100	3,943	100	5,968

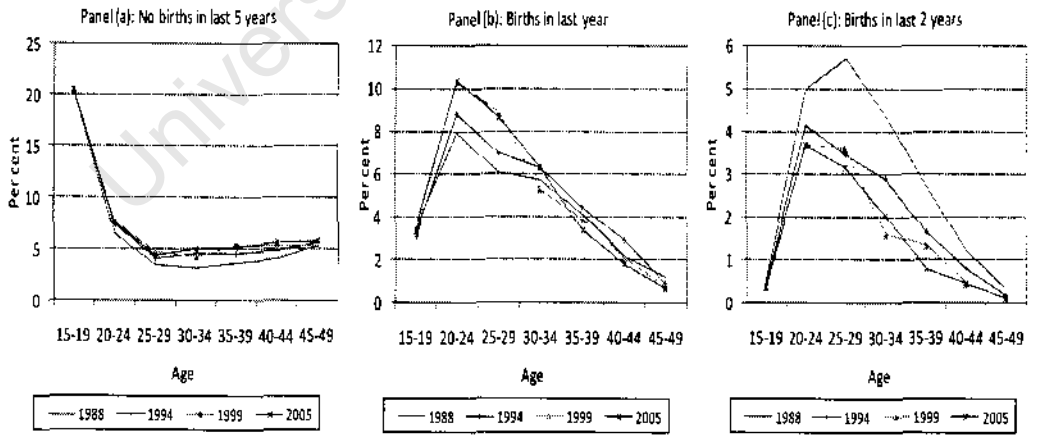
Note: % refers to weighted per cent while N refers to the unweighted number of observations

Table 3.4 shows that the proportion of women having a birth in the past five years immediately before the survey has decreased over time. A relative 14.2 per cent decline

from 53.6 per cent has occurred between 1988 and 2005, implying a tendency to delay or limit childbearing among women. This can be confirmed also by the fact that the proportion of women desiring to limit childbearing increased by almost by a third from 32.7 per cent to 42.3 per cent, while the proportion of those who want another child soon (within 2 years) decreased to 10.3 per cent from 17 per cent in the same period. These descriptive statistics indicate that the crisis period (1999-2005) is associated with a higher propensity for women to limit or delay childbearing.

The timing of births by age of the mother shown in panel (a) in Figure 3.3 indicates an increase from 1988 to 2005 in the proportion of women who had not given birth in the last five years before each survey. Figure 3.3 shows that most births in last year before each of the surveys in panel (b) and two years before each of the surveys in panel (c) occurred among women age 20-24, except in 1988 where a large proportion of women aged 25-29 had children in the last two years of the survey. The results show that the timing of births in the immediate two years before the surveys has changed between the pre-1990 era and the post-1990 era. The 1988 survey indicates a higher proportion of women had given birth in the past two years before the survey at all ages, except age group 1519 as compared to the 1994, 1999 and 2005 surveys.

Figure 3.3: Timing of births among women aged 15-49, according to age group, 1988-2005 ZDHS



This chapter has examined the distribution of the variables in the data sets to check for consistency in the data. Overall, the data appear to be well-behaved. To assess fertility

trends and the quality of fertility data in the surveys in detail, a method known as cohort-period fertility rates originally developed by Hobcraft, Goldman and Chidambaram (1982) described in the next chapter has been used. In addition, fertility differentials according to level of education, place of residence and economic status are assessed over time using period fertility rates (i.e., age-specific and total fertility rates). To control for selection effects a paired-comparison procedure, Projected Parity Progression Ratios (Pj), proposed by Brass and Juarez (1983) is described in Chapter 4. Since sample composition changes over time, a multivariate analysis procedure set out in Chapter 5 improves the understanding of fertility trends according to women's economic status while controlling for the variation caused by other variables. The methods outlined above are described in detail in their respective chapters.

CHAPTER 4: FERTILITY TRANSITION IN ZIMBABWE

4.1 Introduction

The objective of this chapter is to examine fertility dynamics in Zimbabwe over time and to assess the quality of birth history data using various demographic techniques. Fertility levels, trends and differentials are presented. The changes in total fertility rate (TFR), age-specific fertility rates (ASFRs), cohort-period fertility rates (CPFRs) and projected parity progression ratios (Pjs) arc also discussed.

4.2 Period fertility

In this section, the age-specific and total fertility rates are presented based on a 3-year exposure period to assess the nature of changes that have taken place in fertility over time. The syntax used in this study for computing the rates from DHS data is described on the Measure DH_ website (www.measuredhs.com). The trends in total fertility rates for national estimates and by age, economic status, educational level and place of residence are shown in Figure 4.1. Figure 4.2 presents age-specific fertility rates for the country as a whole and according to rural-urban residence and educational levels. Figure 4.3 shows the age-specific fertility rates by economic status. The data for these figures are presented in Tables 4.14.2. The DHS surveys take some months to complete, hence for accurate reporting the mean date of interview may be taken as the reference date for the survey. The accurate reference date for the 1988, 1994, 1999 and 2005 ZDHS surveys are 1988.93 (3/4-November-1988), 1994.76 (4/5-September-1994), 1999.81 (21/22-September-1999) and 2005.89 (19/20-October-2005), respectively. Since 3-year fertility rates are being examined, the estimates apply to the year centred about one and half years before the survey on average, and therefore the period fertility rates refer to the years centred on 1987.43, 1993.26, 1998.31 and 2004.39 for the 1988, 1994, 1999 and 2005 ZDHS surveys, respectively.

Figure 4.1: Trends in total fertility rates according to national, urban-rural residence, educational levels and economic status, 1988-2005 ZDHS

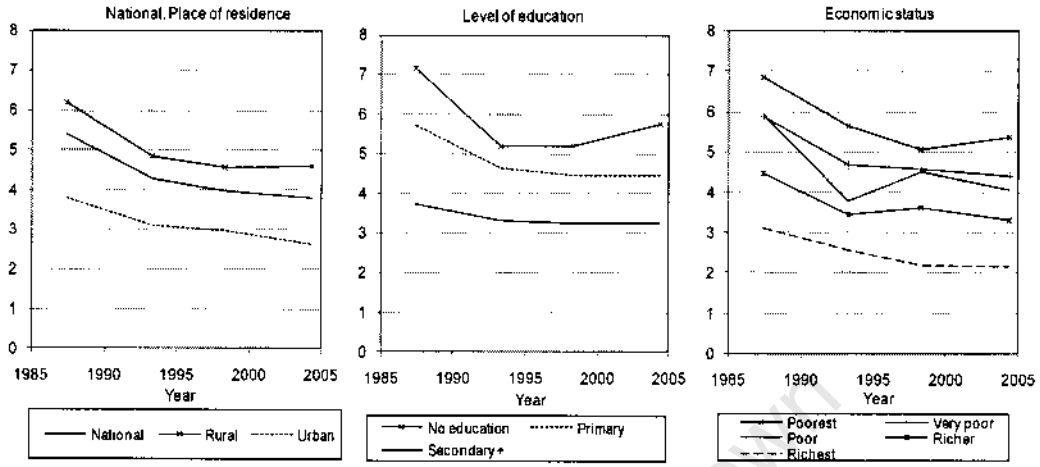


Figure 4.2: Age-specific fertility rates by age, national, urban-rural residence and educational level, 1988-2005 ZDHS

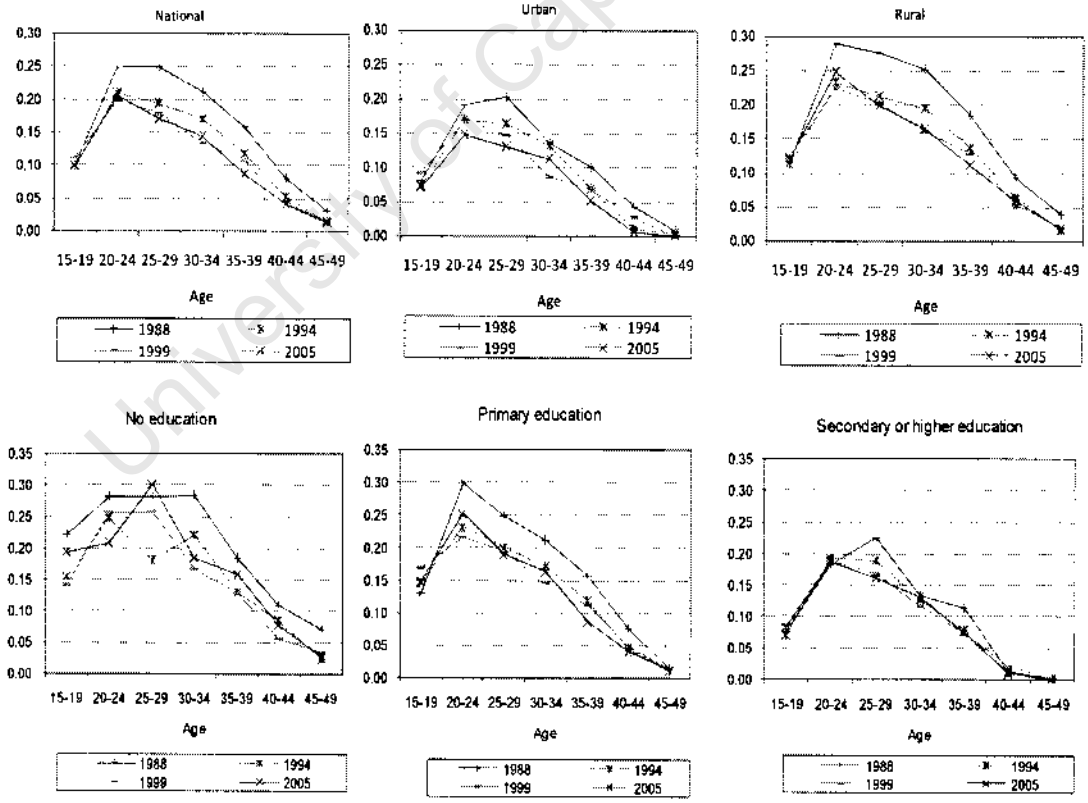


Table 4.1: Age-specific and total fertility rates by age, national, urban-rural residence and educational level, 1988-2005 ZDHS

	1988			1994			1999			2005		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Age group												
15-19	0.081	0.114	0.102	0.072	0.113	0.099	0.093	0.125	0.112	0.070	0.120	0.099
20-24	0.191	0.289	0.251	0.169	0.232	0.210	0.170	0.224	0.199	0.147	0.248	0.205
25-29	0.202	0.276	0.250	0.163	0.211	0.194	0.147	0.202	0.180	0.130	0.198	0.172
30-34	0.136	0.251	0.212	0.132	0.194	0.172	0.087	0.161	0.135	0.112	0.164	0.144
35-39	0.101	0.184	0.158	0.069	0.137	0.117	0.068	0.128	0.108	0.051	0.111	0.086
40-44	0.044	0.093	0.080	0.009	0.066	0.052	0.027	0.054	0.046	0.006	0.059	0.042
45-49	0.007	0.040	0.032	0.004	0.016	0.014	0.000	0.019	0.015	0.000	0.017	0.013
TFR 15-49	3.8	6.2	5.4	3.1	4.9	4.3	3.0	4.6	4.0	2.6	4.6	3.8
	1988	Education		1994	Education		1999	Education		2005	Education	
Age group	1	2	3	1	2	3	1	2	3	1	2	3
15-19	0.221	0.132	0.075	0.155	0.147	0.068	0.142	0.170	0.085	0.194	0.149	0.081
20-24	0.281	0.298	0.184	0.247	0.233	0.194	0.256	0.216	0.189	0.208	0.253	0.187
25-29	0.281	0.249	0.225	0.180	0.201	0.189	0.257	0.194	0.167	0.302	0.190	0.162
30-34	0.283	0.212	0.134	0.222	0.172	0.128	0.167	0.145	0.116	0.185	0.163	0.131
35-39	0.185	0.158	0.113	0.132	0.119	0.077	0.129	0.111	0.073	0.160	0.087	0.074
40-44	0.109	0.077	0.013	0.083	0.046	0.008	0.055	0.048	0.022	0.078	0.041	0.011
45-49	0.071	0.015	0.000	0.023	0.011	0.000	0.035	0.011	0.000	0.027	0.012	0.000
TFR 15-49	7.2	5.7	3.7	5.2	4.6	3.3	5.2	4.5	3.3	5.8	4.5	3.2

Note: 1 refers to no education, 2 refers to primary education, and 3 refers to secondary or higher education. The rates refers to 1 ½ years before the survey.

Figure 4.3: Age-specific fertility rates by age and economic status, 1988-2005 ZDHS

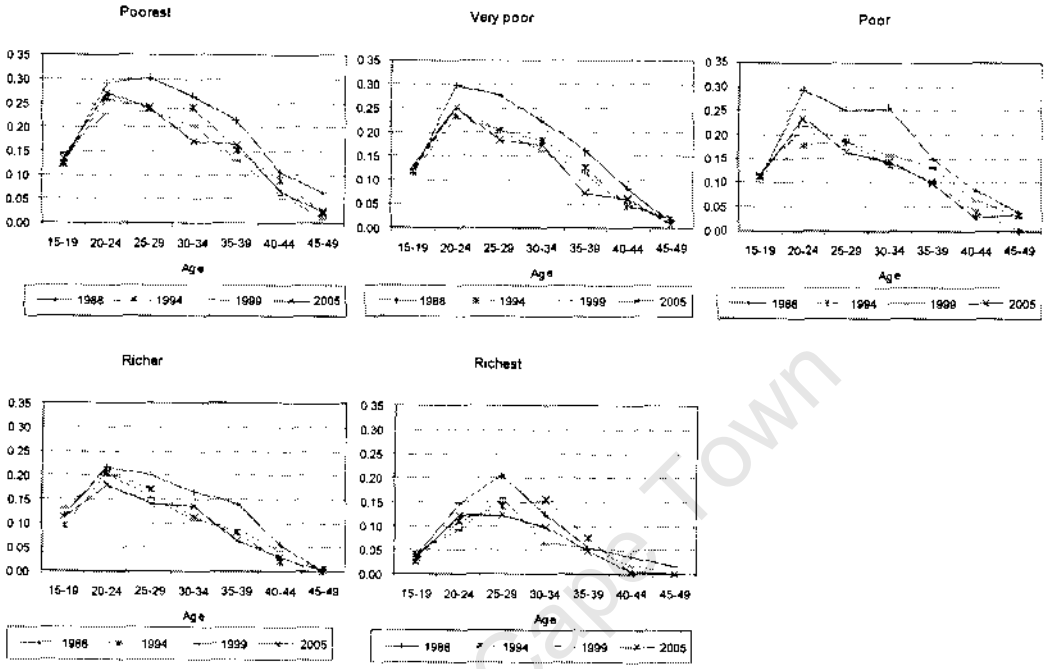


Table 4.2: Trends in age-specific and total fertility rates according to age and economic status, 1988-2005 ZDHS

	1988	Economic status				1994	Economic status			
Age group	A	B	C	D	E	A	B	C	D	E
15-19	0.123	0.114	0.107	0.118	0.035	0.124	0.117	0.111	0.094	0.026
20-24	0.293	0.299	0.295	0.216	0.148	0.261	0.234	0.179	0.205	0.111
25-29	0.303	0.278	0.252	0.201	0.206	0.239	0.204	0.185	0.171	0.143
30-34	0.266	0.226	0.256	0.166	0.126	0.241	0.184	0.138	0.112	0.155
35-39	0.214	0.162	0.149	0.140	0.056	0.151	0.127	0.103	0.081	0.075
40-44	0.107	0.084	0.084	0.056	0.038	0.090	0.048	0.040	0.022	0.005
45-49	0.062	0.013	0.038	0.000	0.015	0.020	0.020	0.000	0.006	0.000
TFR 15-49	6.8	5.9	5.9	4.5	3.1	5.6	4.7	3.8	3.5	2.6
	1999	Economic status				2005	Economic status			
Age group	A	B	C	D	E	A	B	C	D	E
15-19	0.146	0.121	0.117	0.131	0.046	0.135	0.130	0.115	0.114	0.033
20-24	0.228	0.250	0.218	0.205	0.092	0.272	0.253	0.234	0.181	0.122
25-29	0.233	0.203	0.186	0.152	0.159	0.241	0.184	0.163	0.140	0.123
30-34	0.204	0.162	0.158	0.109	0.065	0.171	0.174	0.145	0.136	0.099
35-39	0.131	0.114	0.131	0.089	0.055	0.163	0.073	0.097	0.064	0.048
40-44	0.060	0.048	0.063	0.042	0.018	0.067	0.062	0.027	0.030	0.004
45-49	0.009	0.017	0.028	0.000	0.000	0.024	0.007	0.033	0.000	0.000
TFR 15-49	5.1	4.6	4.5	3.6	2.2	5.4	4.4	4.1	3.3	2.1

Note: A refers to poorest, B refers to very poor, C refers to poor, D refers to richer and E refers to richest. The rates refers to 1 ½ years before the survey.

4.2.1 National fertility rates

Examining the changes in the fertility rates from 1987 to 2004 indicates that fertility has fallen in Zimbabwe from 5.4 children per woman to 3.8 children per woman over the period. Fertility dropped by 20.6 per cent, 7.7 per cent and 4 per cent between 1987-1993, 1993-1998 and 1998-2004, respectively (Table 4.1 and Figure 4.1). Overall, in all the surveys most births have occurred among women aged 20-24. In addition, the median age at marriage among all women remain at 18 years in each survey and no change in age at marriage over time.

The pace of fertility decline was highest between 1987 and 1993 and lowest dining the economic crisis from 1998 to 2004 (Figure 4.1). Research attributes fertility decline in Zimbabwe to high use of contraceptives and lengthening of birth intervals (Muhwava and Timaus, 1996; Moultrie, 2005). This study finds that the use of contraceptives among all women increased from 27.2 per cent to 39.1 per cent between the 1988 and 2005 surveys. The least relative percentage increase in contraceptive use of 9.8 per cent occurred between 1998 and 2004 (i.e., from 35.6 per cent to 39.1 per cent) during economic crisis (Table 3.2). Hence, the economic crisis might be associated with the apparent stall in fertility since contraceptives uptake increased slowly among all women. However, Figure 4.2 suggests that there is no evidence that the recent severe socioeconomic crisis depressed fertility since the national age-specific fertility schedules are similar for the 1999 and 2005 surveys. More data using the next ZDHS would shed light on the effect of the crisis on fertility. The stalling of fertility decline in the recent period could be as a result of separation of partners due to an increase in divorce, widowhood (Table 3.1) and possibly as women with children emigrate.

Among women in union, the current use of modem contraceptives is generally higher than the prevalence that is shown among all women in Table 3.1. Contraceptive prevalence among women aged 15-49 in union at the time of the survey increased from 36.1 per cent in the 1988 survey, to 42.2, 50.4 and 58.4 per cent in the 1994, 1999, and 2005 surveys, respectively (data are not shown).

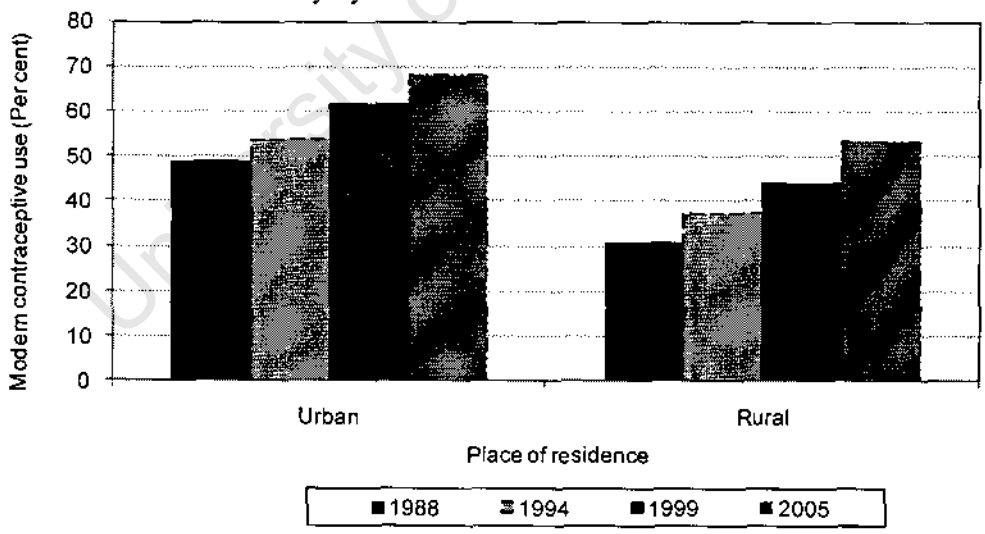
4.2.2 Fertility by residence

The total fertility rates estimated from the four ZDHS surveys indicate that urban women have lower fertility compared to rural women and that fertility decline was rapid between

1987 and 1993 especially among rural women (Figure 4.1 and Figure 4.2). Table 4.1 shows that fertility decreased from 3.8 to 2.6 and 6.2 to 4.6 children per woman in urban and rural areas, respectively. Since place of residence is a current status variable caution should be taken in interpreting the results due to possible migration between urban and rural areas. This may overestimate fertility in the receiving area while underestimating fertility in the sending area.

Figure 4.4 shows the rural-urban differentials in current use of modern contraceptives among women in union at the time of the survey. Since 1987 modern contraceptive uptake increased rapidly in both urban and rural areas, and urban women have a higher propensity to use modem contraceptives than rural women. There is a propensity for fertility to decline with increase in contraceptive use. I fence an explanation for low urban fertility could be that there is higher modern contraceptive use among urban women and a higher age of entry into first marriage and of giving a first birth compared to rural women. Overall, the age at marriage in Zimbabwe is low in both rural and urban areas, but higher in urban areas than rural areas by an age difference of one year.

Figure 4.4: Current use of modern contraceptives amongst women aged 15-49 in union at the time of survey by urban-rural residence

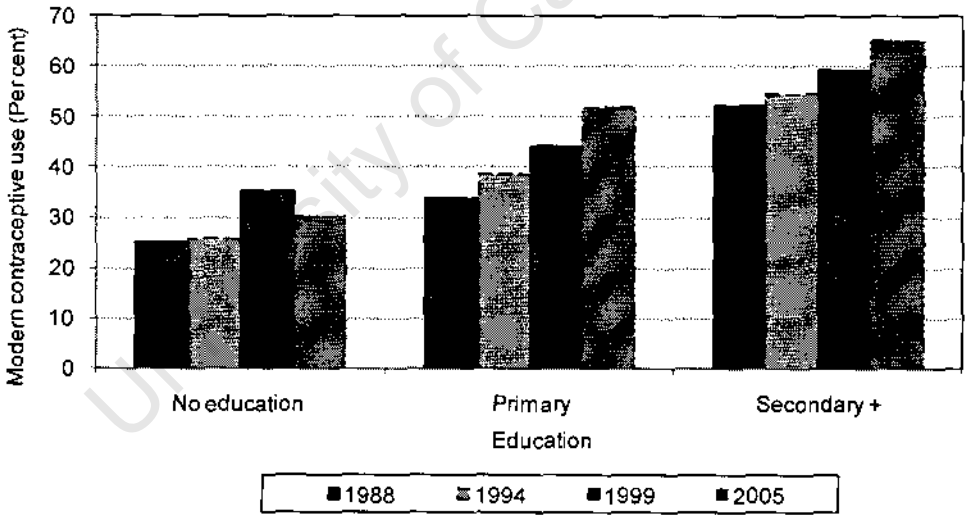


4.2.3 Fertility by education

All the surveys show that fertility is inversely related to the level of education (Figure 4.1 and Table 4.1). Figures 4.1 and 4.2 show that the uneducated women are more likely to

change their fertility behaviour than the educated women since their fertility was higher and changed sharply over time. Between 1987 and 1993, the greatest fertility decline occurred among uneducated women. Relative to the 1998 estimates, in 2004 fertility increased by 10.5 per cent from 5.2 children per woman among uneducated women, while for primary- and secondary or higher-educated women fertility dropped. Overall, uneducated women have a lower age at marriage than educated women, hence longer exposure to risk of childbearing. In addition, in Zimbabwe, the use of modern contraceptives is high and has increased over time among educated women and this could have a negative effect on fertility. In general, modern contraceptive prevalence increases with the level of education in each survey (Figure 4.5). The proportion of uneducated women using modern contraceptives between 1999 and 2004 dropped and this could have contributed to the slow change and increase in fertility in the same period among the uneducated women (Figure 4.1 and Figure 4.5).

Figure 4.5: Current use of modern contraceptives amongst women aged 15-49 in union at the time of survey by level of education



4.2.4 Fertility by economic status

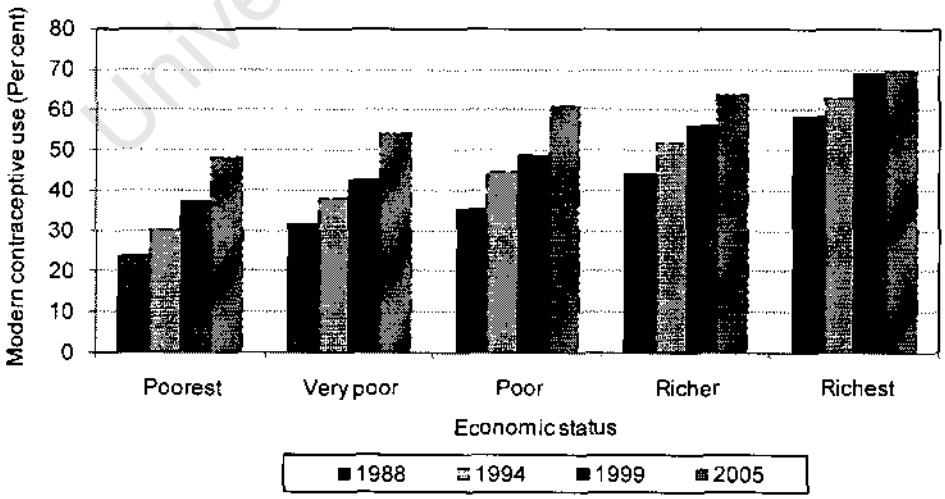
Figure 4.1 and Table 4.2 show that there is a negative association between economic status as defined in section 3.3 and fertility in each survey. Fertility is highest among the poorest and lowest among the richest. From 1987 to 2004 fertility among the poorest is more than twice that of the richest women. The explanations for fertility differentials according to

economic status are related to those by education since there is a propensity for the poor to have lower levels of education whereas the well off are more likely to be better educated.

Figure 4.6 shows the distribution of economic status by modern contraceptive use at the time of the survey. Across all the levels of economic status modern contraceptive use has increased over time and there is a positive correlation of contraceptive use with economic status. Between 1987 and 2004 modern contraceptive use increased substantially among the poorer/low-economic status women (first the poorest, then the very poor, and poor by relative per cent of 102.3, 71.3, and 72 from 24, 31.6 and 35.5 per cent, respectively) than among the rich/high-economic status women (richer and richest where contraceptive use increased by relative per cent of 45.7 and 19.2 from 43.9 and 58.6 per cent, respectively). Overall, the age at marriage between the low-economic status and high-economic status women differ by one year and among all the levels of economic slams there is not much variation in age at marriage between 1987 and 2004. The age at first birth is highest among the rich and lowest among the poorest.

Overall, the high-economic status women are more likely to use modern contraceptives, and be married and give birth at a later age than the low-economic status women. Tentatively, it can be concluded that economic status has a positive relationship with contraceptive use and age at first marriage and/or age at first birth.

Figure 4.6: Current use of modern contraceptives amongst women aged 15-49 in union at the time of survey by economic status



It appears there is a contradiction in the results obtained in the 2005 survey. Figure 4.5 shows modem contraceptive prevalence has decreased relative to the 1999 survey among the uneducated whereas Figure 4.6 indicates that modern contraceptive uptake has increased among the poorest in the same period. This suggests that the economic status variable captures probably more information on women than the education variable. Some women who are poorest are better educated hence an overall increase in contraceptive use over time. Further, Table 3.1 shows that the proportion of uneducated women has decreased markedly over time and is lowest in the 2005 survey. Thus the proportion of uneducated women not using contraceptives could have been oversampled in the 2005 survey and this might be as a result of random fluctuation due to small sample size.

Both the age-specific and total fertility rates are period measures that do not permit an assessment of the fertility experience of a real cohort of women, hence cohort-period fertility rates may shed some light on the dynamics of fertility changes. Further, period rates might be distorted by shifts in the timing of fertility and thus may be unreliable for measuring the level of fertility (Hinde, 1998).

4.3 Cohort-period fertility rates

This section uses cohort-period fertility rates (CPFRs) to assess fertility trends from the 1988, 1994, 1999 and 2005 ZDHS surveys. The computation of CPFRs is useful to determine fertility trends in successive five year periods prior to the survey and to evaluate the quality of birth history data. It allows the direct computation of cohort and period fertility (P/F) ratios which are useful in determining the pace and timing of fertility decline, fertility distribution, and data problems (Goldman and Hobcraft, 1982; Moultrie and Timæus, 2002).

The cohort-period fertility rates and P/F ratios for the country as a whole are presented as six panels in Tables 4.3, 4.4, 4.5 and 4.6 for the 1988, 1994, 1999, and 2005 ZDHS surveys, respectively. Panel A shows the number of women in each cohort at the time of survey (i) and births in each cohort of women at the time of survey (i) and duration at five successive years before the survey (j). Panel B presents CPFRs, computed using the following formula:

$$CPFR(i,j) = [Births(i,j)/Women(i)]/5$$

In panel C the CPFRs in Panel B are rotated to reflect age at end of period rather than survey date so that columns present period comparisons by age, rows present age comparisons by age and diagonals present cohort rates. Panel D presents the cumulated cohort fertility at the end of period (P) obtained by summing the diagonals for each cohort and five year durations before the survey in panel C and multiplying the result by five. To obtain cumulated fertility within periods (F) in panel E for each cohort the columns in panel C are summed and multiplied by five. The last panel, F, shows the P/F ratios obtained by dividing the rates in panel D by the rates in panel E (Goldman and Hobcraft, 1982; Moultrie and Timaeus, 2002).

In this study, Panels A to F are shown in Table 4.3 only as an illustration of all the calculations done while for the rest of the tabulation of CPFRs, only Panels C to F are presented. Also, the national estimates are presented in the main document while the estimates by place of residence and education subgroups are tabulated in Appendix A. The calculated fertility estimates may be taken as applying to the year centred on mid-points of the respective intervals before the survey, that is, for 2.5 for 0-4 years before the survey, 7.5 for 5-9 years before the survey and so on up to 32.5 years before the survey.

4.4 Evaluating the data and estimating fertility trends

An examination of the quality of data using the CPFRs and P/F ratios highlight errors of omission, and/or displacement of births. The displacement errors are also known as Brass and Potter effects (Potter, 1977). Brass effects are characterised by a tendency for older women to displace the dates of birth further back in the past than when they actually occurred. This results in an overestimate of the level of fertility in the most recent periods preceding the survey, and hence the appearance of a declining fertility for recent younger cohorts would be incorrect. Potter effects are caused by the displacement of births closer to the survey date, but the recent births are reported correctly. This result in an underenumeration of the level of fertility for the periods' further back in time, and heaping of births in the intermediate periods (Potter, 1977). The CPFRs provides a tool for highlighting errors and inconsistencies between data sets.

The shaded parts in the Panel C in Table 4.3-4.6 and Table A1-A20 tin Appendix A) for national estimates, and differential estimates by residence and education, respectively show some possible omission and displacement of births in the data. The results show a

common pattern of some possible heaping of births in the intermediate periods, that is, Potter effects some 10-14 or 15-19 years before the 1988, 1994, 1999 and 2005 surveys. Omission of births in the earliest periods (i.e., more than 20 years before the survey) may be observed for the older cohorts of women in all the surveys when the data are disaggregated by urban-rural residence and education. The omission of births further back in time among women may underestimate the level of fertility. In the 1988 and 2005 surveys some evidence of displacement of births towards the survey date may be seen among both urban-rural women, and among women with primary education and no education in the most recent periods before the survey in the 0-9 years before the survey). Displacement of births toward the survey date among uneducated women aged 25-29 some 5-9 years may be observed in the 1988 and 2005 surveys (Table A3 and A18).

To estimate the total fertility rate in the 5-9 years before the survey it may be assumed that the age-specific rates for women aged 45-49 in the 5-9 years before the survey (bold font in Panel C in Table 4.3-4.6 and Table Al-A20) is the same as for the adjacent cohort in the 0-4 years prior the survey. This implies fertility has been constant for that age group in the period. Then the cumulated fertility within periods (total fertility rate) for the 5-9 years before the women aged 45-49 in the 5-9 years before the survey (bold font in Panel E in Table 4.3-4.6 and Table A1-A20) is obtained as mentioned in section 4.3. The assumption made is not a significant impact on the total fertility rate since fertility among women aged 45-49 is low. Figure 3.3 supports the assumption made for women aged 45-49 since the proportion giving birth in this age group in all the surveys is very small. Thus from each survey two estimates of fertility may be obtained for the years centred some 2.5 years and 7.5 years before the survey. For instance, from the 1988 survey, Panel E in Table 4.3 shows a total fertility rate of 5.6 and 6.7 children per woman 2.5 and 7.5 years before the survey, respectively. That is, between 1981 and 1986 fertility dropped by one birth per woman, which is a rapid decline in a short span of time. From all the surveys fertility estimates, trends and differentials by urban-rural residence and education can be obtained. A discussion of these estimates for the rest of CPFRs tabulations follows later.

Table 4.3: Cohort-period fertility rates and P/F ratios for women aged 15-49, 1988 ZDHS

			Years prior to survey						
			0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at survey								
A		No. Women in cohort	NUMBER OF BIRTHS						
	15-19	1,021	188	4					
	20-24	840	843	236	12				
	25-29	679	851	857	242	15			
	30-34	589	713	888	747	202	10		
	35-39	464	471	646	698	569	163	22	
	40-44	318	210	359	450	495	372	138	11
	45-49	290	82	235	329	389	447	360	131
B	COHORT PERIOD FERTILITY RATES								
	15-19		0.037	0.001					
	20-24		0.201	0.056	0.003				
	25-29		0.251	0.252	0.071	0.004			
	30-34		0.242	0.302	0.254	0.069	0.003		
	35-39		0.203	0.278	0.301	0.245	0.070	0.009	
	40-44		0.132	0.226	0.283	0.311	0.234	0.087	0.007
	45-49		0.057	0.162	0.227	0.268	0.308	0.248	0.090
	Age group of cohort at end of period								
C	COHORT PERIOD FERTILITY RATES								
	15-19		0.037	0.056	0.071	0.069	0.070	0.087	0.090
	20-24		0.201	0.252	0.254	**0.245**	**0.234**	0.248	
	25-29		0.251	0.302	0.301	0.311	0.308		
	30-34		0.242	0.278	0.283	**0.268**			
	35-39		0.203	0.226	0.227				
	40-44		0.132	0.162					
	45-49		0.057	**0.057**					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)								
	15-19		0.184	0.281	0.356	0.343	0.351	0.434	0.452
	20-24		1.285	1.619	1.611	1.578	1.604	1.693	
	25-29		2.872	3.119	3.082	3.160	3.234		
	30-34		4.329	4.474	4.575	4.576			
	35-39		5.489	5.704	5.710				
	40-44		6.365	6.521					
	45-49		6.803						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)								
	15-19		0.184	0.281	0.356	0.343	0.351	0.434	0.452
	20-24		1.188	1.543	1.625	1.569	1.521	1.675	
	25-29		2.441	3.051	3.129	3.126	3.062		
	30-34		3.652	4.443	4.544	4.467			
	35-39		4.667	5.572	5.679				
	40-44		5.327	6.382					
	45-49		5.610	**6.665**					
F	P / F RATIOS								
	15-19		1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24		1.082	1.049	**0.992**	1.005	1.054	1.011	
	25-29		1.177	**1.022**	**0.985**	1.011	1.056		
	30-34		1.186	**1.007**	1.007	1.024			
	35-39		**1.176**	1.024	**1.006**				
	40-44		1.195	**1.022**					
	45-49		1.213						

Table 4.4: Cohort-period fertility rates and P/F ratios for women aged 15-49, 1994 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.033	0.044	0.068	0.071	0.066	0.062	0.073
	20-24	0.176	0.195	0.258	0.244	0.233	0.242	
	25-29	0.204	0.256	0.306	0.304	0.302		
	30-34	0.187	0.252	0.290	0.276			
	35-39	0.153	0.213	0.230				
	40-44	0.109	0.149					
	45-49	0.037	0.037					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.165	0.218	0.341	0.355	0.331	0.309	0.367
	20-24	1.096	1.318	1.646	1.551	1.476	1.579	
	25-29	2.339	2.927	3.082	2.996	3.089		
	30-34	3.864	4.342	4.444	4.468			
	35-39	5.106	5.511	5.618				
	40-44	6.057	6.362					
	45-49	6.546						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.165	0.218	0.341	0.355	0.331	0.309	0.367
	20-24	1.043	1.195	1.632	1.574	1.499	1.521	
	25-29	2.064	2.476	3.163	3.094	3.008		
	30-34	3.000	3.737	4.611	4.473			
	35-39	3.763	4.804	5.761				
	40-44	4.309	5.547					
	45-49	4.493	5.731					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	1.051	1.103	1.009	0.985	0.985	1.038	
	25-29	1.133	1.182	0.974	0.968	1.027		
	30-34	1.288	1.162	0.964	0.999			
	35-39	1.357	1.147	0.975				
	40-44	1.406	1.147					
	45-49	1.457						

Table 4.5: Cohort-period fertility rates and P/F ratios for women aged 15-49, 1999 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.036	0.041	0.048	0.046	0.064	0.060	0.046
	20-24	0.169	0.181	0.193	0.250	0.237	0.226	
	25-29	0.196	0.220	0.270	0.303	0.298		
	30-34	0.158	0.188	0.253	0.280			
	35-39	0.131	0.175	0.230				
	40-44	0.079	0.141					
	45-49	0.032	0.032					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.181	0.203	0.238	0.228	0.318	0.298	0.232
	20-24	1.049	1.142	1.192	1.566	1.483	1.362	
	25-29	2.123	2.293	2.918	2.997	2.851		
	30-34	3.080	3.858	4.263	4.252			
	35-39	4.516	5.137	5.404				
	40-44	5.534	6.107					
	45-49	6.269						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.181	0.203	0.238	0.228	0.318	0.298	0.232
	20-24	1.027	1.106	1.202	1.477	1.503	1.427	
	25-29	2.008	2.207	2.554	2.990	2.992		
	30-34	2.796	3.148	3.820	4.391			
	35-39	3.453	4.022	4.972				
	40-44	3.850	4.725					
	45-49	4.011	4.887					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	1.021	1.032	0.991	1.061	0.987	0.964	
	25-29	1.057	1.039	1.143	1.002	0.953		
	30-34	1.102	1.226	1.116	0.968			
	35-39	1.308	1.277	1.087				
	40-44	1.437	1.293					
	45-49	1.563						

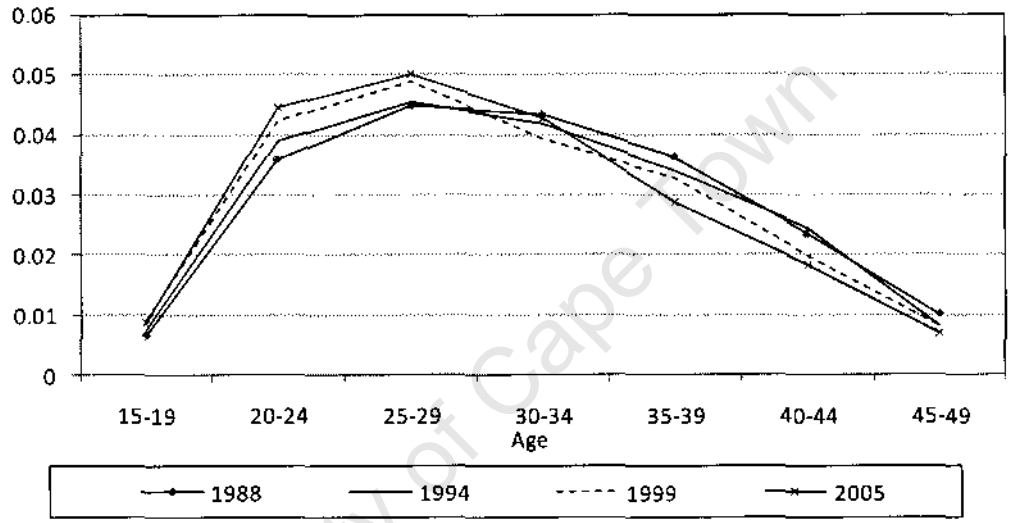
Table 4.6: Cohort-period fertility rates and P/F ratios for women aged 15-49, 2005 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.034	0.043	0.046	0.050	0.054	0.053	0.059
	20-24	0.171	0.184	0.191	0.183	0.248	0.238	
	25-29	0.193	0.208	0.217	0.247	0.307		
	30-34	0.164	0.175	0.207	0.244			
	35-39	0.111	0.144	0.172				
	40-44	0.071	0.087					
	45-49	0.026	0.026					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.170	0.217	0.230	0.252	0.271	0.265	0.295
	20-24	1.072	1.148	1.209	1.184	1.505	1.485	
	25-29	2.113	2.249	2.267	2.738	3.018		
	30-34	3.070	3.141	3.773	4.240			
	35-39	3.693	4.493	5.101				
	40-44	4.846	5.535					
	45-49	5.667						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.170	0.217	0.230	0.252	0.271	0.265	0.295
	20-24	1.025	1.136	1.187	1.165	1.511	1.455	
	25-29	1.990	2.176	2.269	2.399	3.044		
	30-34	2.810	3.050	3.304	3.621			
	35-39	3.363	3.770	4.164				
	40-44	3.716	4.205					
	45-49	3.848	4.337					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	1.046	1.011	1.019	1.016	0.996	1.020	
	25-29	1.062	1.034	0.999	1.142	0.991		
	30-34	1.092	1.030	1.142	1.171			
	35-39	1.098	1.192	1.225				
	40-44	1.304	1.316					
	45-49	1.473						

The CPFRs in Panel C for the most recent period can be standardised across data sets to give a non-conventional schedule of age-specific fertility rates for the five years before the survey shifting from older to younger ages. The shape of the national age distribution has not changed rapidly over time (Figure 4.7). Fertility seems to have declined at older age groups and become increasingly concentrated at younger age groups over time. This is consistent with previous fmdings using the 3-year exposure age-specific fertility rates (Figure 4.2). To assess how fertility has changed over a period of time can be done by reading from right side to the left in Panel C or Panel E across the rows. When the P/F ratios are close to one in all age groups fertility is constant and when they are monotonically increasing with age this indicates a true fertility decline. The pace of fertility decline is faster

when the divergence between cohort and period fertility is larger. That is, when a strong upward trend in P/F ratios is observed in the most recent time periods and they are not clearly visible in earlier time periods. However, a deviation from one points to an approximate time when fertility started to drop (Potter, 1977; Goldman and Hobcraft, 1982; Hobcraft, Goldman and Chidambaram, 1982; Moultrie and Timaus, 2002).

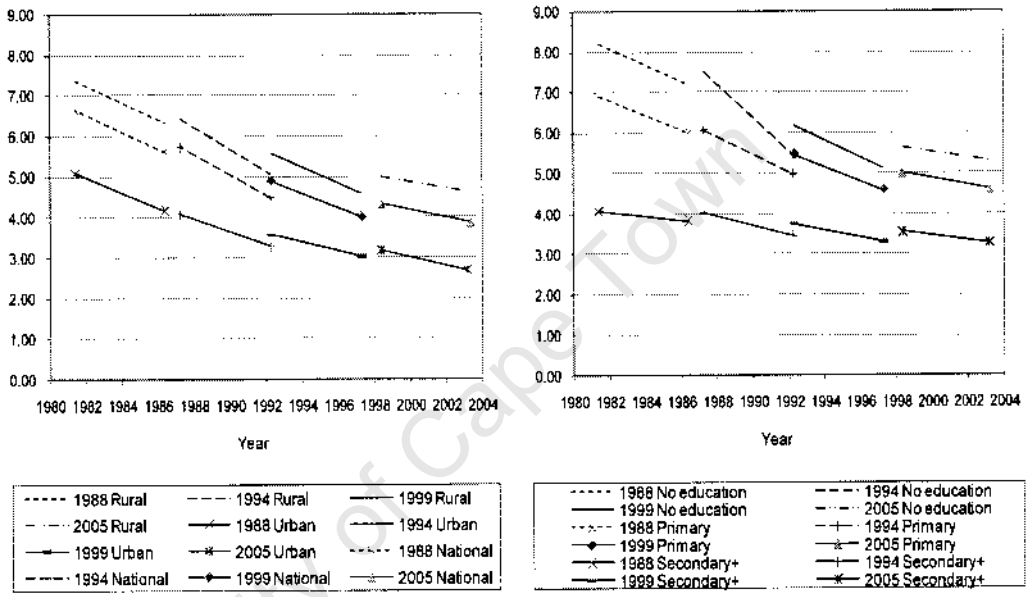
Figure 4.7: Standardised age distribution of fertility for women aged 15-49 in the five years before each survey, 1988-2005 ZDHS



Examining the P/F ratios in Panel F along the diagonals among older women suggests some evidence of age misreporting. Underreporting of births is confirmed by P/F ratios which deviate from the trend in the adjacent cohorts, for an easy illustration they have been shaded in the tabulations (Tables 4.3-4.6). For example, underreporting of parities is confirmed by looking at the diagonals of the cohort of older women aged 35-49 in Panel F which deviates from the trend in the adjacent cohorts (Table 4.5). As indicated for national estimates some evidence of age misstatement and misreporting of births among older women may be observed also by looking at the P/F ratios according to rural-urban residence and education (Appendix A). This indicates omission of births especially among the oldest women has occurred in the earliest time periods. This distortion appears to have been worst among women with no education perhaps due to recall error bias. Cohen (1993:11) argues that omission of births are difficult to correct, however their effect "on fertility levels is relatively minor".

The estimates of total fertility rates in Panel E for the CPFRs (in Table 4.3-4.6 and Table A1-A20) apply to the years centred on the midpoints of the 0-4, and 5-9 years before the survey, that is, 2.5 and 7.5 years before the survey, respectively. Hence from each survey two estimates of fertility rate are obtained to get fertility trends plotted in Figure 4.8.

Figure 4.8: Total fertility rate by age, national, urban-rural residence and educational level, 1988-2005 ZDHS



The two time references for each survey are: 1981.43 and 1986.43; 1987.26 and 1992.26; 1992.31 and 1997.31 and 1998.39 and 2003.39 for the 1988, 1994, 1999 and 2005 surveys, respectively. Thus two estimates of fertility rates with close reference points between two consecutive surveys in Figure 4.8 should closely match. Overall, the fertility estimates from the four surveys are dependable and a slight variation in the estimates is observed especially for the national, urban, primary education and secondary or higher education categories compared to the rural and no education categories. The fertility estimates which apply to the 2.5 years before each survey are consistent with those obtained from period fertility rates (in Table 4.1). The fertility rate estimates which apply to the 7.5 years before each survey are slightly higher than the consequent estimate in the following survey. This suggests that the assumption made earlier that fertility is constant in the five years before the survey for women aged 45-49 is not perfect when fertility declines rapidly in the same period. Since there are few discrepancies from the fertility trends

obtained in each survey in Figure 4.8, an overall fertility trend over time can be fitted or observed for each population subgroup to get an overall picture of fertility decline in Zimbabwe.

Overall, as indicated previously the pace of fertility decline was rapid before 1990 and slow after 1990. The rapid decline in fertility occurred among uneducated and primary-educated women prior to 1990. In the same period, although urban fertility is lower than that in rural the speed of decline was almost the same since fertility decline in the two areas is parallel (Figure 4.8). The greatest decline in fertility decline occurred in periods where economic conditions were good compared to the period of economy decline. The findings here are consistent with those obtained from the period fertility rates. However the cohort approach reveals that the fertility differentials by education are narrowing over time.

The CPFRs may give a very approximate summary of the timing of the onset of rapid fertility transition (decline) tabulated in Table 4.7. "Date of onset of the fertility transition, ... is the date at which cumulated fertility at age 40 started to decline in a consistent way" (Garenne and Joseph, 2002:1837). In this study, the P/F ratios (derived as a ratio of cumulative fertility of cohorts at end of period, P, to cumulative fertility within periods, F, as defined earlier) are used to date when fertility started to decline in a sustained way in Zimbabwe using the four ZDHS survey data. As mentioned before, deviations of P/F ratios from 1 allow one to identify the approximate time period in which fertility started to decline. To date the onset of sustained rapid fertility decline the average date of two periods in which the P/F ratios are very close to one (fertility unchanging) and P/F ratios are increasing by age cohort (fertility decline) were taken. The approach gives an approximate reference time for the onset of rapid fertility decline. By first looking at the ratios for national estimates, the 1988 survey indicates that fertility started to decline about 0-4 years before the survey and was constant about 5-9 years before the survey.

Table 4.7: Timing of the fertility transition in Zimbabwe using the 1988-2005 ZDHS surveys

Variable	DHS survey	Start date of sustained rapid fertility decline	Average start date of sustained rapid fertility decline
National	1988	1983.93	
	1994	1984.76	1984.8
	1999	1984.81	
	2005	1985.89	
Urban	1988	1968.93	
	1994	1984.76	1977.3
	1999	1974.81	
	2005	1980.89	
Rural	1988	1978.93	
	1994	1984.76	1983.0
	1999	1982.31	
	2005	1985.89	

Fertility started to decline rapidly around 1984 when the mid-points of the periods are taken for the country as a whole (Table 4.7). The estimates of the time when fertility started to decline rapidly arc observed to be consistent whether using the 1994, 1999 and 2005 ZDHS data, especially when deriving the national average. The estimates derived from the four data sets for residence (urban/rural) do vary quite widely due to random fluctuations, therefore caution should he exercised in interpreting the results. This inconsistency may be due to the urban-rural current status variable problem as a result of migration as mentioned earlier and probably due to underreporting of births among older women. The pace of fertility decline started to accelerate about 2.5, 7.5, 12.5 and 17.5 years before the 1988, 1994, 1999 and 2005 survey, respectively since the P/F ratios markedly increase deviating from one (Table 4.3-4.6).

The CPFRs give an overall picture of fertility decline which could have started to accelerate in the early 1980s, for the country as a whole and first among urban women and later among rural women as indicated by the 1988 survey. In a study in sub-Saharan Africa, Garrene and Joseph (2002) investigated fertility trends in Zimbabwe by fitting a polynomial on the 1988 and 1994 ZDHS data and observed that fertility began to fall in urban areas as early in 1970 and followed later in rural areas in 1984. Although Garenne and Joseph used a different approach to the CPFRs procedure applied in this study, their estimates on onset of fertility decline in Zimbabwe,1984 for rural and 1970 for urban, vary modestly (and widely) from those obtained in this study using multiple data sets (Table 4.7). Besides the differing method approach, this inconsistency could be as a result of simple random

fluctuations, displacement of births and static descriptions of urban-rural current status variable problem which could not controlled for using the CPFRs technique.

4.5 Projected parity progression ratios (Pj)

As opposed to the preceding sections which did not examine the pattem of fertility decline with respect to parities, this section investigates how women have progressed from one parity to a subsequent one over time in Zimbabwe. The proportion of women with a given number of children who progress to have another child is known as the parity progression ratio (PPM. Parity progression ratios have a disadvantage that they do not address selectivity effects which arises because some women who are more fertile than others are overrepresented in the experience reported. In addition they cannot be used when fertility is not yet complete, which is especially the case among younger cohorts. To deal with selection effects on birth histories, Brass and Juarez (1983) proposed the projected parity progression ratios (Pj) technique, where j represents parity. This is a method to measure women's propensity to limit family size and provides estimates of the projected completed family size among cohorts of women by the end of their reproductive life span. Hence changing patterns of family formation process may be examined.

The approach requires two tabulations of data first; parity by age group of the mother at the time of the survey (i.e., the untruncated data), and parity, one excluding births in last five years before the survey, by age group of mother at the time of the survey (i.e., the truncated data). Defining n_j as the number of women of parity h the PPR from parity j to j+1 is thus denoted by a_j, where $a_j = n_{j+1}/n_j$ (Hinde, 1998). In separate tabulations for both the untruncated and truncated data, the PPRs are computed for each parity and cohort. Then the indices of relative change are derived as the ratio of equivalently untruncated and truncated data of each cohort of women and parity (i.e., for each parity; the ratio of younger cohorts (from the untruncated data) to older cohorts (from the truncated data)). The indices of relative change assess the change in fertility at equivalent parities and ages between two different cohorts. The implied assumption stated by Brass and Juarez (1983:6) is that "the ratio of values with equivalent censoring is the same as the ratio of corresponding values without censoring". That is, relative fertility between cohorts will van- in the same way in the future as in the past. Hence selection bias is reduced by cohort comparison. An index of less than one implies that fertility of the younger cohort

truncated five years ago has fallen compared to the older cohort, and vice versa (Moultrie and Timaeus, 2002).

The indices may be used to derive projected parity progression ratios using an iterative procedure. The Pj for cohort of women aged 45-49 is by definition the PPR for that cohort. Then the Pjs for all other cohorts in reverse order from the 45-49 cohort may be obtained by the product of the previous Pj for the older cohort and index of relative change for the cohort (Moultrie and Timuus, 2002).

Brass and Juarez (1983) and Moultrie and Timuus(2002) find that the Pj method give estimates consistent with the alternative method, truncated pairwise measures of parity progression (Bt) which measures the proportion of women who progress to have another birth within t months of an index child. The Pj technique is not affected by timing of births events as the total fertility rate hence it is a better indicator of the level of fertility in the family building process (Brass and Juarez, 1983).

Figure 4.9 presents the national estimates of indices of projected parity progression ratios for the 1988, 1994, 1999 and 2005 ZDHS surveys with the x-axis as the birth cohorts of women aged 15-49 arranged from oldest to youngest to get a time trend. The data for this figure are presented in Table B1 (in Appendix B). A series of Pjs can be chained together for each parity progression and each survey to obtain parity progression patterns and assess the reliability of fertility data since the surveys overlap (Muhwava and Timaeus, 1996; Moultrie and Timaeus, 2002).

The 1988, 1994, 1999 and 2005 surveys were conducted approximately 5-6 years apart hence some age group cohorts overlap each other. The mid-points of the birth cohort intervals were plotted for each survey. The Pjs values less than 65 per cent are not graphed in the analysis because it is inaccurate to project these small Pjs since most women have not experienced that parity progression while those between 65 and 80 per cent should be treated with caution as suggested by Moultrie and Timaeus (2002). A horizontal line for the Pjs suggests no evidence of fertility decline while a point of inflection and a downward slope may be a rust sign that fertility might be falling. The Pjs among all women (national estimates) are presented in Figure 4.9 based on the four surveys. Figure B1-B2 (in Appendix B) presents the Pj to the fourth parity according to residence and educational level, respectively. Due to fragmentation of the data small numbers according to the level

of education and categories of urban-rural residence become inevitable, hence the fifth parity onwards are not presented.

Figure 4.9 shows that the estimated Pjs up to the fourth birth order are near one in the 1988 survey. This suggests a high fertility reproductive environment and no significant drop in fertility due to control of family size reflected in the 1988 survey up to parity four. Table B1 (in Appendix B) for the 1988 survey shows that from the fifth birth onwards the Pjs tend to fall from the largest age cohort to the cohort of women born around 1953. It may be observed that the quantum of fertility started to fall as a result of a drop in high birth orders among younger women aged less than forty at the time of survey.

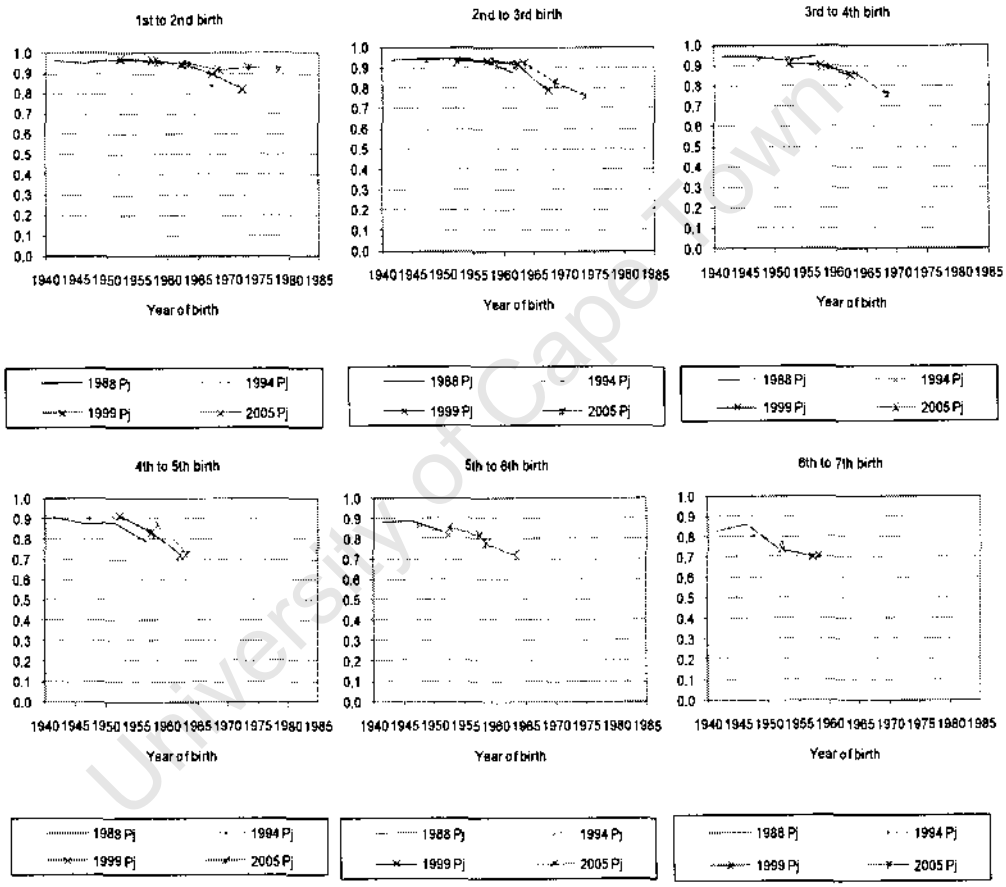
The 1994 survey shows some evidence of fertility decline among younger women at all parities while among older women fertility has remained quite high. This decline among all parities is apparent and continues in the 1999 and 2005 surveys, respectively with the exception that in the 2005 survey the Pjs at second birth seems not to be falling. A marked decline in the Pjs at third and higher births appears to be due to a strong family size control among all age cohorts of women in recent years. Overall, the proportion of women progressing to higher parities has been falling over time, which indicates that the level of fertility has also been falling.

It is important to note that there is consistency and close coincidence in data points for all the parity progressions in all the surveys, which imply an overall good quality of birth history data despite of some omission of births which have been found earlier using CPFRs, and hence the method used is robust. It may be observed that the method is not affected by the timing of birth events in the family formation process. Further, when the Pjs are plotted according to urban-rural residence, regardless of the current status variable problem mentioned earlier, the data points are close to each other (Figure B1), and the same pattern can be observed by examining Pjs according to the level of education (Figure 132).

Figure 4.9 suggests that fertility began to fall for the cohort of women born around the mid-1960s for the country as a whole. The dates knit together with estimates obtained from cohort-period fertility rates in the previous chapter that fertility dropped in early 1980s. Again, examining data points from the 2005 survey indicates the proportions of women progressing to higher order parities (4th or above) have decreased markedly over time when compared to those in the 1988 survey. It is observed that the progression to a

second birth (and higher parities for women aged 40-49) was almost universal in all the surveys. The drop in fertility at higher parities may be seen to have been more recent and among younger women at those parities. Figure B1-82 reflects that fertility decline occurred earlier among better educated women and urban women compared to uneducated and rural women.

Figure 4.9: Trends in national projected parity progression ratios by birth cohort and parity, 1988-2005 ZDHS



Overall, the estimates obtained from Pis are similar to those obtained by Garrene and Joseph (2002) and Muhwava and Timaeus (1996) and corroborate those obtained from CPFRs (Table 4.7). Early signs of fertility decline may be seen among women born around 1960 and 1965 for urban women and rural women, respectively. Allowing about 15-19 years for exposure to start childbearing, fertility began to decline in the late 1970s and early 1980s for urban and rural areas, respectively (Figure B1 in Appendix B). Figure B2 indicates

that fertility started to fall among women born around 1960 (second parity), 1965 (third parity), and 1970 (fourth parity) among women with secondary or higher, primary and no education, respectively.

4.6 Completed fertility

The projected parity progression ratios may be used to estimate the mean parities of each cohort of women by the end of their reproductive life span. Table 4.8 presents the average completed family sizes by cohort, place of residence, education and the country as a whole from the 1988, 1994, 1999 and 2005 DHS surveys. With exception of the 2005 survey, the surveys are approximately on average 5 years apart, hence a cohort of women can be followed from one survey to the next survey. For instance, women aged 35-39 in the 1988 survey would be aged 40-44 on average in the 1994 survey and 40-44 in the 1999 survey as illustrated in bold in Table 4.8. Caution should be exercised in interpreting the results since the surveys are not perfectly equally spaced and that urban-rural residence is a current status variable and education is a time-varying variable. By the age of 30 a woman would have completed her schooling and more often committed in marriage which might not allow her to migrate or change her place of residence frequently. The results are expected to be reliable, since older cohorts of women being examined more often do not change their level of education and residence in a short span of time.

Table 4.8: Projected completed fertility by cohort, place of residence and education, 1988-2005 ZDHS

	1988			1994			1999			2005		
Age group	Rur	Urb	Tot	Rur	Urb	Tot	Rur	Urb	Tot	Rur	Urb	Tot
30-34	5.86	3.95	5.23	4.88	3.81	4.48	4.00	2.74	3.49	4.24	2.70	3.66
35-39	**6.48**	**4.59**	**5.77**	5.89	44.31	5.39	5.27	3.84	4.79	4.43	3.17	3.92
40-44	6.91	5.05	6.50	**6.65**	**4.72**	**6.14**	6.03	4.55	5.61	5.60	3.72	4.92
45-49	7.18	4.79	6.61	6.88	4.79	6.42	**6.81**	**4.56**	**6.16**	6.09	4.38	5.64

	1988 Educ			1994 Educ			1999 Educ			2005 Educ		
Age group	1	2	3	1	2	3	1	2	3	1	2	3
30-34	6.66	5.22	3.71	5.62	4.77	3.26	4.72	4.40	2.91	4.42	4.40	3.36
35-39	**7.02**	**6.03**	**4.58**	6.01	5.47	4.24	5.76	4.80	3.71	4.94	4.69	3.39
40-44	6.41	6.82	4.67	**6.67**	**6.24**	**4.38**	6.14	5.79	4.07	6.16	5.19	3.72
45-49	6.98	6.71	4.20	6.88	6.47	4.34	**6.57**	**6.47**	**4.50**	6.20	5.84	4.21

Note: Rur refers to rural, Urb refers to urban, Tot refers to national estimates for the country as a whole; Educ refers to educational level, 1 refers to no education, 2 refers to primary education, 3 refers to secondary or higher education.

Tracing the cohort of women aged 35-39 for the country as a whole from the 1988 survey to the 1999 survey, as illustrated by the diagonal in bold in Table 4.8, suggests that by the end of their reproductive period the average number of children they would have had have increased, albeit marginally from 5.8 to 6.2 children in a decade. The cohort of women aged 45-49 in Table 4.8 represents the estimates of projected TFR, and when compared with the period TFR in Table 4.1 the projected TFR is generally higher than the period TFR which implies fertility is declining with time as corroborated with earlier findings. Overall, the results in Table 4.8 suggests that younger cohorts of women desire small family sizes compared to the older cohorts of women over time.

Table 4.8 shows, as expected in each survey and cohort, that urban women (or more educated women) can be expected to have had a lower number of births than rural women (and less educated and uneducated women). Tentatively, among women aged 35-39, 40-44, and 45-49 in both urban and rural residence, the later is the survey the lower is the projected completed fertility of women in each cohort by the end of their reproductive life span.

4.6 Discussion

The chapter has summarised the fertility levels and trends in Zimbabwe by cohorts, and parities. The estimated fertility rates obtained from a combination of direct and indirect methods used in the analysis are consistent and have been used to summarise the magnitude and nature of fertility decline mainly by urban-rural residence and educational level. On the whole the study utilise the data from the four ZDHS surveys to allow for comparison of fmdings over time. All fertility measures which have been applied to the data suggest that fertility has declined in the post-independence era since the early 1980s. The steepest decline in fertility has occurred in periods where economic conditions were good (before 1990) compared to the periods of economy decline (after 1990). An ongoing fertility decline among all parities and cohorts has been observed in all the surveys. In addition, an interesting pattern in family formation has occurred among uneducated and poorest women which appear to have increased their fertility in recent years. 'Ibis might have slowed the overall pace of fertility decline in the same period (Figure 4.1). This contrasts with other findings where researchers observe an overall short-term decline in the total fertility rate which occurs as a response to the times of economic crisis (Eloundou-

Enyegue, Stokes and Cornwell, 2000; Woldemicael, 2008). This may be explained partly by Eloundou-Enyegue, Stokes and Cornwell and Woldemicael's use of single calendar year estimates which fluctuates rapidly compared the three year exposure fertility rates used in this study, which are reasonably stable. However, the arguments with regard to crisis may not be conclusive since fertility decline may have occurred as a result of other independent factors such as diffusion of contraception and ideational factors which have an important role in influencing fertility as argued by Hirschman (1994). Further, improvements in education among women (Table 3.2) may have shifted tastes for childbearing by reducing the demand for children (Karki and Radha, 2008), between 2001 and 2006 in Zimbabwe. In a study in Nepal, Karki and Radha (2008) find in their study period that the differences in fertility by education narrowed significantly as a result of large fertility declines among the uneducated women due to improved contraceptive use. This is consistent with this study's findings, although a significant fertility decline has occurred over a longer period of time between 1980 and 2005 in Zimbabwe (Figure 4.8) and indeed as a result of an improvement in contraceptive use (Figure 45) as supported by other studies Mhloyi (1992) and Kravdal (2002). In addition, the possible effect of migration out of the urban areas to rural areas and out of the country could also explain fertility decline in Zimbabwe. Fertility differentials by economic status have been examined using period total fertility rate and the next chapter present further results based on logistic regression.

CHAPTER 5: LOGISTIC REGRESSION

5.1 Introduction

The previous chapter provides an assessment of fertility trends in Zimbabwe using total fertility rate, projected parity progression ratios, age-specific and cohort-period fertility rates. However, such techniques do not control for the effects of other reproductive factors on family size. A multivariate approach is employed to identify any periodic changes or shifts in fertility to corroborate the results obtained in the previous chapter. It is conducted to examine how fertility has been influenced by economic status and to compare how the coefficients vary over time, that is, from the pre-crisis period to the crisis period.

5.2 Logistic regression

Logistic regression is a statistical procedure that involves analysing data with a binary response variable, in other words it involves modelling the relationship between independent variables (covariates) and a binary response variable. A logistic modelling approach has the advantage that the model assumptions are less stringent It makes no assumption about the distribution of the independent variables. Further, a multivariate approach enables a test for the impact of a covariate (or set of covariates) on the response variable while controlling for all other covariates in the model (or other effects) (DeMaris, 1992).

Since the response variables mentioned in Chapter 3, (having a birth in the last five years before the survey and desire to limit childbearing) are binary their relationship with covariates can be expressed using the logistic regression model as follows:

$$\text{logit}(p_i) = \log\left(\frac{p_i}{1-p_i}\right) = x_i'\beta_i$$

where, p_i is probability of having birth in last five years (or probability of wanting no more children), for a woman i with a given set of covariates x_i', and β_i is a vector of coefficients related to specific covariates. The ratio, $p_i/(1-p_i)$, is the odds ratio (OR) of a woman having a birth in past five years relative to not having a birth in the same period (or odds of a woman desiring no more children versus wanting more children). In addition, the desire to delay childbearing may be interpreted in a similar fashion as in the above discussion.

The results from logistic regression are presented as odds ratios which indicate the net effect of each covariate on the dependent variable after controlling for all other covariates. The reference (omitted) category of each covariate has a value of one and the values for other categories are compared to that of the reference category. An odds ratio greater than one indicates that women in that respective category have a higher chance of giving birth (stopping or delaying childbearing) compared to women in the reference category, and vice versa (DeMaris, 1992; Lee and Forthofer, 2006).

5.3 Dependent variables

This study uses the variables "birth in last five years" for actual fertility behaviour and "desire for children" for fertility intentions and preferences to construct the dependent variables. First, with regard to birth occurrence in the last five years regardless of parity, that is, whether or not a woman experienced a live birth during the immediate five years before the survey, two measures; the odds of having birth (in last 5 years) and the odds of not having birth fin last 5 years) were formulated. Both indicators were coded '0' for a negative response and '1' for a positive response. The former refers to women who have begun childbearing (with at least one child) and the latter pertains to all women aged 15-49. Both investigations on timing of recent births and fertility intentions are needed since they complement each other in giving an overall representation of reproductive behaviour. According to Agadjanian and Prata (2002), fertility intentions can be used as an approximate gauge of future fertility, especially if such intentions are prevalent.

In the second part of this analysis, fertility intentions indicate whether or not a woman intends to space or stop childbearing. The responses for 'birth stopping' (whether or not a woman wants no more children) were scored into a binary form with a positive answer coded '1' for yes (wants no more) while a negative answer (wants) or those who were undecided were coded '0' for no. Only a small proportion of respondents gave an uncertain response, and women who were sterilised or declared infecund were excluded. Birth spacing' was coded '1' for a positive response (wants later) and '0' for a negative response (wants soon, undecided, wants no more).

5.4 Independent variables

The correlates/independent variables have been identified and considered based on their established theoretical importance as set out in the previous chapters. The correlates used include economic status, education, place and province of residence, age, age at first birth, number of living children, employment status, modern contraceptive use and knowledge of modern contraceptives. The main independent variable of interest is economic status whereas the other variables are controls. The study focuses on economic status as one of the vital components of the overall economic conditions and economic uncertainty. This indicator of a woman's economic status is constructed from ownership of certain household goods and characteristics as suggested by Schoumaker (2004) in Chapter 3.

5.5 Methodology of analysis of births occurrence and fertility preferences

Stata was used to find the estimates coefficients (A) of the covariates using maximum-likelihood estimation methods. The p-value was used to test the significance of the coefficients in the model. A p-value less than 0.05 signifies that the coefficient is statistically significant at the 5 per cent level in the model and vice versa.

The variables used in the analysis were first standardised for each DI IS for Zimbabwe such that they have the same categories for comparative purposes. The relationship between economic status and fertility behaviour can be complex. Since economic status is the main factor of interest among socioeconomic factors, it is the variable used in the main-effects model to assess the net effect (after controlling for other demographic and socioeconomic factors mentioned earlier) on fertility (the odds of giving birth) and fertility preferences. As socioeconomic variables (e.g., economic status and education) are closely interrelated and influence fertility outcomes in a complex manner. Logistic regression (with interaction effects) is used to assess the relative importance of these variables and to determine the net effects of each variable and of the combined (gross) effects on fertility outcomes in a given period or survey. The following interactions were considered; economic status and education, economic status and residence, and education and age. The results from analysis of interaction effects of economic status and other socioeconomic variables on fertility and fertility preferences are presented in Appendix C. By controlling for confounding variables, the net effect of economic status on fertility outcomes may differ from those obtained in the total fertility rate. In addition, it is thought that the effect

of economic status on fertility outcomes can be modified by education and hence the net effect of education and economic status on fertility outcomes presents a picture of fertility outcomes different from when there is no interaction between these two variables (i.e., main-effects model). In other words, one cannot easily predict fertility behaviour when "wealth" (a measure of economic status) and investments in education among women are increased simultaneously. The fertility outcomes would be controlled or determined by the net effect of education and economic status and the relationship/interaction between these two variables. This allows for direct comparison of economic status within educational levels. That is, the influence of wealth on fertility (and fertility preferences) can be examined for uneducated and educated women.

Separate logistic regression models were fitted to assess shifts in actual fertility and fertility intentions. The models are applied to data on all women when modelling odds of not having given birth in the last 5 years and all women with at least one child when modelling birth occurrence in the last 5 years before each survey. The models were also applied to data on women who have begun childbearing to determine their fertility preferences and intentions: desire to space childbearing and desire to stop childbearing. The same model used as the standard was applied separately to each ZDHS data to examine periodic shifts or variations in actual fertility (occurrence of a birth) and fertility preferences, and to assess whether or not population subgroups adjust differently over time. This was done to compare coefficients from a fitted model for different periods using the four ZDHS surveys. An assessment of how the coefficients (and odds) change has been done using separate data sets since this has the merit of concentrating on recent fertility or changes in fertility between different surveys instead of looking at cohort (or cumulative) fertility trends.

After fitting logistic models with interaction effects, Tables in Appendix C, post estimation commands, for example, in Appendix C were run in Stata to predict the gross and net effects on birth occurrence and desired fertility in each model mentioned earlier for the variables of interest; economic status and education. The predict command with the table, c() command gives the gross effects. Looking at the coefficients (for the main- and interaction-effects) in each model gives net effects, which are calculated manually, in Excel, using the ultimate means of all the independent variables. This allows one to determine the predicted absolute values (coefficients). The exponents of each of the

predicted values were taken to obtain the odds ratios for the net effects of economic status (poorest, very poor, poor, richer, and richest) on fertility (and fertility preferences) across educational levels (no education, primary, and secondary+). The adjusted odds ratios were found by dividing each odds ratio for each economic status-education interaction term by the odds ratio of the reference category; poor-secondary+. Thus point estimates for net effects of economic status-education on fertility outcomes are obtained for each survey data to determine the pattern of fertility. This is done since the overall (net) effect of economic status on fertility is modified by its interaction with education.

5.6 Multivariate results on interaction between economic status and education

This section presents the adjusted/relative odds ratios (tabulated in Table 5.1-5.4) for the variables of interest, that is, the net effect of a woman's economic status on fertility outcomes across educational levels. Since adjusted odds ratios (adj. OR) were derived from the odds ratios (OR) as stated above, hence the latter are not commented on. As emphasis is on economic status ("wealth") variable, findings are discussed on the net effect of economic status and education on the dependent variables. Other socioeconomic variables have been used to develop the models or corroborate the findings, and are not discussed. Thus only interaction effect tables in this section are shown and discussed. The findings are presented in two sections: the first section presents results from the analysis on the odds of giving birth, followed by analysis of fertility intentions (desire to limit/space childbearing).

5.6.1 Results of the multivariate analysis of births occurrence

The estimated adjusted/relative odds ratios of the net effects of economic status on having given birth in the last five years across educational levels among women with at least one child according to are presented in Table 5.1. The results represents fertility outcomes for the periods 1983-1988 (economic growth/pre-crisis era), 1989-1994 (onset of economic decline/early phase of economic reform), 1994-1999 (economic decline-onset of economic crisis), 2000-2005 (severe economic crisis) which corresponds to the five years before the 1988, 1994, 1999, and 2005 surveys, respectively. The four time periods aim at capturing the change in timing of birth events over time.

Table 5.1 shows the adjusted odds ratios relative to the secondary or higher-educated poor women. There is a clear pattem that indicates the odds of having a given child

decreases with economic status in the 1994, 1999 and 2005 surveys. In the 1988 survey, the odds of having a child decreases with economic status among the educated women whereas among the relationship between uneducated women and economic status is not clear. In all the surveys the odds of having a given child are generally lowest among women with secondary or higher education. The odds of having a given child are higher among primary-educated than among uneducated women in the 1988, 1994 and 1999 surveys, but a different (reverse) pattern is seen in the 2005 survey. This finding in the 2005 survey is consistent with the results obtained in Figure 4.1 where fertility increased among the uneducated and poorest women.

Table 5.1: Adjusted odds of the net effects of economic status of having given birth in the last five years across educational levels, by year of survey among women with at least one child

	1988		1994		1999		2005	
	OR	adj. OR	OR	adj. OR	OR	adj. OR	OR	adj. OR
Education*Economic status								
No education*Poorest	3.92	1.51	5.95	2.26	8.37	3.03	9.00	3.73
No education*Very Poor	2.39	0.92	5.28	2.01	5.26	1.90	10.28	4.26
No education*Poor	3.95	1.53	2.86	1.09	4.28	1.55	5.49	2.27
No education*Richer	1.74	0.67	2.09	0.80	1.06	0.38	2.65	1.10
No education*Richest	6.75	2.60	1.61	0.61	2.24	0.81	2.29	0.95
Primary*Poorest	17.94	6.93	13.33	5.07	6.32	2.28	4.41	1.83
Primary*Very Poor	12.80	4.94	9.07	3.45	5.31	1.92	3.93	1.63
Primary*Poor	12.11	4.67	6.54	2.49	5.43	1.96	3.28	1.36
Primary*Richer	8.94	3.45	3.77	1.43	4.65	1.68	2.76	1.14
Primary*Richest	5.89	2.27	3.90	1.48	1.43	0.52	1.14	0.47
Secondary+*Poorest	3.17	1.22	10.19	3.87	4.24	1.53	4.00	1.66
Secondary+*Very Poor	2.90	1.12	6.74	2.56	5.48	1.98	2.85	1.18
*Secondary+*Poor (ref.)*	*2.59*	*1.00*	*2.63*	*1.00*	*2.77*	*1.00*	*2.41*	*1.00*
Secondary+*Richer	1.72	0.66	1.77	0.67	2.45	0.88	2.54	1.05
Secondary+*Richest	1.55	0.60	1.36	0.52	1.81	0.65	2.19	0.91

Note: adj. OR refers to adjusted (relative) odds ratio, ref. refers to reference or omitted category represented in italics

Table 5.2 shows the odds of not having given birth in last five years among all women by net effects of economic status across educational levels. The odds are reported relative to the poor and secondary or higher-educated women. In general, the odds of not having given birth increases with economic status in all the surveys. The odds of not having a child are generally highest among the secondary or higher-educated women in all the surveys as would be expected. In the 1988 and 2005 surveys, the odds of not giving birth

increases with education, but in the 1994 and 1999 surveys the odds of not giving birth among the primary-educated women are lower relative to uneducated women.

Table 5.2 Adjusted odds of the net effect of economic status on not having given birth in the last five years across educational levels, by year of survey among all women

	1988		1994		1999		2005	
	OR	adj. OR	OR	adj. OR	OR	adj. OR	OR	adj. OR
Education*Economic status								
No education-Poorest	0.28	0.17	0.34	0.15	0.32	0.25	0.21	0.14
No education*Very Poor	0.49	0.31	0.49	0.21	0.48	0.37	0.26	0.18
No education*Poor	0.27	0.17	1.08	0.47	0.53	0.41	0.37	0.25
No education*Richer	0.76	0.47	1.14	0.50	2.99	2.30	1.24	0.86
No education*Richest	0.61	0.38	2.09	0.91	1.19	0.91	0.79	0.54
Primary*Poorest	0.36	0.23	0.24	0.10	0.25	0.19	0.33	0.23
Primary*Very Poor	0.50	0.31	0.29	0.13	0.28	0.21	0.45	0.31
Primary*Poor	0.44	0.27	0.43	0.19	0.32	0.24	0.69	0.48
Primary*Richer	1.09	0.68	0.82	0.36	0.57	0.44	0.82	0.57
Primary*Richest	1.72	1.07	1.01	0.44	1.94	1.49	3.51	2.42
Secondary+*Poorest	1.01	0.62	0.94	0.41	0.75	0.57	0.81	0.56
Secondary+*Very Poor	1.15	0.72	1.39	0.60	0.95	0.73	1.07	0.74
*Secondary+*Poor (ref.)*	*1.61*	*1.00*	*2.30*	*1.00*	*1.30*	*1.00*	*1.45*	*1.00*
Secondary+*Richer	1.34	0.83	1.90	0.83	1.90	1.46	1.92	1.33
Secondary+*Richest	2.56	1.59	4.43	1.93	4.75	3.65	3.08	2.13

Note: adj. OR refers to adjusted (relative) odds ratio, ref. refers to reference or omitted category represented in italics

5.6.2 Results of the multivariate analysis of fertility intentions

In order to understand the pattern of fertility in addition to analysing explicit birth timing, models for fertility decisions to delay or stop childbearing were also estimated. Caution should be taken in interpreting fertility desires since they do not represent actual fertility, but the likely course of fertility in the future or the reproductive environment at that moment. Fertility intentions and preferences may not translate into practice as a result of economic circumstances or over time. Tables 5.3 and 5.4 present the odds of desiring to stop childbearing and delay childbearing among women with at least one child, respectively.

5.6.2.1 Desire to limit childbearing

The adjusted odds ratios in Table 5.3 are presented relative to poor and secondary or higher-educated women. The odds of wanting to stop childbearing (the desire not to have any more children) are lower among women with no education relative to educated women

in all the surveys. Among uneducated women the odds of desiring to limit births are highest among the very poor in the 1988 survey and richer in the 1994, 1999 and 2005 surveys. Among better educated women a positive relationship between economic status and desire to limit childbearing is observed in all the surveys. The odds of wanting to stop childbearing increases with economic status in the 2005 survey, but as for the other surveys the relationship is inconclusive.

Table 5.3 Adjusted odds of the net effect of economic status on wanting to limit births across educational levels, by year of survey

	1988		1994		1999		2005	
	OR	adj. OR	OR	adj. OR	OR	adj. OR	OR	adj. OR
Education*Economic status								
No education*Poorest	0.17	0.36	0.37	0.37	0.41	0.36	0.14	0.10
No education*Very Poor	0.34	0.74	0.60	0.60	0.51	0.45	0.27	0.19
No education*Poor	0.06	0.13	0.25	0.25	0.30	0.26	0.38	0.27
No education*Richer	0.25	0.54	0.87	0.87	0.81	0.71	2.02	1.42
No education*Richest	0.14	0.30	0.13	0.13	0.04	0.04	0.98	0.69
Primary*Poorest	0.72	1.55	0.91	0.91	0.77	0.68	1.14	0.80
Primary*Very Poor	0.70	1.51	1.03	1.03	0.99	0.87	1.40	0.98
Primary*Poor	0.62	1.33	0.86	0.86	1.10	0.97	1.53	1.08
Primary*Richer	0.74	1.58	2.31	2.31	1.12	0.98	3.19	2.25
Primary*Richest	0.29	0.62	0.59	0.60	0.42	0.37	1.16	0.82
Secondary+*Poorest	1.45	3.11	0.91	0.91	1.21	1.07	1.10	0.78
Secondary+*Very Poor	0.43	0.93	0.89	0.90	1.23	1.08	1.36	0.96
*Secondary+*Poor (ref.)*	*0.47*	*1.00*	*1.00*	*1.00*	*1.14*	*1.00*	*1.42*	*1.00*
Secondary+*Richer	0.77	1.65	1.51	1.51	1.07	0.94	2.17	1.53
Secondary+*Richest	2.19	4.71	1.89	1.89	1.77	1.56	2.95	2.08

Note: adj. OR refers to adjusted (relative) odds ratio, ref. refers to reference or omitted category represented in italics

5.6.2.2 Desire to delay childbearing

Table 5.4 indicates that, overall, the odds of wanting to delay having children decreases with economic status in all the surveys. The results especially from the 2005 survey are instructive probably due to the large sample size used. Most notably, the poorer (i.e., poorest, very poor and poor) women are more likely to space having a child than the rich/affluent (i.e., richer and richest) women. With respect to education, primary-educated women are less likely to delay childbearing than better educated women in all the surveys, but this relationship is reversed among the poorer women in the 2005 survey.

Table 5.4 Adjusted odds the net effect of economic status of wanting to delay/space births across educational levels, by year of survey

	1988		1994		1999		2005	
	OR	adj. OR	OR	adj. OR	OR	adj. OR	OR	adj. OR
Education*Economic status								
No education*Poorest	0.61	1.25	0.54	1.28	0.60	2.39	1.84	9.12
No education*Very Poor	0.36	0.74	0.45	1.08	0.40	1.60	0.51	2.50
No education*Poor	0.13	0.27	0.10	0.23	0.21	0.85	0.23	1.15
No education*Richer	0.27	0.56	0.40	0.94	0.10	0.39	0.07	0.32
No education*Richest	0.05	0.10	0.07	0.16	0.44	1.76	0.04	0.19
Primary*Poorest	0.37	0.75	0.25	0.58	0.10	0.40	0.29	1.44
Primary*Very Poor	0.37	0.75	0.20	0.48	0.10	0.41	0.34	1.68
Primary*Poor	0.37	0.76	0.18	0.43	0.09	0.36	0.22	1.10
Primary*Richer	0.25	0.52	0.14	0.34	0.11	0.45	0.14	0.67
Primary*Richest	0.03	0.06	0.06	0.14	0.06	0.24	0.08	0.40
Secondary+*Poorest	0.41	0.84	0.35	0.83	0.22	0.89	0.27	1.34
Secondary+*Very Poor	0.77	1.58	0.32	0.76	0.26	1.03	0.25	1.24
*Secondary+*Poor (ref.)*	*0.49*	*1.00*	*0.42*	*1.00*	*0.25*	*1.00*	*0.20*	*1.00*
Secondary+*Richer	0.38	0.77	0.36	0.86	0.37	1.46	0.14	0.69
Secondary+*Richest	0.21	0.44	0.28	0.66	0.24	0.96	0.10	0.50

Note: adj. OR refers to adjusted (relative) odds ratio, ref. refers to reference or omitted category represented in italics

5.7 Discussion and interpretation of results

It should be noted that the study also assesses if there are differences in fertility between the pre-crisis periods and crisis periods, that is, how the point estimates in adjusted odds ratios vary between the 1988 and the 2005 surveys. The odds of giving birth among women who have begun childbearing increased in the 2005 survey relative to the 1988 survey on all levels of economic status among uneducated and secondary or higher-educated women, but decreased on all the levels of economic status among primary-educated women (Table 5.1). Table 5.2 suggests that the odds of not giving birth increases by education and economic status between the 1988 and 2005 survey except among the poorest and very poor uneducated women amongst all women. This further confirms an overall declining trend in fertility and that the uneducated poorest women have increased their fertility as found in Figure 4.1. It should be noted that there is no a consistent pattern on how the point estimates obtained in the study varies from one period of survey to the next. Although it is difficult to establish a direct causal link between fertility and the severe economic crisis, the data does not show conclusive evidence whether the crisis (as reflected by the 2005 survey) has influenced fertility decline among population segments. With economic setbacks or hardships one would expect a pronounced decrease in the odds of having birth as

suggested by Agadjanian and Prata (2002), yet this is not consistent with the study findings. Even if the lower standards of living could have encouraged change in reproductive behaviour by lowering fertility choices, women's circumstances such as widowhood and divorce are other factors which have an indirect negative bearing on fertility behaviour. Thus no single factor may be necessary and sufficient for explaining the fertility decline process.

The second part of the multivariate analysis has dealt with fertility intentions and preferences for the limitation of childbearing and the spacing of childbearing. The pattern obtained from desired fertility tells only part of the story, since a clear pattern of childbearing is not obvious as found in actual fertility and preferences may change with the passage of time. Overall, the odds of educated women to limit childbearing are higher relative to uneducated women in all the surveys (Table 5.3). However, with respect to women desiring to space childbearing, it is difficult to discern an apparent pattern of childbearing, although it is noticeable that the secondary or higher-educated women are more likely than primary-educated to space their childbearing in all the surveys, except in the 2005 survey where the poorer primary-educated women are likely to space childbearing than the poorer secondary or higher-educated women.

The ratio of the odds of wanting to space childbearing (in Table 5.4) to the corresponding odds of desiring to stop childbearing (in Table 5.3) provides an overall picture of fertility preferences and intentions among women with children. If the ratio is greater than one this implies women are more likely to space than stop childbearing. Among uneducated women the poorer (low-economic status women) are more likely to space than to stop childbearing in all the surveys. Among the rich/affluent (high-economic status women), the same pattern is observed in the 1994 survey, but the findings from the 1988 and 1999 surveys are inconclusive. In the 1994 survey, the rich are more likely to space than to stop childbearing whereas a decade later (2005 survey) the opposite is observed. Among primary-educated women both the rich and poorer are more likely to stop childbearing than to delay childbearing in all the surveys, except in the 2005 survey where the poorer appear to be spacing rather than limiting births. Among the secondary or higher-educated women the pattern is complex to analyse. The rich are likely to limit childbearing in all the surveys except in the 1999 survey where the results are inconclusive. The poorer are likely to limit their births in the 1994 and 1999 surveys whereas in the 2005

survey they are likely to space their births, and the results from the 1988 survey are not conclusive. The analyses presented above suggest that educated poorer women are likely to change their fertility behaviour over time. The educated rich women are consistent and better able to control their fertility in all the periods than the uneducated women. This finding is similarly echoed by Potts and Marks (2001) that if education enhances a woman's status her bargaining power in controlling family size may improve due to, amongst other factors, new aspirations and expanded horizons.

CHAPTER 6: CONCLUSIONS

The purpose of this study has been to examine socioeconomic differentials in fertility in Zimbabwe over time using the 1988, 1994, 1999 and 2005 ZDHS surveys. The socioeconomic factors; rural-urban residence, education and economic status were selected for the study. Before explaining fertility differentials it is important to highlight fertility at national level and overall data quality.

Overall fertility in Zimbabwe has declined over the period of study. As measured by cohort-period fertility rates (CPFRs) fertility has declined from 6.7 to 3.8 children per woman between 1980 and 2005. That is an average drop of about 3 births per woman in two and half decades resulting mainly from an increase in modern contraceptive use over time. The median age at marriage is low at age 19 and has not changed over time.

By applying CPFRs and projected parity progression ratios (Pjs) in addition to the conventional total fertility rate (TFR), the nature of fertility decline, robustness of methods used and data quality were determined using the four ZDHS surveys. The CPFRs estimates from the four surveys suggest omission of births occurred among the oldest women aged 45-49, especially among uneducated women. It is difficult to correct for recall errors bias, although this is not a major drawback in this study. It is noteworthy to observe that the study found close coincidence and consistency in the estimates of Pjs in all the surveys, which may suggest the birth history data may be of overall good quality, despite the omission of births in earlier time periods among older women. Hence the Brass-Juarez method used in the analysis is robust and not affected by the timing of birth events in the family building process. Further, the estimates derived from Pjs and CPFRs substantiate each other on the finding that fertility began to fall faster in the early 1980s or among women born in the mid 1960s (Figure 4.9 and Table 4.7). The pattern is observed for all the four data sets used in the analyses. It has been observed that fertility began to decline as result of a drop in high parities and has been rapid before 1990 and slowed since 1990.

This study reveals what has been driving overall fertility over time in Zimbabwe is not uniform among population subgroups. With respect to recent data from the 1999 and 2005 surveys, at face value, overall fertility appears to have stalled in Zimbabwe in recent years. However, this conclusion is not always supported by socioeconomic differentials and other

patterns of fertility behaviour; modern contraceptive use, fertility preferences and timing/occurrence of births or in-depth analysis of birth histories. High fertility among the poorest women with no education is offset by much lower fertility among the richest women with secondary or higher education. On the whole, an ongoing fertility decline among all parities and cohorts has been observed in all the surveys.

The CPFRs and Pjs show that fertility began to decline in urban areas in the 1970s and then followed later in the early 1980s in rural areas. Urban women consistently have lower fertility than rural women. Between 1980 and 2005, the fertility rate estimates show that rural fertility has declined almost in parallel to rural fertility with a difference of about 2 births per woman in all the periods, and hence the rate of fertility decline was almost the same. In the period urban fertility dropped by 49 per cent from 5.1 to 2.6 children per woman whereas rural fertility dropped by 38 per cent from 7.4 to 4.6 children per woman. The age pattern of fertility decline is similar between the rural and urban areas with the peak of childbearing occurring among women aged 20-24, in all the surveys. The proportions of rural women who proceed to a subsequent birth are higher than those of urban women. In both urban and rural areas fertility decline accelerated in the 1980s then slowed after 1990. Although fertility decline slowed down in the post-1990 period, the use of modern contraceptives increased rapidly in both urban and rural areas in the same period with the former having higher contraceptive uptake than the latter. While in the pre-1990 era contraceptive use had a strong depressing effect on fertility, the post-1990 era indicates the effect of contraception on fertility might have been lower. Median age at marriage is low both in rural and urban areas. Overall, urban women are married at age 19 whereas rural women are married one year earlier.

The results indicate that fertility is inversely related to the level of education. Between 1980 and 2005 fertility has fallen from 8.2 to 5.8, 6.9 to 4.5, and 4.1 to 3.2 children per woman among women with no education, primary education and secondary or higher education, respectively. In the period of concern fertility has fallen most both among uneducated and primary-educated women by about 2.4 children per woman. A much more rapid fertility decline occurred among uneducated and primary-educated women prior to 1990. The Pjs show that fertility decline occurred earlier for better educated women compared to uneducated women whose fertility decline followed later.

Uneducated women are more likely to shift their fertility behaviour than are educated women. Perhaps uneducated women's fertility has shifted more because it was higher to start with. The age pattern of fertility in the four surveys is similar among the educated women but different in each respective survey among uneducated women aged 30 and below. Between 1987 and 1993 fertility has fallen much more rapidly among uneducated women and then increased between 1998 and 2005. This shows indeed that the period TFR may be affected by shifts in timing of births since the CPFRs show a gradual fertility decline over time across all the levels of education. In addition the CPFRs reveal that the differences in fertility according to the level of education have narrowed over time. This finding sheds some light on the dynamics of reproductive changes that could have been widespread among the uneducated in recent times as a result of the diffusion of birth control technology or that family planning has strengthened over time.

Educated women are more likely to use modern contraceptives than women with no formal education. Between 1987 and 2005 the proportion of uneducated women in union using modern contraceptives has changed only a little whereas among educated women contraceptive use has increased substantially. Although differences are slight, educated women tend to marry later than uneducated women. Overall the median age at marriage among secondary or higher-educated women, primary-educated women and uneducated women has been found to be 17, 18 and 19 years, respectively, in all the surveys. Fducation among women might have brought about knowledge of health care and birth control, economic ambitions and realisations of personal needs which have a negative effect on fertility.

Rural (urban) residence and low (high) levels of education are associated with low-(high-) economic status. Fertility differentials by economic status exist. At extreme economic status segments, fertility is lowest amongst the richest women and highest amongst the poorest women in all the surveys. Affluent/high-economic status (i.e., the richest and richer) women have lower fertility than low-economic status (i.e., the poorest, very poor and poor) women in all the survey periods. Overall, the period TFR shows that there is a negative relationship between economic status and fertility. There are only marginal differences in the age at marriage across the levels of economic status, but marked differences in the use of modern contraceptives might have resulted in the fertility differentials. The results show that in all the surveys a positive correlation of contraceptive

use with economic status exists. With the exception of an anomaly among the richest class, across all the levels of economic status modem contraceptive use has increased over time.

Further analysis of the effects of economic status on fertility outcomes was conducted using multivariate analysis controlling for various socioeconomic and demographic variables. The study looked at the overall (net) effects of economic status and education on fertility and fertility preferences: having or not having given birth in the last five years before each survey and the desire to delay or stop childbearing. Overall, there is a negative relationship between economic status and having given birth among women who have had at least one child. Better educated women have the lowest odds of giving birth. This pattern of fertility behaviour is consistent in all the survey periods or over time. Among all women, the odds of giving (not giving) birth decreases (mcreases) with increase in wealth. Analysis of fertility preferences and intentions show some, although moderate, differences. Notably the odds of desiring to limit childbearing are lower among uneducated women relative to educated women in all the surveys. In general, the odds of desiring to delay childbearing decreases with economic status in all the surveys. On the whole, fertility control across economic strata has not yet spread equally over lime.

One should be careful not to over-interpret the results based on self reported fertility preferences and intentions since they may be biased due to rationalization and may not necessarily correlate with actual fertility behaviour. Further, there may be a thin line in separating the differences between long-term and short-term reproductive future expectations especially for women at lower parities.

The other limitation of the study is that the subject matter on the relationship between economic status and fertility outcomes has not received much attention in sub-Saharan Africa. Aggravating the situation is the fact that there are different quantifications and definitions amongst researchers which therefore make comparisons within countries and across countries difficult. Due to this conceptualisation problem, it is therefore necessary to undertake studies which refine on the methodologies or standardise measures to facilitate comparisons using the DHS data. If different measures of economic status were employed, although this is not the focus of this study, this would have determined if the same/different conclusions would be drawn. In addition, this study only looks at the impact of economic status on fertility (and fertility preferences) and does not take into account reverse causality, since childbearing also have an influence on economic status.

Measurement of fertility disaggregated by the urban-rural variable is prone to bias as mentioned earlier since women may change residence and report events in the place they did not occur. However, the variable is important for programme intervention and policy making. It is recommended that future studies should incorporate migration in the process of determining fertility. One coping strategy toward a crisis is migration and therefore it has consequences for fertility since temporary spousal separation or even divorces may occur. Further inquiry may be needed to compare the fertility of women native to both urban and rural areas with that for migrants. It should be noted, however, that due to the cross-sectional nature of DI IS data (since it measures events at one point in time) one cannot precisely track compositional changes of women over time in terms of their migration, residence, economic status, education amongst other important socioeconomic status variables partly because status can be changed anytime. This problem cannot be easily resolved since there is lack of longitudinal data or time-varying socioeconomic data in developing countries, and in Zimbabwe in particular. Collection of detailed migration histories, however, would not be cost effective as the objective of DHS surveys is to minimise the costs of collecting data.

AIDS does have some effect on fertility, although, limited DHS data used in the study does not permit an inquiry of fertility outcomes among infected and non-infected women. Further, change in economic settings may lead to, or vary with, fertility changes. The substantial protracted economic decline since 1999 in Zimbabwe may lead one to assume that the crisis had an impact on fertility and that it may have disproportionately increased the economic status gap among women. To draw conclusions on the effect of the crisis on fertility in Zimbabwe would be premature since the crisis is still ongoing. It would be of huge importance to use DHS dataset(s) post the crisis era to evaluate its effects on fertility. From the analysis in this study, the fertility rates declined almost proportionally across all in the surveys and there are no signs of a pronounced trend or deviations of fertility outcomes, even by socioeconomic subgroups. Hence there is not enough evidence to accept or refute the crisis-led fertility transition debate in Zimbabwe.

The study standardises the variables across the four ZDHS data sets and then fits the same model to each dataset for comparative purposes, therefore, the analysis does not intend to fit a 'best model' for each data set. It would be useful to fit a model for each survey to determine which factors best describe the fertility outcomes used in logistic

modelling and how these factors differ from those used in the study. It would be useful to conduct similar research in countries with different levels of fertility transition; early or later stage of fertility transition.

Despite the limitations mentioned above, this study shows that measures of socioeconomic status are linked to fertility behaviour; contraceptive use, parity progression, fertility as measured by TFR or timing of births/birth occurrence in regressions and these fertility measures corroborate each other in the analyses/findings. In other words, socioeconomic variables used in this study play an important role in defining a woman's fertility behaviour. It can be concluded that fertility has declined in all economic status levels, educational groups and urban-rural residential categories, and a negative relationship between these socioeconomic variables and fertility is observed in all the surveys. In other words, uneducated, low-economic status and rural women have larger families whereas educated, high-economic status and urban women have small families. The negative relationship between economic status and fertility is observed even after controlling for various socioeconomic variables. The net effects results show that fertility decreases with rising wealth as well as with education in all the surveys. The urban-rural residence differences in fertility seem to have remained constant over time whereas that between educational levels has reduced over time. Contraceptive use clearly is a more significant factor than age at marriage in explaining fertility differentials by socioeconomic factors (urban-rural residence, education and economic status) in Zimbabwe. Indeed contraceptive use is negatively related to socioeconomic variables whereas with median age at marriage the differences among the various categories of socioeconomic variables are only marginal. Fertility decline in Zimbabwe has occurred among all age groups and birth orders, especially among higher birth orders in recent years. In addition, the poorest lag behind in controlling their fertility as compared to the richest and hence leading to growing differences in fertility among population subgroups. Perhaps the high fertility among the poorest is a rational response to hardships or insecurity and hence insurance and replacement strategies may explain the benefits of large families among the poorest as suggested by Schoemaker (2004).

Overall, fertility differentials by socioeconomic factors (economic status, measure of wealth, and education) tend to remain. An increase in wealth and education among women tend to lower fertility (and fertility preferences). Therefore it is likely that levels of wealth

and education among women have a continued importance in shaping levels and trends in fertility. Despite the continued differentials in fertility, policy makers and planners should continue to ensure on increasing modern contraception and that it is affordable, accessible and used efficiently to the whole population. This would in the short-term or long-term reduce the unmet need for contraception/family planning. With regard to the static age of marriage, empowerment of women through improving on education, employment/labour-force participation and other mechanisms would motivate women in increasing their age of marriage thereby lowering fertility. Economic status was found to be a good predictor of fertility behaviour since the same negative relationship in the total fertility rates is found in multivariate analyses and that the differentials in fertility persist after the effects of education, rural-urban residence and other variables were controlled for. This suggests that the effect of economic status "wealth" goes beyond the effects of level of education and rural-urban residence on fertility behaviour. This study, altogether, adds to the body of knowledge on the importance of economic status in fertility analyses.

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APPENDIX A: COHORT-PERIOD FERTILITY RATES

1988 ZDHS

Cohort-period fertility rates by place of residence

Table A.1: Cohort-period fertility rates and P/F ratios for urban women aged 15-49, 1988 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.024	0.049	0.063	0.049	0.069	0.077	0.055
	20-24	0.166	0.226	0.210	0.236	0.220	0.208	
	25-29	0.193	0.247	0.256	0.284	0.230		
	30-34	0.190	0.210	0.235	0.208			
	35-39	0.146	0.165	0.170				
	40-44	0.086	0.093					
	45-49	0.027	0.027					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.121	0.243	0.315	0.243	0.347	0.385	0.274
	20-24	1.072	1.444	1.295	1.528	1.484	1.315	
	25-29	2.409	2.529	2.806	2.901	2.466		
	30-34	3.481	3.854	4.077	3.507			
	35-39	4.583	4.901	4.356				
	40-44	5.330	4.822					
	45-49	4.959						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.121	0.243	0.315	0.243	0.347	0.385	0.274
	20-24	0.950	1.372	1.367	1.423	1.446	1.426	
	25-29	1.916	2.605	2.645	2.841	2.597		
	30-34	2.868	3.654	3.821	3.882			
	35-39	3.597	4.478	4.670				
	40-44	4.026	4.944					
	45-49	4.163	5.081					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	1.128	1.053	0.947	1.073	1.026	0.922	
	25-29	1.258	0.971	1.061	1.021	0.950		
	30-34	1.214	1.055	1.067	0.903			
	35-39	1.274	1.094	0.933				
	40-44	1.324	0.975					
	45-49	1.191						

Table A.2: Cohort-period fertility rates and P/F ratios for rural women aged 15-49, 1988 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.043	0.061	0.076	0.080	0.071	0.091	0.102
	20-24	0.224	0.266	0.278	0.249	0.240	0.262	
	25-29	0.281	0.332	0.321	0.322	0.335		
	30-34	0.271	0.309	0.302	0.286			
	35-39	0.229	0.250	0.246				
	40-44	0.151	0.185					
	45-49	0.066	0.066					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.213	0.306	0.378	0.398	0.353	0.454	0.512
	20-24	1.425	1.709	1.786	1.600	1.652	1.820	
	25-29	3.112	3.446	3.206	3.264	3.493		
	30-34	4.799	4.753	4.775	4.935			
	35-39	5.897	6.026	6.166				
	40-44	6.780	7.092					
	45-49	7.424						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.213	0.306	0.378	0.398	0.353	0.454	0.512
	20-24	1.332	1.637	1.766	1.645	1.551	1.763	
	25-29	2.735	3.297	3.372	3.258	3.224		
	30-34	4.088	4.844	4.883	4.700			
	35-39	5.232	6.095	6.114				
	40-44	5.985	7.021					
	45-49	6.317	7.353					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	1.070	1.044	1.012	0.972	1.065	1.033	
	25-29	1.138	1.045	0.951	1.002	1.083		
	30-34	1.174	0.981	0.978	1.050			
	35-39	1.127	0.988	1.009				
	40-44	1.133	1.010					
	45-49	1.175						

Cohort-period fertility rates by education

Table A.3: Cohort-period fertility rates and P/F ratios for women with no education aged 15-49, 1988 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.100	0.136	0.113	0.124	0.081	0.115	0.115
	20-24	0.281	0.279	0.282	0.249	0.202	0.217	
	25-29	0.277	0.347	0.338	0.255	0.302		
	30-34	0.306	0.319	0.277	0.266			
	35-39	0.237	0.249	0.244				
	40-44	0.136	0.215					
	45-49	0.098	0.098					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.500	0.678	0.566	0.618	0.407	0.574	0.573
	20-24	2.085	1.959	2.029	1.654	1.585	1.659	
	25-29	3.344	3.765	3.346	2.862	3.171		
	30-34	5.294	4.938	4.245	4.500			
	35-39	6.123	5.489	5.720				
	40-44	6.170	6.793					
	45-49	7.280						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.500	0.678	0.566	0.618	0.407	0.574	0.573
	20-24	1.907	2.071	1.977	1.865	1.418	1.660	
	25-29	3.292	3.807	3.669	3.141	2.930		
	30-34	4.821	5.399	5.052	4.470			
	35-39	6.007	6.644	6.271				
	40-44	6.687	7.717					
	45-49	7.175	8.205					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	1.093	0.946	1.026	0.887	1.118	0.999	
	25-29	1.016	0.989	0.912	0.911	1.082		
	30-34	1.098	0.915	0.840	1.007			
	35-39	1.019	0.826	0.912				
	40-44	0.923	0.880					
	45-49	1.015						

Table A.4: Cohort-period fertility rates and P/F ratios for women with primary education aged 15-49, 1988 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.042	0.092	0.074	0.064	0.071	0.080	0.088
	20-24	0.271	0.271	0.263	0.256	0.264	0.280	
	25-29	0.262	0.308	0.301	0.334	**0.314**		
	30-34	0.235	0.285	0.293	**0.278**			
	35-39	0.205	0.233	0.222				
	40-44	0.141	0.147					
	45-49	0.045	**0.045**					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.209	0.458	0.369	0.322	0.354	0.402	0.441
	20-24	1.812	1.724	1.636	1.636	1.722	1.840	
	25-29	3.036	3.177	3.141	3.392	3.410		
	30-34	4.353	4.564	4.856	4.798			
	35-39	5.589	6.021	5.910				
	40-44	6.727	6.644					
	45-49	6.867						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.209	0.458	0.369	0.322	0.354	0.402	0.441
	20-24	1.563	1.813	1.683	1.604	1.674	1.801	
	25-29	2.875	3.353	3.188	3.274	3.243		
	30-34	4.052	4.776	4.652	4.663			
	35-39	5.077	5.941	5.764				
	40-44	5.783	6.675					
	45-49	6.007	**6.898**					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	1.159	0.951	0.972	1.020	1.029	1.022	
	25-29	1.056	0.947	0.985	1.036	1.051		
	30-34	1.074	0.956	1.044	**1.029**			
	35-39	1.101	1.013	**1.025**				
	40-44	1.163	**0.995**					
	45-49	**1.143**						

Table A.5: Cohort-period fertility rates and P/F ratios for women with secondary or higher education aged 15-49, 1988 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.029	0.016	0.026	0.029	0.053	0.040	0.010
	20-24	0.131	0.172	0.190	0.184	0.140	0.080	
	25-29	0.191	0.231	0.253	0.340	0.280		
	30-34	0.204	0.197	0.240	0.190			
	35-39	0.150	0.107	0.200				
	40-44	0.060	0.090					
	45-49	0.000	0.000					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.144	0.078	0.131	0.147	0.266	0.200	0.050
	20-24	0.732	0.993	1.098	1.188	0.900	0.450	
	25-29	1.949	2.255	2.453	2.600	1.850		
	30-34	3.275	3.438	3.800	2.800			
	35-39	4.188	4.333	3.800				
	40-44	4.633	4.250					
	45-49	4.250						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.144	0.078	0.131	0.147	0.266	0.200	0.050
	20-24	0.798	0.939	1.082	1.069	0.966	0.600	
	25-29	1.754	2.096	2.348	2.769	2.366		
	30-34	2.774	3.080	3.548	3.719			
	35-39	3.524	3.614	4.548				
	40-44	3.824	4.064					
	45-49	3.824	4.064					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	0.917	1.057	1.014	1.111	0.932	0.750	
	25-29	1.111	1.076	1.045	0.939	0.782		
	30-34	1.181	1.116	1.071	0.763			
	35-39	1.188	1.199	0.836				
	40-44	1.212	1.046					
	45-49	1.112						

1994 ZDHS

Cohort-period fertility rates by place of residence

Table A.6: Cohort-period fertility rates and P/F ratios for urban women aged 15-49, 1994 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.025	0.023	0.071	0.067	0.046	0.064	0.089
	20-24	0.136	0.167	0.226	0.218	0.214	0.225	
	25-29	0.166	0.208	0.257	0.228	0.277		
	30-34	0.152	0.184	0.221	0.169			
	35-39	0.110	0.149	0.112				
	40-44	0.058	0.076					
	45-49	0.007	0.007					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.126	0.113	0.356	0.336	0.230	0.318	0.444
	20-24	0.793	1.191	1.463	1.321	1.387	1.570	
	25-29	2.023	2.503	2.608	2.528	2.955		
	30-34	3.264	3.527	3.631	3.799			
	35-39	4.075	4.374	4.358				
	40-44	4.665	4.738					
	45-49	4.771						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.126	0.113	0.356	0.336	0.230	0.318	0.444
	20-24	0.806	0.948	1.484	1.428	1.299	1.443	
	25-29	1.637	1.988	2.771	2.568	2.684		
	30-34	2.398	2.907	3.874	3.411			
	35-39	2.946	3.650	4.433				
	40-44	3.237	4.030					
	45-49	3.270	4.063					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	0.984	1.257	0.986	0.926	1.068	1.087	
	25-29	1.235	1.259	0.941	0.984	1.101		
	30-34	1.361	1.213	0.937	1.113			
	35-39	1.383	1.198	0.983				
	40-44	1.441	1.176					
	45-49	1.459						

Table A.7: Cohort-period fertility rates and P/F ratios for rural women aged 15-49, 1994 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.036	0.056	0.066	0.073	0.075	0.061	0.069
	20-24	0.199	0.211	0.276	0.255	0.241	0.247	
	25-29	0.225	0.283	0.328	0.331	0.309		
	30-34	0.207	0.282	0.314	0.306			
	35-39	0.172	0.237	0.263				
	40-44	0.127	0.169					
	45-49	0.045	0.045					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.182	0.281	0.332	0.366	0.376	0.306	0.346
	20-24	1.276	1.388	1.746	1.652	1.508	1.582	
	25-29	2.513	3.159	3.292	3.164	3.127		
	30-34	4.192	4.703	4.736	4.658			
	35-39	5.562	5.919	5.976				
	40-44	6.556	6.822					
	45-49	7.049						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.182	0.281	0.332	0.366	0.376	0.306	0.346
	20-24	1.177	1.336	1.713	1.641	1.579	1.542	
	25-29	2.302	2.749	3.352	3.297	3.124		
	30-34	3.334	4.161	4.924	4.828			
	35-39	4.193	5.344	6.242				
	40-44	4.830	6.190					
	45-49	5.057	6.417					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	1.084	1.039	1.019	1.006	0.955	1.026	
	25-29	1.092	1.149	0.982	0.960	1.001		
	30-34	1.257	1.130	0.962	0.965			
	35-39	1.327	1.108	0.957				
	40-44	1.357	1.102					
	45-49	1.394						

Cohort-period fertility rates by education

Table A.8: Cohort-period fertility rates and P/F ratios for women with no education aged 15-49, 1994 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.095	0.143	0.146	0.136	0.115	0.084	0.079
	20-24	0.229	0.268	0.319	0.253	0.231	0.212	
	25-29	0.197	0.283	0.303	0.297	0.271		
	30-34	0.208	0.285	0.295	0.299			
	35-39	0.165	0.251	0.279				
	40-44	0.131	0.207					
	45-49	0.064	0.064					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.476	0.713	0.732	0.678	0.576	0.419	0.394
	20-24	1.860	2.070	2.274	1.841	1.572	1.454	
	25-29	3.054	3.689	3.356	3.056	2.810		
	30-34	4.728	4.783	4.529	4.305			
	35-39	5.606	5.786	5.700				
	40-44	6.439	6.737					
	45-49	7.056						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.476	0.713	0.732	0.678	0.576	0.419	0.394
	20-24	1.623	2.050	2.328	1.943	1.729	1.480	
	25-29	2.608	3.465	3.843	3.428	3.084		
	30-34	3.646	4.892	5.315	4.923			
	35-39	4.469	6.149	6.710				
	40-44	5.123	7.187					
	45-49	5.441	7.506					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	1.146	1.009	0.977	0.947	0.909	0.983	
	25-29	1.171	1.065	0.873	0.892	0.911		
	30-34	1.297	0.978	0.852	0.874			
	35-39	1.254	0.941	0.849				
	40-44	1.257	0.937					
	45-49	1.297						

Table A.9: Cohort-period fertility rates and P/F ratios for women with primary education aged 15-49, 1994 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.055	0.068	0.097	0.064	0.053	0.055	0.080
	20-24	0.221	0.252	0.283	0.249	0.250	0.263	
	25-29	0.230	0.275	0.316	0.320	0.318		
	30-34	0.196	0.251	0.301	0.277			
	35-39	0.158	0.209	0.220				
	40-44	0.107	0.131					
	45-49	0.028	**0.028**					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.273	0.341	0.483	0.319	0.266	0.273	0.400
	20-24	1.445	1.743	1.732	1.509	1.525	1.716	
	25-29	2.891	3.106	3.087	3.124	3.308		
	30-34	4.086	4.341	4.628	4.692			
	35-39	5.130	5.672	5.792				
	40-44	6.206	6.446					
	45-49	6.588						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.273	0.341	0.483	0.319	0.266	0.273	0.400
	20-24	1.377	1.601	1.896	1.562	1.518	1.589	
	25-29	2.525	2.975	3.475	3.161	3.110		
	30-34	3.506	4.228	4.979	4.545			
	35-39	4.295	5.271	6.079				
	40-44	4.829	5.925					
	45-49	4.972	**6.067**					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	1.049	1.089	0.913	0.966	1.004	1.080	
	25-29	1.145	1.044	0.889	0.988	1.064		
	30-34	1.166	1.027	0.930	1.032			
	35-39	1.194	1.076	0.953				
	40-44	1.285	1.088					
	45-49	1.325						

Table A.10: Cohort-period fertility rates and P/F ratios for women with secondary or higher education aged 15-49, 1994 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.017	0.025	0.035	0.046	0.037	0.058	0.003
	20-24	0.148	0.143	0.164	0.200	0.138	0.185	
	25-29	0.187	0.197	0.263	0.223	0.283		
	30-34	0.154	0.193	0.212	0.186			
	35-39	0.101	0.160	0.133				
	40-44	0.077	0.079					
	45-49	0.007	**0.007**					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.086	0.127	0.176	0.229	0.185	0.292	0.017
	20-24	0.869	0.893	1.051	1.187	0.979	0.941	
	25-29	1.830	2.039	2.503	2.092	2.354		
	30-34	2.811	3.469	3.152	3.282			
	35-39	3.975	3.953	3.945				
	40-44	4.338	4.341					
	45-49	4.374						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.086	0.127	0.176	0.229	0.185	0.292	0.017
	20-24	0.828	0.844	0.998	1.231	0.873	1.216	
	25-29	1.765	1.831	2.314	2.345	2.285		
	30-34	2.537	2.797	3.373	3.273			
	35-39	3.043	3.598	4.036				
	40-44	3.428	3.994					
	45-49	3.462	**4.027**					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	1.049	1.058	1.053	0.964	1.122	0.774	
	25-29	1.037	1.113	1.082	0.892	1.030		
	30-34	1.108	1.240	0.934	1.003			
	35-39	1.306	1.099	0.977				
	40-44	1.265	1.087					
	45-49	1.264						

1999 ZDHS

Cohort-period fertility rates by place of residence

Table A.11: Cohort-period fertility rates and P/F ratios for urban women aged 15-49, 1999 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.029	0.027	0.032	0.029	0.053	0.063	0.038
	20-24	0.132	0.148	0.146	0.219	0.216	0.206	
	25-29	0.171	0.189	0.222	0.266	0.232		
	30-34	0.124	0.152	0.187	0.215			
	35-39	0.099	0.125	0.150				
	40-44	0.044	0.063					
	45-49	0.008	0.008					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.146	0.135	0.161	0.146	0.266	0.315	0.190
	20-24	0.795	0.903	0.878	1.363	1.395	1.219	
	25-29	1.757	1.823	2.473	2.724	2.378		
	30-34	2.442	3.233	3.658	3.450			
	35-39	3.727	4.285	4.201				
	40-44	4.506	4.514					
	45-49	4.556						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.146	0.135	0.161	0.146	0.266	0.315	0.190
	20-24	0.806	0.877	0.893	1.243	1.347	1.344	
	25-29	1.660	1.822	2.003	2.571	2.506		
	30-34	2.279	2.582	2.937	3.644			
	35-39	2.773	3.209	3.688				
	40-44	2.994	3.522					
	45-49	3.036	3.563					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	0.986	1.030	0.983	1.097	1.036	0.907	
	25-29	1.058	1.001	1.235	1.059	0.949		
	30-34	1.072	1.252	1.245	0.947			
	35-39	1.344	1.335	1.139				
	40-44	1.505	1.282					
	45-49	1.501						

Table A.12: Cohort-period fertility rates and P/F ratios for rural women aged 15-49, 1999 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.040	0.052	0.059	0.056	0.069	0.058	0.050
	20-24	0.202	0.205	0.223	0.266	0.245	0.234	
	25-29	0.215	0.241	0.296	0.317	0.324		
	30-34	0.179	0.207	0.279	0.307			
	35-39	0.149	0.194	0.263				
	40-44	0.093	0.172					
	45-49	0.042	0.042					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.200	0.262	0.296	0.281	0.345	0.291	0.250
	20-24	1.273	1.320	1.395	1.675	1.518	1.420	
	25-29	2.395	2.598	3.156	3.106	3.041		
	30-34	3.496	4.193	4.503	4.574			
	35-39	4.937	5.475	5.887				
	40-44	5.941	6.748					
	45-49	6.958						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.200	0.262	0.296	0.281	0.345	0.291	0.250
	20-24	1.211	1.286	1.411	1.611	1.572	1.461	
	25-29	2.287	2.489	2.892	3.198	3.193		
	30-34	3.184	3.526	4.289	4.731			
	35-39	3.928	4.498	5.603				
	40-44	4.394	5.358					
	45-49	4.604	5.568					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	1.051	1.026	0.989	1.040	0.966	0.972	
	25-29	1.047	1.044	1.091	0.971	0.952		
	30-34	1.098	1.189	1.050	0.967			
	35-39	1.257	1.217	1.051				
	40-44	1.352	1.259					
	45-49	1.511						

Cohort-period fertility rates by education

Table A.13: Cohort-period fertility rates and P/F ratios for women with no education aged 15-49, 1999 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.064	0.128	0.154	0.138	0.099	0.080	0.056
	20-24	0.239	0.220	0.240	0.283	0.245	0.214	
	25-29	0.250	0.245	0.305	0.318	0.286		
	30-34	0.182	0.235	0.286	0.293			
	35-39	0.150	0.187	0.264				
	40-44	0.090	0.170					
	45-49	0.049	0.049					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.318	0.639	0.768	0.688	0.495	0.402	0.279
	20-24	1.832	1.870	1.889	1.910	1.627	1.350	
	25-29	3.118	3.115	3.437	3.219	2.783		
	30-34	4.026	4.610	4.647	4.248			
	35-39	5.357	5.580	5.566				
	40-44	6.032	6.417					
	45-49	6.660						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.318	0.639	0.768	0.688	0.495	0.402	0.279
	20-24	1.511	1.741	1.969	2.103	1.720	1.474	
	25-29	2.759	2.967	3.496	3.694	3.153		
	30-34	3.669	4.139	4.923	5.160			
	35-39	4.417	5.073	6.242				
	40-44	4.869	5.924					
	45-49	5.112	6.167					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	1.213	1.074	0.959	0.908	0.946	0.916	
	25-29	1.130	1.050	0.983	0.871	0.883		
	30-34	1.097	1.114	0.944	0.823			
	35-39	1.213	1.100	0.892				
	40-44	1.239	1.083					
	45-49	1.303						

Table A.14: Cohort-period fertility rates and P/F ratios for women with primary education aged 15-49, 1999 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.059	0.075	0.078	0.069	0.067	0.058	0.051
	20-24	0.217	0.223	0.261	**0.262**	0.244	**0.241**	
	25-29	0.212	0.250	0.278	0.314	0.324		
	30-34	0.176	0.181	0.260	0.295			
	35-39	0.137	0.186	0.235				
	40-44	0.083	0.146					
	45-49	0.032	**0.032**					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.294	0.373	0.388	0.346	0.333	0.291	0.255
	20-24	1.459	1.503	1.652	1.642	1.512	1.460	
	25-29	2.563	2.902	3.031	3.079	3.079		
	30-34	3.781	3.938	4.380	4.552			
	35-39	4.621	5.311	5.730				
	40-44	5.725	6.458					
	45-49	6.618						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.294	0.373	0.388	0.346	0.333	0.291	0.255
	20-24	1.380	1.489	1.694	1.654	1.554	1.496	
	25-29	2.439	2.739	3.084	3.222	3.172		
	30-34	3.318	3.646	4.384	4.696			
	35-39	4.001	4.577	5.562				
	40-44	4.415	5.304					
	45-49	4.575	**5.465**					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	1.058	1.010	**0.975**	**0.992**	**0.973**	**0.976**	
	25-29	1.051	1.060	**0.983**	**0.956**	**0.970**		
	30-34	1.139	1.080	**0.999**	**0.970**			
	35-39	1.155	1.160	1.030				
	40-44	1.297	1.217					
	45-49	1.447						

Table A.15: Cohort-period fertility rates and P/F ratios for women with secondary or higher education aged 15-49, 1999 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.026	0.021	0.026	0.021	0.026	0.037	0.018
	20-24	0.144	0.156	0.142	0.190	0.196	0.185	
	25-29	0.185	0.198	0.221	0.236	**0.216**		
	30-34	0.143	0.169	0.180	0.210			
	35-39	0.103	0.110	0.169				
	40-44	0.050	0.085					
	45-49	0.012	**0.012**					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.128	0.107	0.131	0.104	0.130	0.187	0.089
	20-24	0.826	0.909	0.815	1.082	1.169	1.013	
	25-29	1.834	1.805	2.187	2.347	2.096		
	30-34	2.520	3.030	3.247	3.146			
	35-39	3.544	3.796	3.993				
	40-44	4.043	4.419					
	45-49	4.479						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.128	0.107	0.131	0.104	0.130	0.187	0.089
	20-24	0.847	0.885	0.843	1.056	1.111	1.112	
	25-29	1.772	1.874	1.948	2.234	2.194		
	30-34	2.487	2.717	2.848	3.285			
	35-39	3.000	3.266	3.695				
	40-44	3.248	3.691					
	45-49	3.308	**3.751**					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	0.975	1.027	0.968	1.025	1.052	**0.911**	
	25-29	1.035	0.963	1.123	1.051	**0.955**		
	30-34	1.013	1.115	1.140	**0.958**			
	35-39	1.181	1.162	**1.081**				
	40-44	1.245	1.197					
	45-49	1.354						

Cohort-period fertility rates by place of residence

Table A.16: Cohort-period fertility rates and P/F ratios for urban women aged 15-49, 2005 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.023	0.025	0.028	0.033	0.048	0.038	0.050
	20-24	0.120	0.150	0.148	0.168	0.212	0.219	
	25-29	0.151	0.168	0.173	0.202	0.263		
	30-34	0.124	0.149	0.157	0.180			
	35-39	0.075	0.095	0.114				
	40-44	0.033	0.040					
	45-49	0.007	0.007					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.117	0.124	0.138	0.164	0.238	0.191	0.249
	20-24	0.725	0.887	0.906	1.081	1.253	1.345	
	25-29	1.642	1.748	1.945	2.266	2.658		
	30-34	2.370	2.691	3.052	3.559			
	35-39	3.068	3.528	4.131				
	40-44	3.691	4.333					
	45-49	4.366						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.117	0.124	0.138	0.164	0.238	0.191	0.249
	20-24	0.717	0.872	0.881	1.006	1.300	1.288	
	25-29	1.472	1.714	1.745	2.018	2.613		
	30-34	2.095	2.460	2.532	2.919			
	35-39	2.472	2.936	3.104				
	40-44	2.634	3.137					
	45-49	2.667	3.171					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	1.010	1.016	1.029	1.074	0.964	1.045	
	25-29	1.115	1.020	1.115	1.122	1.017		
	30-34	1.132	1.094	1.206	1.219			
	35-39	1.241	1.202	1.331				
	40-44	1.401	1.381					
	45-49	1.637						

Table A.17: Cohort-period fertility rates and P/F ratios for rural women aged 15-49, 2005 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.041	0.058	0.058	0.061	0.059	0.061	0.062
	20-24	0.211	0.206	**0.217**	**0.193**	0.268	0.245	
	25-29	0.220	0.232	0.248	0.272	0.322		
	30-34	0.188	0.193	0.235	0.268			
	35-39	0.136	0.172	0.193				
	40-44	0.092	0.104					
	45-49	0.034	**0.034**					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.205	0.291	0.289	0.306	0.295	0.307	0.311
	20-24	1.347	1.318	1.392	1.258	1.648	1.536	
	25-29	2.419	2.551	2.496	3.008	3.148		
	30-34	3.491	3.462	4.184	4.486			
	35-39	4.140	5.044	5.450				
	40-44	5.505	5.968					
	45-49	6.137						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.205	0.291	0.289	0.306	0.295	0.307	0.311
	20-24	1.261	1.320	1.375	1.269	1.636	1.531	
	25-29	2.362	2.479	2.614	2.628	3.248		
	30-34	3.302	3.445	3.789	3.967			
	35-39	3.980	4.305	4.753				
	40-44	4.441	4.823					
	45-49	4.609	**4.992**					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	1.068	0.998	1.012	0.991	1.008	1.003	
	25-29	1.024	1.029	0.955	1.144	**0.969**		
	30-34	1.057	1.005	1.104	**1.131**			
	35-39	1.040	1.172	1.147				
	40-44	1.240	1.237					
	45-49	1.331						

Cohort-period fertility rates by level of education

Table A.18: Cohort-period fertility rates and P/F ratios for women with no education aged 15-49, 2005 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.080	0.097	0.069	0.097	0.140	0.078	0.085
	20-24	0.206	0.218	0.244	0.226	0.284	0.216	
	25-29	0.262	0.215	0.231	0.281	0.305		
	30-34	0.199	0.227	0.255	0.264			
	35-39	0.157	0.183	0.199				
	40-44	0.105	0.134					
	45-49	0.053	0.053					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.399	0.486	0.344	0.483	0.698	0.391	0.423
	20-24	1.514	1.433	1.705	1.826	1.813	1.503	
	25-29	2.744	2.781	2.983	3.216	3.026		
	30-34	3.774	4.118	4.490	4.346			
	35-39	4.903	5.406	5.341				
	40-44	5.932	6.009					
	45-49	6.275						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.399	0.486	0.344	0.483	0.698	0.391	0.423
	20-24	1.427	1.575	1.566	1.611	2.120	1.471	
	25-29	2.739	2.651	2.723	3.014	3.643		
	30-34	3.731	3.786	3.996	4.334			
	35-39	4.516	4.702	4.991				
	40-44	5.042	5.371					
	45-49	5.308	5.637					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	1.061	0.910	1.089	1.133	0.855	1.021	
	25-29	1.002	1.049	1.096	1.067	0.831		
	30-34	1.011	1.088	1.123	1.003			
	35-39	1.085	1.150	1.070				
	40-44	1.176	1.119					
	45-49	1.182						

Table A.19: Cohort-period fertility rates and P/F ratios for women with primary education aged 15-49, 2005 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.057	0.089	0.073	0.080	0.082	0.061	0.054
	20-24	0.237	0.239	0.238	0.244	0.268	0.257	
	25-29	0.216	0.227	0.231	0.262	0.325		
	30-34	0.185	0.192	0.212	0.258			
	35-39	0.130	0.150	0.176				
	40-44	0.075	0.082					
	45-49	0.022	**0.022**					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.284	0.444	0.367	0.400	0.410	0.304	0.270
	20-24	1.627	1.564	1.590	1.628	1.645	1.553	
	25-29	2.645	2.725	2.783	2.953	3.176		
	30-34	3.652	3.744	4.011	4.464			
	35-39	4.392	4.763	5.342				
	40-44	5.137	5.754					
	45-49	5.864						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.284	0.444	0.367	0.400	0.410	0.304	0.270
	20-24	1.467	1.641	1.557	1.618	1.751	1.587	
	25-29	2.549	2.776	2.712	2.926	3.374		
	30-34	3.476	3.737	3.770	4.214			
	35-39	4.124	4.489	4.648				
	40-44	4.497	4.901					
	45-49	4.607	**5.011**					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	1.109	0.953	1.021	1.006	0.940	0.979	
	25-29	1.038	0.982	1.026	1.009	0.941		
	30-34	1.051	1.002	1.064	1.059			
	35-39	1.065	1.061	1.149				
	40-44	1.142	1.174					
	45-49	1.273						

Table A.20: Cohort-period fertility rates and P/F ratios for women with secondary or higher education aged 15-49, 2005 ZDHS

		Years prior to survey						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
	Age group of cohort at end of period							
C	COHORT PERIOD FERTILITY RATES							
	15-19	0.025	0.029	0.033	0.034	0.031	0.024	0.045
	20-24	0.150	0.158	0.166	0.145	0.191	0.198	
	25-29	0.182	0.198	0.207	0.201	0.244		
	30-34	0.152	0.160	0.169	0.173			
	35-39	0.096	0.109	0.126				
	40-44	0.042	0.045					
	45-49	0.009	**0.009**					
D	CUMULATIVE FERTILITY OF COHORTS AT END OF PERIOD (P)							
	15-19	0.124	0.143	0.166	0.169	0.156	0.121	0.224
	20-24	0.891	0.957	1.000	0.883	1.078	1.216	
	25-29	1.864	1.992	1.919	2.082	2.437		
	30-34	2.752	2.722	2.925	3.301			
	35-39	3.201	3.471	3.931				
	40-44	3.680	4.156					
	45-49	4.203						
E	CUMULATIVE FERTILITY WITHIN PERIODS (F)							
	15-19	0.124	0.143	0.166	0.169	0.156	0.121	0.224
	20-24	0.873	0.933	0.997	0.896	1.113	1.113	
	25-29	1.780	1.925	2.033	1.899	2.334		
	30-34	2.541	2.727	2.877	2.763			
	35-39	3.020	3.273	3.507				
	40-44	3.229	3.498					
	45-49	3.276	**3.545**					
F	P / F RATIOS							
	15-19	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	20-24	1.021	1.025	1.003	0.985	0.969	1.093	
	25-29	1.047	1.035	0.944	1.096	1.044		
	30-34	1.083	0.998	1.017	1.195			
	35-39	1.060	1.060	1.121				
	40-44	1.140	1.188					
	45-49	1.283						

APPENDIX B: PROJECTED PARITY PROGRESSION RATIOS

Table B.1: Projected parity progression ratios, 1988, 1994, 1999 and 2005 ZDHS, National

1988 DHS	Parity progression									
Age group	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10+
15-19	0.631	0.431								
20-24	0.859	0.785	0.764							
25-29	0.958	0.952	0.880	0.910	0.670	0.685	0.438			
30-34	0.971	0.963	0.939	0.946	0.792	0.811	0.791			
35-39	0.978	0.972	0.946	0.924	0.880	0.836	0.742	0.695		
40-44	0.975	0.948	0.949	0.944	0.878	0.888	0.861	0.819	0.674	0.654
45-49	0.966	0.964	0.941	0.945	0.908	0.885	0.829	0.825	0.765	0.683

1994 DHS	Parity progression									
Age group	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10+
15-19	0.702	0.499								
20-24	0.875	0.786	0.491							
25-29	0.960	0.839	0.692	0.659	0.689	0.882	0.536			
30-34	0.981	0.938	0.901	0.812	0.718	0.738	0.674			
35-39	0.987	0.960	0.941	0.889	0.843	0.787	0.720	0.516		
40-44	0.976	0.966	0.934	0.947	0.915	0.821	0.774	0.669	0.595	0.594
45-49	0.989	0.966	0.941	0.935	0.902	0.864	0.806	0.722	0.619	0.726

1999 DHS	Parity progression									
Age group	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10+
15-19	0.891	0.504								
20-24	0.975	0.718	0.529							
25-29	0.984	0.822	0.693	0.592	0.435					
30-34	0.954	0.896	0.791	0.687	0.616	0.570	0.547			
35-39	0.963	0.949	0.920	0.853	0.723	0.672	0.740	0.599	0.519	
40-44	0.973	0.965	0.934	0.906	0.833	0.819	0.703	0.620	0.652	0.340
45-49	0.981	0.974	0.931	0.912	0.915	0.853	0.737	0.728	0.680	0.491

2005 DHS	Parity progression									
Age group	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10+
15-19	0.761	0.776								
20-24	0.941	0.846	0.675							
25-29	0.975	0.922	0.700	0.572	0.720	0.491				
30-34	0.991	0.931	0.760	0.756	0.580	0.523	0.317			
35-39	0.975	0.919	0.825	0.756	0.591	0.612	0.593	0.543	0.421	
40-44	0.976	0.948	0.925	0.861	0.724	0.719	0.650	0.594	0.555	0.352
45-49	0.974	0.959	0.939	0.898	0.874	0.780	0.708	0.670	0.506	0.616

Figure B.1: Trends in national projected parity progression ratios according to residence by birth cohort and parity, 1988-2005 ZDHS

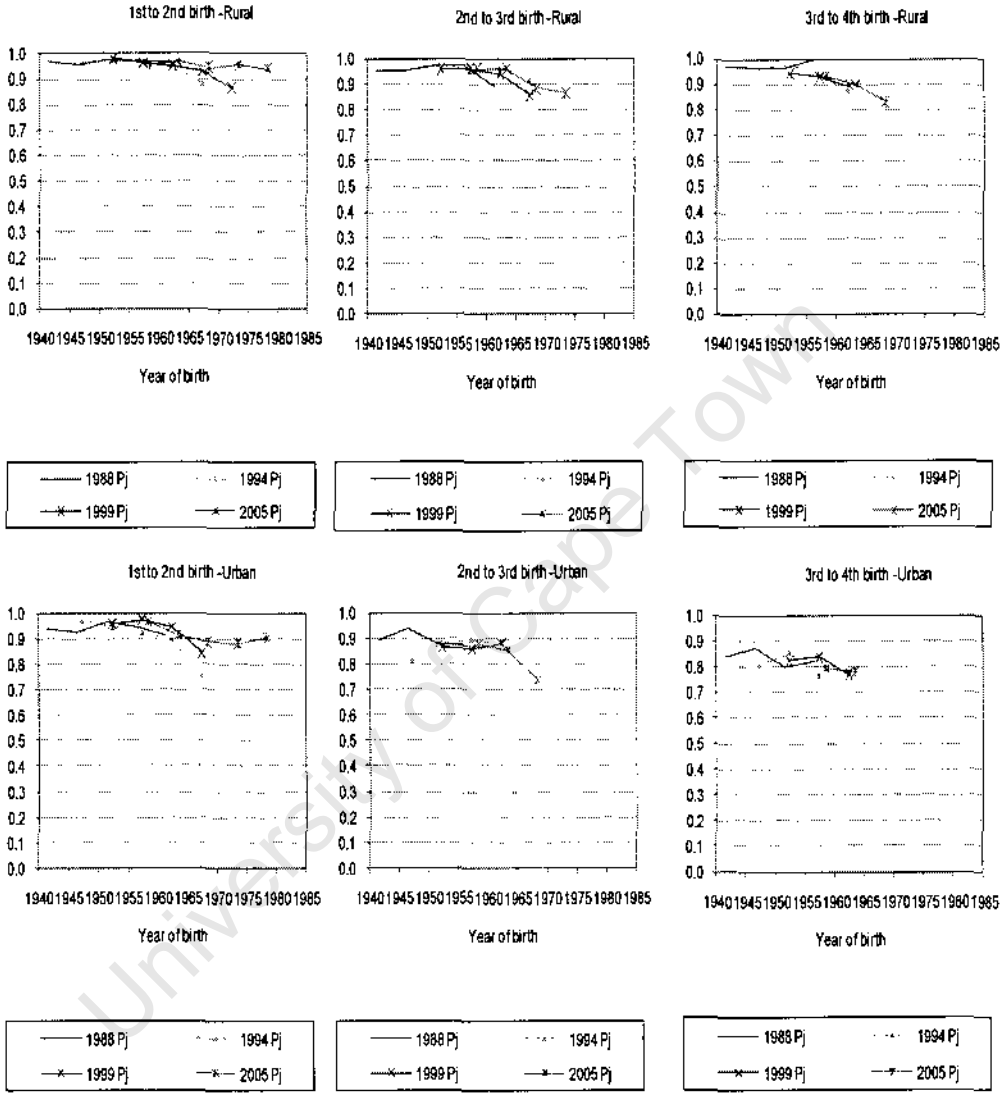
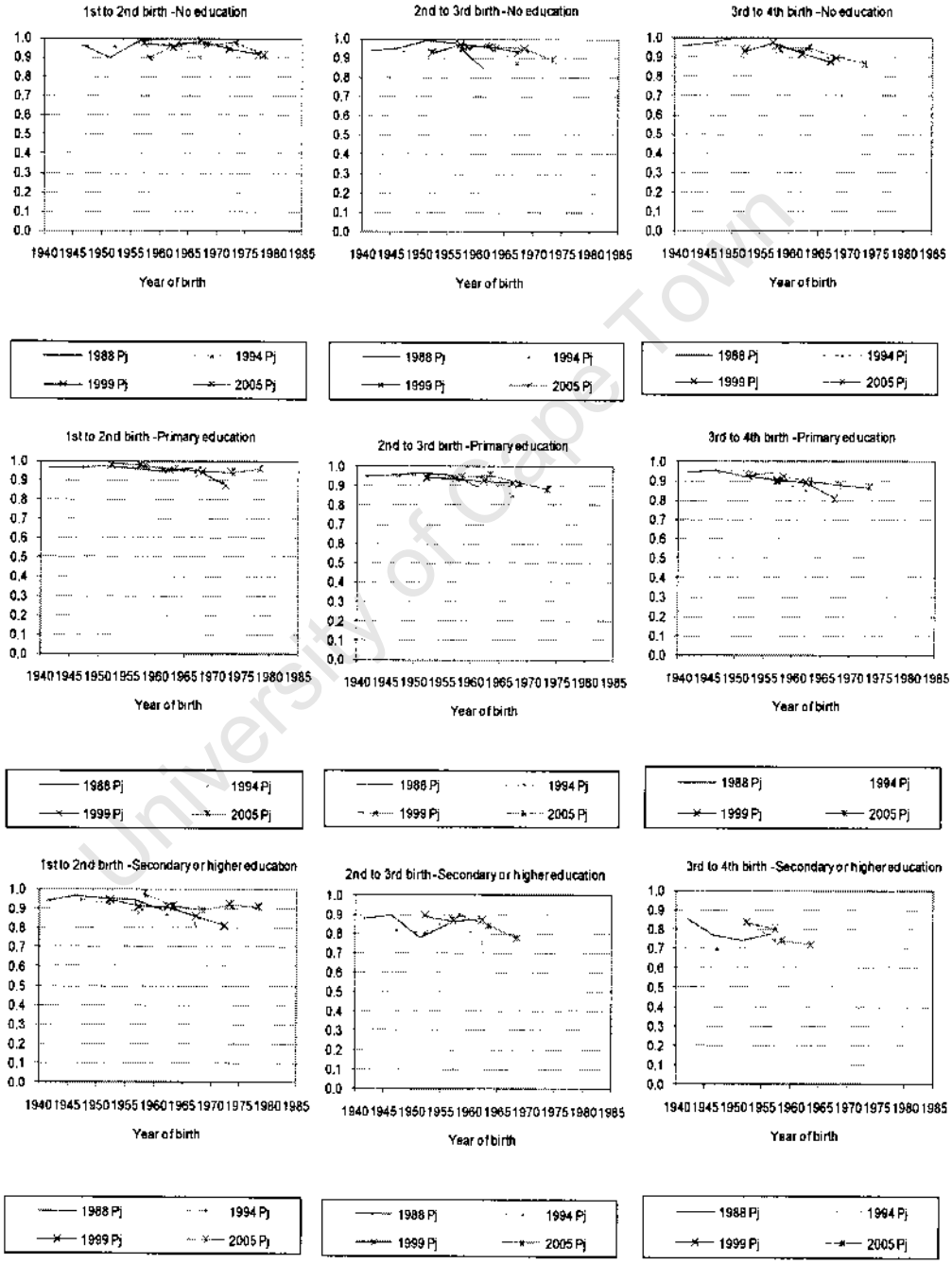


Figure B.2: Trends in national projected parity progression ratios according to education by birth cohort and parity, 1988-2005 ZDHS



APPENDIX C: LOGISTIC REGRESSION

An example of a statistical model for predicting the probability/odds of not having births in the last 5 years ('bv208') before the 1988 ZDHS

```
char v013 [omit]  3 -age
char nv106 [omit] 2 -education
char nv218 [omit] 0 -number of living children
char v102 [omit]  1 -place of residence
char v101 [omit]  0 -region of residence
char nv313 [omit] 0 -current use of modern contraceptives
char v714 [omit]  0 -employment status
char nv301 [omit] 0 -knowledge of modern contraceptives
char ES  [omit]   4 -economic status
xi: svy: logit bv208 i.ES i.nv106 i.ES*i.nv106 i.v102 i.ES*i.v102 i.v013 i.v013*i.nv106 i.v101 i.nv313 i.v714
i.nv301
*Computing GROSS EFFECTS and Checking for variables which are perfectly predicted
table v013 nv106, c(m bv208)
table ES v102, c(m bv208)
table ES nv106, c(m bv208)
*Generating a subpopulation for completely determined variables (age 45-49 & primary education)
generate subpop1 = 0 if v013==7 & nv106==2
recode subpop1 .=1
*New model using the subpop command
xi: svy, subpop(subpop1): logit bv208 i.ES*i.nv106 i.ES*i.v102 i.v013*i.nv106 i.v101 i.nv313 i.v714 i.nv301
*Post estimation commands
predict phat if e(sample), xb
*To derive the mean values of variables
tab ES nv106 if e(sample) & subpop==1 [iw=DHSwt]
tab ES v102 if e(sample) & subpop==1 [iw=DHSwt]
tab v013 nv106 if e(sample) & subpop==1 [iw=DHSwt]
tab v101 if e(sample) & subpop==1 [iw=DHSwt]
tab nv313 if e(sample) & subpop==1 [iw=DHSwt]
tab v714  if e(sample) & subpop==1 [iw=DHSwt]
tab nv301 if e(sample) & subpop==1 [iw=DHSwt]
```

Table C.1: Logistic regression results of the probability of having a birth among women with at least one child, 1988-2005 ZDHS

	1988				1994				1999				2005			
	Coef.	SE	[95%	CI]	Coef.	SE	[95%	CI]	Coef.	SE	[95%	CI]	Coef.	SE	[95%	CI]
Economic status																
Poorest	0.22	1.03	-1.81	2.24	2.02**	0.75	0.53	3.50	0.85	0.58	-0.30	2.00	0.60	0.39	-0.16	1.37
Very poor	1.79	1.28	-0.75	4.32	0.33	0.54	-0.73	1.39	1.11*	0.57	-0.02	2.24	2.34**	0.53	1.29	3.39
Poor	1.13	0.76	-0.37	2.63	-0.36	0.39	-1.12	0.41	-0.32	0.37	-1.05	0.41	-0.22	0.31	-0.82	0.39
Richer	0.17	0.44	-0.70	1.04	0.11	0.32	-0.52	0.75	0.28	0.21	-0.13	0.69	0.10	0.17	-0.22	0.43
Richest (ref.)																
Education																
No education	0.31	1.18	-2.01	2.63	-0.49	0.41	-1.30	0.31	0.22	1.00	-1.76	2.19	0.06	1.24	-2.39	2.51
Primary	-1.09**	0.50	-2.08	-0.10	-0.09	0.41	-0.90	0.72	-0.89**	0.36	-1.60	-0.19	-0.99**	0.34	-1.67	-0.31
Secondary + (ref.)																
Economic status*Education																
Poorest *No education	-1.26	1.32	-3.86	1.34	-0.71	0.49	-1.68	0.27	0.46	0.89	-1.29	2.22	0.77	0.79	-0.78	2.31
Poorest*Primary	0.40	0.79	-1.16	1.96	-0.78	0.50	-1.77	0.21	0.64	0.41	-0.17	1.44	0.75*	0.39	-0.01	1.51
Very poor*No education	-1.66	1.35	-4.33	1.00	-0.41	0.45	-1.30	0.48	-0.26	0.87	-1.97	1.46	1.24	0.82	-0.37	2.84
Very poor*Primary	0.15	0.86	-1.54	1.84	-0.75	0.46	-1.65	0.14	0.20	0.37	-0.52	0.93	0.97**	0.36	0.26	1.69
Poor*No education	-1.05	1.27	-3.55	1.46	-0.08	0.52	-1.11	0.94	0.22	0.91	-1.57	2.01	0.78	0.92	-1.03	2.59
Poor*Primary	0.21	0.60	-0.98	1.40	-0.14	0.46	-1.05	0.78	0.91**	0.42	0.09	1.74	0.96**	0.42	0.13	1.79
Richer*No education	-1.45	1.11	-3.65	0.74	---	---	---	---	-1.05	1.14	-3.29	1.20	---	---	---	---
Richer*Primary	0.32	0.54	-0.75	1.39	-0.29	0.47	-1.22	0.63	0.88**	0.34	0.21	1.55	0.74*	0.37	0.00	1.47
Place of residence																
Urban (ref.)																
Rural	0.39	0.54	-0.68	1.46	-0.57	0.50	-1.55	0.41	-0.25	0.56	-1.35	0.84	0.08	0.39	-0.68	0.84
Economic status*Residence																
Poorest*Rural	0.50	0.89	-1.25	2.26	-0.01	0.82	-1.63	1.61	---	---	---	---	---	---	---	---
Very poor*Rural	-1.19	1.20	-3.57	1.19	1.37**	0.64	0.11	2.63	---	---	---	---	-2.10**	0.64	-3.36	-0.84
Poor*Rural	-0.65	0.84	-2.31	1.01	1.14*	0.58	-0.01	2.28	0.80	0.66	-0.50	2.09	0.35	0.49	-0.61	1.32
Richer*Rural	-0.37	0.61	-1.58	0.85	0.77	0.55	-0.31	1.85	0.09	0.60	-1.10	1.28	0.14	0.42	-0.68	0.97

Table C.1: Continued

	1988				1994				1999				2005			
	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]
Age																
15-24	3.11**	0.48	2.15	4.06	2.83**	0.33	2.18	3.48	2.99**	0.26	2.47	3.50	2.83**	0.23	2.38	3.29
25-29 (ref.)																
30-34	-2.48**	0.35	-3.18	-1.79	-1.66**	0.26	-2.18	-1.15	-1.92**	0.21	-2.33	-1.50	-1.90**	0.14	-2.18	-1.61
35-39	-3.73**	0.54	-4.79	-2.67	-3.60**	0.35	-4.29	-2.91	-3.77**	0.29	-4.33	-3.21	-3.50**	0.18	-3.86	-3.14
40-49	-6.62**	0.58	-7.77	-5.47	-4.99**	0.46	-5.89	-4.08	-5.80**	0.52	-6.82	-4.78	-5.44**	0.27	-5.97	-4.92
Age*Education																
15-24*No education	0.26	0.97	-1.66	2.18	0.27	0.83	-1.35	1.90	-2.08**	0.93	-3.91	-0.26	----	----	----	----
15-24*Primary	-0.13	0.60	-1.31	1.05	0.34	0.41	-0.47	1.15	-0.64*	0.36	-1.35	0.07	-0.05	0.39	-0.81	0.72
30-34*No education	1.71**	0.63	0.47	2.95	0.44	0.45	-0.46	1.33	-0.59	0.82	-2.20	1.02	-0.08	1.38	-2.80	2.63
30-34*Primary	1.13**	0.42	0.30	1.95	0.09	0.30	-0.51	0.69	-0.05	0.34	-0.72	0.63	0.16	0.27	-0.36	0.69
35-39*No education	1.10	0.70	-0.28	2.48	1.27**	0.50	0.28	2.27	-0.07	0.75	-1.54	1.40	-0.16	1.33	-2.77	2.45
35-39*Primary	0.81	0.54	-0.25	1.87	0.86**	0.38	0.12	1.61	0.67**	0.31	0.05	1.29	0.54*	0.30	-0.04	1.12
40-49*No education	2.21**	0.64	0.94	3.47	1.17**	0.53	0.13	2.21	0.33	0.78	-1.20	1.87	-0.03	1.30	-2.58	2.53
40-49*Primary	1.92**	0.57	0.80	3.04	0.62	0.44	-0.24	1.49	0.84*	0.50	-0.13	1.82	0.21	0.32	-0.42	0.84
Region of residence																
Manicaland (ref.)																
Mashonaland Central	-0.02	0.26	-0.55	0.50	0.02	0.26	-0.49	0.53	-0.05	0.22	-0.49	0.39	0.10	0.18	-0.25	0.46
Mashonaland East	-0.16	0.19	-0.54	0.22	0.34	0.25	-0.15	0.83	-0.48**	0.20	-0.88	-0.08	-0.58**	0.20	-0.98	-0.19
Mashonaland West	-0.24	0.23	-0.69	0.22	0.14	0.24	-0.34	0.61	-0.43**	0.19	-0.80	-0.05	-0.05	0.17	-0.39	0.28
Matebeleland North	-0.20	0.24	-0.67	0.27	0.38	0.27	-0.14	0.90	-0.16	0.20	-0.55	0.24	0.02	0.21	-0.39	0.43
Matebeleland South	-0.19	0.21	-0.62	0.23	-0.06	0.23	-0.51	0.40	0.08	0.19	-0.30	0.46	0.06	0.19	-0.31	0.42
Midlands	-0.25	0.21	-0.66	0.17	0.02	0.24	-0.46	0.50	-0.20	0.21	-0.60	0.21	-0.05	0.18	-0.41	0.31
Masvingo	-0.34	0.27	-0.87	0.19	-0.06	0.24	-0.53	0.41	-0.30*	0.16	-0.62	0.01	0.16	0.19	-0.21	0.53
Harare	0.03	0.35	-0.65	0.72	0.10	0.31	-0.51	0.71	-0.50**	0.24	-0.97	-0.04	-0.15	0.17	-0.48	0.18
Bulawayo	-0.18	0.24	-0.65	0.29	0.21	0.32	-0.43	0.85	-0.40*	0.23	-0.86	0.06	-0.29	0.22	-0.72	0.13
Current use by modern method																
No (ref.)																
Yes	0.38**	0.13	0.13	0.63	0.45**	0.10	0.26	0.65	0.82**	0.11	0.60	1.05	0.78**	0.08	0.62	0.95

Table C.1: Continued

	1988				1994				1999				2005			
	Coef.	SE	[95%	CI]	Coef.	SE	[95%	CI]	Coef.	SE	[95%	CI]	Coef.	SE	[95%	CI]
Employment status																
Not working (ref.)																
Working	-0.17	0.13	-0.42	0.08	-0.28**	0.11	-0.50	-0.06	-0.21*	0.11	-0.43	0.00	-0.27**	0.09	-0.44	-0.10
Knowledge of any modern method																
No (ref.)																
Yes	0.23	0.45	-0.65	1.12	0.45	0.48	-0.49	1.39	-0.33	0.49	-1.28	0.63	0.39	0.60	-0.79	1.57
Number of living children																
1 (ref.)																
2	1.29**	0.22	0.86	1.72	1.20**	0.18	0.85	1.55	1.30**	0.16	0.97	1.62	1.10**	0.13	0.84	1.37
3	2.39**	0.23	1.94	2.85	2.12**	0.20	1.72	2.52	2.55**	0.20	2.15	2.94	2.48**	0.16	2.17	2.80
4 +	4.48**	0.27	3.94	5.01	3.70**	0.24	3.22	4.19	3.96**	0.24	3.48	4.43	3.86**	0.21	3.45	4.27
Age at first birth																
<15 (ref.)																
15-17	0.95**	0.26	0.44	1.45	0.75**	0.22	0.32	1.18	0.95**	0.33	0.30	1.59	0.64*	0.35	-0.04	1.32
18-19	1.48**	0.25	0.98	1.98	1.44**	0.22	1.01	1.86	1.49**	0.31	0.88	2.10	1.12**	0.34	0.45	1.79
20-24	2.17**	0.25	1.68	2.66	1.92**	0.22	1.49	2.36	2.40**	0.32	1.77	3.04	1.91**	0.34	1.24	2.58
>24	3.57**	0.38	2.82	4.33	3.18**	0.30	2.59	3.77	3.87**	0.40	3.09	4.65	3.81**	0.40	3.03	4.60
Constant	-1.61	0.62	-2.84	-0.39	-2.15**	0.64	-3.41	-0.88	-1.47**	0.68	-2.82	-0.12	-2.01	0.72	-3.42	-0.59

Note: ref. refers to reference category; OR refers to Odds Ratio; SE refers to Standard Error; 95% CI refers to 95% Confidence Interval; ---- indicates that the variable is omitted (not shown/estimated) in the respective survey.

**p<0.05; *p<0.10

Table C.2: Logistic regression results of the probability of not having a birth among all women, 1988-2005 ZDHS

	1988				1994				1999				2005			
	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]
Economic status																
Poorest	0.44	0.65	-0.85	1.73	-2.07**	0.53	-3.11	-1.02	-1.85**	0.34	-2.53	-1.17	-1.34**	0.27	-1.87	-0.80
Very poor	-0.74	0.58	-1.89	0.41	-1.03**	0.34	-1.70	-0.35	-2.27**	0.77	-3.79	-0.75	-2.12**	1.04	-4.18	-0.07
Poor	-0.96**	0.41	-1.78	-0.14	-0.25	0.42	-1.08	0.57	-0.44*	0.22	-0.88	-0.01	-0.51	0.43	-1.35	0.33
Richer	-0.65**	0.21	-1.07	-0.23	-0.82**	0.20	-1.22	-0.43	-0.80**	0.13	-1.06	-0.54	-0.42**	0.11	-0.64	-0.20
Richest (ref.)																
Education																
No education	-0.84	0.66	-2.15	0.46	0.23	0.40	-0.56	1.02	-1.51	1.03	-3.55	0.52	-1.35	1.30	-3.90	1.20
Primary	-0.11	0.36	-0.82	0.59	-0.34	0.32	-0.97	0.29	0.27	0.37	-0.46	1.00	0.90**	0.30	0.31	1.49
Secondary + (ref.)																
Economic status*Education																
Poorest *No education	0.15	0.67	-1.17	1.47	-0.28	0.39	-1.04	0.49	0.54	0.98	-1.39	2.47	-0.01	0.58	-1.15	1.14
Poorest*Primary	-0.62	0.41	-1.43	0.19	0.10	0.35	-0.58	0.78	-0.21	0.34	-0.88	0.45	-1.03**	0.31	-1.63	-0.43
Very poor*No education	0.58	0.63	-0.66	1.82	-0.30	0.38	-1.05	0.46	0.71	0.97	-1.20	2.62	-0.04	0.80	-1.61	1.53
Very poor*Primary	-0.45	0.37	-1.18	0.28	-0.09	0.32	-0.72	0.55	-0.35	0.32	-0.98	0.29	-0.99**	0.30	-1.58	-0.40
Poor*No education	-0.36	0.64	-1.63	0.91	---	---	---	---	0.49	0.97	-1.43	2.41	---	---	---	---
Poor*Primary	-0.91**	0.39	-1.67	-0.15	-0.19	0.33	-0.83	0.46	-0.52	0.33	-1.17	0.14	-0.87**	0.35	-1.55	-0.19
Richer*No education	0.87	0.67	-0.46	2.20	0.24	0.41	-0.56	1.05	1.84*	1.02	-0.18	3.86	0.93	0.78	-0.61	2.47
Richer*Primary	0.19	0.36	-0.53	0.91	0.64*	0.34	-0.04	1.32	-0.31	0.30	-0.91	0.29	-0.98**	0.31	-1.59	-0.37
Place of residence																
Urban (ref.)																
Rural	-0.11	0.34	-0.79	0.57	-0.06	0.40	-0.85	0.74	0.47	0.33	-0.19	1.12	0.03	0.28	-0.53	0.58
Economic status*Residence																
Poorest*Rural	-1.39*	0.70	-2.77	-0.02	0.53	0.61	-0.68	1.73	---	---	---	---	---	---	---	---
Very poor*Rural	-0.06	0.65	-1.35	1.23	-0.14	0.47	-1.07	0.78	0.67	0.83	-0.98	2.31	1.07	1.07	-1.04	3.19
Poor*Rural	0.52	0.53	-0.53	1.58	-0.44	0.55	-1.53	0.64	-0.91**	0.40	-1.70	-0.12	-0.28	0.52	-1.29	0.73
Richer*Rural	0.01	0.40	-0.78	0.80	-0.11	0.41	-0.92	0.70	-0.51	0.36	-1.22	0.20	-0.17	0.30	-0.76	0.43

Table C.2: Continued

	1988				1994				1999				2005			
	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]
Age																
15-19	2.52**	0.21	2.10	2.93	2.94**	0.20	2.55	3.33	2.57**	0.19	2.20	2.94	2.41**	0.13	2.15	2.67
20-24	0.82**	0.22	0.39	1.25	0.44**	0.14	0.16	0.72	0.31*	0.15	0.00	0.61	0.07	0.10	-0.14	0.27
25-29 (ref.)																
30-34	0.25	0.26	-0.27	0.76	0.29	0.23	-0.18	0.75	0.62**	0.18	0.25	0.98	0.55**	0.13	0.29	0.80
35-39	0.85*	0.44	-0.01	1.71	1.08**	0.29	0.51	1.64	1.44**	0.25	0.95	1.93	1.34**	0.15	1.04	1.64
40-44	2.35**	0.50	1.37	3.33	1.48**	0.38	0.72	2.24	2.09**	0.43	1.24	2.93	2.30**	0.23	1.85	2.75
45-49	2.09**	0.40	1.30	2.87	3.95**	1.00	1.98	5.91	3.69**	0.69	2.33	5.05	3.95**	0.51	2.94	4.96
Age*Education																
15-19*No education	-1.06**	0.51	-2.07	-0.06	-2.21**	0.65	-3.49	-0.93	0.54	0.85	-1.14	2.22	-0.12	1.37	-2.81	2.57
15-19*Primary	0.26	0.29	-0.31	0.82	-0.76**	0.26	-1.27	-0.25	-0.65**	0.26	-1.17	-0.13	-0.48**	0.23	-0.92	-0.03
20-24*No education	-1.51**	0.52	-2.55	-0.48	-1.19**	0.52	-2.22	-0.15	-0.13	0.92	-1.94	1.69	---	---	---	---
20-24*Primary	-1.10**	0.29	-1.68	-0.53	-0.50**	0.23	-0.96	-0.04	-0.51**	0.25	-1.01	-0.01	-0.52**	0.25	-1.00	-0.03
30-34*No education	-0.69	0.54	-1.76	0.38	-0.38	0.43	-1.23	0.46	0.93	0.77	-0.59	2.45	0.56	1.28	-1.95	3.07
30-34*Primary	-0.09	0.34	-0.76	0.57	0.02	0.29	-0.54	0.59	-0.24	0.35	-0.94	0.45	-0.09	0.25	-0.58	0.40
35-39*No education	-0.70	0.61	-1.90	0.50	-0.60	0.46	-1.51	0.32	0.49	0.77	-1.03	2.00	0.31	1.23	-2.11	2.73
35-39*Primary	-0.11	0.46	-1.02	0.80	-0.26	0.35	-0.94	0.42	-0.35	0.34	-1.03	0.33	-0.30	0.29	-0.88	0.27
40-44*No education	-0.72	0.64	-1.99	0.54	-0.59	0.50	-1.57	0.39	0.36	0.77	-1.15	1.87	0.39	1.22	-2.00	2.79
40-44*Primary	-0.97*	0.56	-2.08	0.13	-0.03	0.42	-0.86	0.80	-0.22	0.49	-1.18	0.75	-0.27	0.31	-0.89	0.34
45-49*No education	---	---	---	---	-2.01*	1.06	-4.09	0.08	-0.45	0.98	-2.38	1.47	-0.61	1.33	-3.23	2.01
45-49*Primary	0.70	0.45	-0.18	1.58	-0.78	1.01	-2.77	1.21	-0.72	0.74	-2.17	0.74	-0.52	0.58	-1.66	0.62

Table C.2: Continued

	1988				1994				1999				2005			
	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]
Region of residence																
Manicaland (ref.)																
Mashonaland Central	0.20	0.18	-0.15	0.55	0.12	0.17	-0.22	0.46	-0.09	0.15	-0.39	0.21	0.01	0.12	-0.22	0.23
Mashonaland East	0.19	0.15	-0.11	0.50	-0.17	0.16	-0.49	0.15	0.26	0.18	-0.10	0.62	0.57**	0.17	0.25	0.90
Mashonaland West	0.30*	0.18	-0.05	0.64	-0.12	0.18	-0.47	0.23	0.32	0.16	0.01	0.64	0.18	0.15	-0.11	0.47
Matebeleland North	0.02	0.16	-0.29	0.34	-0.49**	0.18	-0.84	-0.13	0.10	0.17	-0.23	0.43	0.22	0.17	-0.11	0.55
Matebeleland South	0.19	0.17	-0.14	0.51	-0.16	0.18	-0.51	0.18	-0.13	0.17	-0.46	0.21	0.15	0.16	-0.16	0.46
Midlands	0.14	0.15	-0.15	0.43	-0.02	0.18	-0.37	0.33	0.19	0.14	-0.08	0.47	0.16	0.15	-0.13	0.45
Masvingo	0.34**	0.17	0.01	0.66	0.17	0.16	-0.14	0.48	0.40**	0.13	0.13	0.67	0.01	0.17	-0.32	0.34
Harare	0.04	0.21	-0.38	0.46	-0.03	0.24	-0.52	0.45	0.36**	0.17	0.02	0.69	0.36**	0.15	0.07	0.66
Bulawayo	0.07	0.18	-0.29	0.42	-0.31	0.26	-0.83	0.21	0.28	0.18	-0.08	0.63	0.62**	0.17	0.29	0.96
Current use by modern method																
No (ref.)																
Yes	-1.77**	0.11	-1.98	-1.56	-1.57**	0.09	-1.73	-1.40	-1.79**	0.09	-1.97	-1.60	-1.92**	0.07	-2.05	-1.78
Employment status																
Not working (ref.)																
Working	0.08	0.09	-0.09	0.25	0.12	0.07	-0.03	0.26	0.08	0.08	-0.09	0.24	0.32**	0.08	0.17	0.48
Knowledge of any modern method																
No (ref.)																
Yes	-1.40**	0.27	-1.92	-0.87	-0.97**	0.27	-1.50	-0.45	-1.00**	0.30	-1.59	-0.41	-1.19**	0.30	-1.79	-0.60
Constant	1.42**	0.36	0.71	2.13	1.63**	0.41	0.81	2.45	1.33**	0.39	0.55	2.10	1.44**	0.37	0.72	2.17

Note: ref. refers to reference category; OR refers to Odds Ratio; SE refers to Standard Error; 95% CI refers to 95% Confidence Interval; ---- indicates that the variable is omitted (not shown/estimated) in the respective survey.

**p<0.05; *p<0.10

Table C.3: Logistic regression results of the probability of wanting/desiring to limit childbearing, 1988-2005 ZDHS

	1988				1994				1999				2005			
	Coef.	SE	[95%	CI]	Coef.	SE	[95%	CI]	Coef.	SE	[95%	CI]	Coef.	SE	[95%	CI]
Economic status																
Poorest	-1.18	2.20	-5.51	3.16	1.24*	0.73	-0.21	2.68	-0.38	0.38	-1.13	0.37	-0.98**	0.35	-1.67	-0.30
Very poor	-0.63	0.96	-2.53	1.27	-0.08	0.34	-0.74	0.59	-1.58	1.60	-4.73	1.57	0.39	0.62	-0.83	1.60
Poor	-2.16**	0.70	-3.55	-0.78	-0.42	0.45	-1.31	0.47	-0.41	0.37	-1.14	0.32	0.65**	0.24	0.17	1.12
Richer	-1.08**	0.36	-1.79	-0.36	-0.01	0.24	-0.48	0.46	-0.52**	0.19	-0.88	-0.15	-0.16	0.14	-0.45	0.12
Richest (ref.)																
Education																
No education	-1.41	1.25	-3.87	1.06	-1.40	0.86	-3.08	0.29	-3.09**	0.99	-5.04	-1.14	-0.33	0.94	-2.19	1.52
Primary	-1.63**	0.38	-2.39	-0.88	-0.71	0.49	-1.68	0.26	-0.77*	0.44	-1.63	0.08	-0.55	0.34	-1.22	0.13
Secondary + (ref.)																
Economic status*Education																
Poorest *No education	-0.60	1.34	-3.24	2.05	0.61	0.80	-0.97	2.20	1.68*	0.95	-0.20	3.56	-1.99**	0.72	-3.40	-0.58
Poorest*Primary	0.13	0.61	-1.07	1.33	0.03	0.46	-0.87	0.93	0.04	0.45	-0.86	0.93	-0.07	0.35	-0.76	0.63
Very poor*No education	1.32	1.44	-1.52	4.17	1.12	0.82	-0.50	2.73	1.90**	0.92	0.08	3.72	-1.55*	0.85	-3.22	0.12
Very poor*Primary	1.31*	0.76	-0.18	2.81	0.16	0.46	-0.74	1.07	0.27	0.43	-0.58	1.11	-0.08	0.36	-0.78	0.62
Poor*No education	0.73	1.30	-1.85	3.31	1.24	0.82	-0.38	2.86	2.39**	0.93	0.55	4.23	-0.21	0.73	-1.65	1.23
Poor*Primary	1.12*	0.54	0.05	2.19	-0.12	0.47	-1.06	0.81	0.46	0.45	-0.43	1.34	-0.02	0.38	-0.78	0.73
Richer*No education	0.43	1.27	-2.09	2.95	0.96	0.84	-0.69	2.61	2.49**	1.03	0.45	4.53	---	---	---	---
Richer*Primary	0.79	0.47	-0.14	1.72	0.45	0.45	-0.44	1.34	0.53	0.43	-0.32	1.37	0.29	0.36	-0.43	1.00
Place of residence																
Urban (ref.)																
Rural	0.16	0.74	-1.30	1.63	0.27	0.58	-0.88	1.42	-0.57	0.38	-1.31	0.17	0.23	0.34	-0.44	0.91
Economic status*Residence																
Poorest*Rural	0.76	2.29	-3.75	5.28	-2.00**	0.88	-3.73	-0.27	---	---	---	---	---	---	---	---
Very poor*Rural	-1.01	1.01	-3.00	0.98	-0.73	0.63	-1.96	0.51	1.23	1.64	-2.01	4.47	-1.17	0.70	-2.55	0.20
Poor*Rural	0.64	0.91	-1.16	2.44	-0.25	0.67	-1.56	1.07	-0.04	0.48	-0.99	0.92	-1.56**	0.42	-2.38	-0.74
Richer*Rural	0.16	0.76	-1.33	1.66	-1.07*	0.59	-2.24	0.09	0.08	0.37	-0.65	0.81	-0.47	0.37	-1.20	0.27

Table C.3: Continued

	1988				1994				1999				2005			
	Coef.	SE	[95%	CI]	Coef.	SE	[95%	CI]	Coef.	SE	[95%	CI]	Coef.	SE	[95%	CI]
Age																
15-19	-0.13	0.78	-1.68	1.41	0.68*	0.34	0.01	1.35	-0.41	0.32	-1.05	0.23	-0.03	0.20	-0.43	0.37
20-24	0.06	0.41	-0.76	0.87	0.03	0.20	-0.36	0.42	-0.25	0.16	-0.57	0.06	-0.35**	0.12	-0.59	-0.10
25-29 (ref.)																
30-34	0.26	0.35	-0.44	0.96	0.60**	0.26	0.10	1.10	0.11	0.17	-0.23	0.45	0.33**	0.12	0.09	0.56
35-39	0.72	0.46	-0.18	1.62	0.75**	0.36	0.03	1.46	1.08**	0.28	0.52	1.63	0.96**	0.17	0.63	1.29
40-44	3.07**	0.98	1.14	4.99	2.95**	0.64	1.69	4.22	1.54**	0.54	0.47	2.61	2.10**	0.32	1.46	2.73
45-49	2.36**	1.03	0.33	4.39	1.49**	0.60	0.30	2.68	2.18**	0.83	0.55	3.81	2.13**	0.54	1.07	3.19
Age*Education																
15-19*No education	---	---	---	---	0.55	0.92	-1.26	2.37	---	---	---	---	3.00**	1.42	0.21	5.80
15-19*Primary	---	---	---	---	-0.42	0.46	-1.34	0.49	0.43	0.42	-0.40	1.25	-0.54	0.36	-1.24	0.17
20-24*No education	0.74	0.69	-0.62	2.10	0.29	0.62	-0.93	1.51	1.05	0.77	-0.47	2.58	2.44*	1.24	0.00	4.89
20-24*Primary	-0.25	0.47	-1.19	0.69	0.17	0.32	-0.46	0.80	0.30	0.26	-0.21	0.82	0.17	0.20	-0.22	0.56
30-34*No education	0.28	0.49	-0.69	1.25	-0.62	0.45	-1.51	0.27	0.29	0.65	-0.99	1.58	0.61	0.90	-1.15	2.38
30-34*Primary	0.45	0.39	-0.32	1.23	-0.03	0.30	-0.63	0.57	-0.07	0.25	-0.56	0.43	0.14	0.20	-0.26	0.54
35-39*No education	0.28	0.61	-0.93	1.49	-0.06	0.50	-1.04	0.91	0.18	0.62	-1.04	1.40	1.61	1.13	-0.62	3.84
35-39*Primary	0.70	0.50	-0.29	1.69	0.55	0.40	-0.24	1.34	-0.16	0.34	-0.84	0.51	0.19	0.23	-0.26	0.64
40-44*No education	-1.04	1.05	-3.10	1.02	-1.23	0.80	-2.81	0.34	0.00	0.80	-1.58	1.57	-0.15	0.87	-1.87	1.57
40-44*Primary	-0.83	0.99	-2.79	1.13	-1.09	0.70	-2.46	0.28	-0.17	0.56	-1.27	0.93	-0.07	0.37	-0.81	0.66
45-49*No education	-0.16	1.13	-2.40	2.07	0.88	0.75	-0.61	2.36	1.17	1.11	-1.01	3.35	0.61	1.04	-1.42	2.65
45-49*Primary	0.64	1.06	-1.46	2.73	1.33*	0.68	0.00	2.67	0.18	0.90	-1.58	1.95	1.18*	0.62	-0.03	2.40
Region of residence																
Manicaland (ref.)																
Mashonaland Central	-0.16	0.26	-0.67	0.35	0.09	0.18	-0.26	0.44	0.18	0.18	-0.17	0.54	0.29*	0.17	-0.04	0.62
Mashonaland East	0.13	0.25	-0.35	0.62	0.66**	0.14	0.37	0.94	0.55**	0.20	0.16	0.94	0.44**	0.18	0.08	0.80
Mashonaland West	0.29	0.22	-0.15	0.73	0.03	0.18	-0.32	0.37	0.32	0.21	-0.10	0.73	0.41**	0.17	0.08	0.74
Matebeleland North	-0.33	0.26	-0.85	0.19	0.97**	0.16	0.66	1.28	0.58**	0.19	0.21	0.95	0.71**	0.19	0.34	1.09
Matebeleland South	0.36	0.23	-0.09	0.81	0.87**	0.18	0.51	1.23	0.68**	0.18	0.33	1.03	0.47**	0.16	0.15	0.80
Midlands	0.19	0.25	-0.30	0.68	0.62**	0.16	0.30	0.94	0.58**	0.18	0.23	0.93	0.24	0.17	-0.09	0.57
Masvingo	-0.16	0.25	-0.65	0.33	0.73*8	0.19	0.36	1.10	0.24	0.19	-0.13	0.62	-0.25	0.20	-0.64	0.14
Harare	0.04	0.32	-0.60	0.67	0.38	0.25	-0.11	0.87	0.04	0.21	-0.37	0.46	0.25	0.18	-0.11	0.61
Bulawayo	0.45	0.38	-0.30	1.19	0.72**	0.25	0.22	1.22	0.41*	0.21	-0.01	0.82	0.84**	0.20	0.45	1.22

Table C.3: Continued

	1988				1994				1999				2005			
	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]
Current use by modern method																
No (ref.)																
Yes	0.14	0.12	-0.09	0.37	0.08	0.08	-0.09	0.24	-0.21**	0.10	-0.40	-0.03	-0.44**	0.07	-0.58	-0.29
Employment status																
Not working (ref.)																
Working	0.05	0.12	-0.19	0.29	0.05	0.10	-0.14	0.25	0.13	0.09	-0.05	0.32	0.01	0.08	-0.14	0.17
Knowledge of any modern method																
No (ref.)																
Yes	0.26	0.44	-0.61	1.13	0.80**	0.32	0.18	1.43	0.20	0.43	-0.65	1.06	0.26	0.48	-0.69	1.21
Number of living children																
1 (ref.)																
2	1.11**	0.32	0.47	1.75	0.95**	0.14	0.67	1.23	0.97**	0.15	0.68	1.26	0.88**	0.10	0.69	1.07
3	1.56**	0.33	0.90	2.21	1.46**	0.16	1.15	1.76	1.37**	0.15	1.06	1.67	1.36**	0.14	1.08	1.64
4 +	2.59**	0.34	1.91	3.26	2.46*8	0.18	2.11	2.80	2.33**	0.21	1.92	2.74	1.95**	0.16	1.64	2.26
Age at first birth																
<15 (ref.)																
15-17	-0.27	0.22	-0.71	0.17	-0.10	0.16	-0.42	0.22	-0.11	0.23	-0.56	0.35	0.15	0.25	-0.34	0.65
18-19	-0.55**	0.23	-1.00	-0.09	-0.19	0.17	-0.52	0.14	-0.12	0.23	-0.57	0.33	0.00	0.20	-0.40	0.39
20-24	-0.90**	0.26	-1.41	-0.40	-0.49**	0.17	-0.83	-0.15	-0.29	0.23	-0.75	0.17	-0.03	0.22	-0.47	0.41
>24	-1.32**	0.39	-2.08	-0.55	-1.14**	0.24	-1.61	-0.67	-0.94**	0.30	-1.54	-0.35	-0.27	0.27	-0.79	0.25
Constant	-1.66**	0.74	-3.12	-0.20	-2.71**	0.48	-3.66	-1.76	-0.91*	0.46	-1.82	0.00	-0.90	0.57	-2.01	0.22

Note: ref. refers to reference category; OR refers to Odds Ratio; SE refers to Standard Error; 95% CI refers to 95% Confidence Interval; ---- indicates that the variable is omitted (not shown/estimated) in the respective survey.

**p<0.05; *p<0.10

Table C.4: Logistic regression results of the probability of desiring to delay/space childbearing, 1988-2005 ZDHS

	1988				1994				1999				2005			
	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]
Economic status																
Poorest	----	----	----	----	-0.16	0.83	-1.81	1.48	----	----	----	----	0.99**	0.38	0.25	1.74
Very poor	1.20	0.77	-0.33	2.72	-0.21	0.37	-0.94	0.53	2.05	1.27	-0.46	4.56	-0.39	0.53	-1.43	0.65
Poor	0.00	0.62	-1.23	1.23	0.47	0.41	-0.34	1.28	0.67*	0.35	-0.01	1.35	-0.39	0.30	-0.99	0.21
Richer	0.46	0.28	-0.10	1.02	0.23	0.21	-0.19	0.64	0.51**	0.23	0.07	0.96	0.11	0.17	-0.22	0.43
Richest (ref.)																
Education																
No education	-0.02	0.76	-1.52	1.47	-0.14	1.35	-2.80	2.52	1.47	0.98	-0.46	3.40	-0.73	1.11	-2.91	1.45
Primary	-0.01	0.38	-0.77	0.74	0.35	0.42	-0.48	1.17	0.19	0.42	-0.64	1.01	0.09	0.47	-0.82	1.01
Secondary + (ref.)																
Economic status*Education																
Poorest *No education	0.26	0.86	-1.45	1.96	0.66	1.38	-2.07	3.39	-0.10	0.92	-1.91	1.70	2.69**	1.19	0.34	5.03
Poorest*Primary	0.26	0.61	-0.94	1.46	0.02	0.45	-0.86	0.91	0.07	0.46	-0.84	0.99	0.06	0.52	-0.96	1.09
Very poor*No education	-0.91	0.90	-2.68	0.86	0.57	1.38	-2.15	3.30	-0.66	0.91	-2.45	1.14	1.47	1.26	-1.01	3.95
Very poor*Primary	-0.38	0.57	-1.51	0.75	-0.08	0.42	-0.91	0.74	-0.05	0.46	-0.96	0.85	0.30	0.49	-0.66	1.25
Poor*No education	0.13	0.80	-1.44	1.71	-0.08	1.40	-2.84	2.69	-0.76	0.91	-2.55	1.02	1.12	1.26	-1.36	3.60
Poor*Primary	0.10	0.42	-0.74	0.94	-0.46	0.46	-1.36	0.44	-0.14	0.45	-1.02	0.74	0.09	0.53	-0.95	1.13
Richer*No education	-0.47	0.84	-2.13	1.20	0.31	1.37	-2.40	3.02	-2.41	1.56	-5.48	0.66	----	----	----	----
Richer*Primary	-0.02	0.40	-0.80	0.76	-0.55	0.44	-1.42	0.32	-0.29	0.44	-1.16	0.59	-0.04	0.51	-1.04	0.96
Place of residence																
Urban (ref.)																
Rural	-0.57	0.65	-1.85	0.72	0.27	0.55	-0.81	1.34	0.72	0.52	-0.31	1.75	-0.25	0.38	-0.99	0.49
Economic status*Residence																
Poorest*Rural	0.65	0.79	-0.92	2.21	0.39	0.95	-1.49	2.27	-0.08	0.53	-1.12	0.97	----	----	----	----
Very poor*Rural	0.09	0.91	-1.70	1.88	0.37	0.59	-0.80	1.54	-1.99	1.37	-4.69	0.70	1.32**	0.64	0.07	2.58
Poor*Rural	0.86	0.88	-0.88	2.60	-0.06	0.62	-1.29	1.17	-0.68	0.61	-1.89	0.53	1.24**	0.47	0.31	2.16
Richer*Rural	0.55	0.66	-0.75	1.86	0.19	0.55	-0.90	1.28	-0.43	0.60	-1.62	0.76	0.71*	0.39	-0.05	1.48

Table C.4: Continued

	1988				1994				1999				2005			
	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]	Coef.	SE	[95%	C I]
Age																
15-19	2.03**	0.60	0.84	3.21	1.37**	0.29	0.79	1.95	1.86**	0.30	1.27	2.44	1.38**	0.20	0.98	1.77
20-24	1.04**	0.38	0.30	1.79	1.03**	0.17	0.70	1.35	0.81**	0.17	0.48	1.14	0.83**	0.13	0.58	1.08
25-29 (ref.)																
30-34	-1.21**	0.44	-2.07	-0.34	-1.00**	0.27	-1.52	-0.47	-0.65**	0.17	-0.99	-0.31	-0.90**	0.15	-1.18	-0.61
35-39	-1.84**	0.50	-2.82	-0.86	-2.24**	0.50	-3.23	-1.26	-3.01**	0.48	-3.95	-2.07	-1.98**	0.24	-2.46	-1.51
40-44	-2.70**	0.52	-3.74	-1.67	-2.94**	0.32	-3.58	-2.30	-2.45	0.38	-3.20	-1.70	-3.11**	0.62	-4.33	-1.89
45-49	-3.09**	0.62	-4.33	-1.86	-3.14**	1.04	-5.18	-1.10	-2.20**	1.00	-4.17	-0.23	-4.63**	1.06	-6.72	-2.55
Age*Education																
15-19*No education	-0.12	0.91	-1.91	1.68	-1.64*	0.95	-3.52	0.23	---	---	---	---	-3.56**	1.57	-6.66	-0.46
15-19*Primary	-0.35	0.68	-1.69	1.00	0.13	0.39	-0.65	0.91	-0.55	0.38	-1.29	0.19	-0.32	0.39	-1.09	0.45
20-24*No education	-0.28	0.49	-1.24	0.67	-0.17	0.48	-1.12	0.79	-1.06	0.73	-2.50	0.38	-1.70*	0.91	-3.49	0.10
20-24*Primary	0.10	0.40	-0.69	0.88	-0.29	0.24	-0.77	0.19	-0.20	0.23	-0.67	0.26	-0.16	0.18	-0.51	0.18
30-34*No education	0.59	0.52	-0.44	1.62	0.20	0.40	-0.59	0.98	-0.58	0.69	-1.95	0.79	0.15	0.92	-1.66	1.97
30-34*Primary	0.34	0.47	-0.57	1.26	-0.05	0.29	-0.62	0.52	-0.06	0.28	-0.61	0.49	0.13	0.22	-0.31	0.57
35-39*No education	0.48	0.59	-0.69	1.65	0.55	0.62	-0.67	1.76	0.97	0.77	-0.54	2.48	-1.50	1.29	-4.04	1.04
35-39*Primary	-0.07	0.51	-1.06	0.93	0.14	0.52	-0.90	1.17	1.39**	0.54	0.33	2.46	0.62*	0.32	0.00	1.24
40-44*No education	---	---	---	---	0.31	0.48	-0.63	1.24	-0.08	0.74	-1.53	1.37	0.47	1.06	-1.60	2.55
40-44*Primary	-0.03	0.63	-1.27	1.20	---	---	---	---	---	---	---	---	0.47	0.69	-0.88	1.83
45-49*No education	---	---	---	---	-0.88	1.20	-3.24	1.48	-2.20	1.59	-5.33	0.93	---	---	---	---
45-49*Primary	-0.55	0.86	-2.25	1.15	-1.20	1.21	-3.59	1.18	-2.38*	1.41	-5.16	0.39	-0.32	1.45	-3.16	2.53
Region of residence																
Manicaland (ref.)																
Mashonaland Central	-0.10	0.18	-0.46	0.27	-0.24	0.18	-0.60	0.11	-0.15	0.17	-0.48	0.17	0.18	0.16	-0.13	0.50
Mashonaland East	-0.26	0.20	-0.65	0.12	-0.21	0.18	-0.57	0.15	-0.42**	0.17	-0.75	-0.09	-0.06	0.21	-0.47	0.35
Mashonaland West	-0.25	0.19	-0.62	0.12	-0.01	0.19	-0.38	0.37	-0.41**	0.20	-0.80	-0.01	-0.02	0.18	-0.37	0.34
Matebeleland North	-0.19	0.22	-0.62	0.24	-0.56**	0.17	-0.89	-0.22	-0.24	0.21	-0.65	0.16	-0.04	0.18	-0.41	0.32
Matebeleland South	-0.27	0.27	-0.81	0.27	-0.50**	0.19	-0.88	-0.13	-0.53**	0.19	-0.91	-0.15	0.15	0.18	-0.20	0.50
Midlands	-0.13	0.20	-0.53	0.26	-0.41**	0.17	-0.74	-0.08	-0.33*	0.17	-0.67	0.00	0.27	0.18	-0.08	0.62
Masvingo	-0.14	0.25	-0.62	0.35	-0.61**	0.21	-1.03	-0.20	-0.16	0.17	-0.49	0.16	0.21	0.15	-0.10	0.51
Harare	-0.69**	0.23	-1.14	-0.24	-0.25	0.27	-0.78	0.27	-0.36*	0.21	-0.78	0.06	0.16	0.20	-0.24	0.56
Bulawayo	-0.35	0.25	-0.84	0.14	-0.71**	0.29	-1.28	-0.13	-0.21	0.22	-0.65	0.24	-0.20	0.21	-0.62	0.21

Table C.4: Continued

	1988				1994				1999				2005			
	Coef.	SE	[95%	CI]	Coef.	SE	[95%	CI]	Coef.	SE	[95%	CI]	Coef.	SE	[95%	CI]
Current use by modern method																
No (ref.)																
Yes	0.50**	0.10	0.30	0.71	0.57**	0.10	0.38	0.76	0.83**	0.10	0.65	1.02	0.91**	0.08	0.75	1.07
Employment status																
Not working (ref.)																
Working	0.01	0.10	-0.18	0.20	0.03	0.10	-0.17	0.23	-0.16	0.10	-0.36	0.04	-0.05	0.08	-0.21	0.11
Knowledge of any modern method																
No (ref.)																
Yes	0.60	0.54	-0.46	1.66	-0.46	0.30	-1.05	0.14	0.45	0.42	-0.39	1.29	-0.04	0.43	-0.89	0.82
Number of living children																
1 (ref.)																
2	0.21	0.18	-0.15	0.57	0.21	0.13	-0.04	0.46	-0.09	0.12	-0.33	0.15	-0.31**	0.10	-0.50	-0.12
3	0.47**	0.19	0.11	0.84	0.35**	0.15	0.06	0.64	0.04	0.16	-0.28	0.36	-0.28*	0.15	-0.57	0.01
4 +	0.61**	0.22	0.17	1.06	0.36**	0.16	0.05	0.67	-0.29	0.20	-0.69	0.11	-0.40*	0.20	-0.80	-0.01
Age at first birth																
<15 (ref.)																
15-17	0.77**	0.23	0.31	1.23	0.47**	0.19	0.10	0.85	0.30	0.25	-0.19	0.79	0.05	0.38	-0.69	0.79
18-19	1.12**	0.24	0.65	1.59	0.94**	0.19	0.57	1.31	0.50*	0.25	0.01	0.99	0.39	0.33	-0.27	1.05
20-24	1.63**	0.26	1.11	2.15	1.26**	0.19	0.88	1.64	0.83**	0.26	0.32	1.34	0.69*	0.34	0.02	1.37
>24	2.19**	0.33	1.55	2.84	2.41**	0.26	1.90	2.91	1.58**	0.35	0.90	2.27	1.36**	0.38	0.61	2.10
Constant	-2.53**	0.70	-3.91	-1.16	-1.32**	0.48	-2.27	-0.37	-2.22**	0.54	-3.28	-1.15	-2.05	0.59	-3.20	-0.90

Note: ref. refers to reference category; OR refers to Odds Ratio; SE refers to Standard Error; 95% CI refers to 95% Confidence Interval; ---- indicates that the variable is omitted (not shown/estimated) in the respective survey.

**p<0.05; *p<0.10