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FACULTY OF HUMANITIES, ARTS & SOCIAL SCIENCES

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Mortality Perceptions and their Influence on Fertility Intentions in Mozambique

by

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ABSTRACT

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by Ana Pires de Carvalho

Demographers often posit that a decrease in mortality rates is a pre-condition for fertility decrease. This fertility decline only happens after a certain lag from the start of mortality decline, the explanations for which are not yet fully understood. This lag might be related with parents' mortality perceptions and its better understanding will likely influence interpretations of fertility behaviour. This research concerns the relationship between women's mortality perceptions and their subsequent fertility desires in high mortality settings. It focuses on the various estimations of women's mortality perceptions and the desired family size, and looks at the possibility that couples use insurance strategies involving high fertility to compensate for possible future child loss. In addition, this study explores the relationship between women's perceptions of AIDS mortality and fertility behaviour.

The study setting is Mozambique, a Southern African Country with high infant and child mortality levels, in a context of rising HIV prevalence. Data from the Mozambique Demographic and Health Survey held in 1997 were analyzed, and, in addition, a quantitative survey and an in-depth interview survey were carried out and analyzed.

Results suggest that women perceive mortality rates to be higher than they are in reality. In addition, results imply that women use insurance strategy to a considerable extent in response to child mortality, and that women's perceptions of child survivorship into adulthood strongly affects their fertility desires. However, women's experience of several child' deaths has a repressor effect on the intention to have an additional child. Finally, women's intention to change fertility behaviour due to AIDS seems to be linked not only to AIDS awareness but also to women's perceptions of survivorship into adulthood.

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my husband Manuel and our children Maria, Sergio and Xana, who gave me encouragement and all their love
and to
all Mozambican women who, amid the misery of war, poverty and AIDS, still hold and transmit a joy for life.

Chapter 1

Introduction

Introduction

This research explores the relationships between women's mortality perceptions and their subsequent fertility desires in high mortality settings. It estimates women's mortality perceptions using different methods, analyses their desired family size and evaluates their use of high fertility insurance strategies to compensate for future possible child loss. In addition, this study explores the relationships between women's perceptions of AIDS mortality and how they affect fertility behaviour.

The study is focused on the family building process, aiming to help women make an informed choice when planning their families. Furthermore, governments and institutions concerned with reproductive health may also benefit from this study findings by reinforcing their information and dissemination activities to improve reproductive health. Moreover, the findings of this study help to understand demographic transitions in Africa. The study setting is Mozambique, a southern African country with high infant and under five mortality levels, in a context of rising HIV prevalence.

1.1 Relevance of research to population studies

The Beijing Declaration and the Platform of Action on Women and Health (World Conference on Women, 1995) state that it is imperative for women to have the right to reproductive health. Women should have the right to make their own reproductive decisions, namely to decide if, when, and how often to reproduce. By exercising this right, "they should take into account the needs of their living and future children and their responsibilities towards the community" (World Conference on Women, 1995, pp.911). Furthermore, in order to achieve their family preferences, it is crucial that women have access to health services and information on family planning methods. In exercising their right to reproductive choices, in a well informed and conscious way, women will contribute to a more balanced population development.

Balanced population development has been of central concern for demographers, politicians and the general public in the last few decades, particularly worried with the high rate of population growth. Indeed, it was during the second half of the 20^{th} century that the most dramatic population increase took place. Not only did the population increase, but also the annual rates of population growth also steadily rose throughout this century. Only towards the turn of the century did those growth rates decrease slightly (Cohen, 1995). These high growth rates led to a dramatic increase in world population: Cohen estimated that during the past century human population increased from 1.6 billion to 2.5 billion until 1950, and to 6 billion at the end of the century. The potential negative consequences of this dramatic population increase on economic and social development, environment, poverty and political instability, have been quite well documented (see Preston (1996), Cohen (1995), Lutz (1994), McNamara (1984), World Bank (1984), among others). As Cohen states (1995, pp10), "Slower population growth, with many other improvements in human institutions and behaviours, would make it easier for people to retain control of their fate and to turn their attention from the numbers to qualities of humankind."

Although there is an increasing awareness that the carrying capacity of the earth is limited, there is not yet a consensus on the ideal population size. Opposing positions on how, and even if population growth should be curbed, may have prevented a more efficient implementation of family planning policies (Lutz, 1994). Indeed, according to Sinding (2000), contemporary declines in fertility and the end of the 'population crises' mentality that prevailed in the mid- to late 20th century may have diminished the public support for those programs that have enhanced reproductive health and have been responsible for the recent fertility decline.

Fertility transition is now underway in most developing countries in Latin America, South Asia and, more recently and tentatively, in some African countries (Bongaarts, 2002). However, the evidence of emerging fertility transitions associated with the appearance of other population crises such as the AIDS pandemic, make public attention on population growth problems and demographic science decline and shift to these new population crises (Hirsham 2001). Nevertheless, rapid population growth will persist because of population momentum and because the speed of the transition is still of critical concern. Indeed, Bongaarts (2002), after analyzing the determinants of the fertility rates in 143 developing countries from 1950 to 2000, found that, after a period of fertility transition, where fertility decreased rapidly and without interruption, a further reduction below four births per woman will take place at a slower pace. He also concluded that it was unlikely that most countries can reach replacement level in the next few decades and that this process is not likely to take place without increases in both human development and family planning efforts. He further states that:

> "The recent experience of developing countries with relatively high levels of development suggests that life expectancy near 75 years combined with literacy near 95 percent is needed on average to reach replacement. Many countries are still far from these levels of human development and have weak family planning programs, thus making further progress through transition difficult."

1.2 The case of sub-Saharan Africa

The rates of population increase are unevenly distributed throughout countries and regions, and most countries of persistent high fertility are in Sub-Saharan Africa. High rates of mortality, low per capita income, and low levels of human development characterise these countries (UNDP, 1997). For a handful of sub-Saharan countries, recent trends in total fertility rates show signs of the onset of fertility transition (Lesthaeghe and Jolly, 1992, Cleland et al, 1994, Mhloyi, 1994, Gaisie, 1996, Thomas and Mvandi, 1994, Defo, 1998), but population growth rates in Sub-Saharan countries remain s extremely high: according to the United Nations Population Division (2003) the rate of population increase in this region for the period 2000-2005 is still 3.0 percent per annum.

Fertility levels in Sub-Saharan Africa remain staggeringly high. According to the United Nations Population Division (2003) the estimated average total fertility rate for the years 2000-2005, revised in 2002, is estimated at 5.38 for sub-Saharan Africa. The reason why the growth rates are so high is that, from an equilibrium situation where mortality and fertility levels were very high, the introduction of new medical and health care technologies after the World War II, led to rapidly falling mortality levels, while fertility levels remained high (Gaisie, 1996). However, some sub-Saharan countries have already started the fertility decline, namely Botswana, Zimbabwe and Kenya (Kuate Defo, 1998).

Although a decrease in mortality levels has occurred during the last decades in sub-Saharan Africa, they are still enormously high: the average under five mortality rate is 162 per thousand and the life expectancy is 44 years for females and 46 years for males (United Nations Population Division, 2003). Nevertheless, mortality decreases have been substantial: the World Bank (1994) estimated that decrease in infant mortality rates in the 18 Sub-Saharan countries for which there were available data varied between 18% to 65% from 1970 to 1992.

Demographers often posit that a decrease in mortality rates is a pre-condition for fertility decrease (Mason, 1997; Bongaarts, 2002; Cleland, 2001). However, after decades of mortality decline, Sub-

Saharan countries still maintain high fertility levels. Indeed, according to Mason (1997), in all countries that started or completed a demographic transition by the end of the 1980s, population growth rates first increased, showing that fertility decline only happened after a certain lag of the start of mortality decline. An analysis of the mortality perceptions of parents and their influence on fertility can contribute to a better understanding of this lag, as the relationship between fertility preferences, mortality decline, and fertility transition might be better understood. Indeed, a better understanding of these relationships will likely influence interpretations of fertility behaviour, particularly the insurance attitude as a response to child mortality. Such a study might also help to explain the persistently high fertility levels in sub-Saharan Africa (Montgomery, 1999; Mason, 1997).

Due to the spread of the AIDS epidemic, fertility behaviour in the face of adversity and death poses new complexities that should be analyzed and understood, especially in Sub-Saharan countries. It is not yet clear whether the AIDS epidemic will provoke a decrease in population in most infected countries. Indeed, partly because of the population momentum, population will probably continue to grow, but at a slower rate than before (Bongaarts, 1996). However, given the dramatic increase of mortality rates in childhood, and more importantly in adults in their prime age, fertility behaviour might change (Ainsworth et al, 1998). Most studies on the effects of mortality on fertility concentrate on infant and childhood mortality. The consideration of adult mortality, which has not been relevant in studying the effects of mortality on fertility, might raise new aspects to the understanding of this relationship (Grieser et al, 2001).

In any case, the understanding of people's mortality perceptions might bring new understanding of the effects of mortality on fertility. Montgomery (1999, abstract) urges that "individual perceptions and beliefs about mortality risks, conspicuously absent from the demographic agenda, be studied directly."

1.3 Objectives of the study

In Mozambique, data from the Mozambique Demographic and Health Survey 1997 (National Institute of Statistics, 1998) show a slight decrease in age-specific fertility rates in the years preceding that of the survey. However, the TFR in 1997 remained quite high at 5.62 births per woman. Although infant and child mortality rates are also very high (even though have been decreasing in recent decades), the rate of natural population growth is still 2.3 percent per annum (National Institute of Statistics, Censo 1998).

Several studies on reproductive health and fertility have been carried out in Mozambique, namely: (i) the Mozambique Demographic Health Survey (MDHS, 1997), (ii) an anthropological study in three different regions of the country about women's reproductive behaviour (Korfker, 1987), (iii) a detailed analysis of reproductive behaviour in the capital, Maputo (Monreal, 1989) and (iv) a research on the fertility determinants in Mozambique (Arnaldo, 2003). Each of these studies contributes substantially to the understanding of reproductive issues in Mozambique. In particular, the MDHS provides a huge amount of information on fertility and reproductive behaviour in the country.

A more complete understanding of reproductive behaviour, however, requires substantive knowledge about people's perceptions of mortality. It is therefore important to understand how mortality perceptions are formed, to estimate their level and to analyse their influence on people's fertility decision making. It is particularly important to explore parents' perceptions of child survival levels. The broad goal of the present study is thus to contribute to the knowledge of fertility decision making and strategies in Mozambique, by taking into account perceptions of mortality and their influence in fertility decision making. This research centres on women and has the following specific goals:

(i) to learn more about women's perceptions of mortality, how they are formed and to measure them;

(ii) to understand how women view childbearing, with special emphasis on the effects of the adversity people face with AIDS;

(iii) to obtain a better understanding of the association between mortality perceptions and fertility intentions.

And the main research questions are:

Question 1: What are women's perceptions of mortality levels (infant mortality rate, survivorship into adulthood) and how are these perceptions formed?

Question 2: In which ways are these perceptions of mortality linked with women's fertility intentions?

Question 3: How does the insurance strategy operate and what is the approximate extent of this strategy in high mortality settings?

Question 4: How does the AIDS epidemic awareness, particularly regarding parents' and children's mortality levels increase, influence fertility intentions?

Given the aforementioned objectives and research questions, this study focuses on the demand side of family building, and the decision making processes that underlie family building, with particular emphasis on the effects of mortality perceptions on fertility intentions. Only with a better knowledge of these issues can effective population policies regarding fertility be formulated.

1.4 Organization of the study

This study is divided into nine chapters. The second chapter reviews the literature related to mortality and perceptions of mortality and their influence on fertility. Chapter 3 presents the methodology used to address the research goals and questions. Chapter 4 describes the profile of the study population, which includes the recent history and economic situation, demographic trends and AIDS prevalence in Mozambique. Chapter 5 describes the data from the Mozambique Demographic and Health Survey 1997 that were used for the analysis of the relationship between women's desire for additional children and mortality perceptions proxies. This analysis controls

for some socio-economic and demographic variables and uses multinomial logistic regression. Chapter 6 presents the univariate and bivariate analysis of a 800-women quantitative survey, conducted in Maputo City in 2003. Using this survey data set, Chapter 7 uses the logistic regression model to analyze the outcome variables concerning the desire for an additional child, the intention of changing fertility behaviour due to AIDS and the number of children needed to guarantee at least a surviving child. The explanatory variables tested depended on the outcome variable and included mortality perceptions, socio-economic and demographic variables. Chapter 8 describes a qualitative survey conducted in Maputo City and in a village in Maputo province, aimed at understanding and complementing the results from the quantitative survey described in Chapter 6. Chapter 9 discusses and compares the results from the various analyses made in the previous chapters, presents suggestions on how to use these results in policies which aim to help people choose and realize their desired family size and concludes with proposals for further research.

Chapter 2

Literature Review

"Who of us would not be glad to lift the veil behind which the future lies hidden and direct our thoughts towards the unknown future..." (Hilbert, 1900, p.437, paper presented at the International Congress of Mathematicians, cited in Hastie, 2001).

Introduction

This Chapter reviews the literature on fertility decision-making, giving special attention to mortality, and mortality perceptions' effects on fertility. The Chapter is composed of seven sections. The first section provides an overview of the key demographic transition theories, explaining the reasons for fertility changes among different populations in the recent world history. Section 2 analyses the family building processes, with special emphasis on the concept of desired family size. Because a decrease in mortality is often considered an important and necessary condition for fertility decline, a framework for analysing these effects is presented in the third section. In section 4, a summary of several qualitative and quantitative studies on mortality perceptions and their effects on fertility is presented. Furthermore, because the study of mortality perceptions, in particular child mortality perceptions, is quite recent and incomplete, the need for further research is highlighted at the end of this section. Mortality increases due to the AIDS epidemic bring new complexities to the relationship between mortality and fertility and section 5 presents an overview of recent research on this issue. Mortality perceptions formation and their effects on fertility decision-making also touch the domain of psychology, so section 6 briefly reviews the psychological theory of decision-making. The last section presents a summary of the main findings in the literature review and suggests potential further research.

2.1 Demographic transition

2.1.1 Introduction

All societies, at one time or another, move from a demographic equilibrium configuration of high mortality and high fertility to one of low mortality and low fertility. Most theories of demographic transition follow a chronological sequence: a fall in death rates, a period of rapid population increase, a lagged decline of birth rates, and an eventual return to population equilibrium (Cleland, 2001; Sinding, 2000). Indeed, for countries containing four-fifths of the world's population, fertility began to steadily decrease during the period 1955-1975 (Caldwell, 2001). However, as mentioned in Chapter 1 - Introduction, countries in sub-Saharan Africa only recently and timidly started their demographic transition.

The major demographic transition theories are the following: the classical demographic transition theory, the neo-classical micro-economic theory of fertility, Kingsley's multi-phasic theory, Easterlin's framework, Caldwell's theory of wealth flows and the diffusion theory. A demographic transition theory should explain why and what caused fertility declines in the countries that started or completed demographic transition, otherwise it is incomplete. However, none of the theories presented so far can explain all fertility transitions (Mason, 1997; Caldwell, 2001). In analysing the different demographic transition theories the effects of mortality on fertility can be better understood and the role of mortality decline on fertility decline can be visibly situated among the different fertility decline's determinants.

2.1.2 Major theories

2.1.2.1 Classical demographic transition theory

The first elaborated theory of demographic transition was developed by Notestein (1953). For Notestein, increased survival was a necessary but perhaps not a sufficient condition for fertility decline. According to his theory, industrialisation improved the survival of children, so parents found themselves in a position where rearing more than just a few children became expensive. Furthermore, industrialisation also changed the role of families as production units: factors such as

the costs and benefits of children, new economic roles and the evolution of families as productive units, may have played a crucial role on the reduction of fertility levels. In summary, modernisation of societies provoked both mortality and fertility decline, although the latter lagged behind the former.

While this theory is supported by data from western European and English speaking countries, the correlations between levels of urbanisation or industrialisation and fertility at the decade of the onset of fertility decline in the developing countries are weak (Bongaarts and Watkins, 1996). For example, Bangladesh is undergoing a fertility transition (Amin et al, 1995) although it is still an agrarian underdeveloped country. In addition, some regions in western European countries started the fertility transition without a decline in mortality rates (Mason 1997). Hence, it might be argued that the original form of the transition theory seems to be incomplete (Mason, 1997).

2.1.2.2 Neo-classical micro-economic theory of fertility

The neo-classical micro-economic theory of fertility (Becker, 1960; Schultz, 1973, Becker and Barro, 1988) used a consumer behaviour model to explain a household's childbearing decision-making process. The major proximate determinants of a couple's fertility choices are the costs of children in relation to other goods, the couple's income and their preferences for children in comparison with other forms of consumption. The crux of this theory is a kind of trade-off between 'child quality' and 'child quantity.' In his theory, Becker assumed that children are unique assets and that demand is for child-services instead of children. He further added the concept of *child quality* to the model and that this child-quality is elastic with respect to income but child quantity is not. In other words, when income increases, demand for child services also increases, while quantity does not. Increased income means that adults invest more in fewer children. An obvious example of an investment in quality would be expenditures on education, which carry both direct (school, fees, uniforms, etc.) and indirect (forgone earnings for child labour) costs. Although this theory provides a very useful quantifiable framework for analysing fertility decline, it is still an incomplete theory because it does not take into account the environmental and institutional conditions that change costs, income or preferences (Mason, 1997).

Furthermore, as Robinson (1997) pointed out, the imprecision of the notions of "quality of children" makes this important component of the theory difficult to quantify.

2.1.2.3 Kingsley Davis's multi-phasic theory

Kingsley (1963) considers that mortality is a necessary and also a sufficient condition for fertility decline. Analysing the demographic transition in several industrialized countries, he points out that fertility decline occurred more or less at the same time in urban and rural regions, hence suggesting that industrialization might not be the main reason for fertility decline.

Davis pointed out that following a prolonged natural increase, rural families had difficulty in maintaining and, even less, upgrading their social status, even with the noticeable improvement of the countries' per capita revenue. Larger families and increased life expectancy due to mortality decrease, made inheritances of land fragmented and postponed. This situation tended to decrease the families' status and families resorted to every demographic means (migration, postponing of marriages, celibacy, abortion, among others) to maximize their opportunities. Most of these demographic responses provoked decrease in fertility.

This observed multiphasic character of the response to increased family size shows that families resort to demographic means to decrease fertility in situations other than the fear of absolute poverty.

2.1.2.4 Easterlin's framework

Easterlin's framework (1975, 1978; Easterlin and Crimmins, 1985) further elaborates the microeconomic fertility model by explaining fertility in terms of three proximate determinants: 1) the supply of children, i.e. the number of children parents would have without deliberate fertility control; 2) the demand for children, that is the number of surviving children they would like to have; and 3) the costs of fertility reduction, where "costs" are defined broadly as psychic, social and monetary costs. Easterlin's framework has been useful for organising the thinking about

fertility decline, but similarly to the neo-classic microeconomic theory of fertility, it contains few ideas about institutional determinants of fertility decline (Mason, 1997).

2.1.2.5 Caldwell's theory of wealth flows

Other theories have attempted to fill the gaps mentioned in the previous two sub-sections. Caldwell's theory of wealth flows (Caldwell, 1982) attributes the decline of fertility to the reallocation of the net economic benefits of family life from parents to children. According to this theory, if elders are likely to benefit from high fertility then they will encourage high fertility patterns. Otherwise, once children become the net beneficiaries of the family, the burden on elder people shifts their preferences towards a pattern of low fertility. This theory, developed by Caldwell, was based on his extensive fieldwork in sub-Saharan Africa (Mason, 1997). However, according to Thornton and Fickle (1987), this theory may not work so well in several countries in Asia, where fertility has declined without a significant change in extended family relationships.

2.1.2.6 Diffusion theory

More recently, Cleland and Wilson (1987, Cleland (1985)) elaborated the diffusion theory of fertility decline that attributes the timing of fertility transition to the diffusion of information and new social norms about birth control. They also suggest that previous mortality declines may also be a necessary precondition for the transition. This theory adds a new fundamental element to the other theories, but the authors recognise that Africa still does not fit this theory properly. In Africa, parents seem to want a large number of surviving children (Caldwell, 1982) and the diffusion of birth control information might not play an important role in the absence of changing preferences. It is possible that information about birth control would influence parity mainly through increased birth spacing, if at all (Caldwell, Orubuloye and Caldwell, 1992). Although this theory is incomplete like others, it is increasingly recognised as important (Bongaarts and Watkins, 1996). Indeed, the diffusion of ideas and the processes through which diffusion occurs, particularly social interaction and influence, may play a crucial role in people's fertility decision-making.

2.1.3 New ideas

More recently, Cleland (2001) offers a new approach for the study of fertility transition. Emphasising that mortality decline is a pre-condition for fertility transition as Davis (1963) did, he argues that improved survival brings some "disadvantages" to the families, in that more surviving children will stress the already meagre wealth. Firstly, more children have to be reared and educated, the result of which is financial stress. Secondly, the children's inheritance of resources will be reduced as a result of the increase of siblings. Thirdly, the inheritances will be delayed as a consequence of an increase in the parents' life expectancy. Cleland, after characterising the nature of the pre-transitional societies, maintains that the central question of fertility transitions is "for how long, and by what means, can [they] accommodate and tolerate such an unprecedented abundance of children?" (Cleland, 1993, pp. 351).

Caldwell (Caldwell, 2001) states that any fertility transition theory must take into account socio-economic change over long periods, and must incorporate ideologies and attitudes. Indeed, the diffusion of concern about population explosion lead the Western elite to greatly influence and support developing countries family planning programs. Furthermore, he stresses the importance of the availability of methods of fertility control in order to influence fertility behaviour as well as influence other behaviours. In sum, the interaction between socio-economic change, ideologies and means of fertility control constitutes the crux of fertility transitions.

Mason (2001) analysed the role of gender and family systems in the fertility transition. She concludes that there is some evidence that more egalitarian gender and family systems based on the nuclear couple promote fertility transitions. The costs of children become a stronger burden if the couple has to support the costs alone, instead of sharing them with the extended family. The increased entry of married women in the formal labour force decreases fertility by increasing women's time value, thus increasing the costs of children. Women's education will further increase women's time value by increasing their wages.

The importance of contraceptive prevalence in accelerating fertility decline has been often mentioned in the literature (Tsui, 2001). The pace at which fertility transition occurs in several developing countries is often attributed to strong population programs. These programs, which encompass legislative, regulatory and programmatic mechanisms aim to influence the size, distribution, composition and growth of a population. The accessibility to modern contraceptive methods and the information and incentives provided by programmatic interventions have had a strong effect in fertility declines (Geoffrey McNicoll, 2001).

As mentioned in the Introduction (Chapter 1), Bongaarts (2002), states that the recent experience of demographic transitions of developing countries with relatively high levels of development suggest that life expectancy near 75 years, combined with literacy near 95, percent is needed on average to reach replacement. He arrived to this conclusion after analysing the determinants of fertility rates in 143 data sets of developing countries from 1950 to 2000. He adds that it is unlikely that most countries can reach replacement level in the next few decades, and that this process is not likely to take place without a progress in human development and without an increase of family planning efforts.

2.1.4 The role of mortality decline in the fertility decline

Mortality reductions as a pre-condition for fertility reductions seem to be the only common feature in the countries that have undergone fertility transitions. There is no general acceptance of this causation, but the counter-examples presented so far are scarce and perhaps not very well justified (Mason, 1997). Effects of mortality decline on fertility decline can happen for two reasons. One reason is that parents have a certain more or less fixed target of surviving children in pre-transitional societies, and the number of children they need to have in order to meet their target decreases with increased probability of child survivorship. As a result, parents tend to decrease their own fertility. The other reason is that mortality increases family size, so families will have more children than they can support. Consequently, parents will then strive to have fewer children. The occasions when decreased mortality did not trigger a decrease in fertility, or when the levels of mortality in which fertility decline took place were quite diverse, have been used to argue against

mortality decline as a pre-condition for fertility decline. Furthermore, after some decades of mortality decrease in Africa, fertility is only slightly decreasing in this continent today.

It is important to note that decreases in fertility during European transition occurred at relatively low levels of mortality (van de Valle, 1986). Caldwell et al (1992) also argued that the decline of fertility in Sub-Saharan Africa could only happen in countries where under-five mortality rates were under 70 per thousand. However, less than 10 percent of the countries in this region have reached this 'low' level and more than 20% have an under-five mortality rate of around 200 per thousand or higher (UNDP, 1997). Moreover, in almost all countries that have started or completed the demographic transition by the end of the 1980s, growth rates increased at first, and according to Mason (1997), this is a sign that mortality rates decreased before the decrease in fertility rates.

Furthermore, the cases where a mortality decrease didn't trigger fertility declines, might have some explanations. Indeed, according to Davis (1963), when parents are faced with a larger family size than they can support, they do not need to decrease their fertility immediately. As a post-natal family limitation process, parents send their extra children to be fostered, to work as servants in other households or have them migrate to urban areas or even overseas. The other reason why fertility decline can occur at different levels of mortality is related to the potential discrepancy between reality of child survival and parent's perceptions of this reality. Montgomery (1998) suggests that, in many circumstances, people are unlikely to perceive a decline in mortality rates. Even when people notice that their children are more likely to survive, they may think that this is due to luck instead of a general decrease in mortality rates. This observation has been corroborated with empirical evidence. Montgomery (1998) reported that people declared that more children died at the moment of the survey than a generation earlier, even during a clear downward trend in mortality rates. As Lloyd and Ivanov (1988) have noted, the cause of the mortality decline may affect the mortality level at which people feel confident that their child's survival to adulthood was improved, and they may decrease their fertility. Indeed, these authors argue that if mothers can improve their child's survival by using techniques that they control, such as the use of oral

rehydration techniques, they will more easily perceive mortality declines. However, in Africa, decrease in mortality rates was mainly due to exogenous factors (Barbieri, 1994).

In sum, there are several reasons to believe that decreases in mortality are a pre-condition to decreases in fertility. However, what is still unknown is the level at which mortality declines trigger fertility declines, and thus, whether further declines are necessary to end global fertility transition.

2.1.5 Fertility transition in sub-Saharan Africa

2.1.5.1 Fertility and mortality levels

As mentioned in Chapter 1 Introduction, fertility levels in Sub-Saharan Africa remain extremely high. According to the United Nations Population Division (2003) the estimated average total fertility rate for the years 2000-2005, revised in 2002, is estimated at 5.38 for sub-Saharan Africa. Many reasons have been advanced to explain the high fertility in Sub-Saharan Africa, and, more importantly, the persistence of high fertility in spite of increased child survivorship rates. Caldwell's theory of wealth flows was developed mainly based on extensive research on sub-Saharan countries (Caldwell, 1982). Mortality rates and the uniqueness of African family systems have also been mentioned as important factors for the delay in fertility transition.

Although a decrease in mortality levels has occurred during the last decades in sub-Saharan Africa, they are still enormously high: the average under five mortality rate is 162 per thousand and the life expectancy is 44 years for females and 46 years for males (United Nations Population Division, 2003). Nevertheless, mortality decreases have been substantial: the World Bank (1994) estimated that decrease in infant mortality rates in the 18 Sub-Saharan countries for which there was available data varied between 18% to 65% from 1970 to 1992.

Many studies on the demographic transition have shown that the decline in childhood mortality is one of the essential conditions for fertility decline. Barbieri (1994) studied the association between lower childhood mortality levels and the decline in fertility for the 10-year period preceding the

Demographic and Health Surveys in 11 Sub-Saharan countries for which the data were available. She concluded that the association is evident and strong in two countries, namely Zimbabwe and Botswana. However, for the remaining countries, there was no clear association. Two hypotheses were considered: first, that there is a threshold in mortality levels above which declines in mortality do not trigger a decline in fertility; second, the decrease in mortality levels were not accompanied by peoples' perceptions of those decreases (Barbieri, 1994). In particular, she stresses that part of the difficulty in perceiving mortality declines, arises from the fact that mortality declines are mainly due to external interventions and parents do not feel that they take part in influencing reductions in mortality. Furthermore, and linking this reasoning with Mason's critique that a ten-year period is a short interval to analyse correlations when studying demographic transitions, doubt that the lack of association between mortality and fertility might not be relevant to question that mortality decline is a necessary condition for fertility decline (Mason 1997).

2.1.5.2 The cost of children: family strategies and fertility behaviour

Attempts to apply micro-economic theories of fertility focused on the decision-making made of couples have not proven the adequacy of these models in analysing fertility in sub-Saharan countries (Locoh, 1994). More attention needs to be given to the specific African family systems and childcare practices. Indeed, parents often resort to child fostering, where the responsibility for managing the costs and benefits of children lies with the extended family, not the nuclear one. This practice makes the burden of family rearing smaller for the nuclear couple, and, consequently, the increased costs of rearing children may not have as strong an effect on decreasing fertility (Isiugo-Abanihe, 1994). However, schooling costs have risen considerably, after a period where schooling was free of charge in most African countries, and there are some signs that traditional family structures are becoming less common. These factors suggest that parents may become increasingly aware of the need to decrease their fertility in order to cope with child rearing costs (Makinwa-Adebusoye, 1994).

2.1.6 Summary

From the brief review on fertility transitions presented above, it can be concluded that transition theory is still incomplete. Indeed, analysing the fertility transition theories, Mason (1997) points out four major errors of thinking, namely: the assumption that all transitions have the same cause, the failure to acknowledge mortality decline as a pre-condition of fertility decline, the assumption that fertility regulation is fundamentally different in pre-transition and post-transition populations and the focus on a decadal time scale.

Sub-Saharan Africa apparently stands out from the causation just mentioned: after World War II mortality levels have decreased in this region, especially infant and child mortality, but these decreases in mortality rates were not accompanied by a decrease in fertility. Some authors attribute this outcome to people in this region wanting a large number of surviving children, but this argument has not yet been proved. Other authors argue that there is a threshold of mortality rates above which fertility decreases will not be relevant. In addition, recent literature points to another explanation: that parents, the ultimate fertility decision-makers, do not perceive changes in mortality. If this is the case, then mortality decreases per se will not make parents to continue to have fewer children as they did before the mortality decreases.

The section that follows presents some aspects of the process of family building and includes a detailed analysis of the concept of desired family size.

2.2 Family building processes

2.2.1 Natural fertility

The concept of natural fertility, introduced by Henri (1953), refers to people or populations who do not make any conscious effort to limit family size. This concept is closely linked to the concept of biologic maximum fertility. A typical characteristic of natural fertility is that the curve

of the age specific fertility rates is convex, while the curve of age specific fertility rates in populations that practice family planning is concave. Another similar concept is that of family building by fate, where parents do not make a conscious decision on the size of the family, as opposed to family building by design, where parents decide how many children they will have and when.

This concept of natural fertility may be restrictive when analysing pre-transitional societies in sub-Saharan Africa. In these societies, high fertility is desired to ensure that children will provide labour, support their parents when they grow old and continue the family lineage (Caldwell and Caldwell, 1987). However, this does not necessarily mean that people do not plan their reproductive lives. For example, Bledsoe et al (1994) analysed the population in a region in rural Gambia, where the total fertility rate reached 7.5, and concluded that people ultimately set reproductive goals and make efforts to accomplish them, without consciously limiting their parity. In fact, women use modern as well as traditional contraceptive methods in order to achieve their desired births intervals, which in turn produce a lower parity than if they did not use the methods.

Demographers frequently consider that the answer 'up to God' to the question on the ideal family size, which that so often appears on the Demographic and Health Surveys, as a sign of natural fertility. However, Castle (2001), studying the Fulani people in rural Mali, concludes that fertility goals consist of the maximum number of children women can have, and that people usually have a very good idea of the range that this goal comprises. The author says that women also have a very good idea of the number of children who will survive, and they believe that they need to have many children in order to have a desired number of surviving children. Women tend to refuse to verbalize the number of children, but they do so in order to avert supernatural risk, thus the answer 'up to God' (Castle, 2001).

In summary, as Mason (1997, p.447) points out "...scattered but considerable evidence from ethnographic, historical and demographic studies suggests that individuals in many pre-transitional

settings do think, plan and strategize about what Skinner (1997) refers to as the configuration of their offspring sets."

2.2.2 Desired fertility

2.2.2.1 The ideal number of children

Demographers frequently suggest that the onset of fertility transitions depends predominantly on a decrease in desired fertility (see, for example, Pritchett, 1994; Cleland and Wilson, 1987; Bongaarts, 1993; Demeny, 1992). This causative model has resulted in the collection of individual level data that measures fertility desires, including the ideal number of children. The usual question on ideal family size that has been used in the Demographic and Health Surveys for childless women is: "If you could choose exactly the number of children to have in your whole life, how many would that be?" (Women with children are asked the same question preceded with the following introduction: "If you could go back to the time when you did not have any children...."). The information elicited from this question has been used by researchers in many ways to estimate what the fertility level of a region *would be* if women were to implement their stopping and spacing preferences; to understand the relationship between socio-economic characteristics and family size preferences; and to study changes in preferred family size over time (Lightbourne, 1985).

Both the formulation and utilisation of this question have, however, been extensively critiqued. Bongaarts (1990) presents a comprehensive list of the shortcomings, some of them also mentioned in Lightbourne (1985) and Pritchett (1994), among others. Non-numerical responses, post-facto rationalisation, infant and child mortality, and compositional preferences are, among others, possible sources of bias often mentioned. It is important to note that even in the less developed countries with high mortality levels, the great majority of women give a numeric response to the question of the ideal number of children. Some of the shortcomings just mentioned make the ideal number of children an upwardly biased indicator of desired fertility, while others will produce a downwardly biased indicator. It is possible, as some argue, that the various sources of bias will roughly cancel each other, and, at aggregate level, the ideal number may turn out to be an

acceptable proxy for fertility desires. For instance, in an analysis of 18 DHS surveys, Bongaarts (1991) verified that the answers to the questions on the ideal number of children and desire for additional children were quite consistent with only 15% of the answers being inconsistent. It is important to note that the desire to have additional children is generally accepted as an unbiased fertility preferences indicator.

Similarly, Lightbourne (1985), concludes that in spite of its potential shortcomings, the conventional mean of ideal number of children offers a reasonable approximation to the mean of living children that women would have if "(i) they were to succeed in stopping at the family size at which they report no further desire for additional children; (ii) they do not suffer fecundity impairments; and (iii) they do not permanently postpone desired births."

2.2.2.2 The desired family size

The question about the ideal number of children used in the DHS questionnaires does not specify whether it refers to living children or desired number of births. Because the question about preferred family size refers to children, it is likely that women respond in terms of surviving children, as several authors mention. Pritchett (1994) considers that women refer to their desired number of surviving children and comments: "If a woman chooses births to achieve a desired family size, then child mortality will cause the AINC [Average Ideal Number of Children] to underestimate desired fertility". Lightbourne (1985) and Bongaarts (1991) also consider that preferred family size probably refers to the number of living children preferred. However, if mortality concerns are part of fertility strategies, this assumption about the understanding of "ideal number of children" may require some validation. Montgomery (1987) also mentions that the distinction between births and surviving children was ambiguous in the WFS (World Fertility Surveys) question on the ideal number of children, which had the same formulation as that in the Demographic and Health Surveys.

If this is the case, mothers may respond to the question regarding ideal family size in two ways. They may think of the ideal number of children as all the children they will deliver assuming that

some will not survive. Alternatively, they may think of the number of living children they want, even though they may require more to achieve this goal. In a population that offers both kinds of responses to the question, the mortality expectations of some respondents may confound the aggregate data and make interpretations of desired fertility or family size problematic. It is therefore important to understand exactly how mortality influences women's understanding of and response to questions regarding the ideal number of children.

2.2.3 The sequential family building process

The understanding of people's individual perceptions, motivations and decision processes may help predict fertility behaviour. In particular, the perceived supply of children depends on a woman's assessment of her fecundity and of the chances of infant and child survival (Hollerbach, 1983). While fecundity is difficult to measure, there is no doubt that most women in sub-Saharan Africa greatly value their fecundity, and before having the first child, they fear not being able to produce enough children. The second component of perceived supply is perceived infant and child survival. In high mortality settings, parents will tend to have more births in the expectation of attaining the desired family size. On the other hand, higher perceived mortality may reduce the demand for surviving children, as the costs of attaining a particular family size increase (Hollerbach, 1983). Therefore, fertility decision-making is a sequential process where the outcome of each demographic event influences the decision-making on whether to have more children and when (Heer and Wu, 1972, Knodel, 1978).

Bledsoe et al (1998) analysed the results of a survey conducted in rural Gambia and highlight the importance of still births and miscarriages in family building process. First, they acknowledge that women in the middle of their reproductive lives wanted to have larger birth intervals, by delaying a new pregnancy significantly after the weaning of the last child. Second, women see pregnancy outcomes other than births as causing more physical harm to the mothers than normal live births. Taking into account that reproductive mishaps are about 8% of all known pregnancies (Bledsoe et al, 1998), the inclusion of these health problems should be considered when analysing family building.

Preferences for a son might also affect the family building process significantly. Indeed, Choe et al (1997), analysing data from Egypt, Bangladesh and South Korea, concluded that the interval to the next child tends to be smaller if the previous child is a girl than if it is a boy. Furthermore, in two of the countries in the study, girls experience higher mortality than boys, which, according to the authors, could be in part a result of shorter intervals.

2.2.4 Cultural, economic reasons for large family size in Africa

Bongaarts and Mencken (1983) consider five proximate determinants which affect fertility in all societies: age at sexual union, duration of post-partum infecundability, contraceptive use, abortion and sterility. Fertility desires in Sub-Saharan Africa stem from norms that place high value in children for labour, old-age security and kinship ties. According to van de Walle and Foster (1990), the achievement of this goal is obtained through almost universal early age marriage, and very low use of modern contraceptives. Furthermore, long breastfeeding and post-partum abstinence are also important determinants in shaping people's fertility.

Cultural and economic systems act through the five proximate determinants in order to shape fertility. On the one hand, it is often said that the cultural uniqueness in Africa is the main reason for persistent high fertility in Africa (Caldwell et al, 1987). However, this culture is not necessarily homogeneous, and it has been undergoing deep transformation for some decades now. Mason (1997) elaborates on the concept of culture and says "The collective ideational system that governs custom views culture as a relatively fixed set of rules for behaviour into which the new generations are inculcated and thereafter regulates their behaviour." However, she suggests that it is considered increasingly more unrealistic to view culture as a relatively rigid template for individual behaviour. Anthropologists nowadays regard culture as a dynamic set of rules that individuals ceaselessly reinterpret and renegotiate. Not all individuals are equally able to influence culture, and representatives of powerful institutions such as the church or the state have a disproportionate influence in maintaining and determining the rules for behaviour. Nevertheless, as Mason adds,

"...even the most powerless members of society are able to resist, redefine or reinterpret the group's rules for behaviour and, in so doing, contribute to the change of culture."

Similarly, the economic systems in sub-Saharan Africa are in deep transformation. It would not be accurate to classify an African country in terms of a certain form of productive systems. It is common to find a farmer excavating a small plot of land with a hoe to produce subsistence crops, while a hundred meters away an enormous factory produces huge quantities of manufactured goods. Indeed, the Working Group on Factors Affecting Contraceptive Use (1993) concluded that the demographic significance of the lineage has been progressively undermined by economic development and modernization. Furthermore, the rising of costs of social benefits such as education and health due to structural adjustment programmes, which had been free during the first years of independence, are putting an extra burden on people's already meagre revenue. This economic transformation has already shown signs of provoking a decrease in fertility (Isiugo Abanihe, 1994).

2.2.5 Contraceptive use in Africa

The rate of contraceptive use in Africa was 13% in 1993, which is much lower than in the other developing regions where the rate was about 57% (Population Reference Bureau, 1992). There are two main reasons for such low contraceptive prevalence: one is the demand for high birth rates and the other is that the extremely limited access to modern contraceptives (Working Group on Factors Affecting Contraceptive Use, 1993). More recently, however, contraceptive prevalence has improved and demand for children has decreased slightly (Westoff and Bankole, 2002; Ross et al, 2002).

Moreover, another factor should also be taken into consideration - the diffusion of modern contraceptive methods. More and more, the importance of this issue in contraceptive prevalence and hence fertility decline is being recognized. Greater knowledge of the ways in which ideas and practices are diffused in Africa, may contribute to the spread of contraceptive methods knowledge (Cleland, 1985; Lockood, 2000). However, Brass and Jolly (1993) argue that this diffusion of

ideas can only be effective if there is a good supply of contraceptives and a strong, well organized governmental family planning program.

The section that follows presents a detailed analysis of the effects of mortality on fertility, including the most used framework for analysing the effects of child mortality on fertility.

2.3 The effects of child mortality on fertility

2.3.1 Introduction

The relationship between mortality and fertility is one of the most significant areas of population studies and it has been researched thoroughly for some time. Chowdhurry (1988) empirically analysed a causal relationship for 35 developing countries and although no consistent results were evident, more countries appeared to support the existence of a strong relationship between fertility and mortality than did not. However it is still unclear how changes in mortality rates relate to changes in fertility rates. Do improvements in children's survival chances reduce birth rates? Does high fertility increase the likelihood of mortality? These questions and many other have been studied, but theorists do not always agree on the answers.

As it is well known, age-specific mortality rates are usually U-shaped, more or less skewed corresponding to lower or higher mortality settings (Bacci, 1990). Thus, very high child mortality levels are characteristic of less developed countries and they differ enormously from child mortality levels in developed countries. Indeed, these differences in child mortality can reach an order of 25 times or even 50 times (UNDP, 1997) between developed and developing countries. Nonetheless, infant and child mortality rates in less developing countries can change drastically in a relatively short period of time. Hence, the effects of the infant and child mortality changes on fertility have been, until recently, much more relevant than the effects of the mortality rate changes at other ages on fertility. However, because the AIDS epidemic is drastically changing age-specific mortality rates at older ages (UNAIDS, 2000), adult mortality should also be taken into

account. An immediate result of higher mortality rates in prime age adults is a lower crude birth rate. In addition, changes in fertility can also occur due to biological and attitudinal factors.

2.3.2 The association between child mortality and fertility

The association between fertility and child mortality has three possible linkages (Rosero-Bixby, 1998): i) child mortality (and mortality in general) share a common set of socio-demographic determinants with fertility (mother's education, access to health and others) (Hanson et al); ii) higher fertility heightens child mortality due to weakened mother's health, diminution of lactation period (Trussel and Pebley, 1984), siblings competition for scarce resources (Pebley and Millman, 1986), and transmission of infections in child-crowded environments (Blacker, 1987); iii) increases in child survival provoke a decrease in fertility as the number of births necessary to achieve a certain desired number of surviving children lowers (Preston, 1978; Cohen and Montgomery, 1998). These three types of casual links are closely interrelated and difficult to disentangle.

2.3.3 Framework to analyse the effects of child mortality on fertility

For simplicity, most researchers have used a single analytical framework to analyse the effects of child mortality on fertility. According to this analytical framework (see Randall Olsen, 1983, for example), the process of causation of child mortality on fertility is considered in terms of four categories: direct replacement, hoarding, societal replacement and biological replacement. Direct replacement is the direct effect of mortality on fertility: when a child dies, parents decide to have another one to replace it. The "hoarding" effect refers to the decision to have more children in anticipation of future child deaths. The "societal" replacement is the effect of changes in mortality of social norms related with fertility. Finally, "biological" replacement is the replacement of a dead child due to the shortening of the time to the next birth caused by his death, thus increasing the probability of another birth. The first three categories involve attitudes and volition while biological replacement does not.

2.3.3.1 The replacement effect

The replacement attitude is simple and myopic. It is a decision taken only after a death occurs. In this strategy, no complicated reasoning occurs and no fear of mortality is present in the decision-making. Furthermore, the replacement may not happen immediately after the occurrence of a child death. If the parents have decided to have a certain number of children, the next child they have may not be a replacement of the dead one but rather the natural birth they already had decided to have to obtain a predetermined number of children, regardless of the death of that child. However, in their life span, the replacement took place because they may have had more births than the ideal number of surviving children they had wanted.

Several studies trying to measure the impact of this attitude were made with consistent results. However, in general, an additional child death in the family, leads to far less than an additional birth. Preston (1978), when analysing several studies on this issue, concluded that in no population are as many as 20-30% of child deaths replaced by additional later births (Chowdhurry et al, 1978 and Vallin and Levy, 1978). The techniques usually utilised are: the estimation of the number of additional births by measuring the probability that one birth is followed by another according to the death or survival of the first birth, and through the estimation of the lengthening of the interval between one birth and the next, considering whether or not the first birth was followed by a death. These results reported in Preston (1978) were later confirmed by Grummer-Strawn et al (1998) who analysed 46 data sets from developing countries, and also concluded that the replacement rate following a child's death was less than 50%. In some cases, essentially in high fertility pre-transitional populations, this strategy is practically non-existent.

2.3.3.2 The hoarding effect

The "hoarding" attitude is an ex-ante decision, contrary to the "direct replacement" attitude, which is a decision that is taken after the event happens, i.e. when a child dies. The hoarding attitude or hoarding strategy is a long run, insurance strategy. The high incidence of fatal diseases plays a role in shaping fatalism in many spheres of life, including fertility behaviour. If a

family size goal is defined in terms of "no less than" a certain number of surviving children, the number of births in high mortality settings will be bigger than the target family size. If we imagine that all the couples in a given community make a fertility decision when they get married, the effect of the hoarding attitude would be the average difference between the number of children they plan to have minus the number of children they consider ideal as survivors to adulthood. In this case, the number of births will depend on the couple's perception of the children's survival rate at the time of marriage. However, fertility decision-making is not a one-time decision, but rather a sequential reproductive life-time process of decision-making (Sah, 1991). It may happen that parents have a reproductive intention at the beginning of their reproductive lives, but they may change their intentions and their behaviour for several possible factors. One of these factors could be the change of mortality perceptions over time, either increasing or decreasing the value of the initial mortality perceptions. The hoarding attitude is a decision that can be made at different stages in life about the number of children to have, taking into consideration that some will die.

Although there have been some attempts to measure the impact of this attitude, the results have been inconclusive. Nevertheless, its importance may be primordial in high mortality settings. An interesting demographic exercise is to simulate how many births a couple should have in order to obtain a given parity with a certain degree of certainty. McNicoll, cited by Lloyd and Ivanov (1988), prepared a table of the average distribution of females with six births by number of children surviving to age 20 under high ($e_0 = 25$) and moderate ($e_0 = 50$) mortality regimes. According to this table, 73% of those women under the high mortality regime are likely to lose half or more of their children. In this situation, a family size goal greater than 3 surviving children would be unattainable for most families. In addition when risks of mortality and morbidity are very high, few women could bear more than six children.

The insurance strategy may be linked with the expectation that when parents grow old, they will be taken care of by their children, who will also guarantee the continuation of the family line. This is particularly important in societies were social security benefits are practically non-existent.

2.3.3.3 The societal effect

The societal effect is difficult to define and even more difficult to measure empirically. With high and variable rates of child and infant mortality, it is impossible for any couple to predict with any certainty how many children will survive from a given number of births. This perception may in turn be influenced by past family experience as well as by societal perceptions that were developed for generations. These societal perceptions may have been, in turn, transformed into cultural attitudes regarding fertility behaviour, operating as social norms of high fertility in order to preserve the society. If this is the case, it would be very difficult to measure the relation between high mortality and fertility. However, in a given society, norms towards high fertility that cannot be explained solely by economic motivations may be a response to high mortality. Looking at the demographic history in recent years, population growth has remained very low (Cohen, 1995), indicating that the norms and social attitudes for high fertility barely compensated for the levels of mortality. This societal effect differs from hoarding behaviour in that it does not reflect an individual's conscious response to high mortality, but rather valorises high fertility.

In a transition society where mortality levels and patterns are constantly changing, it may not be the real rates of mortality that determine the process of causation, but rather the perceptions that fertility decision-makers have regarding those rates.

2.3.3.4 The relationship between the attitudinal effects

It is interesting to note that the replacement and hoarding strategies are substitutes for each other. These replacement strategies are likely to occur depending on the level and patterns of mortality. Not only should life expectation be considered, but also whether the high mortality rates are concentrated in the first years of life or if they are spread more evenly over the life span. If mortality rates are concentrated in the first years of life then a replacement attitude is more efficient than a hoarding attitude. In the latter event, a hoarding attitude can lead parents to end up with a certain number of unwanted children. However, if child death occurs to a large extent after early childhood, parents are bound to use the hoarding strategy in order to guarantee a certain number of survivors, as the death of a child can occur when parents can no longer replace it (Lloyd and

Ivanov, 1988). Furthermore, if there is a hoarding strategy of having a certain number of births in order to guarantee the desired number of survivors, no replacement will occur with the death of a child because this death has already been accounted for.

Nevertheless, other factors can intervene to replace a hoarding attitude with a replacement attitude, even if the perceived rates of mortality do not decrease. This may occur when economic pressures, especially in the urban areas, encourage a reduction in fertility. If a couple seeks a certain number of survivors and thinks it needs to have a greater number of children in order to achieve their target, it may decide to begin only with the number of survivors they want to have: this is because they may not afford to have more children, and then hope that none will die or at least if it happens that they will still have time to replace them (Carvalho, 1998).

Nevertheless, there is a consensus among demographers that the insurance strategy is the typical response in high mortality settings while direct replacement is a more common characteristic attitude in low mortality settings (Lloyd, C. and Ivanov, S. (1988); Mari Bhat, P.N. (1998)).

It is also difficult to distinguish between the hoarding and the societal effects. The hoarding effect is probably related with the parents' mortality levels perceptions. The societal or community effect, often linked with the insurance effect (Lloyd and Ivanov, 1978), refers to customs and norms in the society that arise in response to a common level of mortality, such as taboos and other cultural norms. However, linked to the societal effect, community perceptions of mortality may also play an important role on fertility. Indeed, the essence of the insurance effect lies in the combination of individual experience and social structure that forms individual perceptions of mortality and forms the basis of fertility goals (Cohen and Montgomery, 1998).

2.3.4 The measurement of the different effects

2.3.4.1 The measurement of the direct replacement and lactational effects

Most published studies analyse and attempt to measure the effect of one additional child death on fertility (Ben-Porath, 1978; Chowdhurry et al, 1978; Grummer-Strawn et al, 1998). This

effect can be subdivided into two different categories: i) the direct replacement, a behavioural effect, which is the conscious decision of parents to have an additional child in order to substitute the one who has died; ii) the biological effect, which measures the shortening of the birth interval to the next child, due to the mother's ceasing to breastfeed the child who dies. This effect can only happen when the child who dies is still breastfeeding and, for this reason, is significant only in societies where long breastfeeding (significantly more than 9 to 10 months) is the norm. The results of various studies show that the lactation and the direct replacement effects together do not compensate for child loss, averaging less than 0.5 additional births for each child death. If these were the only effects of child mortality on fertility, then the long term population growth rate would not decrease with the decrease of child mortality, in fact it would even have the opposite effect (Cohen and Montgomery, 1998).

2.3.4.2 The Measurement of the hoarding and societal Effects

Much empirical research on the mortality-fertility relationship concentrates on the physiological effects and direct replacement because these can be reasonably well tested and measured with the usual individual survey data. However, expected mortality is, to a large extent, shared by the couples in a given community, and so hoarding cannot be measured with the usual demographic survey data (Cohen and Montgomery, 1998).

Indeed, it is difficult to measure the hoarding effect. At aggregate level, one hypothetical way of doing it could be to compare two groups of people with the same socio-economic and cultural environments but with different rates of mortality and analyse the resultant fertility. However this is very hypothetical as mortality is correlated with the socio-economic and cultural environments.

How could a measurement for the hoarding effect be defined at individual level? A possible measurement might be the number of additional births a couple would have, compared with the number of surviving children this couple would consider as optimum. A first problem with this measurement is the difficulty to define the desired family size. The demand for children is not a one-time decision (see Sah, 1991), but rather a process that for years is adapted to the socio-

economic environment of the families as well as the mortality experiences that the families undergo. In fact, not only is the fertility decision-making not made at one time but also even if couples do make an initial decision, it may change over time. Even if an initial decision is not made, a hoarding attitude may still prevail. Furthermore, the reliability of the answers to questions on these issues may be questioned. A second problem with such measurement is the time needed to obtain it. Indeed, ideally, the way of measuring a hoarding attitude would be through a longitudinal survey, specially designed for this effect. This would mean that the survey would take at least a parent's reproductive life span.

2.3.5 Economic models of the influence of mortality on fertility

In the past decades researchers have created several models to explain fertility behaviour and some of them analyse the effects of mortality on fertility. These models assume that parents maximize a concave utility function that includes costs and benefits of children. The rationale for this assumption is that the utility of having no children is null, increasing with the increase of children who survive up to a certain point and decreasing afterwards. Below, the four major models that include the effects of child mortality are presented: Ben-Porath's (Ben-Porath, 1978), Sahs's (Sah, 1991), Wolpin's (Wolpin, 1984) and Becker and Barro's (Becker and Barro, 1988). Although no model proved to represent all the important features of the fertility decision-making processes they have the worth of highlighting important issues regarding child mortality. Indeed, no model estimates the 'hoarding attitude' but two of them stress the importance of considering the child deaths costs when modelling fertility. In addition, another model stresses the assumption that parents are risk adverse when facing the possibility of becoming childless.

Ben-Porath's model

Ben Porath's model considers that parents maximize utility of expected surviving children. The utility function is a function of the parental income, the number of births, the survival probability per child and the cost per birth. Because there is a cost associated to each birth, the cost of a certain number of surviving children increases with the number of children who died. So, on one hand, a replacement effect may occur due to the increase of mortality, but on the other hand, if the rates of

mortality are very high, the costs of producing an additional surviving child will be too high, thus provoking a decrease on the number of births.

Thus, the maximization process can result in a very low number of births and risks the existence of surviving children. However, this will partly depend on the parents' perception of the balance between the benefits of having children and the costs of loosing a child. Furthermore, this model does not take into consideration that the decrease in mortality may stimulate parents to invest more in their children as they expect them to survive. Notwithstanding, this model highlights the importance of considering the costs of children lost. It is not indifferent to parents to have several births that end up in deaths, either from an economic or from a psychological point of view.

Sah's model

In Sah's model the utility function depends on the costs and benefits of surviving children. It differs from Porath's model in that Sah's considers that parents are risk averse in the sense that they do not risk to become childless. Indeed, because the benefits of a surviving child are higher than the costs, the optimal solution will not be zero survivors. The rationale for this is that parents are concerned with surviving children and aim to guarantee a certain number of adult children. In addition, Sah introduces a dynamic component in the model, arguing that fertility decisions are dynamic in nature as they may change over time. This dynamic aspect is due to several factors, of which past mortality experience is an important one.

However, a serious drawback of this model is that it does not consider the costs of children who die. It does not seem reasonable to consider that the utility of having a certain number of survivors is the same regardless of having lost children or not. However, this model highlights the hypothesis that parents are risk adverse when facing the possibility of becoming childless.

Wolpin's model

Wolpin developed a dynamic stochastic model of life-cycle fertility within an environment where infant survival is uncertain. This model attempts to estimate the different effects of mortality on

fertility. It is a finite-horizon dynamic programming problem that it is assumed to be solved by the individuals and considers that in each period a decision on whether to have a child or not is taken. The decision rules for each time do not have a simple analytical representation. The model is discrete-time and discrete-outcome. A period is the length of time within which a birth may occur. Contraception is assumed to be perfect and conception can be scheduled with certainty. There is a fixed cost of bearing a live child and a cost for maintaining a live child for the first period. It is assumed that once a child survives the first period will survive into adulthood. Infant mortality and household income are assumed exogenous, and each follows a stochastic process known to the household. The decision of the household is given by the solution of maximizing a dynamic programming utility function, whose optimum value is calculated by the Bellman's principle of optimality.

This model can generate a wide variety of replacement patterns, from zero to full child death replacement. However, this model it is not likely to estimate an hoarding attitude in high mortality settings, as in general the optimum solution will be to replace directly a child who dies. Indeed, the fact that the decision period is the period where a birth may occur, is contradictory with the assumption that once a child survives the first period, than will survive into adulthood. In addition, the estimation of the parameters of this model is computationally rather complex.

Becker and Barro's model

Becker and Barro developed a model that includes the analysis of the linkages in fertility rates and capital accumulation across generations. This model is an extension of the previous Becker's economic model of fertility, and it is based on the assumption that parents are altruistic toward their children. The utility of the parents depends on their own consumption and also on the utility of each child, and thus the number of children. The relation between the utilities of parents produces a 'dynastic' utility function that depends on the consumption and number of descendents in all generations. The first order conditions to maximize this fertility function imply that the increase of the real interest rate and the degree of altruism induce high fertility, while the increase of rate of growth in per capita consumption decreases fertility.

A sub-model including the effects of mortality on fertility is also included. In this sub-model, the authors show that a permanent decline on child mortality lowers the costs of raising surviving children in all generations. Thus, the demand for surviving children raises in the initial generation of decreased mortality, but than fertility decreases. Similarly to Ben Porath's model, this model highlights the importance of cost of the lost children.

2.3.6 Too many children?

As mentioned in section 2.1, Kingsley Davis (1963) and Cleland (2001) view mortality decline effects on fertility as a necessary and sufficient condition for fertility declines, but for reasons slightly different to those mentioned in the previous sections. Both argue that, for the family, improved survival brings an inevitable bulk of disadvantages, since more children have to be reared, educated, and the inheritance of resources becomes fragmented and delayed due to the parents' longer survival. Consequently, a decrease in mortality levels puts a severe strain on maintaining the size and social status of the family throughout the generations. One response is to send children to fostering or as servants (see section 2.1), which has been a widespread practice in sub-Saharan countries. However, after a while, the need for more efficient measures causes parents to diminish their fertility. In fact, according to Cleland (1993), the main question is: "for what reasons and how long can societies accommodate high rates of population increase before equilibrium can be restored?" Indeed, it is not yet proved that high demand for children, even in Africa, means high demand for surviving children (Cleland, 2001).

2.3.7 Other possible mortality effects on fertility

The framework for analysing the effects of mortality on fertility presented in the previous sub-sections contemplates only mortality at early ages. Indeed, during the decades after World War II, the decrease in mortality affected mainly infant and child mortality rates. However, nowadays, the mortality situation in sub-Saharan Africa is less clustered at young ages. The AIDS epidemic has sharply increased the mortality rates of adults in their prime adult ages. The potential

consequences of this epidemic on fertility are various and complex, due to the fact that the increase in mortality significantly changes the rates of both child mortality and mortality of adults in their prime adult age. Attitudinal effects and indirect effects on fertility can happen as a result of the AIDS epidemic. This issue will be analysed later in this chapter.

It is also important to mention other possible mortality effects. In a study in south India in the early eighties, Caldwell (1986) found that the demographic behaviour in response to periodic high risk was more related to the improvement of the family's abilities to cope with these risks than to ensure old-age support. South India is prone to drought which brings terrible famines to rural people, while those involved in other non-agricultural economic activities were less affected by the drought. As a result, parents tend to invest in their children's education so that they can obtain another profession and become independent from rural labour. Because the cost of rearing children increases with this strategy, parents have fewer children.

The section that follows presents a summary of the main studies on the effects of mortality perceptions on fertility.

2.4 Perceptions of mortality and their influence on fertility

2.4.1 Introduction

In a setting with moderate to high mortality rates, it is not unreasonable to suppose that parents might think about mortality and fertility simultaneously. In other words, concerns about potential mortality may influence both fertility desires and outcomes. Caldwell (1987), commenting on an in-depth survey in Ibadan, Nigeria, said

> "We were surprised at the extent to which the women were always aware of the possibility that one or more children could suddenly die... While it is true that the vast majority of Ibadan parents do not control their family size because they fear the capricious inroads of mortality, that fear is so great that little concession is given to the substantial mortality declines that have already taken place."

If there is a hoarding (insurance) attitudinal effect of mortality on fertility, then decision makers' perceptions on mortality are crucial. Indeed, the essence of the insurance effect lies in the combination of individual experience and social structure that forms individual perceptions of mortality and forms the basis of fertility goals (Cohen and Montgomery, 1998). However, remarkably little demographic research on these fundamental issues has been done. Part of the reason for this lack of research is that insurance effects are very difficult to detect with aggregate data or with any demographic data that is usually collected (Montgomery, 1998).

Relatively few micro-level analyses have attempted to link fertility changes to community level changes in mortality. The two sub-sections that follow present the main empirical and qualitative studies on mortality perceptions' influences on fertility found in the literature. Then a sub-section on the relationship between perceptions of mortality, hoarding attitude and the ideal number of children is presented. The present section on the influence of the perception on mortality finishes with a subsection which summarizes the main results of the studies made so far.

2.4.2 Empirical studies considering perceptions of mortality and its effects on fertility

Some empirical studies have been done so far, namely

- Rutstein (1974) – Taiwan
- Heer and Wu (1978) –Taiwan and Morocco
- Pebley, Delgado and Brinemann (1979) - Guatemala
- Kunstadter and others (1992) - Thailand
- Mahy (1999) – Zimbabwe

Rutstein (1974) – Taiwan

The Rutstein study in Taiwan consisted of regression analysis in a survey administered to 2,277 couples, during 1967-69. The author used the parity progression ratios as the dependent variable

and interpreted these ratios as the conditional probabilities for couples at each parity level of having another birth. There were two mortality perception variables which constituted the main independent variables. One was the couple's own experience of child mortality (the author considered mortality of children under the age of 15) and the other was a variable that measured the couple's attitudes toward child mortality. This last variable was an index constructed from three questions and for each of the questions, one point was added in case of an affirmative answer or if mortality was mentioned in the answer. The three questions were as follows:

- "Generally speaking, in the past, children often died, and therefore it was a great advantage to have at least four sons. Do you think it is true today?"
- " Most people feel that a couple with five or more children has a large family. In your view what are the main advantages of having such a large family?"
- "Are there any important disadvantages to having only two children? What are they?"

Rutstein found that 30 percent of the couples in the survey expressed some fear of child mortality. He concluded that couples expressing fear of child mortality had lower education levels and less exposure to the mass media. Furthermore, he found that the ideal number of children was higher for the couples who expressed fear of child mortality. It is interesting to note that infant mortality rate in Taiwan fell from 125 per thousand in 1948 to 39 per thousand in 1971.

Heer and Wu (1978) –Taiwan and Morocco

Heer and Wu (1978) prepared a more detailed and complete study to analyse the effects of mortality on fertility in rural Taiwan (data from 1969-70). They studied two townships with different mortality rates and analysed their recent fertility. They posited that the effect of infant and child mortality on fertility behaviour and attitudes could be subdivided into two components: the effect of the community level mortality rates and the effect of the individual experience of child loss. They analysed four categories of respondents separately: low and high mortality settings were combined with an indicator for having lost a child. The technique used was to regress actual or intended fertility behaviour on the subjective perception of child survival and on some objective measure of actual mortality conditions. They found that the perception of a lower child mortality rate was associated with significantly lower fertility; respondents with low perception of child

survival go on to have about .24 fewer children than those with higher perception after adjusting for other variables. However, the perceived levels of survivorship seemed to have no effect on the current or previous use of contraception or on the additional number of children desired. For these last two dependent variables, the community levels of survivorship seemed to have a much higher effect. According to the authors, "Nevertheless, our results indicate that township is a more important variable than perception of child survival in explaining subsequent fertility after either the second or the third birth. A major reason why the direct relation between township and subsequent fertility still exists after control for individual perceptions of child survival is probably the failure to achieve reliable measurement of the latter variable." Indeed, the variables they used to capture the perceptions of child survival, were the number of survivors from 20 and 100 births. One year after the interviews took place, the authors re-interviewed the same respondents and obtained a very low correlation between test and retest of .290 (with an n of 5,454) and .285 (with an n of 4,800) respectively on the perceptions of survivors from 20 and 100. It may happen that the base rates of these mortality figures, particularly the 100 base rates, are too high for less educated people to be able to estimate consistent mortality rates. Even the number 20 is a much higher figure than the ones people normally deal with regarding these issues. In fact, when people think about children, they normally think about 4 or 6, and rarely as high as 10. Furthermore, the hoarding attitude depends greatly on the parents' perception of survivorship rates to adulthood not only infant and child mortality rates.

Heer and Wu's study, which compared two villages with different mortality levels, represents one of the most complete attempt to measure the hoarding attitude. However, if the weakness of the measurement of mortality perceptions could be overcome, the procedure would only give a lower bound for the hoarding attitude, not its full magnitude. Indeed, if people in both villages pursue a hoarding attitude but with different magnitude, only this difference would be checked. So, there is the need to try to find a better measure of people's mortality perceptions. There is little doubt that, if conscious decision-making regarding the number of children to have depends on mortality rates, then this decision-making depends primarily on the decision-makers' perceptions of mortality,

which may not coincide with the real rates. It is thus necessary to take a different approach in order to assess these perceptions as accurately as possible.

Pebley, Delgado and Brinemann (1979) - Guatemala

Pebley et al prepared a first questionnaire for a preliminary survey to test whether people's perceptions of mortality levels were accurate, before comparing these perceptions with fertility behaviour. The questions were: i) is there more, less or the same proportion of child deaths in the region compared with the proportion of deaths five years before the survey?; ii) how many children would survive out of five births and out of ten births? They found that women had a reasonably accurate assessment of child mortality levels in two regions of Guatemala where different rates of mortality prevailed. However, despite the accuracy in estimating mortality levels, Pebley found that perceptions of child mortality did not affect fertility intentions. However, the death of a sibling or one of the respondents' own children was positively associated with the desire for additional children.

Kunstadter and others (1992) – Thailand

Kunstadter and others initially collected information on the insurance strategy by asking parents in a household survey among the Hmong whether they wanted more children and if yes, why. Fear of child mortality was mentioned in less than one percent of the answers. However, both researchers and informants suggested that the fear of a child death was not mentioned because they were afraid that discussing potential death might affect their child's survival. In a further round of the survey, additional questions were asked, as follows:

- "Compared with 20 years ago, do you think that the proportion of Hmong children born in this community now survive until they are at least 5 years old, increased, decreased or remained the same? Why?"
- "If you think that the proportion of children who survive has changed, what difference would this make in the number of children you would like to have now? Why?"

They found that 204 out of 242 responded that mortality decreased over that time, suggesting that they have a reasonable accurate perception of the trends. Furthermore, a large proportion of those

who felt mortality had decreased wanted fewer children. However, the findings were not statistically significant.

Mahy (1999) - Zimbabwe

More recently, Mahy analysed women's and men's desire for an additional child as an outcome variable and certain mortality perceptions variables as dependent variables. She used the data from the Zimbabwe Demographic and Health Surveys and applied logit regression analysis, controlling for a number of socio-economic variables. The mortality perceptions variables that were used were: respondent's own child mortality, household child mortality, childhood sibling death, access to media, knowledge of someone with AIDS, and community under five mortality rates. She found that the effect of mortality perceptions on the desire for an additional child were different between men and women. In summary, the main results were:

- The death of a sibling during the respondent's childhood has no significant effect on fertility, both for women and men;
- If a woman knew someone that has AIDS or died of AIDS, it decreased her probability of desiring an additional child, while an inverse relationship was found for men;
- The exposure to media has no significant effect on females, but was significantly negatively associated with male's desire for additional children;
- Child mortality in the community was positively associated with women's desire for additional children, while for men it was not significantly associated;

Experience of own child death was not significant for women's desire for additional children, but was positively associated with men's. In particular, she found evidence of an insurance effect, based on the association between high mortality in the community and an increased probability of wanting additional children.

2.4.3 Qualitative Studies

- Knodel, Chamaratrithirong and Debavalya (1987) – Thailand
- Ross, Etkin, and Muazzamu (1991) - Nigeria
- Mary Mahy (1999) - Zimbabwe

- Legrand et al (2001) - Zimbabwe and Senegal
- Carvalho (1998) - Mozambique

Knodel, Chamaratrithirong and Debavalya (1987) - Thailand

Knodel and al conducted a large study in order to study the ongoing fertility decline in Thailand. They used both quantitative and qualitative methods to look at how child mortality affected fertility. The qualitative research included focus groups in which perceptions of child mortality were analysed. Perceived trends of child mortality corresponded with actual trends of declining mortality. However, there was little evidence that these perceptions affected fertility decisions.

Ross, Etkin, and Muazzamu (1991) - Nigeria

Ross, Etkin, and Muazzamu (1991) used reproductive stories for all men in a Nigerian village to estimate under-five mortality. They visited the village twice over a 12 year period, during which time a pilot project was implemented to improve health care in the village. The authors found that the overall under-five mortality rates decreased, especially due to a sharp decrease in infant mortality rates. However, because mortality for children aged 1 to 4 was increasing, village perceptions were that overall under five mortality rates were increasing.

Mary Mahy (1999) - Zimbabwe

Another recent study on mortality perceptions and their effects in fertility was carried out by Mary Mahy (1999). She reported that 60 percent of the informants in a qualitative study in Zimbabwe mentioned the fear of losing a child as a reason for having a large family. She also analysed mortality perceptions formation and the ways in which they could affect fertility.

Legrand et al (2001) - Zimbabwe and Senegal

Legrand et al (2001) undertook a qualitative survey in Zimbabwe and Senegal, in order to analyse the insurance strategy. According to the authors, many people interviewed in Zimbabwe expressed insurance strategies and behaviours, which seemed to be a quite common strategy in this country.

However, reproductive behaviours in Senegal were somewhat different. In Dakar, many men and women appeared to follow the insurance strategy, while people from small towns and rural areas did not do so as frequently. People from the rural areas frequently mentioned that it was up to God to decide if and how many children would die. Incidentally, however, these were regions of much higher fertility rates than the country's averages.

Carvalho (1998) - Mozambique

A small mixed quantitative-qualitative survey was carried out for a hundred women in the outskirts of Maputo City. Although mortality levels show a decreasing trend, only about one third of the women believed that children are more likely to survive nowadays than was one generation ago. About 15% reported either there was no difference or they didn't know. The remainder, about half of the total, thought that children die more often now than they did previously. These results underline the notion that perceptions and reality may diverge.

In addition, women in the Maputo survey were asked three questions regarding survivorship: (i) If someone has ten children, how many should she expect that will survive the mother? (ii) How many children do you think you must have so that when you are old you have the number of surviving children [you think it is really important to have when you get old]? (iii) How many children do you think you need to have to be sure you get at least one to support you at old age? Taking proportions, the results of these three questions were, respectively, 6.4, 5.5 and 3.8 survivors out of ten children. It is interesting to note that in a city of under five mortality rate of about 92, one might expect a much higher rate of perceived survivorship. The difference in the results may partially be explained by the fact that fertility is a discrete variable. This is particularly important for the answer in (iii). Indeed, once a person thinks that a child may die, even attributing a low probability to this event, he/she must think of two children if they want to have a survivor with a high degree of certainty. In this case, the corresponding estimated rate of survivorship will fall immediately to 50%.

So, the important issue may be a combination of mortality perceptions and risk aversion - their willingness to avoid risking becoming childless. Because most women in this sample wanted to have more than one surviving child in their old age and because the great majority of women were not thinking of having ten children, the figures in (i) and (iii) may not represent their own reality. It thus seems acceptable to consider the figure given in (ii) as the one nearest to their reasoning when making fertility decisions. There are no accurate rates of survivorship, but a lower bound for the rate of survivorship to thirty years old in the city of Maputo was recently estimated at 78%.

2.4.4 Relationship between perceptions of mortality, hoarding attitude and the ideal number of children

If women consider the ideal number of children in terms of living children, then the desired number of births, at the aggregate level, would be biased downwards due to mortality. In fact, women will likely have more children than their reported ideal for two reasons: first, because some might die and be replaced; second, because women pre-emptively produce a higher than desired number of children in anticipation of potential future child deaths. In the second instance, women may be seen to continue childbearing after they have reached their desired number of surviving children. In other words, if women report the ideal number of children as the desired number of surviving children and want to fulfil their target, both a direct replacement strategy and an insurance strategy may translate into a larger number of births than desired children. It can also happen that no mortality occurs, and if women are not pursuing an insurance strategy, then the ideal number of surviving children may correspond to the desired number of births, even if women are responding only in terms of surviving children. Thus, if mortality is declining and women are not aware of it, a direct replacement strategy will result in less divergence between births and ideal family size than will an insurance strategy, but in both instances, births are likely to exceed reported desired family size (Carvalho and Sigle, 2000).

Consequently, an interpretation of the aggregate data as the level of fertility that would obtain provided women practised their desired stopping and spacing behaviour is flawed. It can, of course, also happen that women consider the ideal number of children in terms of desired number of births,

thinking that some might not survive. In this case, the ideal number of children *will* correspond to (or even fall short of) the desired number of births. Interpreting the aggregate data as desired fertility will therefore be less problematic.

In a study in Maputo (Carvalho, 1998), women were asked the question regarding the ideal number of children exactly as it was posed in the Mozambique DHS, and the average reported ideal number of children was four. The average ideal number of children obtained in the DHS for Maputo City was also four. After having answered the question about the ideal number of children and other related questions, the following question was asked: "When you think that the ideal number of children for you is ___, are you thinking that some may not survive? In other words, does the possibility that some of the children may not survive influence your choice for the ideal number of children?" Interestingly, this question appeared to be clearly understood and provoked a prompt answer from interviewees. Most of them firmly declared that they were thinking only of survivors. However, a significant proportion, 35%, said that they were taking into account the fact that some might die. Some women mentioned that one or two probably would not survive, implying that they may be employing an insurance strategy.

Because the sample was rather small (only a hundred women taken by chance in a neighbourhood in the outskirts of Maputo), it is difficult to relate the type of response (desired survivors or desired births) to the socio-economic characteristics of the individual women. However, it seems that the group of women who answered only in terms of survivors is not selective by age, origin (place of birth), whether they grew up in urban or rural areas, mother tongue, education, socio-economic group, or quality of house materials. For instance, the percentage of women who answered "only survivors" was, by number of completed years of schooling, 61% if they had none, 67% if they had 4 years, 53% if they had between 5 and 6 years, and 75% if they had between 7 and 9 years. Similar results were obtained for the other control variables.

These results underscore the divergent understandings of the concept "ideal number of children." If the question of ideal number had been put in terms of "survivors," it might have lowered the

average ideal number of children. Conversely, if the question had been put in terms of total births, it might have increased the ideal number of children. Indeed, in this sample, the average ideal number of children for those that were thinking only in terms of survivors is 3.5, compared with 4.9 for the remainder.

2.4.5 Main results of the studies done

The above presented studies represent a large proportion of the published studies that evaluated the effects of mortality perceptions on fertility. Indeed, during the 1960's and 1970's, demographers debated and researched the effects of mortality on fertility, but this interest has subsided for a while, and only at the turn of the century has it regained attention. The gap in the understanding of these issues due to the dearth of research should be overcome.

A large part of the studies presented in this section were carried out in relatively low mortality settings when compared with the mortality levels in most sub-Saharan Africa countries. It might happen that, in the latter region, the results of similar studies show a stronger effect of mortality perceptions on fertility than it was found in some of the above studies. Indeed, it is interesting to note that in all African countries where the question about the changes in mortality levels were asked, most people thought that mortality rates were rising, even though they were falling in reality.

In most studies where mortality perceptions were asked directly to the parents, the quantitative questions often used very large numbers e.g., how many children would survive the first year out of a hundred births. This question was most probably made to illiterate or quasi-illiterate parents, who may not have fully understood the quantities in question. Furthermore, even when this kind of question was asked considering lower numbers, e.g., ten newborns, people may have responded by thinking of some event outside their own lives. Indeed, it is unreasonable to think that most people will ponder the rates of survivorship (or mortality), before deciding to have their children. They might think, however, that if they have a certain ideal number of surviving children, how many

children they will need to have in order to reach their target. Only one study (Carvalho's) used this approach, but the sample was quite small.

Only in one study the formation of mortality perceptions were studied (Mahy's), but the process of mortality perceptions formation did not take into account psychological research on the issue.

Demographers have had difficulty in measuring the 'hoarding attitude'. Part of the problem might be linked to the fact that, although the idea of an insurance strategy is simple, the exact boundaries of this concept are unclear. However, recent literature points to a possible important effect on fertility. One way to circumvent this problem might be to perform a survey where parents are asked about their ideal number of surviving children and how many children they deem necessary to guarantee their desired family size.

The next section analyses in detail the additional complexities of mortality effects on fertility due to the drastic rise in mortality rates due to AIDS pandemic, particularly the rise of mortality rates in prime age adults.

2.5 AIDS

2.5.1 AIDS in Africa

Any investigation into the association between fertility and mortality in present-day sub-Saharan Africa, must take into account the consequences of the AIDS epidemic. Trends in AIDS prevalence and mortality are staggeringly high in this region. In 1995, WHO (cited in Bongaarts, 1996) estimated that 2.5 percent of the adults in Africa were infected with HIV, the AIDS virus. This figure, already high, hides two important features: the number of infections has increased drastically and the HIV infected adults are unevenly distributed across regions in Africa (Bongaarts, 1996). For instance, Hollander (1996) estimated that AIDS deaths would exceed 100,000 thousand per year in Uganda until 2020.

Assuming a stable crude birth rate, UN estimates suggest that increased mortality due to AIDS reduced population growth by 0.1 percent in sub-Saharan Africa (Bongaarts, 1996). Projections for 2005, assuming the same birth rate, indicated that AIDS would be responsible for a 0.14% reduction from the growth that would happen without AIDS. These rates mean that the epidemic has a significant moderating effect on population growth in sub-Saharan Africa, but even if we consider a high variant of AIDS prevalence projections, the growth rate would continue to be at a high of 26.1 per thousand per year (Bongaarts, 1996). However it is important to note that these results were obtained assuming unchanged fertility rates.

2.5.2 Effects of the AIDS epidemic on fertility

The potential consequences of this epidemic on fertility are varied and complex. There is a significant increase in morbidity and mortality in the population due to AIDS, where non-trivial changes of the rates of both child mortality and mortality of adults in their prime adult age prevail. The channels through which the AIDS epidemic may influence fertility are related to the proximate determinants of fertility such as contraceptive use, breastfeeding, marriage, infecundity, sterility and abortion (Bongaarts, 1978). Examples of these effects are the increased use of condoms and the possible decrease in fecundity due to illness, among others. These indirect effects will not be dealt with in this study.

Martha Ainsworth and colleagues (1998) analysed the attitudinal effects resulting from mortality due to AIDS and concluded that they may appear in two opposite forms. First, the elevated child mortality rates due to AIDS will probably exert a strong positive effect on fertility through the insurance channel. As people's perceptions of child mortality reflect higher mortality due to AIDS, they will likely increase the number of excess births deemed think is necessary to achieve the number of desired surviving children. Second, adult mortality rates due to AIDS may reduce desired family size and the observed demand for children of individual women through the following channels: i) increased adult mortality rates will reduce the expected benefits of children as old age care-givers; ii) mortality of prime-age adults may reduce household income and raise the

demand for labour of the surviving adults, which in turn would raise the cost of children per adult; iii) heightened adult mortality will leave many orphaned children to be absorbed by the household relatives, which will burden the already tight income, thus reducing the demand for children in the receiving family (Ainsworth et al, 1998). In addition, empirical research has shown a complementary effect of AIDS mortality on fertility: parents fearing infection and an early death, tend to decrease their initial desired family size so that the possibility of infecting their own children is reduced, and fewer children become orphaned (Rutenberg et al, 2000; Grieser et al, 2001).

There is a dearth of research on these issues and the following section summarizes the main published studies on the attitudinal effects of AIDS in fertility.

2.5.3 Research on the effects of mortality perceptions due to AIDS on fertility

Sewankambo et al (1994), cited in Bongaarts et al (1996), carried out a prospective study in the Rakai District of Uganda, where they made a survey in 1990 and a follow up in 1991. In 1990, 13 percent of adults were sero-positive and vital rates were calculated in the two stages. Although a cause specific mortality due to AIDS was found, the population growth rate declined only modestly. Furthermore, fertility rates of infected women were slightly lower than non-infected women, and this difference corresponded to a decrease in the crude birth rate from 4.69 to 4.57 percent. However, the effect of AIDS on fertility might have been overestimated, because many of the HIV infected women were also infected by other sexual transmitted diseases, and these diseases, many of which result in sterilization, might also have affected fertility decrease.

Ainsworth et al (1998) analysed some data sets in Tanzania and discovered a positive but weak relationship between community levels of child mortality and recent fertility, suggesting that an increase in child mortality will contribute to higher fertility. Furthermore, she found that community levels of adult mortality are negatively correlated with recent fertility, although the results were not always statistically significant. She concludes that, taken together, the results

suggest that there will be a fertility behavioural response to the increase of mortality due to AIDS, which, on the net, will decrease fertility. This result is confirmed by Hinde and Mturi (2000), who while analysing the DHS and Census Data in Tanzania, concluded that only 1 to 2 percent of the recent fertility decline could be attributed to the AIDS epidemic.

Rutenberg et al (2000), analysed a qualitative survey performed in Ndola, a region in Zambia with very high incidence of AIDS and concluded that in the absence of AIDS signs or symptoms, there is no change in the childbearing and contraceptive decisions. Nevertheless, when signs or symptoms were present, individuals strongly oppose having a child. At any rate, once people know their serostatus, they are unlikely to remain sufficiently healthy to significantly alter their total fertility.

Grieser et al (2001), found similar results in their qualitative survey in Zimbabwe. They discovered that insurance and replacement attitudes in response to mortality to be minimal, but a new effect of mortality on fertility was found: people who feared becoming ill, decided to have fewer children, but earlier on in order to minimize the probability of transmitting the disease to children or to leave many orphans to their relatives. Indeed, the fear and emotional pain of child death was the most frequent reason given for having fewer children. It is important to note that, in 1995, it was estimated that 52-60 percent of all adult deaths in Zimbabwe were associated with HIV/AIDS and that in the year 2000, this figure would increase to 70 percent (Robinson and Marindo, 1995, cited in Grieser et al (2001)).

Next section presents an overview of the research on the domain of psychology regarding decision making. It is deemed important to take into account a theoretical psychological framework for the understanding of the parents' mortality perceptions formation and how their subsequent fertility decision making is made.

2.6 Decision-making theory

2.6.1 Introduction

As mentioned earlier, family building may be viewed as an ongoing step-wise process of small decisions (Heer and Wu, 1968). Couples have children for several reasons: because they give pleasure, because they will become their caretakers in old age, because they give continuity to the family line, among others. The decision to have children is a consequence of different beliefs and attitudes and their understanding may shed some additional light on the fertility decision-making process. The 'why' of the parents' decisions, partly conscious and partly unconscious, constitutes a complicated web of feelings, beliefs, interests, and perceptions. This is not characteristic solely to family building decision-making, but also of human decision-making in general. Research in the domain of psychology has begun to "lift the veil" on how people make decisions. What follows is a theoretical framework for analysing mortality perceptions and their effect on fertility desires.

2.6.2 Belief, attitude, intention and behaviour

There is a widespread agreement that attitude is probably one of the most distinctive and crucial concepts in social psychology (Allport, 1968, mentioned in Fishbein and Ajzen, 1975). While this concept can be ambiguous, precise conceptual definitions may provide an adequate basis for developing measurement procedures. Fishbein and Ajzen have developed a framework distinguishing this concept and the closely interrelated concepts of belief, intention and behaviour.

Fishbein and Ajzen (1975), after considering more than one hundred different definitions, concluded that most researchers agree with the following definition of 'attitude' on a basic level: "Attitude is a learned predisposition to respond to an object or class of objects in a consistently favourable or unfavourable way." However, most researchers agree that this definition still fails to capture the full complexity of the concept, partly because it does not capture its evaluative or affective nature.

Attitudes are built upon beliefs. "*Beliefs* are the fundamental building blocks in this conceptual structure. On the basis of direct observation or information received from outside sources or by way of various inference processes, a person learns or forms a number of beliefs about an object. Objects here encompass physical objects, persons, institutions, etc. These beliefs may lead one person to have a moderate, favourable or unfavourable attitude toward, for example, a given institution. The totality of a person's beliefs serves as the informational base that ultimately determines his attitudes, intentions and behaviours. Attitude formation cannot be understood when its informational base is ignored.

Intention is a person's location on a subjective probability dimension, involving a relation between himself and some action. A behavioural intention therefore refers to a person's subjective probability that he/she will perform a certain behaviour. There is a strong relation between attitudes and intentions, an attitude toward a certain object influences an intention with respect to that object. However this influence is not necessarily deterministic. For example, a person may be favourable to the use of contraceptive methods, but not have the intention to spend money in buying them.

Similarly, intentions with respect to a certain object influence *behaviour* with respect to that object. However, in this case, the relationship is stronger. According to Fishbein and Ajzen (1975), the best predictor of a person's behaviour is his/her intention to perform the behaviour. When dealing with attitudes, the major concern is with predispositions to behave than behaviour itself. Because it is almost impossible to measure the intentions to perform a behaviour immediately before the behaviour itself, the measure of intention obtained may not be representative of the person's intention at the time of the behaviour observation. Intervening events that lead to changes in intentions must therefore be taken into account. If so, an appropriate measure of intention will usually provide an accurate prediction of behaviour. But if understanding a person's behaviour is the primary objective, the factors determining his/her intention must be specified.

2.6.3. Judgment under uncertainty

2.6.3.1. Judgment

In recent decades, researchers have shown considerable interest in cognitive psychology, an area which encompasses the study of perception problem solving, judgmental process, thinking, concept formation and human information processing in general. Most work has been directed toward understanding the mechanisms by which people confront and interpret stimuli and particularly seek to specify their abilities and limitations as an information processing system (Hogarth, 1975).

Judgment and decision-making comprise how people combine desires (utilities, personal values, goals, ends, etc.) and beliefs (expectations, knowledge, means, etc.) to choose a particular course of action. For research in judgment, the central empirical question concerns the processes by which as-yet obscure events, outcomes and consequences could be inferred or perceived. It also looks at how do people integrate multiple, fallible, incomplete and sometimes conflicting cues to infer what exists in the external world (Hastie, 2001). Hogarth (1975, pp. 273) considers that "man is a selective, stepwise information system with limited capacity, and ill-equipped for assessing subjective probability distributions."

However, Hogarth does not think that man is necessarily inefficient in his judgmental activity. Indeed, he states that the survival of the human race to date provides ample evidence of its general proficiency. Nonetheless, he argues that most people do not evaluate uncertainty. Indeed, he thinks that people act to reduce or avoid uncertainty.

2.6.3.2 Risk and uncertainty

The word 'risk' can mean different things. Economists distinguish between risk, in which the probabilities of the different possible outcomes are known, and uncertainty, in which the probabilities of the outcomes are unknown or unknowable (Knight, 1921, cited in Heimer, 1988). Therefore, economists refer to risky choices as where one chooses among two or more different courses of action, with prior knowledge of the outcomes probabilities. Conversely, social scientists

merge the concepts of risk and uncertainty, in opposition to certainty. Indeed, social scientists are more interested in decision-making processes where there are possible unfavourable outcomes.

Fischoff et al (1981), cited in Mellers et al (1998) consider that "risk is a multidimensional construct with dimensions labelled as dread, lack of familiarity and lack of controllability". Slovic (1996) cited in Mellers et al (1998) adds that risk is a social construct invented to cope with dangers and uncertainties of life. He says that, for example, those who have less trust in governments, institutions, and authorities perceive risks of hazards or technologies as greater than those with more trust. Furthermore, it is impossible to know how accurate the risk evaluations of different groups or individuals are, because there is no single objective definition of risk. Wilson & Crouch (1982) cited in Mellers et al (1998), give an interesting example. Between 1950 and 1970, the number of deaths in coal mines per ton of coal decreased, but the number of deaths per total number of miners increased. In this case, it is not possible to evaluate whether coal mining was riskier in 1950 or 1970.

2.6.3.3 Perceptions of risk

Much of the research on perception of risk is related with technological hazards and people's perceptions of the occurrence of these hazards. Whereas technologically sophisticated analysis employs risk assessment to evaluate hazards, the majority of people rely on intuitive risk judgments. For these people, nearly all experience with hazards comes from the news media, which rather thoroughly document mishaps and threats all over the world (Slovic, 1987). Furthermore, Short (cited in Slovic, 1987), states that response to hazards is mediated by social influences transmitted by friends, family, fellow workers and respected public officials.

Although man might not systematically evaluate uncertainty, when faced with the task of estimating statistics intuitively from data, subjects have been shown to be fairly accurate at guessing values of central tendency but not the variance of the data. In addition, a set of mental strategies or heuristics that people employ in order to face the uncertain world have been detected, which can lead to biases (Slovic, 1987).

2.6.3.4 Heuristics and biases

Tversky & Kaheneman (1974) identified several general inferential rules that people use when evaluating risks. These rules, known as *heuristics*, are employed to reduce difficult tasks to simpler ones. Although they are valid in some circumstances, in others they lead to large and persistent biases with serious implications. The reason for these biases stems from the fact that, in people's subjective risk assessment, the sample an individual retrieves from memory is not random because memories are not equally retrievable (Camerer, 1995). In summary, the main biases typical to people's subjective assessment are (Tversky & Kahneman, 1974; Camerer, 1995):

a) *Representativeness* – In the representativeness heuristic, the probability is assessed by the degree to which the person is representative of or similar to a certain stereotype. For instance, people in the US are very likely to say that a child from an unwed mother is black. This belief stems from the fact that a large percentage of black mothers are unwed, which is true. However, the total number of white women who are unmarried mothers is much higher. Hence, the likelihood that a child of an unwed mother is white is higher than the likelihood that he or she is black. The main problems with this rule are its insensitivity to previous probability outcomes, insensibility to sample size and misconception of chance. Indeed, the representativeness bias fails to take into account the base rates.

b) *Availability* - People tend to assess the frequency of a class or the probability of an event by taking into account occurrences that can easily be brought to mind. For example, one may assess the risk of heart attack among middle-aged women, by recalling the number of such occurrences among one's acquaintances. In addition, there are other factors that facilitate the recalling of events, such as *salience* and *recency*. *Salience* is related to the impact that a certain event has on people's mind. Indeed, it is easier to recall a house on fire if the fire was witnessed than a notice about a house on fire in some newspaper. Another example of saliency is given by Slovic (1981), reporting an experience where people judged 41 different causes of death. In general, rare causes of death were

overestimated while more common causes of death were underestimated. The rare causes of death tended to be dramatic and sensational, such as accidents, natural disasters, fires, homicides. *Recency* relates to the time elapsed since a certain event occurred; one is more likely to recall an event that occurred recently than an event which occurred a long time ago. Indeed, the *availability* heuristic explains how the personal experience determines the perception of risk, and if one's experience is biased, the risk perception will also be biased.

c) *Point of anchor* – How people estimate numerical values is also affected by the reference, or point of anchor from which they start. For example, if someone is told which probabilities are associated with the possible outcomes of a given event, he/she is likely to be influenced by the probabilities that have been stated, even if he/she believes them to be wrong.

2.6.3.5 - Other problems when evaluating uncertainty

Further to the framework of heuristics and biases devised by Kaheneman and Tversky, there are other problems that might influence the evaluation of uncertainty.

a) *Null events* – Estes (1976) reports several cases in which people demonstrate their difficulty in recalling information about null events. An example of a null example (Montgomery,1998) is a child's survival, as nothing g happens. However, a child's death is an event to take into consideration.

b) *Assessment of negative events*- Taylor (1991) argues that humans find it more difficult to recall negative events, citing a few studies that suggest that memories of positive events are both richer and more accessible. The assessment of uncertainty is dominated by two factors: the degree to which the probabilities are unknown and the dread with which an event is regarded, where dread has a catastrophic nature (Slovic, 1987, Savage, 1993). Again, this result suggests that emotions play a crucial role in decision-making processes.

c) *Absolute versus relative frequencies* – A fundamental difficulty in the estimation of risk (probability) is the lack of clear separation between absolute and relative frequencies. People appeared capable of estimating probabilities, given a constant number of trials (Hogarth, 1975), but not when the number of trials differed. This is particularly true when people deal with large samples. If for example, a sample has a large amount of units and another sample has half that number, the probabilities differ greatly for the same number of occurrences. However, people might recognize that the number of occurrences is the same, but not the number of sample units, so they wrongly assess the probabilities.

d) *Assessment of covariation* - According to Nisbett & Ross (1980) and McKenzie (1994), in general lay people do not understand covariation and causation. Indeed, inference of causation depends on the degree to which an effect occurs primarily in the presence of one cause, and on the likelihood that the effect will produce the outcome of interest (Nisbett & Ross, 1980). As an example, Montgomery (1998) gives the example of the perceptions of the effect of modern health care in rural areas. Because children are cured (or die) when treated both by traditional healers and modern health clinics, the effect of the presence of a new clinic in the improvements of child survival will not be obvious. Even if the percentage of children cured by the clinic is higher, peasants will resist in changing their ideas about the best treatment. Indeed, psychological literature on covariation assessment emphasizes the importance of pre-existing beliefs and theories, which function as mental frameworks through which new evidence is interpreted.

2.6.3.6 A sociological point of view of the heuristics and biases framework

The above framework was based mostly on laboratory experiments (Heimer, 1988), and these psychological processes and rules probably "behave" differently in non-laboratory settings. Indeed, Heimer analysed these heuristics and biases from a sociological point of view and concluded that the effects might vary from especially strong to especially weak. However, even taking into account that some aspects fall outside the framework, it is feasible to incorporate the above psychological framework into a sociological theory of risk. In particular, Heimer stressed the importance of social influences in shaping people's conceptions of risk. For example, not only

does the mass media play a relevant role in shaping people's perceptions of risk, but also other social aspects such as occupational status and socio-economic status. For instance, the risk of poverty and illness is much higher in developing countries than in industrialized nations. Furthermore, Heimer argues that most of the heuristics that affect our judgments about risk are manipulable and are actively used by those who want to influence the way certain issues are perceived. Indeed, events or problems that figure prominently in the news, movies or other cultural media are more "available" than events or problems that get less attention.

2.6.4 - Decision-making

According to Mellers et al (1998), decisions are based on beliefs about the likelihood of future events. Those beliefs are expressed as probability judgments, judgments under uncertainty, and confidence judgments.

2.6.4.1 Expected utility models

Research on decision-making has been mostly inspired in the theories originally developed by philosophers, mathematicians and economists. These theorists have been interested in explaining preferential choice and action. The central question is: how do people choose what action to pursue to achieve fallible, sometimes conflicting goals in an uncertain world?

Although the field of decision-making is becoming more psychologically based and descriptive, its boundaries and major theoretical concerns stem from the historically dominant *expected utility* family of theories. The expected utility theory is used to predict decisions: If a person has certain utilities and expectations, he/she will choose the course of action that maximizes his/expected expected utility.

However, there are important limitations to this theory. It is incomplete, as some aspects of the decision process lie outside its analysis. For example, the expected utility framework does not mention how a decision situation is comprehended or constructed by the decision maker. In addition it does not provide a valid description of human decision-making processes (Hastie,

2001). Even with these limitations, subjective expected utility has been the dominant conceptual framework for rational and empirical studies of decision-making for the last two or three centuries.

What is important to take into account when thinking on decision-making theory, is that even when people appear to be making systematically biased judgments or irrational decisions, they are probably trying to solve a problem or achieve some goal to the best of their abilities. The behavioural researcher should thus look carefully to his or her research participant's behaviour, beliefs, and goals to discern "the method in the apparent madness" (Becker 1976, Miller & Cantor 1982, cited by Hastie, 2001).

2.6.4.2 Decisions and emotions

Isen (1993, cited in Mellers et al, 1998) argues that positive emotions increase creative problem solving and facilitate the integration of information. Furthermore, positive feelings can promote variety seeking, overestimation of the likelihood of favourable events and underestimation of the likelihood of unfavourable events (Kahn &Isen, 1993, Nygren et al, 1996, cited in Mellers et al, 1998). Complementarily, negative emotions can produce a narrowing of attention and a failure to search for new alternatives. Therefore, emotions play an essential role in decision-making.

The post-decision effect should also be considered. Gilovich & Medvec (1994, 1995, cited in Mellers et al, 1998) show that in the short term, people regret actions more than inactions, while in the long term the opposite is true. However, Kahneman (1995, cited in Mellers et al, 1998) believes that people feel greater regret about actions more than inactions throughout their lives.

Anticipated regret also influences choices. For example, Ritou and Baron (cited in Mellers et al, 1998) demonstrate that people prefer not to vaccinate their child when the vaccine has potential fatal side effects, even if the death rate from the vaccine is a small fraction of the death rate from the disease. People regret causing their child's death, but by avoiding the vaccine they actually increase their child's death risk.

2.6.4.3 Framing decisions

A decision problem is defined by the acts or options among which one must choose, the possible outcomes or consequences of these acts, and the contingencies or conditional probabilities that relate outcomes to acts. The term "decision frame" refers to the decision maker's conception of the acts, outcomes and contingencies associated with a particular decision. The frame that a decision maker adopts is controlled partly by the norms, habits, and personal characteristics of the decision maker (Tversky & Kahneman, 1981). These authors argue that different frames for the same decision problem may produce different choices. The following problem illustrates the effect of frames on decision-making (see Kahneman & Tversky, 1981, pp 453). The same problem was presented to two different groups, but in different ways (frames):

> *"Imagine that the US is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed with the following possible outcomes:*
> *If Program A is adopted, 200 people will be saved*
> *If program B is adopted, there will be a 1/3 probability that 600 people will be saved, and 2/3 probability that no people will be saved.*
> *The great majority of the respondents (72%) chose program A, showing a risk averse attitude, although the expected value for both programs is the same.*
> *The same problem was presented to another group of people, this time with a slightly different formulation:*
> *If program C is adopted, 400 people will die*
> *If program D is adopted there is 1/3 probability that nobody will die, and 2/3 probability that 600 will die.*
> *The great majority of the respondents (78%) chose program D, which is the same as program B!"*

The above example shows how the relative attractiveness of options can vary when the same problem is framed in different ways.

2.6.4.4 Decision-making under uncertainty - Risk attitudes

Risk attitudes have been studied largely within economic theories. In economic theories, risk attitudes are measured by revealed preferences. Suppose one must choose between a gamble and a sure thing equal to the expected value of the gamble. People who choose the sure thing are said to have risk-averse preferences, and those who choose the gamble have risk-seeking preferences.

Kaheneman and Tversky (1982), based on several ingenious experiments, argue that people are risk seeking in some situations and risk averse in others. The results of their experiences on the rules underlying decision-making showed that people tended to be risk seeking when faced with losses and risk averse when faced with gains.

2.6.4.5 Some final notes

Research on the psychological aspects of decision-making is still incomplete. Part of the problem in understanding the complexities of decision-making is that most research to date focus on how well people evaluate uncertainty, and how people's judgments deviate from a normative statistical model. More recently, Tversky and Kahneman have started to ask " How people evaluate uncertainty" (Hogarth, 1975). It may also be the case, as Hogarth (1975) and Slovic (1987) argued, that people in their daily lives often simply do not evaluate risk, choosing instead to deny or avoid it.

2.6.5 Relevance of theory of decision-making for the study of mortality perceptions

Albeit the flaws presented on the theory of decision-making, the above brief literature review of decision-making theory constitutes an important theoretical framework that should be considered as a background for the design and implementation of the study of mortality perceptions and their influence on fertility. The applications of the theory of decision-making could be organized into two broad groups: one is constituted by the applications concerning the formation of mortality perceptions and the other is constituted by the applications to fertility decision-making. Because it is impracticable to perform a prospective study where the formation of the perceptions on mortality are analysed and later the subsequent fertility decision-making observed, the latter aspect will be analysed only at the stage of intentions.

Formation of mortality perceptions

The relevant question to this study is: how do people integrate multiple, fallible, incomplete and sometimes conflicting cues to infer the chances of their children's survival? Two approaches

should be considered: the first analyses the effects that media and social influences transmitted by friends, family fellow workers and respected public officials exert on individuals, about events not lived by the individuals themselves. For example, if public officials often raise the problem of high child mortality levels, people will become more preoccupied and convinced that child mortality levels are high. The second approach analyses the effects that a hazardous personal experience might exert on risk evaluation and decision-making. This is the case of a personal experience with child death or a death of someone who is close to an individual.

For both approaches, the potential errors of thinking when evaluating child survival can be summarized as follows:

- Representativeness: this error is linked with the failure of taking into account the base rates. For instance, as population grows, individuals may see more overall deaths, and not fully take into account that the denominator of the rate has also grown, perhaps faster than the numerator.
- Availability: people will tend to evaluate higher mortality rates if someone close to them experiences a child death.
- Recency: this error of evaluation tends to give more importance to events that occurred recently.
- Point of anchor: if there is someone, either in the media or a respected person saying that mortality is high, people might be negatively influenced even if his observation and reasoning cause him to think that there is a decrease in mortality levels.
- Null events: a child surviving is not considered as an event, because nothing happened (alternatively, a child death would be considered an event), and is consequently easily forgotten. Even if a large number of children survive, the idea that mortality is very high if a few of them die would prevail because people only pay attention to these last events.
- Assessment of covariation: If individuals actively participate in the reduction of child mortality activities, they will recognize mortality levels decline. However, if they don't identify themselves with activities leading to mortality reduction (for instance, vaccinations) they may fail to understand the link between the activities and the results.

Decision-making

As mentioned above, this study is mostly concerned with intentions and not behaviours. However, since intentions may be good predictors of behaviours, the analysis of the behaviour is similar to the analysis of intentions. From the above psychological literature review, a few notes relating to mortality effects on fertility decision-making should be taken into account:

- Decisions are strongly influenced by emotions. Fear of mortality might incite less 'rational' decisions regarding fertility.
- Framing of decisions: decision-making is strongly influenced by the way the situation is presented. This aspect of decision-making may be particularly relevant to the way a survey about decisions related to mortality perceptions is conducted.
- Risk attitudes: this aspect might be particularly relevant regarding fertility decision-making, as the fear of becoming childless might be so strong that any other alternatives that do not guarantee a certain number of children are disregarded.
- People often avoid thinking in terms of risk, which means that parents might not be very careful in evaluating mortality risks, but rather decide to have many children so that the risk of becoming childless diminishes.

Death, in its finality, might exacerbate people's heuristics and biases in forming perceptions of risks and consequently heavily influence their decision-making regarding fertility.

2.7 Summary

From the above review, it can be concluded that the issue of mortality perceptions and their influence on fertility is complex and needs to be more explored. A few preliminary conclusions may nevertheless be pointed out:

- Fertility transition theory is still incomplete and it is not yet clear if, in any country, people desire a large number of surviving children.

- Mortality levels are high in sub-Saharan Africa. There was a significant decrease in the decades after World War II, but the levels remain high.
- The studies of the effects of mortality perceptions on fertility undertaken so far are rather incomplete. However, there are several cases where a significant association was found. Furthermore, it is interesting to note that most of the quantitative studies have been done outside Africa, where mortality rates are lower.
- People's evaluation of mortality levels often seems flawed, according to the errors of evaluating risks mentioned in the psychological literature.
- It has not been easy to measure the 'hoarding' and 'societal' effects. However, literature points to potential important effects, possibly related to the levels of mortality.

The following chapter addresses these conclusions, and presents the design of the study. It takes into account the summary of the studies made on the effects of mortality perceptions on fertility (sub-section 2.5.4) and the notes on the relevance of decision-making theory to the present study (sub-section 2.6.6).

Chapter 3

Methodology

Introduction

Chapter 3 presents the methodology applied in this study. It starts with an assessment of the existing data and the need for additional data gathering. The types of the surveys needed to fill the data gaps are then described. In addition, this chapter presents an overview of the statistical models used for the analysis of the different data sets. Finally, this chapter provides an outline of the qualitative analysis methodology used in this study.

3.1 Strategy of the study

3.1.1 Introduction

The objectives for the study of the effects of mortality perceptions on fertility desires presented in Chapter 1 - Introduction constitute the foundation for the strategy and methodology used. Recalling Chapter 1, the broad goal of this study is to contribute to the knowledge of fertility decision making and strategies, and its more specific goals are to:

(i) to learn more about women's perceptions of mortality, how they are formed and to measure them;

(ii) to understand how women view childbearing, with special emphasis on the effects of the adversity people face with AIDS;

(iii) to obtain a better understanding of the association between mortality perceptions and fertility intentions.

And the main research questions are:

Question 1: What are women's perceptions of mortality levels (infant mortality rate, survivorship into adulthood) and how are these perceptions formed?

Question 2: In which ways are these perceptions of mortality linked with women's fertility intentions?

Question 3: How does the "insurance strategy" for childbearing operate and what is the approximate extent of this strategy in high mortality settings?

Question 4: How does the AIDS epidemic awareness, particularly regarding parents' and children's mortality levels increase, influence fertility intentions?

3.1.2 Assessment of existing data and studies

Published studies on the effects of mortality perceptions on fertility conducted so far all over the world and highlighted in section 2.4 of the previous chapter, utilized three main types of data: the Demographic and Health Surveys, especially designed quantitative surveys including mortality perceptions variables and qualitative studies.

In one study (Mahy), a DHS data set was used to explore whether the desire for an additional child was influenced by proxies of mortality perceptions variables such as: own experience with child death, sibling's mortality, AIDS awareness, in particular its mortality feature, access to media and community mortality levels. This study, carried out using data from Zimbabwe, found interesting relationships between the proxies of mortality perceptions and the desire for an additional child. However, the lack of mortality perceptions variables prevented a more complete analysis and an attempt to estimate the insurance ('hoarding') attitude.

Data from specific quantitative surveys have included questions on survey respondent's estimates of rates of child mortality and whether their perceptions of these rates increase or decrease over time. Most of these studies found an association between mortality perceptions variables and

fertility variables. However, these associations didn't capture the magnitude of the insurance strategy as a response to mortality. A main flaw in most of the studies that include estimates of mortality perceptions is that they are restricted to the respondent's estimation of mortality rates, in a similar way as demographers would estimate them. However, fertility decision makers may be much more concerned with their progeny survivorship into adulthood than the average rates in a given community. In other words, parents might think more about the survivorship of their children into adulthood than how many children die in their first year of life. In addition, the insurance strategy (hoarding) is closely linked to the strong need that parents have to bear children that support them during their old ages. Any study regarding the insurance strategy that ignores questions on the old ages support fails to capture the whole story.

Qualitative surveys exploring men and/or women's processes of thinking relating child mortality with fertility are also documented. In most if not in all of these qualitative surveys, an insurance strategy was mentioned by the majority of the respondents, but the results of the qualitative studies undertaken are not representative due to sample size and/or sampling procedures. Furthermore, the issue of insurance strategy was not analyzed in detail and no estimate of the value of the insurance strategy had been attempted. In addition, studies on the effects of AIDS on fertility intentions are scarce.

In Mozambique, there are no studies regarding mortality perceptions and their effects on fertility. The first Demographic and Health Survey was carried out in 1997 and a second one was carried out more recently. However, only the data from the first one is available. Furthermore, studies regarding the volitional effects of AIDS awareness on fertility are non-existent.

3.1.3 Overview of the strategy

Part of the problem for not obtaining estimates for the insurance strategy is the fact that cross-section studies can't properly capture people's fertility intentions and decisions throughout their lives. However, to conduct an adequate longitudinal survey would take several years before producing results for a cohort of people. As a result, by the time a given cohort have finished their

reproductive lives and an evaluation of the true value of the insurance strategy could be carried out, the mortality, socio-economic and cultural settings will probably have changed to an extent that renders the results limited. Nevertheless, the hoarding strategy, which is closely linked with mortality perceptions, might be too important in high mortality settings to be neglected by researchers.

Hence, the importance of designing a simpler strategy that can nevertheless produce an estimate of the magnitude of the insurance strategy without the recourse to longitudinal methods. In this sense, it is advisable to include questions in a cross section survey regarding fertility intentions as a response to perceived mortality events, instead of analyzing fertility outcomes as response to mortality. With scarce resources and limited time the strategy adopted in this study of the effects of mortality perceptions on fertility had to be carefully designed. First it was decided to narrow the research to women. Then, three main procedures were used:

- **First, to explore existing data – Mozambique Demographic and Health Survey, 1997**

  The Mozambique Demographic and Health Survey (MDHS-97) carried out in 1997 was used in order to show results that are representative of women in the country. Some variables from this survey could be considered as proxies to mortality perception variables. Due to the size of the sample, many explanatory variables could be included in an analysis of mortality perceptions and thus the true effect of these proxies could be ascertained net of confounding variables. A multinomial logistic model was used to find out whether proxies of mortality perceptions have any effect on the desire for having an additional child.

- **Second, to perform a new quantitative survey in Maputo City**

  It was decided to carry out quantitative survey in Maputo City, using a sample of 800 women chosen randomly. The questionnaire prepared was relatively small, minimizing the socio-economic and demographic questions that are usually asked and developing a number of new mortality perception variables. A logistic regression model was used to analyse different outcome variables: the desire for an additional child and the intention of changing fertility

behaviour due to AIDS. The main explanatory variables were the mortality perceptions variables and socio-economic and demographic variables were used as control variables. In addition, logistic regression analysis was also used to attempt to find out the socio-economic and demographic characteristics of women who had low or high mortality perceptions. The results of this study are representative for the women in Maputo City.

- **Third, to conduct a new qualitative survey**

A qualitative survey was also undertaken, which aimed to understand the underlying reasons and motivations for women's answers in the quantitative surveys above described. It also intended to analyse in greater depth some conclusions of the statistical analysis of the MDHS data. This survey was conducted in a neighbourhood in Maputo city and in a village in Maputo Province. The additional objective of the inclusion of a village in this survey was to have a glimpse on whether women's mortality perceptions and their subsequent behaviour in rural areas are radically different of those in urban areas or not.

The sections that follow detail each of the sets of data and present the theoretical framework used for the analysis of each set of data. Statistical models used in the quantitative analysis are also described.

3.2 Analysis of the MDHS data

3.2.1 Data source

The Mozambique Demographic and Health Survey (MDHS) data were collected in 1997 (National Institute of Statistics, 1998a). This survey aims to provide information about fertility, fertility intentions, nuptiality, family planning, child and maternal mortality, health-related matters, and awareness and behaviour regarding sexually transmitted diseases and AIDS.

Sample selection for the survey was undertaken in two stages, the first consisting in the selection of the enumeration areas and the second consisting in the selection of the households within each of the enumeration areas. At the first stage, 398 enumeration areas (EAs) where selected (of which 388 were implemented), distributed proportionally by urban and rural areas within each of the eleven provinces of the country. The EAs were selected with probability proportional to the number of households. At the second stage, households within each EA were listed and a sampling approach was used to select 9,590 women aged 15-45. The total number of women actually interviewed was 8,779. The sample is not self weighted thus it was necessary to use the sample weights to obtain nationally representative indicators.

3.2.2 Variables and construction of data file

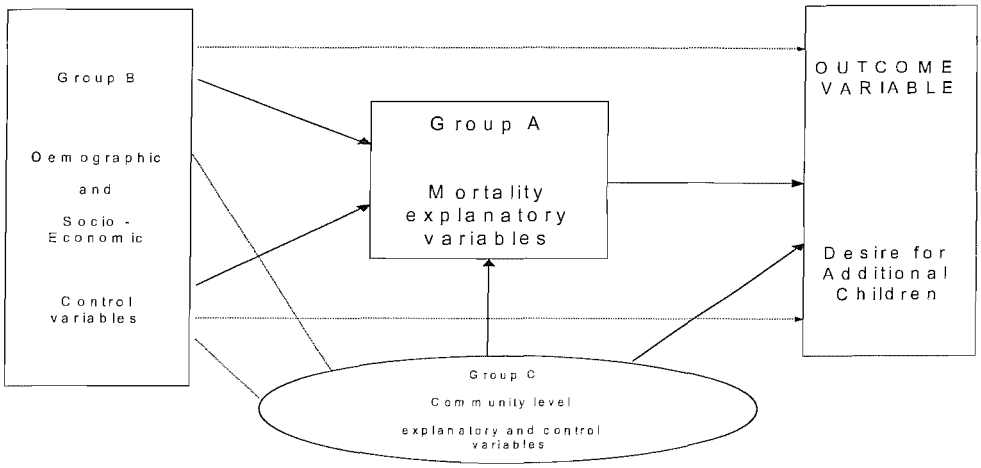
The outcome variable for the analysis on mortality perceptions is whether the respondent wants more children, and the possible answers considered are 'yes', 'no', or 'undecided'. This research seeks to explore the effect of different perceptions of mortality on fertility intentions, thus the explanatory variables of interest are the mortality perception variables. Because the MDHS does not ask questions concerning mortality perception variables, a number of questions directly or indirectly linked with mortality perceptions were taken as proxies. These variables are as follows: women's children death, household's children death, women's sibling's death, exposure to media and AIDS awareness.

Because these variables may in turn be influenced by a number of other characteristics of the respondent as well as characteristics of household in which she lives, a number of other explanatory control variables were also considered. Furthermore, because mortality perceptions may also be influenced by the community in which a woman lives, some community-level variables were also considered.

The explanatory variables can thus be grouped under three broad groups: mortality perceptions variables, individual- or household-level socio-economic and demographic control variables, and community-level contextual variables. Chapter 5 presents a detailed description of the variables

used in the analysis. In Figure 3.1 a diagram of the variables used in this study is presented. The arrows indicate the processes of causation that will be studied in Chapter 5. The darker arrows indicate the main effects to be considered. The lines indicate relationships between the variables, but not all possible relationships are indicated in this diagram. A detailed description of all variables considered is present in Chapter 5.

Figure 3.1 – Diagram of the outcome and explanatory variables for the MDHS analysis



3.2.3 The Multinomial Logistic Model

3.2.3.1 The model

Multiple regression analysis allows us to describe the relationships between an outcome variable and explanatory variables. In the case of the study of the MHDS data, regression makes it possible to isolate the effect of the proxies of mortality perceptions on the desire for an additional child, while controlling for other variables that might confound observed bivariate associations. Indeed, the results in regression models show the true contribution of each variable in explaining the variation in fertility intentions.

The multinomial logistic regression model is an extension of the logistic regression model where the response variable has three or more categories. This model is particularly important for

determining the effects of explanatory variables on a subject's choice of one of a mutually exclusive, discrete set of more than two options (Agresti, 1990). If the response variable has R categories, the multinomial logistic can be expressed as a set of R(R-1) possible correlated logistic models, but only R-1 are necessary as the rest are redundant. The choice of which R-1 categories should be fitted is arbitrary.

When R=3, which is the case for this study, the model can be described has follows:

$$\log\left[\frac{p_1}{p_3}\right] = \alpha_1 + \beta_{11} X_1 + \beta_{12} X_2 + \ldots + \beta_{1n} X_n$$

$$\log\left[\frac{p_2}{p_3}\right] = \alpha_2 + \beta_{21} X_1 + \beta_{22} X_2 + \ldots + \beta_{2n} X_n$$

where p_1, p_2 and p3 are the probabilities of occurrence of each of the characteristic of the outcome variable, α's and β's are the parameters to be estimated, and X1, X_2, ..., X_n are the explanatory variables. The reference category should be chosen as the most meaningful category. The probabilities will thus be:

$$p_1 = \frac{e^A}{1 + e^A + e^B}$$

$$p_2 = \frac{e^B}{1 + e^A + e^B}$$

$$p_3 = \frac{1}{1 + e^A + e^B}$$

where $A = \alpha_1 + \beta_{11} X_1 + \beta_{12} X_2 + \ldots + \beta_{1n} X_n$

and $B = \alpha_2 + \beta_{21} X_1 + \beta_{22} X_2 + \ldots + \beta_{2n} X_n$.

Details on the goodness-of-fit and on the proportion of variance explained can be found in Agresti (1990), Lloyd (1999) and McCullagh and Nelder (1983).

3.1.3.2 Accounting for the sampling design

As mentioned earlier, the sample in the MDHS is not self weighted, hence being necessary to use sample weights in order to obtain nationally representative indicators. Furthermore, the sample was stratified by province and rural/urban areas within each Province. It was also clustered by enumeration areas. The question is whether the sample design should be accounted for in regression analysis. Indeed, as complex designs are often considerably cheaper and much more practical than simple random samples, the latter are rarely used in large surveys. The Demographic and Health Surveys are not simple random samples, they are often stratified, clustered and not self-weighted. However, sample weights, stratification and clustering may have an effect in regression estimates (Korn and Graubard, 1995).

The main biases resulting from complex sample design are due to (see Madise et al, 2002):

Sample weighting – Sample weights are the inverse of the probability of individuals to be included in the sample. The sample weights are necessary to be included in the analysis so that the sample can represent the population. The magnitude of the bias is related to the variability on the sample weights (Eltinge et al, 1997, cited in Madise et al, 2002).

Stratification – A stratified design can produce smaller standard errors than a simple random sampling if the observations within the strata are similar and the stratified design is accounted for in the analysis. This means that if the stratification is not accounted for, the standard errors will be large and the confidence intervals will be wider.

Clustering – Because it may happen that individuals within clusters have some similar characteristics, the assumption of independence, so important in regression analysis, is not met. This may lead to smaller standard errors and consequently to confidence intervals too narrow.

Two main approaches for dealing with these potential biases have been proposed: one suggests that auxiliary variables, more precisely the variables which were used in the construction of the strata should be included in the regression analysis; the second approach argues for the use of weighted regression.

The statistical software used in the analysis was SPSS-10. This package allows for the inclusion of sample weights in regression analysis. However, this statistical package does not take into account either strata or clusters. In order to avoid the biases caused by stratification, the first approach above mentioned was considered. As the stratification was used by province and rural/urban areas, this variable was checked in all the models.

3.2.3.3 Independence of irrelevant alternatives (IIA) and the Haussman test

While the multinomial logistic model is a very convenient model for discrete choice models with more than two possible outcomes, it has a serious drawback, which is called the independence from irrelevant alternatives (IIA) property. This property establishes that the ratio of the probabilities of choosing any two alternatives is independent of the attributes of any other alternative of the possible outcomes (Haussman and McFadden, 1984). In other words, in the case of the models analyzed in this study this means that all or most women who are undecided of having an additional child would not have chosen a specific alternative, for example to have another child, if the undecided alternative had been dropped.

Although it seems sensible to think that in the case of this study the IIA property is not seriously compromised, the Haussman test (Haussman, 1978, Haussman and MacFadden, 1984) should be performed. However, because the SPSS statistical package does not contain this option, no test was performed.

3.2.3.4 Strategy for model fitting

A general rule for model selection is to find the balance between the improvement of goodness-of-fit to the data by adding an extra term, and the extra increase in complexity introduced by such an addition. Indeed, it is most unlikely that the data will indicate a clear winner among possible models, and normally around an 'optimum model' there are a set of others almost as good and not statistically distinguishable (see McCullagh and Nelder, 1983). Given the decision to select a particular model, it is necessary to proceed to the estimation of the unknown parameters

and obtain some measure of accuracy, the goodness of fit between the data and the corresponding set of fitted values. The strategy is thus to find a set of parsimonious models that have sound measures of goodness-of-fit and compare the results of equally statistically acceptable models. The results of the models studied are presented in Chapter 5.

3.3 The quantitative survey in Maputo City

3.3.1 Objectives

The quantitative survey is part of the general objective of understanding and measuring the effects of mortality perceptions on fertility intentions. More specifically, this survey aimed to quantify women's estimates on mortality perceptions and measure their effects on fertility intentions. In addition, it attempts to evaluate the magnitude of the 'insurance effect'. The survey was restricted to women in Maputo City, the capital of Mozambique, and the sample size was 800 women, aged 20-49 years old. The reason why this site was chosen was that twofold: first, the costs of the survey would be lower than in any other site of the country, and second, Maputo City has an administrative organization that can be very helpful in setting up a sample frame. The field work took place in May-June 2003.

3.3.2 The organization of the survey

3.3.2.1 Questionnaire and pilot survey

The questionnaire used (see Appendix A) was a pre-coded questionnaire and had seven sections, namely:

I – Characteristics of the Interviewee
II – Children
III – Fertility Decision Making Process
IV – Desired Family Size
V – Mortality perceptions and their relation with fertility
VI – Family Planning
VII – AIDS

The socio-economic and demographic questions had a similar wording and categories to those in the Mozambique Demographic and Health Survey held in 1997. The questions included on

mortality perceptions and AIDS awareness, which are the main concern of this study, are listed below:

- **Questions on Mortality perceptions:**

  401 - (for women without children alive) How many children would you like to have through all your life? (for women with children alive) If you could go back in time, when you didn't have any child and if you could choose the total number of children you would like to have through all your life, how many would you like to have?
  403 – a) When you are thinking that your ideal number of children is ____ are you thinking that it can happen that some will not survive? In other words, does the mortality of children in any way influence your ideal number of children?
  403 – b) (If she is thinking in terms of survivors) How many more children do you think you need to have in order to obtain your ideal number of children?
  403 – c) (If she is considering the possibility that some will die) How many children you are thinking you will have alive when you grow old?

  501 – a) How many children do you think it is really important to have when you get old, in order to support you at that age?
  501 – c) How many children do you think you must have so that when you are old you have the number of surviving children you mentioned in the last question.

  502 – a) Imagine that you will be reasonably happy if at least one of your children survive you. How many children do you think you need to have to be sure you get at least one to support you at old age?

  503 - Do you think that now more or less infants and small children die than 20 – 25 years ago?

  504 – a) If someone has five births, how many should she expect that will survive the mother?
  504 – b) If someone has ten births, how many should she expect that will survive the mother?

  505 - Imagine that 10 babies are born in this community. How many do you expect will survive the first year?

  506 - (If at least a child had already died) When your child (children) died, have you thought to have another one to compensate the lost child? If yes, have you done anything? (If no child had already died) What do you think, if you have the misfortune of losing a child, would you do anything to compensate this child, or would you let your children go on to be born naturally?

- **Questions on AIDS awareness:**

  702, 703, 704 – Do you have any relative, friend or colleague infected or who have died from AIDS?

  704 – Can a person who looks healthy be infected with AIDS?

  705 – Is AIDS a mortal illness?

  706 - If you have sexual relations with someone who has AIDS, even if he doesn't appear ill, will you be infected?

707 - Do you think that the possibilities that you are infected or will be infected with AIDS are high, moderate or none (or already is)?

708 - AIDS may influence your thinking about having children. Because of AIDS, do you think that now you want to have more or less children than you would like to have had before?

In general, conducting the questionnaire took between 20 to 30 minutes. A pilot survey was conducted aiming to train the interviewers, to improve the questionnaire functioning, and to test the women's ability to answer questions, especially the more complex questions about mortality perception levels.

3.3.2.2 The sample

Maputo City is administratively divided into five urban districts, numbered 1 to 5. Each district is divided into neighbourhoods called 'Bairros' (see map on Figure 3.2). According to the last national Census (1997), Maputo City had a population of 966,837 inhabitants. Census figures include population distribution by urban district and 'Bairro' (see Census-1997).

Population distribution among Bairros and population density inside each of them is uneven. The most populous Bairro has about 50,000 inhabitants while the least populous one has roughly 8,000 inhabitants. The Bairros with lower population density are mostly in the outskirts of the city, and some of them have an area larger than some of the urban districts, as shown in Figure 3.2. Urban Districts nos. DU1, DU2 and DU3 enclose the central part of the city.

The sample design took these population figures as part of the sample frame. There are 61 Bairros in total, of which 10 were excluded from the sample design. These excluded Bairros are more rural than urban and are Bairros situated in Inhaca Island (around 40km from the city) and on the other side of Maputo Bay, and they account for only 4.3% of the city population. Each 'Bairro' is in turn divided into blocks, which are groups of around 50 households each. Each block has an elected chief who serves as a liaison officer between the residents of the block and the Bairro's administration.

The 800 women to be interviewed were divided into the five urban districts proportionally to their population size as shown in Table 3.1. Because visiting all Bairros would be time consuming and entail higher transportation costs, only about one third of the Bairros were covered, totalling 19 Bairros. The number of Bairros visited in each urban district also depended on the Urban district population size (see Table 3.1). The Bairros in each Urban District neighbourhood were chosen randomly, weighting each Bairro according to its population size. Finally, the number of interviews to be performed in each urban district was divided among the chosen Bairros, proportionally to their population size (see Table 3.1).

Because city administrative rules specify that the block chief must be available during the interview, it was advisable to visit fewer blocks to minimise additional costs. Furthermore, taking into account that interviewers should have conducted about 8-11 interviews per day, the number of blocks to visit was defined such that an interviewer visited a block each day, and performed 8-11 interviews in that block. Table 3.1 shows the number of blocks to visit in each Bairro. The blocks were numbered, and the blocks to be visited were chosen randomly.

Figure 3.2 – Map of Maputo City, showing the Urban Districts and Bairros Division. The Bairros visited are highlighted.

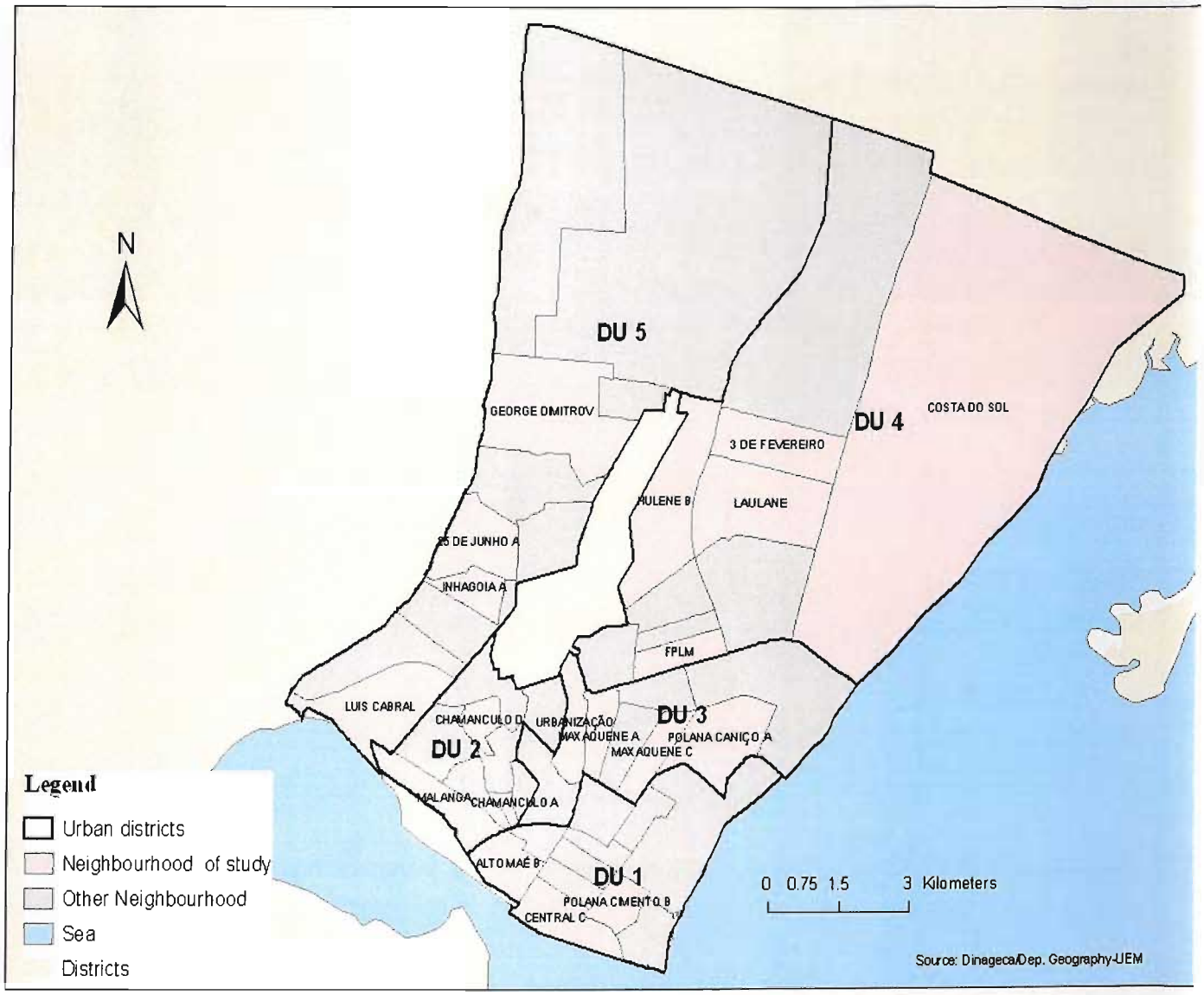


Table 3.1 - Number of interviewees and number of neighbourhoods (Bairros) to visit in each urban district

Urban District	Number of interviews planned	Number of neighbour-hoods (Bairros) to visit	Neighbour-hoods (Bairros) to visit	Number of women to be interviewed	Number of blocks
Urban District 1 (UB1)	140	3	Alto-Mae 'B' Central'C' Polana-Cimento'B'	60 40 40	6 4 4
Urban District 2 (UB2)	131	3	Chamanculo'A' Chamanculo 'D' Malanga	40 41 50	4 4 5
Urban District 3 (UB3)	172	4	Maxaquene'A, Maxaquene'B' Polana-Caniço'A' Urbanização	39 32 77 24	4 4 8 3
Urban District 4 (UB4)	187	5	Cosa do Sol FPLM Hulene'B' 3 de Fevereiro Laulane	25 20 72 30 40	3 2 8 3 4
Urban District 5 (UB5)	172	4	G.Dimitrov Inhagoia'A' Luis Cabral 25 de Junho'A'	66 30 56 20	7 4 6 2
Total	802	19			85

The process of choosing the women to interview comprised the following steps:

1. Each day a random number was given to each interviewer. The interviewer would go to a corner on the block and count the houses until reaching this random number. This would be the first household to visit.

2. The exact number of households on the block was divided by the number of households to be visited in that block, resulting in the 'interval number'. The interviewer would then count this 'interval number' of households to determine the next household to visit.

3. In the case that there was more than one eligible woman in a household, interviewers randomly chose the woman to be interviewed, using a previously prepared table with random numbers.

4. In the case a chosen woman was not available during the visit, a new visit was scheduled. If a chosen household had no eligible woman, the interviewer would visit the neighbouring household. However, the next household would be determined as if the former household had had an eligible woman.

3.3.2.3 Field work and questionnaires quality control

The survey team consisted of the author, a research assistant who lectures in Geography Department at the Eduardo Mondlane University, and four female interviewers, who were end year students at the University with interviewing experience. The author and/or the research assistant would accompany the interviewers to the Bairros and identify the block and the first household to

be visited by each interviewer that day. The Bairro administration was previously advised of the interview date and the block chief would be present to introduce the interviewer to the women. The participation of the Bairro's officials, particularly during the introduction, was crucial in creating a pleasant and relaxing atmosphere between the interviewer and the interviewee. However, no Bairro official was present during the interview. As a result, most of the women approached were willing to answer the questionnaire. Women who did not want to be interviewed were not questioned and the corresponding household was considered as not having an eligible woman to be interviewed. Some women accepted to be interviewed but later were unfriendly or detached. These were mainly women who had recently witnessed their child die or who had lost many children. In these cases the interviewer did not press for the answers and shortened the interview. These were rare cases, and only two questionnaires were discarded from the sample as many of the questions were not answered.

Towards the end of the day, the completed questionnaires would be returned to the author and/or to the research assistant to be reviewed later in the evening. Next day, before departing to the Bairros, the author, the research assistant and the interviewers would meet to correct any errors found while filling questionnaires on the previous day. When necessary, the interviewers would schedule a new interview to correct/complete the questionnaire. The work plan considered six days of visits per week, with the seventh day reserved for extra visits. The extra visits were necessary either because a woman in a chosen household was unavailable or because a second visit was needed. The field work took about 25 days in total, on April-May 2003.

3.3.3 Database and variables under study

The data was entered into a Microsoft Excel file, and then copied to a SPSS 10 file. Several tests were performed on the data to look for blank answers and contradictory values. When an error was found, the questionnaires were double-checked and the correct values introduced in the database. In case some key questions were not answered, the questionnaire was discarded. The cleaned database has a total of 793 women and the rate of answers for most questions is 95%-100%. The original database has a total of 155 variables.

In order to measure the impact of mortality perceptions on fertility intentions, two main outcome variables were considered: i) the desire to have an additional child and ii) the declared intention to change fertility behaviour due to AIDS. In addition, the variable of mortality perceptions that have most significant impact on fertility intentions was also analyzed as an outcome variable, aiming to determine the socio-economic and demographic characteristics that influence women's perceptions on mortality.

The explanatory variables were grouped as follows:

- mortality perceptions variables;
- socioeconomic and demographic variables;
- AIDS awareness variables.

The statistical package used in this data analysis was SPSS-10.

3.3.4 Method of analysis

3.3.4.1 Overview

Because mortality perceptions are crucial in this study, a detailed univariate and bivariate analysis was performed, as it is shown in Chapter 6. This analysis included a scrutiny on the women's answers on the questions related with the ideal number of women and desired family size, and it conduced to an estimation of an insurance attitude. In addition, this analysis compares the women's different estimates of mortality levels (infant mortality rate and survivorship into adulthood) and evaluates their consistency. On Chapter 7, the results of the multivariate analysis using the binary logistic model are presented. This Chapter describes the outcome and explanatory variables and presents the various models analysed.

3.3.4.2 The binary logistic model

A binary logistic regression model is the most suitable model when the outcome variable is dichotomous (McCullagh and Nelder, 1983). The outcome variables in the models here presented are: desire for an additional child (or not), intention to change fertility behaviour due to AIDS (or

not), and perceptions of children's survivorship rate are high (or not). The conditional mean of the outcome is the probability that a particular individual answers yes to the outcome variable, given a set of characteristics. It is assumed that the outcomes are random and independent.

Because there are only two possible outcomes (0 or 1) in the dichotomous outcome, the error term of the conditional distribution of the outcome follows a binomial distribution (Hosmer and Lemeshow, 1989). So, the distribution of outcome will not be normal and will not have a constant variance across levels of the independent variables. In order to achieve a distribution for a linear analysis it is necessary to transform the conditional mean and to describe the error terms of a binomial distribution. Thus a logit transformation is used as follows:

(1) $$\text{logit}\,(p) = \ln\,[p/(1-p)]$$

This transformation can result in values from $-\infty$ to ∞. The transformed value then becomes the logarithm of the odds of the probability of the outcome which is regressed on the explanatory variables.

(2) $$\text{logit}\,(p) = \ln\left[\frac{p}{1-p}\right] = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n$$

Where p is the probability of answering 'yes' to the outcome variable and $X_1, X_2 \ldots, X_n$ are the various characteristics. The probability will thus be:

(3) $$p = \frac{e^{\alpha + \beta 1\, X1 + \beta 2\, X2 + \ldots + \beta n\, Xn}}{1 + e^{\alpha + \beta 1\, X1 + \beta 2\, X2 + \ldots + \beta n\, Xn}}.$$

The Nagelkerke pseudo R^2 values provide a rough estimate of the proportion of the variation that is explained by the variables in the model. Details on the goodness-of-fit and on the proportion of variance explained can be found in Agresti (1990) and McCullagh and Nelder (1983).

3.3.4.3 Strategy for model fitting

The objective is to produce parsimonious models for the data in which unnecessary terms are excluded. It is unlikely that a single model proves to be the only good model for complex data, so a wider set of models with close goodness-of-fit should be sought. The aim here is to find out whether a certain explanatory variable is an important determinant for the outcome or not.

3.4 The qualitative survey

3.4.1 Objectives

As mentioned in Chapter 1 – Introduction, this study focuses on the extent to which mortality perceptions affect the fertility decision-making process. The specific objective of the qualitative survey is to capture women's reasoning regarding family building through their own words. In addition, it aims to gain a deeper understanding of the underlying reasons and motivations for the answers in the quantitative survey mentioned in the last section, particularly the effects of mortality perceptions on fertility. It also intends to analyse in greater depth some conclusions of the statistical analysis of the MDHS data. In other words, the qualitative survey intends to explain the "why" of the results of the quantitative analysis, instead of attempting to characterize or represent the whole population. Qualitative tools can be used as the sole research method or in conjunction with other methods. In this case, it complements the analysis presented in the preceding sections.

3.4.2 Method used

Prior to designing this qualitative survey, the author extensively researched qualitative studies conducted in Africa regarding childbearing desires, attitudes and decision making. Highlights from this bibliographic research are presented in Chapter 2. Based on this bibliographic research, and taking into account the objectives presented in the last paragraph, the most adequate qualitative research method was to conduct in-depth interviews using semi-structured questionnaires.

Semi-structured interviews are used widely in qualitative research for understanding the reasons why people act in particular ways, by exploring participants' perceptions, experiences and attitudes. In this study, semi-structured interviews were used to elicit women's views on childbearing and how mortality influences their desires. As Harvey-Jordan and Long (2001) argue, "One of the advantages of using semi-structured interviews is the richness of data they yield. During an interview the subject is free to talk as openly as he or she wishes and the frankness of

opinions can get to the heart of the matter. Using original quotes can bring colour and life to the research subject."

Semi-structured interviews employ a series of open-ended questions based on the topic or areas the researcher wants to cover, and provide opportunities for various themes or topics to develop. In this research, tentative themes were identified from the previous quantitative studies before the interviews took place, and these were later updated during the interview process, via the addition of new themes and removal of others.

While this analysis method can elicit rich data on the subjects' experience, behaviour or feelings, it also poses some limitations (see Harvey-Jordan and Long, 2001). One of the main weaknesses of this particular method is that the data collected are particular to a certain person and time. For example, a respondent may alter his/her answers when asked the same questions some days after the first interview. Furthermore, because of the personal nature of the research, the scope for introducing error and bias is wide and can affect all stages of the process: planning, interviewing, recording and interpretation. Finally, semi-structured interviews are time consuming.

If combined with other methods, however, semi-structured interviews can produce complete and meaningful results. In the present study this method is mixed with the analysis of the quantitative survey held in Maputo City and the analysis of the MDHS data.

3.4.3 Location

It is important to stress that the qualitative research approach does not intend to provide fully representative data on the population under consideration (see Ingham et al, 1999). Rather, the aim is to understand the range of interpretations and meanings amongst women's fertility desires, to explore the importance of social contexts and other dynamic processes which may help to account for and explain patterns of childbearing attitudes and its relations with mortality perceptions. The choice of the location for the qualitative survey took these aspects into account.

The qualitative survey took place in a neighbourhood of Maputo City and in a village in Maputo Province, 60km from the city. The neighbourhood was chosen among the neighbourhoods that showed higher death rates as reported in the quantitative survey, to increase the chance of including women with child death experience. Indeed, the results of the quantitative survey showed that the majority of women in Maputo City had no child death experience. Furthermore, the fact that a greater proportion of children died in a certain neighbourhood meant that women who did not have own child death experience had greater contact with child mortality in this neighbourhood than in others. The neighbourhood thus chosen in Maputo City was Maxaquene C.

In order to ascertain whether women's perceptions on mortality and its influence on fertility radically differ between urban and rural areas, the author also conducted the qualitative survey in a Maputo Province village. The chosen village, Massaca, can be easily reached from Maputo, so the research team did not need to stay there overnight. At the same time, the chosen village is located as far from the main roads as possible in order to diminish potential urban influences.

3.4.4 Sampling procedures

The definition of the desired sample in qualitative research is guided by iteratively analysing previous results (see Ingham et al, 1999). The interview analysis starts as soon as the first transcripts are available, and the outcomes of the preliminary analysis are used to adapt the previously established sampling procedures. When a certain category of participants or behaviours "saturates", the sampling of that type of participants can stop. Saturation occurs when the researcher feels that pursuing more interviews with a certain type of participant adds little variation or information. There is no simple rule on how to plan the right sample size. In theory, the proper sample size can only be determined after carrying out some fieldwork. Theoretically, the sample reaches its optimum size when the researcher feels that the data collected are conceptually dense enough or saturated, and the research questions can be answered.

It was thus desirable to start with a previously studied composition of women that would have different attitudes and behaviours regarding the themes under study. The initial choice of interviewees concentrated on the 20-40 year old age range. The objective was to have at least two women without children, two women with children without child death experience, and two women who experienced child death, for each of the two subgroups of ages 20-30 and 30-40, in both urban and rural sites.

The first house to visit for each survey was decided randomly, and if a woman aged 20-40 was present, she would be interviewed. Otherwise, a woman next door would be sought. Then, to preserve randomness, 10 houses were counted before looking for the next interviewee, aiming to fulfil the minimum composition presented above. If the 10^{th} household lacked an eligible woman, a neighbour would be sought.

When the basic sample composition was attained, and the preliminary analysis of the results indicated saturation on the main issues, the interviewing would stop. This procedure resulted in a sample of 28 women interviewed, of which 13 in Maputo City and 15 in Massaca. The characteristics of these women are described in Chapter 8.

3.4.5 Interview guide

As mentioned previously, semi-structured interviews utilize a series of open-ended questions based on the topics the researcher wants to cover. Themes are usually identified prior to the interview and new themes may be developed throughout the interviewing. The structure and type of questions posed depends on whether the study is explorative or explanatory (see Ingham et all, 1999). Since the present qualitative study was mainly explanatory, the interview guide (see Appendix B) was relatively structured, with a mixture of general open-ended questions and some other very specific questions.

Despite this high degree of structure, each topic began with a general open-ended question to elicit women's spontaneity while avoiding directing their thinking. It was expected that women would

discuss the issues on their minds before questioning took place on specific aspects. For example, the interviews would begin with the interviewer asking the interviewee to talk about her life history, and to discuss what she considered to be the more important events of her life. Women were also questioned about the value they place on children, before the interviewer asked how many children they have or about their ideal number of children. Therefore, for each main topic, the questions were ordered from general to specific.

The topics chosen and the listing of questions for the qualitative interview guide were mainly based on the Maputo City's quantitative survey questionnaire and preliminary results. Thus, the qualitative interview guide includes questions on the value of children and fertility decision making process, and on mortality perceptions and their influence on fertility desires. It includes also a set of questions on AIDS awareness and the relationship between AIDS and fertility desires. In addition, the interview guide also included some questions trying to capture how other people could influence women's thinking. This networking exercise included questions on the people women considered most important in their lives, specifically during childhood and at present time.

The interviews were conducted in a very relaxed and friendly atmosphere. The interviewers would not press the respondents to answer questions that they were not willing to answer. Furthermore, the interviewers were told to let the women talk freely, without obliging them to follow the interview guide order. For instance, if a woman began talking about AIDS when the topic being questioned was mortality perceptions, she would be allowed to finish her discourse.

3.4.6 Field work

The interviews were performed by two female research assistants finishing their university degrees. The first is studying history and works as a journalist, while the other studies geography and teaches in a secondary school. In addition, both had participated in qualitative research interviewing courses at Eduardo Mondlane University and had much experience in qualitative survey interviewing.

Before the field work took place, the author and the research assistants thoroughly analysed the interview guide and conducted a small pilot survey. This pilot survey aimed to test and improve the interview guide and to acquaint interviewers with the women's attitudes and response to the survey.

The local authorities would first introduce the interviewer to the interviewee, in order to create a trustworthy atmosphere between researcher and respondent. The interviews would then begin with an introduction made by the research assistant, which included: introducing herself, detailing the question topics and explaining the importance of the study. The research assistant would also clarify that confidentiality and anonymity would be preserved. All women contacted accepted to be interviewed. As mentioned previously, respondents were let in a relaxing atmosphere and if they showed no interest in answering a given question, the interviewer would not insist. In addition, the interviewers would let the women talk freely, and they were not obliged to follow the questionnaire order. Each interview lasted about one and a half to two hours. In case women became distressed during the interview when discussing some sensitive topic, interviewers would not stress the answer and would change the topic.

While the interview guide and answers were written in Portuguese, some women were not very fluent in it, and they often understood the questions and answered to them better if the interview language was Tsonga. Despite this, the questionnaire and recording occurred in Portuguese, whatever the language used in the interview. The author did not undertake most of the interviewing because she does not speak Tsonga. However, the transcripts of the day's interviews would be analysed by the author at the end of the day, and subsequently discussed with the research assistants. No audio taping was done.

3.4.7 Methodology of analysis

Content analysis was done by identifying concepts, placing them into categories and developing these into common themes, using a systematic approach (see Ingham et al, 1999). To reduce error and biases, the process of analysis was documented in detail. The answers were initially registered

in the questionnaire paper. Then, all of the answers were grouped keeping each woman's identification in each answer, providing a first view of the themes in each topic. Next, diagrams were drawn to better understand the links among the various themes. When the main themes were identified, all possible answers were registered.

The methodology of analysis and the results are presented in detail on Chapter 8.

3.4.8 Limitations of the study

All researchers should strive to reduce errors and bias, while strengthening both the validity and reliability of their study. This can be achieved by carefully designing the survey and maintaining meticulous records of interviews and observations. The analytical process should also be documented in detail so that it can be checked by another researcher (see Ingham et al, 1999). In addition, researchers must validate their findings. An important technique for validating qualitative findings is triangulation – comparing data obtained by different methods.

A major problem in designing and conducting this survey was funding. The lack of additional funds prevented the author from obtaining a wider and more representative sample in both urban and rural areas. Indeed, qualitative research focuses on the identification of a wide range of behavioural patterns, opinions, justifications and explanations. Although the survey reached a certain degree of saturation of women's responses, a wider group of respondents would guarantee a more complete variety of answers. In addition, the lack of funds also made audio-taping the interviews and translating both the questionnaire and the answers unfeasible. The lack of audio-taping prevented an independent assessment of the transcripts by outside skilled researchers.
In general, women were very receptive to answering questions, partly because of the interviewer introduction to the respondents by the local elected authorities. However, the respondents' unwillingness to cooperate increased as the topic became more intimate and embarrassing. This was especially true when they were asked questions about AIDS.

Next Chapter, Profile of the Population Study, describes the profile of the study population, including the recent history and economic situation of Mozambique, demographic trends and AIDS prevalence in this country.

Chapter 4

Profile of the study population

Introduction

This Chapter has seven sections. The first section briefly describes Mozambique's geography, history and economy. The second section overviews the people's migration and the urbanization of the country. Then a third section on fertility and family planning is presented and mortality levels are described in the fourth section. The fifth section presents an overview of the people's family and culture patterns. Section 6 presents AIDS prevalence and mortality. Finally, in Section seven the main goal of the country's population policy is reviewed. Because part this study focuses mostly on Maputo City, and to some extent also on Maputo Province, there are special references on these regions.

4.1 Mozambique's history and economy

Mozambique (see map in Figure 4.1) is a country located in South Eastern Africa, with about 16,5 million inhabitants and stretched along a 2,800 km coast (Census, 1997, National Institute of Statistics). The regional administration is divided into ten provinces plus Maputo City, the capital of the country.

Mozambique's recent history is characterized by deep social, political and economic transformations that have influenced the demography and behaviour of the population. A former


TANZANIA
ZAIRE
ZAMBIA
MALAWI
ZIMBABWE
BOTSWANA
SOUTH AFRICA
SWAZILAND
CABO DELGADO
NIASSA
NAMPULA
TETE
ZAMBEZIA
MANICA
SOFALA
INHAMBANE
GAZA
MAPUTO
Mozambique Channel
INDIAN OCEAN
Mozambique
International boundary
Province boundary
National capital
Province capital
Railroad
Road
0 50 100 150 Kilometers
0 50 100 150 Miles
Lambert Conformal Conic Projection, SP 65/30S
Base 802418 (A05253) 12-95

Portuguese colony, this country achieved its independence in 1975 after 10 years of colonial war. The social and economic situation of Mozambique at the dawn of its independence was catastrophic: 96% of the population was illiterate, there were no health facilities except in the urban centres, the economy was mainly based on subsistence agriculture, migrant work and trade with the neighbouring countries, especially South Africa and Rhodesia. The post-independence ruling party Frelimo established a socialist system, which precluded a free market economy. This socialist system favoured two crucial sectors: health and education. Massive children's vaccination programs were set up for the first time and school attendance tripled in five years. As a consequence of the educational policies that were implemented in the first years of independence, the illiteracy rate fell to about 60% in 1997 (Census, 1997).

However, soon after independence, a war initiated by neighbouring countries (first Rhodesia and then South Africa) ravaged the country for 15 years. Renamo, the group fighting the ruling party Frelimo, was actively situated mainly in the countryside, thus paralyzing the country by cutting the links with cities. As a result, the already precarious social and economic infrastructures were destroyed (Newitt, 1995).

By the end of the 1980's, the economy had transitioned into a free market economy. Due to this policy change, associated with the establishment of countrywide peace in 1993, the economy has rebounded and, along with it, there has been a widening gap between the rich and the poor. Some social benefits disappeared, such as free schooling and subsidized food rationing system. These changes were particularly noticeable in the urban areas, namely in the city of Maputo. Some people said they could not send all their children to school because they did not have enough money for the fees (Carvalho, 1998).

Despite being rich in natural resources and having a strategic position in Southern Africa, Mozambique is considered one of the poorest countries in the world. In 1997, this country ranked 166th place out of 175 developing countries, in the Human Development Index rank (UNDP, 1997). However, real GDP per capita growth has been steadily and spectacularly increasing for the last ten

years. Indeed, the real GDP per capita growth was 11.3% in 1996-97 and 10.9% in 97-98 (UNDP, 1999).

4.2 Migration and urbanization

Migration in Mozambique has been considerable. In the south, thousands of men go to work in South African mines, factories and farms. Usually, these workers leave their families behind but usually come home every year for the holidays. Furthermore, because Mozambique is a long and thin country, and man-made borders in Sub-Saharan Africa are almost non-existent, the six neighbouring countries exert great influence on Mozambique. This was particularly true during the 13 years of civil war, when millions of Mozambicans fled to neighbouring countries, and many of which later returned to the country.

Partly due to the civil war, but also in search for a better life, thousands of people have migrated from rural to urban areas. This migration is quite recent, thus it is rather difficult to draw a clear cultural and demographic line between people in rural and people in urban regions. Nonetheless, the proportion of urban people was estimated at around 6% in 1970 and 30% in 1990 (Ministry of Planning and Finances, 1996).

4.3 Fertility and family planning

4.3.1 Levels and trends of fertility

The total fertility rates (TFR) in the country for the five years previous to the Mozambique Demographic and Health Survey- 1997 (National Institute of Statistics, 1998) can be seen in Table 4.1.

Table 4.1 -Total fertility rates for the five years previous to the MDHS - 97

	Urban	*Rural*	*Total*
Age 15 – 49	5.08	5.78	5.62
Age 15 – 44	5.05	5.63	5.49

Source: Mozambique DHS, 1998

There are also differences by education: the lowest TFR is 3.62 for women with secondary level or higher and the highest is 5.81 for women without education. Furthermore, there are also differences among different ethnic groups, for example, if a woman's first language is Portuguese, the TFR is only 4.22.

Fertility seems to have started declining recently: a decline of the age specific fertility rates the women aged less than 35 years , especially for women in the age group 30-34 years (MDHS, 1998), as is shown in the Table 4.2. Arnaldo (2003), who extensively analysed the national censuses and MDHS data, concluded that there is a steady fertility decline across all age groups and birth orders in the southern provinces of the country. However, although it seems that the same occurs in the central and northern regions of the country, the evidence is not conclusive.

Table 4.2 - Age specific fertility rates for women between 15 and 34 years old for during the last 20 years (number of births per thousand women)

		1978-1982	*1983-1987*	*1988-1992*	*1993-1997*
Age	15 – 19	173	178	176	172
	20 – 24	274	298	276	271
	25 – 29	252	261	268	235
	30 – 34	246	237	229	199

Source: Mozambique DHS, 1998

4.3.2 Contraceptive prevalence and family planning services

According to the MDHS contraceptive prevalence in Mozambique is very low. On average, only 6% of women use any contraceptive (only 5.4% is currently using a modern method), although 61% claimed to have some knowledge of modern methods. The most important

reason for not using contraceptives is wanting more children (51%). Other important reasons reported for not using contraceptives are: opposition to family planning (12%) and not knowing (15%) (MDHS, 1998). However, in Maputo City, around 30% of women use some method (MDHS, 1998).

Reproductive health in Mozambique has been an important part of national health policy since the Independence in 1975, and in 1980, the Family Planning Program was integrated with the Mother and Child Heath Program (Ministry of Health, 1996). The main objectives of the Family Planning Program are: (i) to improve maternal health, especially for women with high reproductive risk; (ii) to improve child health, promoting a birth interval of at least 2 years. Family Planning services can be obtained in 629 Service Delivery Points spread over the country, of which 240 are Health Centres, 350 are Health Units and 39 are Hospitals. The family planning services, however, are a small part of the child and mother health activities.

A directive from the Ministry of Health states that during the first consultation post-delivery at the health unit, women should receive information and education about family planning. In one study performed in five of the ten provinces (see Green et al, 1996), it was reported that nurses are by far the main source of information, followed distantly by "friends." This study also states that there is little evidence that any print and mass media family planning messages have reached people. Similarly, in another study (see Bardalez & Ferrari, 1996) in three Maputo City neighbourhoods, most people reported having heard about family planning mostly from the health centres and friends.

4.4 Mortality levels

4.4.1 Population growth and life expectancy

Demographic data in Mozambique, although not always reliable, have been gathered through Censuses and Demographic Surveys. The most recent Census was performed in 1997 and

although decenial Censuses were also carried out between 1940 and 1980, their reliability is varied. In 1991 a demographic survey was carried out to 146,331 households and demographics were calculated. A Demographic and Health Survey also took place in 1997, and the results have been published. According to the results of the 1997 Census (National Institute of Statistics, 1998b), the crude birth rate in Mozambique is 44.4 per thousand and the mortality rate is 21.2 per thousand people per year, giving a natural growth rate of 2.32 percent. However, these values vary considerably by region. Although the fertility rates are higher in the rural areas than in the urban areas, the rate of natural increase in the urban areas is 2.7%, much higher than the 2.2% rate of natural increase in the rural areas, due to the considerable difference in mortality rates between rural and urban areas. Indeed, life expectancy at birth in the rural areas is estimated at 40.2 years, while in the urban areas it is 48.8 years.

According to the National Census in 1997, women's life expectancy at birth in Mozambique is 44 years. Because infant and child mortality rates are very high, the total number of years a woman can expect be expected to live after passing childhood is significantly higher than it is at birth. Indeed, according to the mortality tables calculated in the demographic survey carried out in 1991 in 146,331 households all over Mozambique, women's life expectancy at birth was 44.78 years and women's expectancy of life at 20 years old was 39.81 years (see National Institute of Statistics, 1995). So, if a woman manages to reach the age of 20, she is expected to live until approximately 60 years old.

4.4.2 Levels and trends of infant and child mortality

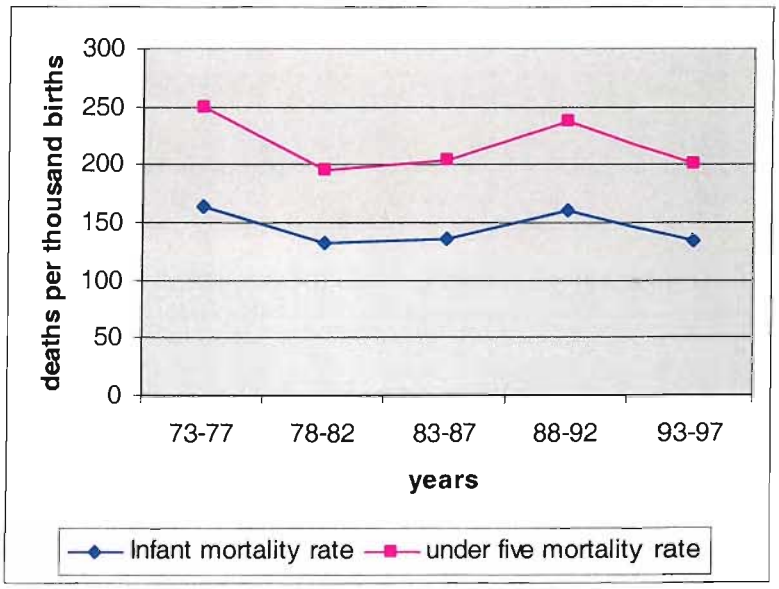
The infant and under-five mortality rates are very high, respectively 147 and 219 per thousand for the country, but there are large differences between regions (MDHS, 1998). For instance, in Nampula Province, the under five mortality rate is 319 per thousand (i.e. almost one out of three children does not reach the age of 5) while in Maputo City this rate is 97 per thousand.

Similar to patterns of under five mortality rates, the present infant mortality rates vary considerably by region. According to the DHS, the lower IMR for the last five years is 41.2 per

thousand in the City of Maputo, while the highest value is in Nampula, a northern province, with an IMR of 196.8. For the last ten years, there has been a difference in the IMR in the rural and urban areas: 159.3 per thousand for the rural areas while for the urban areas the rate is 101.7.

In order to analyze the trends in infant mortality rates (IMR) and under-five mortality rates, over the previous 25 years, the values of these rates for 5-year periods are plotted in a graph as shown in Figure 4.2. This graph suggests that there is no uniform pattern of mortality rates. Although the results are less reliable for the earlier periods, the swings seem to correspond to the periods of war and peace in the country. There is historical data on mortality rates, and Coale (1966) estimated the infant mortality rate of Mozambique in 1950 at 212 per thousand. In addition, data from the Mozambique National censuses in 1980 and 1997, show a decrease in the infant mortality rate from 159 per thousand to 146 per thousand. So, it seems that there has been a long term decrease in IMRs in the country.

Figure 4.2 – Graph of infant and under five rates in Mozambique for the 5-year periods previous to the MDHS



Source: Mozambique DHS, 1997

Similarly, a decreasing trend on under five mortality rate seems to have taken place. This is confirmed by Newitt's (1995) account of under five's death: he said that during the first half of the Twentieth century, one in three children died, due to the endemic diseases (malaria, tuberculosis,

leprosy and sleeping sickness). So it can be concluded that there is a long term decrease of child's mortality rates in Mozambique.

4.4.3 Birth intervals

The length of birth intervals is important for analyzing infant and child mortality. The median of the birth interval in the country is 34.6 months (Mozambique Demographic and Health Survey, MDHS, 1998), with slight differences between rural and urban areas (respectively 34.7 and 33.9). However, 19.2% and 18.3% of the births still occur within 24 months of the previous birth in urban an rural areas respectively. According to the MDHS, the infant mortality rate decreases from 212 per thousand births when the birth interval is less than 24 months to 75 per thousand births when the birth interval is 4 or more years. Furthermore, the MDHS suggests that the incidence of infant mortality is higher when the births are from very young or very old women. Higher parity also seems to increase the infant mortality rates. Indeed, according to the MHDS, and as found in literature elsewhere, infant mortality rates were considerably higher in births that occurred in any (or more than one) of the following circumstances: a) age of mother less than 20 and more than 40 years old; b) birth interval less than 24 months; c) parity higher than 3. It is thus worrisome to realize that 72% of births that occurred in the five years previous to the survey fall into to one or more of these three categories.

4.4.4 Maternal morbidity and mortality

Another reproduction related problem is the maternal mortality rate. In a Ministry of Health study (Ministry of Health, 1996), the rate of maternal mortality was estimated at 500 per 100,000 live births. The determinants of maternal mortality are not yet completely known, but as Vaz (1995) mentioned in a document from the Ministry of Health, there are some factors considered as risk factors for maternal mortality. Age (for maternal health the less risky age is 20-30 yrs old), parity (the first and the parities of order 4 and above), obstetric antecedents, pathologic antecedents and nutrition are factors that can increase the probability of maternal morbidity and mortality.

It is nevertheless important to point out that these factors not only influence maternal mortality but also influence maternal morbidity. Vaz (1995) mentioned that for each woman who dies, 16 will have their health severely weakened throughout their lives. Women are aware of this fact as it was found in a study in a neighbourhood in Maputo City (Carvalho, 1998) In this study, it was found that nearly 70% of women think that having many children seriously harms women's health. However, in Mozambique (MDHS-97) 54% of women aged 45-49 had 6 or more children.

4.5 Family and Culture

4.5.1 Nuptiality patterns

Nuptiality patterns in Mozambique are quite varied. Marriage can be official or traditional; monogamous or polygamous; and men and women can live together without any official or traditional ceremony. Using the MDHS data, the author found that around 40% percent of the women between 15 to 49 years old, who declared themselves single, have or have had children. In addition, according to the results from the Census-1997 (National Institute of Statistics, 1998), only 15% of women are officially married, while 45% are in marital union. These facts underline the fluidity of the marital status concept.

4.5.2 Fertility preferences

Women desire large families. According to the MDHS, the average ideal number of children for the country is 5.9. The ideal number of children varies considerably by age, education and place of residence (urban/rural, region). However, even for a developing country, the average ideal number of children can be considered very high. People want many children for several reasons, because children bring happiness, because children will continue their family line, and because children help parents in old ages, among other reasons (Korfker, 1987).

Some anthropological studies on the family and reproduction in Mozambique (Korfker, 1987, Andrade et al, 1997, Loforte, 1996) have been carried out over the past ten years. They give an account of the organization of the family, traditional practices related with reproduction, women's empowerment, the value of children, and the number of desired children. In general, they conclude that people want many children, especially in the rural areas where a child is considered an investment for the family. Dinecke Korfker (1987, pp 26) says:

> "Men explained their desire to have many children in the following way: 'If I have ten children, maybe three of them will take care of me when I grow old. I may have others that have no interest in their old father. If I only have two children the possibility that they will not take care of me is enormous. I will not feel safe with only two children."

Furthermore, as Loforte (1996, pp 295) points out "...with such high rates of infant and child mortality rates, families want to have many children to overcome the risk zone."

In general, it is the man who usually decides on the number of children, as described during an interview of a 68 year old villager, cited by Andrade et al (1997, pp 27):

> "I have been told that that there are people who limit the number of children. It is not the woman's right to decide alone on the number of children to have because if she does so while she is still of fertile and reproductive age, she will not live in harmony with her husband who wants more children. But what I know is that the woman should never avoid or stop having children because she can never know if she is preventing the birth of someone great, who may become a president, a doctor, an engineer, etc. That is why the woman should never decide by herself that she no longer wants children. She should have them until her stomach is finished."

This passage registers the traditional conception regarding the value of children. However, in the urban context, some changes are taking place. Parents feel the need to provide children with a secure future, a good education and a good social environment and they understand that a large number of children constrains such aspirations (Andrade et al, 1997).

4.5.3 Fostering

Fostering has recently been viewed as a strategy to cope with families that become too large Mason, 1997; Cleland 2001). Interestingly, 21% of the children of the respondents in the Demographic and Health Survey (MDHS, 1998), who are alive and below 15 years old, do not live with their mothers. Furthermore, children from higher parity families have a much greater

propensity of not living with their mothers than children from lower parities. For instance, only 7% of first born children do not live with their mothers, while children fifth in the birth order are very likely (43%) to live elsewhere. This information, however, does not give a complete picture of the fostering process. On the one hand, some of the children who do not live with their mothers might have been sent to villages to attend a school not available near their homes. On the other hand, not all orphans are included in these statistics. Considering that about 18% of children below 15 years old in the country are orphans either of mother or father (National Institute of Statistics, cited in UNDP, 1997) it is probable that the incidence of fostering among children below 15 years old is higher than 21%.

4.5.4 Ethnicity and Religion

Mozambique is a kaleidoscope of different cultures. Besides Portuguese, which is the official language, about 15 more languages are spoken, corresponding to different tribes. Most of these languages are structurally different from each other, making Portuguese the most important communication channel in the country. Furthermore, many different offshoots of Christianity are complemented with local animist spirits faiths, as well as by Muslim practitioners. There are regions were descent is matriarchal, although most are patriarchal. The colonial system and later the socialist system dismantled part of the traditional social and cultural system. In particular, the traditional system of power and the traditional rites of initiation and marriage system were strongly discouraged and often forbidden (Newitt, 1995).

4.6 AIDS

There are few studies on HIV and AIDS prevalence in Mozambique. According to the "National Strategic Plan to Combat AIDS" (Ministry of Health, 1999), it is estimated that the HIV prevalence is 14.5% of the adult population. Most data gathered on HIV prevalence is from urban and semi-urban areas but the few studies carried out on rural areas suggest that there are no significant differences between rural and urban areas. The total number of AIDS cases registered

up to 1998 was 10,863, although the number of AIDS cases is estimated to be 140,000 for the same year. These are cumulative figures. However, the number of new cases registered in 1998 was 4,376.

The estimates of deaths due to AIDS are very high: the Ministry of Health (1999) estimates that the number of adult deaths in 1998 due to AIDS was 77,438 and that this figure would increase at a rate of about 20% per year. If these estimates are reasonably accurate, then the impact of deaths on the crude mortality rate would be significant. However, according to the Ministry of Health, infections in Mozambique are relatively more recent than in neighbouring countries. Hence, it is difficult to ascertain whether there is a significant increase in the rates of mortality, and consequently, whether the perceptions of mortality may have increased due to AIDS.

Using the available data, an expert team from different institutions, analyzed the impact of HIV/AIDS on population growth in Mozambique. They concluded that population will possibly grow from 16.3 million in 1997 to 19.4 million in 2010, growth that would be much higher in the absence of AIDS and would reach 22.3 million in 2010 (Ministry of Health et al, 2001).

4.7 Some notes on Maputo City and Maputo province

Maputo City is a city of almost one million inhabitants, located at the south of the country. Its proximity to South Africa (around 70km by road) makes this city more modern than the other cities in the country. In addition, due to several other factors, the socio-economic development of Maputo, which concentrates a great part of the country's industry, is much higher than the other cities and provinces: the proportion of poor people is smaller, the access to education and health is much higher (UNDP, 1999). Child mortality rates prove the same: the infant mortality rate in 1997 was 41 per thousand while the average of the country was 147; the under five mortality rate was 97 per thousand while the average of the country was 219 per thousand.

There is no reliable historical data on mortality rates for Maputo City, but because Maputo City did not suffer directly the effects of war, it seems reasonable to consider that child mortality rates have not increased for the past 20-25 years old.

Maputo Province, also situated on the south of the country, although having with lower level of development than Maputo City, still stands out from the other provinces. Indeed, this province has lower rates of mortality, higher school enrollment and the percentage of poor people is also lower than the average country (UNDP, 1999).

4.8 Population Policy

The Council of Ministers approved in 1999 (Council of Ministers, 1999) the first Population Policy in the country. The purpose of the Population Policy is "to influence the determinants of demographic variables, namely those of mortality, fertility and migration, in order that population trends and dynamics may contribute towards harmonious economic growth and the human development of the Mozambican population." However, there is no reference to the potential adverse effects of high rates of population growth on population development. Hence, no demographic policy attempting to decrease fertility is set in this policy document.

Family planning is viewed solely as a promoter of reproductive health and the document sets, among others, the following principles

- the right of couples and individuals to set and try to achieve their reproductive goals hence the need to prevent unwanted pregnancies;
- the need to improve the access to and quality of family planning services;
- the need to undertake specific and integrated activities on information, education and communication in matters of family education and reproductive health.

Chapter 5

Analysis of the MDHS data

Introduction

This Chapter presents a quantitative analysis of the Mozambique Demographic and Health Survey (MDHS). In Chapter 3 – Methodology is presented the data collection procedures of the MHDS and the description of the statistical model – the multinomial logistic model – used in its analysis. As mentioned in Chapter 3, the MDHS does not contain variables measuring mortality perceptions. Nevertheless, because it is a very large survey and includes several socio-economic variables, it is very powerful in analyzing the effects of some proxies of mortality perceptions variables on fertility. This Chapter includes the detailed description of the variables used, a bivariate analysis and a multivariate analysis.

5.1 Description of the variables

5.1.1 Outcome variable

As mentioned in Chapter 3 – Methodology, the chosen outcome variable, representing women's fertility intentions was defined as whether the respondent would like to have a, or another, child. The phrasing of the question in the MDHS questionnaire was "Now I have some questions about the future. Would you like to have (a/another) child or would you prefer not to have any (more) children?" Respondents who were pregnant were asked "After the child you are expecting, would you like to have another child or would you prefer not to have any more

children?" The MDHS data file included the following possible outcomes: "wants a/another child," "undecided," "wants no more," "sterilized," "declared infecund," and "never had sex." Women sterilized were categorized as "wants no more" while the women who answered the last two categories were discharged from the data file. In addition, the 46 cases where women gave no answer to this fertility intention question were excluded. Thus the working data file contained 7684 cases, of which only 19 percent of women did not want another child, 7 percent were undecided and 74 percent wanted another child.

5.1.2 Explanatory Variables - Mortality perceptions variables (Group A)

In Table 5.1a, the weighted distribution of the mortality perceptions variables is shown.

OWN CHILD MORTALITY: Several variables were created in order to analyze the effects of the respondents' own child mortality on fertility desires. These variables were created based on the reproductive histories and are as follows: i) if any child has died, ii) the number of children who have died, iii) if there were recent deaths (last year, last two years, last five years), iv) if respondent's last child died and v) if the respondent's first child died before one year old. Each of these variables measures different aspects of the possible impact of child's mortality on fertility. The variable in i), a dichotomous variable, is likely to be an indicator of the desire to replace a child who has died. The second variable, ii) attempts to analyze if the mortality of a bigger number of own children has a bigger or different effect on fertility. Variables indicated in iii) aim to see if a more recent death has a special effect on fertility, i.e., if a recency effect can be determined. The variable in iv) is more likely to show a replacement effect than variables in i) or ii). The last variable is included as some authors found a relationship in the desire for additional children and the death of the first child before one year old (Rashad et al, 1993). It is important to note that no distinction was made on the children's age in most of the above mentioned variables. Indeed, the great majority of children (about 93% of the children from the women in MDHS) died before reaching five years old and it was decided to include all children, as the death of older children may also influence fertility desires.

SIBLINGS DEATH: Two variables were created concerning the mortality of the respondent's siblings, one is the number of siblings who ever died (in groups) and the other a dichotomous variable on whether any sibling has died while the respondent was between 5-15 years old. The aim of these two variables is to analyze the mortality perceptions formation and test whether the experience of death on the respondents' family has effects on fertility desires. The data to construct these variables came from the maternal mortality section of the questionnaire, which asked their respondents about their mother's reproductive history.

EXPOSURE TO MEDIA: A dichotomous variable was constructed based on the three questions related to media exposure. These questions asked whether the respondent watches TV at least once a week, reads a newspaper at least once a week and listens to radio every day. The dichotomous variable is set equal to one if the respondent answered affirmatively to at least one of those three questions. The idea of including media as a mortality perception variable stems from the fact that often the media loudly discusses mortality in general and child mortality in particular.

AIDS: Two variables related to AIDS were considered. One variable, taken directly from the survey, asks whether the respondent had heard about AIDS. The second variable, aiming to capture women's fear of own death by AIDS, is constructed on two survey questions. These questions are "Do you think that people with AIDS, almost always die, sometimes die, or never die?" and "Do you think that your risk of getting AIDS is none, small, moderate or high?" The dichotomous variable that was created, considered that the woman has fear of own death if people with AIDS sometimes or always die and if her self-reported risk of getting AIDS is moderate or high.

Table 5.1a - Weighted Distribution of Explanatory Variables – Mortality Perceptions (Group A)

Explanatory Variables		%	N
At least one child died	0 – No	**60.5**	4647
	1 - Yes	**39.5**	3037
Number of own children death	0 children	**60.5**	4647
	1 to 2 children	**30.2**	2318
	3 to 4 children	**7.2**	587
	5 or more children	**1.7**	133
At least one child died last year	0 – no child died	**98.9**	7599
	1 – at least one child died	**1.1**	85
At least one child died during last two years	0 – no child died	**97.1**	7458
	1 – at least one child died	**2.9**	226
At least one child died last five years	0 – no child	**82.2**	6316
	1 – at lest one child died	**17.8**	1151
Respondent's last child died	0 – No	**84.6**	6498
	1 - yes	**15.4**	1187
If first child died before 1 year old	0 – no child died	**91.2**	7008
	1 – at least one child died	**8.8**	676
Number of siblings who have died	No sibling has died	**57.1**	4386
	1 or 2 siblings have died	**28.8**	2215
	3 or 4 siblings have died	**10.5**	804
	5 + have died	**3.6**	280
At least one sibling has died when respondent was 5-15 yrs	0 – No sibling died	**80.0**	6146
	1 - At least one sibling died	**20.5**	1538
Exposure to media **	0 – no	**68.4**	5170
	1 - yes	**31.6**	2391
Knowledge of AIDS *	0 – no	**16.8**	1287
	1 – yes	**83.2**	6391
Chances of getting AIDS	0 – No moderate or high risk	**87.1**	6693
	1 – moderate or high risk	**12.9**	991
Is AIDS a fatal disease	0 – never, don't know, didn't answer	**34.5**	1811
	1 – sometimes or almost always	**65.5**	5874
Fear of own risk of death by AIDS	0 – no	**88.2**	6777
	1 – yes	**11.8**	907

* missing less than 100 cases; ** missing between 100 and 1,000 cases

5.1.3 Demographic and socio-economic control variables (explanatory variables Group B)

The weighted frequencies of the demographic and socio-economic variables are presented in Table 5.1b.

TOTAL CHIDREN ALIVE: It was created a categorical variable, grouping the number of children alive in the following groups of children: 0, 1-2, 3-4, 5-6, 7 or more.

HAS AT LEAST ONE CHILD ALIVE: Three dichotomous variables were created, aiming to analyze separately the effect on fertility desires of having at least one child, having at least one son and having at least one daughter.

AGE: A five-year group variable was created.

REGION OF RESIDENCE: Two variables were created, one indicating each of the eleven provinces of the country and the other grouped these provinces into three regions.

TYPE OF RESIDENCE: Two variables were considered as they appeared in the survey data base, one is the actual place of residence, classified as *urban* or *rural,* and the other is the childhood place of residence, classified as city, town and countryside.

MARITAL STATUS: Based on the survey data, a marital status variable was created, grouping women into "never married," "married or living together" and "other."

EDUCATION: Three variables related with education were considered in order to better capture the effect of education on fertility desires. These variables are as follows: highest level of education *attended,* number of school years *completed* (grouped), and literacy (if the respondent was able to read and write).

OCCUPATION: Two variables were constructed, one grouping women into the main occupational categories and the other simply a dichotomous variable that indicates whether women are working or not. The occupational groups considered for the first variable are as follows: not working, agricultural worker, trader and other.

RELIGION: This variable, taken directly from the survey data, includes the main religious groups in the country, which are: Catholic, Protestant, Islamic, other, no religion. Later, the last three categories (Islamic, other and no religion) were merged in one category 'other or no rel;igion'

ETHNICITY: This variable, also taken directly from the survey data, uses the first language spoken as a proxy to ethnicity. It is considered that a person's first language corresponds to the parent's identification to the corresponding ethnic group. The main group languages included here are: Xitsonga, Emakua, Cisena, Ekomue, Xitswa, Portuguese and other.

WEALTH - The survey asked women whether they owned some items, namely: refrigerator, radio, TV, bicycle, telephone. A wealth index was created as being the total number of these items the women own. This index was grouped into four categories: 'owns no item,' 'owns 1 item,' 'owns 2-3 items' and 'owns 4 or more items.' The reason for such grouping is that the great majority, about 83% of the women, owns only one or none of these items.

ELECTRICITY - A dichotomous variable on whether women have electricity at home or not, was created.

WATER – In order to analyze the access to water, three variables were created. The first variable is an ordinal three-category variable, each category representing a period of time needed to get water: less than 10 minutes, between 10 and 30 minutes and more than 30 minutes. The second and third variables are related with the source of drinking water. One variable groups the source of drinking water into four categories: residence, neighbor's residence, public and other. The other

variable is dichotomous and groups the previous variable into two categories: 'residence' or 'neighbor's residence' category, and 'public' or 'other' category.

Table 5.1b - Weighted Distribution of Explanatory (control) Demographic and Socio-Economic Variables (Group B)

Explanatory Variables		*%*	*N*
Total children alive	0 children	**18.2**	1397
	1 or 2 children	**39.0**	2997
	3 or 4 children	**25.3**	1944
	5 or 6 children	**12.3**	942
	7 or more	**5.3**	405
Has at least one son alive	No	**35.0**	2689
	Yes	**65.0**	4996
Has at least one daughter alive	No	**36.1**	2775
	Yes	**63.9**	4909
Has at least one child alive	No	**18.2**	1397
	Yes	**81.8**	6287
Respondents age, 5-year groups	15 – 19	**16.1**	1235
	20 – 24	**20.7**	1593
	25 – 29	**20.2**	1552
	30 – 34	**15.0**	1152
	35 – 39	**12.5**	963
	40 - 44	**8.0**	611
	45 - 49	**7.5**	577
Province of residence	Niassa	**5.4**	417
	Cabo Delgado	**6.4**	488
	Nampula	**17.3**	1330
	Zambezia	**14.9**	1148
	Tete	**3.6**	274
	Manica	**5.8**	443
	Sofala	**13.5**	1037
	Inhambane	**9.2**	710
	Gaza	**10.9**	835
	Maputo	**6.6**	508
	Cidade Maputo	**6.4**	494
Regions grouped	South (cid. Map., Map., Gaza, Inh.)	**33.2**	2548
	Center (Zamb., Tete, Manica, Sofala)	**37.8**	2901
	North (Namp., Cabo Del., Niassa)	**29.1**	2235
Type of residence	Urban	**23.6**	1810
	Rural	**76.4**	5874
Childhood place of residence	City	**15.4**	1184
	Town	**7.3**	561
	Countryside	**77.3**	5926
Marital status	Never Married	**9.0**	688
	Married / living together	**80.1**	6155
	Other	**11.0**	842

(continue)

Table 5.1b (continuation)

Explanatory Variables		%	N
Highest education level attended	No education	**43.5**	3340
	Primary	**52.4**	4025
	Secondary or higher	**4.1**	318
Literacy *	Reads easily	**16.8**	1290
	Reads with difficulty	**14.9**	1144
	Cannot read	**68.3**	5237
Number of completed school years	0 -1 year	**47.2**	3635
	2 - 3 years	**20.4**	1569
	4 - 5 years	**17.4**	1237
	6 or more years	**15.5**	541
Occupation *	Not working	**31.4**	2414
	Agricultural worker	**58.3**	4478
	Trader	**4.7**	359
	Other	**5.2**	396
Occupation dichotomous *	Not working	**31.4**	2414
	Working	**68.6**	5233
Religion *	Catholic	**29.5**	2251
	Protestant	**25.6**	1956
	Islamic	**17.5**	1336
	Other	**6.3**	484
	No religion	**20.9**	1607
Ethnicity (first language group spoken) *	Xitsonga	**19.0**	1440
	Emakua	**29.4**	2230
	Cisena	**23.8**	1807
	Ekomue	**8.0**	609
	Xitswa	**12.0**	915
	Portuguese	**3.3**	249
	Other	**4.5**	344
Wealth Index – ownership of selected items **	no item	**52.9**	4004
	1 item	**29.9**	2262
	2 - 3 items	**15.8**	1197
	4 + items	**1.3**	100
Has electricity *	No	**90.3**	6869
	Yes	**9.7**	736
Time to get water **	less than 10 mn	**39.2**	2846
	between 10 and 30 mn	**39.3**	2855
	more than 30 mn	**21.5**	1561
Source of drinking water	In residence	**9.6**	737
	Neighbor's residence	**12.8**	981
	Public	**48.6**	3733
	Other	**29.1**	2233
Source of drinking water, dichotomous	In residence or neighbor's	**22.4**	1718
	Other	**77.6**	5966

*less than 100 missing cases; ** missing between 100 and 1,000 cases;

5.1.4 Community Variables (Group C)

The weighted distribution of the community level variables is presented in Table 5.1c. The aim of the inclusion of these variables is to identify whether certain characteristics at the level of the community have effect on the women's fertility desires. For instance, if there are high levels of mortality in a community, it might influence women's attitudes even if they had not lost a child. Similarly, if education has a depressing effect on women's fertility desires the fact that the majority of women in a certain community are well educated, may influence an uneducated woman to have similar attitudes.

Three groups of variables were created: Education, Wealth and Mortality. The communities considered here were the localities identified by the sample stratum number. There are in total 189 such communities, and the number of women per community varies between 12 and 93, having a mean of 44 and a median of 44.

EDUCATION: The variable created to analyze education at community level was a 4-category grouping of the percentage of women in that community who have no education.

WEALTH: At the level of community, three variables were considered in order to analyze wealth: the average number of items women in the community owned, the percentage of women who use drinking water from own residence or neighbor's and the percentage of women who have electricity. They were also categorized.

MORTALITY : Five variables at the level of community were created: 1) total number of children of women in the community who died; 2) the number of children of the women in the community who died during the last five years; 3) the average number of children per women in the community who died and 4) the proportion of children who died from the children ever born from women in the community. Each of these variables was categorized, as presented in Table 5.1d. The last variable was also transformed in a dichotomous variable (5).

Table 5.1c - Weighted Distribution of Explanatory Community Variables (Group D)

Explanatory variables		*%*	*N*
EDUCATION			
Live in communities where the percentage of women who have no education is	0 – 30%	**30.0**	2304
	30 – 50%	**32.1**	2467
	50 – 70%	**27.5**	2116
	70% or more	**10.4**	798
WEALTH			
Live in community were the average number of items owned is **	0 to 1 item	**60.8**	4602
	1 to 2 items	**29.2**	2207
	2 to 3 items	**5.8**	436
	3 or more items	**4.2**	318
Live in community were the percentage of women who uses drinking water from own residence or from the neighbor is	0%	**38.5**	2956
	0 – 30%	**36.6**	2810
	30 – 60%	**9.0**	692
	60 – 90%	**9.0**	688
	90% +	**7.0**	538
Live in community were the percentage of women who has electricity is *	0%	**46.6**	3544
	0 – 10%	**28.9**	2204
	10 – 30%	**14.2**	1077
	30 – 50%	**5.7**	432
	50% +	**4.6**	348
MORTALITY			
Live in communities where the total number of children who died is	0 to 15 children	**21.2**	1631
	16 to 30 children	**35.0**	2686
	31 to 45 children	**16.0**	1230
	more than 45 children	**27.7**	2130
Live in communities where the number of children who died during last five years is	0 to 5 children	**36.1**	2777
	6 to 10 children	**28.6**	2201
	11 to 15 children	**29.7**	2284
	16 children or more	**5.5**	422
Live in communities where the average number of children who died per woman is	0 to 0.4 children	**20.7**	1591
	0.4 to 0.8 children	**40.8**	3135
	0.8 to 1.2 children	**27.1**	2084
	1.2 children or more	**11.4**	873
Live in communities where the proportion of children who died from children ever born is	0 to 10% children	**9.6**	735
	10 to 20% children	**40.7**	3126
	20 to 30% children	**36.5**	2807
	30% or more children	**13.2**	1016
Live in communities where the proportion of children who died from children ever born is	0 to 20% children	**50.2**	3861
	20% or more children	**49.8**	2823

*less than 100 missing cases; ** missing between 100 and 1,000 cases;

5.2 Bivariate analysis

5.2.1 Introduction

Bivariate analysis constitutes a simple process to analyze the relationships between variables. In Tables 5.2a to 5.2c the results from cross tabulations of the outcome variable with the explanatory variables can be seen. On the right the p-value shows whether the relationship is strong, moderate or weak/none. For most variables the p-value tests whether the probability that the difference in proportion of respondents not wanting more children with the characteristics versus the proportion of respondents without the characteristics was due to chance alone was significant at 99% level. This test is based on a chi-squared distribution, testing the difference of proportions. However, the bivariate analysis does not allow for the control of other variables that might have an impact on both explanatory variables and outcome variable. For instance, there is a very strong effect on wanting more children by the total number of children who died, but this effect can be due mainly or even totally to the number of children ever born, which has high correlation (.56) with the number of children who died. Nevertheless, bivariate analysis is important to select variables that might be significant predictors for a given outcome variable when analyzing the data with more powerful multivariate methods.

5.2.2 Association between the outcome variable and the mortality perceptions variables (Group A explanatory variables)

In Table 5.2a the results of the cross-tabulations of desire for additional children with the mortality perceptions variables can be seen.

Most variables related to the respondent's children's death were significant at 99% level, except variables 'if first child died before one year old' and the variable 'at least one child died last year.' For the latter variable, there is a small number of women in the category 'yes', only 85. The more striking differences appear on the variable 'Number of own children's deaths,' which, as mentioned above, is intimately related with the number of children ever born and may also be related with the respondent's age. It is interesting to note that in this bivariate results, the effect of

own child death represented by different variables appear to be contradictory: if any child died in the last few years (one, two or five) the effect is positive: i.e., women are more likely to declare that they 'want more children' than otherwise. But the more children that have died, the more likely women are to say they 'I don't want more children.' Different reasons, to be checked later with the multivariate analysis, may explain this apparent discrepancy. Furthermore, the cost (monetary and emotional) of the children's death might also have an important effect to be considered. The respondent's last child having died seems to have less impact in the desire for additional children than whether any child died in the last few years, but again, this might be due to age and consequently how long ago the last child has died for some of the respondents.

The number of siblings who died seems to influence fertility desires. The more siblings who have died, the larger the likelihood that a women will declare she doesn't want more children. Here also, age might have an important effect, as the older women are, the larger the number of siblings who have died.

Exposure to media seems not to have significant impact on the fertility desires.

Variables related with AIDS seem also have some impact. The knowledge of the disease, seems to have the largest effect among the variables related with AIDS, although the variable 'is AIDS a fatal disease' is also significant. The perceived chance of contracting AIDS seems to have little impact, indeed the p-value is not significant. However it is not clear that people would have responded truthfully to this question as AIDS illness is very much associated with bad behavior.

Table 5.2a - Bivariate Analysis: desire for an additional child * mortality perceptions variables (Group A)

Explanatory Variables		No %	Und. %	Yes %	p-value
Number of own children death	0 children	15	6	**78**	**0.000**
	1 to 2 children	21	6	**72**	
	3 to 4 children	34	8	**58**	
	5 or more children	64	11	**25**	
At least one child died	0 – no child died	15	6	**78**	**0.000**
	1 – at least one child died	25	7	**68**	
At least one child died last year	0 – no child died	19	7	**74**	0.139
	1 – at least one child died	12	5	**87**	
At least one child died during last two years	0 – no child died	20	7	**74**	**0.000**
	1 – at least one child died	9	6	**85**	
At least one child died last five years	0 – no child died	20	7	**73**	**0.000**
	1 – at lest one child died	15	6	**79**	
Respondent's last child died	0 - No	21	6	**73**	0.001
	1- Yes	14	8	**78**	
If first child died before 1 year old	0 – No	19	7	**74**	0.045
	1 - Yes	22	3	**75**	
Number of siblings who have died	No sibling has died	15	6	**79**	**0.000**
	1 or 2 siblings have died	24	8	**67**	
	3 or 4 siblings have died	25	6	**69**	
	5 + have died	30	4	**66**	
At least one sibling died when mother was 5-15 yrs	0 – No sibling died	19	6	**75**	**0.000**
	1 - At least one sibling died	23	7	**70**	
Exposure to media	0 – no	19	7	**75**	0.098
	1 - yes	21	7	**73**	
Knowledge of AIDS	0 – no	14	9	**77**	**0.000**
	1 - yes	20	6	**74**	
Chances of getting AIDS	0 – Not Moderate or high risk	19	7	**74**	0.108
	1 – Moderate or high risk	21	5	**74**	
Is AIDS a fatal disease	0 – Not sometimes/ almost always	17	8	**76**	**0.000**
	1 – sometimes/ almost always	21	6	**74**	
Fear of own risk of death by AIDS	0 – No	19	7	**74**	0.079
	1 – Yes	21	5	**73**	

5.2.3 Association between the desire for an additional child and the demographic and socio-economic variables (Group B)

The relationship between the desire for additional children and some demographic and socio-economic variables is shown in Table 5.2b. As can be seen, all the variables considered have significant p-values.

As expected, the number of children alive has a negative association with wanting additional children. Having at least a son or a daughter alive seems to have a large and significant association with fertility preferences. It is interesting to note that fertility desires do not vary according to whether the respondent has at least a boy or a girl alive. Furthermore, those with at least one living child are less likely to decide to have more children than otherwise.

Age seems to be a very important variable in explaining fertility desires. As can be seen in Table 5.2b, the older the women, the less likely she is to want more children. However, it is surprising that a large a percentage of the women between 45 and 50 years old (32%) still wants to have additional children.

Region of residence seems also to have a strong impact on fertility desires. The percentage of women who wants more children varies between a low of 63% to a high of 90%. Different provinces were grouped into three major areas: South, Center and North and large differences on the desire of having additional children still prevail, with women in the Southern Region desiring less to have an addition child than do women living in the other regions. Furthermore, the place of residence seems to have a larger effect on the desire for additional children than the childhood place of residence. This suggests that past cultural and socio-economic environment may not have an important effect when compared with the present's.

Large differences occur whether women were 'never married,' 'married or living together' and 'other.' Indeed, if they were never married, they are probably younger and thus more likely to

want children than those in other categories. Women that are in 'other' category, were already married but now live single, probably already with some children.

The variables that categorize education seem to have an effect on desired fertility different than one would expect. Indeed, most literature analyzing the impact of education on fertility in Africa conclude that the higher the level of education the less the number of children desired. However, in this case the relationship is not constant: women with no education seem to desire fewer children than women with some education, while women with a higher education seems to want fewer children than with low education, at more or less the same levels as the uneducated women.

The fact that women are working or not, seems to have a small impact on the desire for additional children, only one percentage point difference. However, if we consider groups of women by different types of jobs, the differences in the percentages are more significant: there is 14 and 15 percentage points difference respectively between women who are not working and women who are traders, and women who are not working and women who are employed in other professions.

The desire for additional children also seems to vary with religion, with a lowest desire for additional children among women who profess protestant religions and the highest desire among women who are Islamic or profess other religions.

Ethnicity also seems to have a large impact on wanting more children. The percentage range for wanting more children among the different ethnic groups, represented by the mother tongue, varies between 65% (Xitsonga) and 80% (Cisena). It is interesting to note that Cisena is a language spoken in the Center Region, while Xitsonga is a language spoken in the South Region. It thus seems likely that there is a relationship between regions and ethnicity, regarding fertility desires.

The ownership of selected items seems to influence strongly fertility only when the number of items owned is 4 or more. However, only a hundred women in the sample own four items or more.

This shows a striking level of poverty. Similarly, only 9.7% of the women have electricity. Both these variables seem to have a significant impact on the desire for an additional child.

Access to water also deserves some acknowledgement. Indeed, if the source of drinking water is at the respondent's residence or at the neighbor's residence, the desire for additional children is 10 percentage points lower. However, the differences in the desire for additional children do not vary that much if the time to get water is considered. Nevertheless this last variable is still significant.

Table 5.2b - Bivariate Analysis: Desire for an additional child * demographic and socio-economic variables (Group B)

Explanatory Variables		No	Und	**Yes**	p-value
		%	%	%	
Total children alive	0 children	3	8	**89**	0.000
	1 or 2 children	7	4	**89**	
	3 or 4 children	23	8	**69**	
	5 or 6 children	52	7	**41**	
	7 or more	69	10	**21**	
Has at least one son alive	No	6	6	**88**	0.000
	Yes	26	7	**67**	
Has at least one daughter alive	No	6	6	**88**	0.000
	Yes	27	7	**67**	
Has at least one child alive	No	3	8	**89**	0.000
	Yes	23	6	**71**	
Respondents age, 5-year groups	15 – 19	3	9	**89**	0.000
	20 – 24	5	4	**91**	
	25 – 29	8	6	**85**	
	30 – 34	22	5	**73**	
	35 – 39	29	10	**60**	
	40 - 44	57	6	**37**	
	45 - 49	64	4	**32**	
Region of residence					
	Niassa	17	4	**79**	0.000
	Cabo Delgado	8	2	**90**	
	Nampula	19	6	**75**	
	Zambezia	17	6	**77**	
	Tete	13	17	**70**	
	Manica	17	3	**81**	
	Sofala	9	9	**82**	
	Inhambane	23	5	**72**	
	Gaza	32	8	**61**	
	Maputo	30	7	**64**	
	Cidade Maputo	31	7	**63**	
Regions grouped					
	South (cid. Map., Map., Ga., Inh.)	29	6	**65**	0.000
	Center (Zam., Tete, Man., Sofala)	14	8	**79**	
	North (Namp., Cabo Del., Niassa)	16	5	**79**	
Type of residence					
	Urban	26	6	**69**	0.000
	Rural	17	7	**76**	
Childhood place of residence					
	City	22	5	**74**	0.006
	Town	19	7	**74**	
	Countryside	19	7	**75**	
Marital status					
	Never married	13	12	**75**	0.000
	Married / living together	18	6	**76**	
	Other	35	5	**60**	

(continue)

Table 5.2b (continuation)

Explanatory Variables		No %	Und %	Want %	p values
Highest education level attended	No education	22	8	**70**	**0.000**
	Primary	17	6	**78**	
	Secondary or higher	22	3	**76**	
Literacy	Reads easily	21	5	**74**	**0.000**
	Reads with difficulty	16	6	**79**	
	Cannot read	20	7	**73**	
Number of completed school years	0 -1 years	18	5	**78**	0.015
	2 – 3 years	15	5	**89**	
	4 -5 years	18	6	**77**	
	6 or more years	20	7	**73**	
Occupation dichotomous	Not working	17	8	**75**	**0.000**
	Working	20	6	**74**	
Occupation	Not working	18	8	**74**	
	Agricultural worker	18	6	**76**	
	Trader	32	3	**65**	**0.000**
	Other	33	4	**63**	
Religion	Catholic	18	6	**76**	**0.000**
	Protestant	27	6	**67**	
	Islamic	14	6	**80**	
	Other	14	11	**75**	
	No religion	17	7	**76**	
Ethnicity (first language group spoken)	Xitsonga	31	8	**61**	**0.000**
	Emakua	17	5	**78**	
	Cisena	11	9	**80**	
	Ekomue	18	5	**77**	
	Xitswa	24	5	**71**	
	Portugues	22	2	**76**	
	Other	17	6	**77**	
Wealth Index – ownership of selected items	no item	20	6	**74**	**0.000**
	1 item	17	6	**77**	
	2 - 3 items	21	8	**71**	
	4 + items	35	4	**61**	
Has electricity	No	18	7	**75**	**0.000**
	Yes	29	4	**67**	
Time to get water	less than 10 mn	22	7	**71**	**0.000**
	between 10 and 30 mn	16	7	**77**	
	more than 30 mn	19	4	**77**	
Source of drinking water	In residence	32	6	**62**	**0.000**
	Neighbor's residence	22	6	**71**	
	Public	19	7	**75**	
	Other	14	7	**79**	
Source of drinking water, dichotomous	In residence or neighbor's	27	6	**67**	**0.000**
	other	17	7	**76**	

5.2.4 Association between the desire for an additional child and community level variables (Group C)

The relationship between the desire for an additional child and some community-level variables is shown in Table 5.2c. As can be seen, all the variables considered have significant p-values. The true effect of the community level variables, can only be detected using multivariate analysis, i.e., when controlled for the corresponding individual level variables.

EDUCATION: The bivariate results for this community level variable show a similar pattern as the education variables at individual level have shown earlier. In fact, women who live in communities where the percentage of women without any education is highest seem less likely to want more children than women who live in communities where the percentage of women without education is slightly lower. But in communities where most women have education, women are less likely to want more children than otherwise.

WEALTH: In any of the community variables representing the household's average wealth, namely the ownership of selected items, the source of water and the availability of electricity, the richer the communities the less women want additional children.

MORTALITY: Across the categories of the four community-level mortality variables, there is no clear ordered pattern. However, women living in communities where mortality levels are lower there tend to desire less children than women living in communities where mortality levels are higher, and this relationship can be discerned in the results of the four variables.

Table 5.2c - Bivariate Analysis: Desire for Additional Children * Community Level Variables (Group C)

Explanatory Variables		No %	Und. %	**Want %**	P value
EDUCATION					
Live in communities where the percentage of women who have no education is	0 – 30%	24	5	**71**	**0.000**
	30 – 50%	22	6	**72**	
	50 – 70%	11	8	**81**	
	70% or more	18	7	**74**	
WEALTH					
Live in community were the average number of items owned is	0 to 1 item	15	7	**79**	**0.000**
	1 to 2 items	25	6	**69**	
	2 to 3 items	29	8	**63**	
	3 or more items	31	6	**64**	
Live in community were the percentage of women who uses drinking water from own residence or from the neighbor is	0%	15	8	**78**	**0.000**
	0 – 30%	20	5	**74**	
	30 – 60%	20	5	**75**	
	60 – 90%	28	6	**66**	
	90% +	28	8	**64**	
Live in community were the percentage of women who has electricity is	0%	15	7	**78**	**0.000**
	0 – 10%	20	5	**75**	
	10 – 30%	27	7	**66**	
	30 – 50%	26	7	**69**	
	50% +	28	7	**65**	
MORTALITY					
Live in communities where the total number of children who died is	0 to 15 children	18	4	**78**	**0.000**
	16 to 30 children	21	6	**73**	
	31 to 45 children	17	7	**76**	
	more than 45 children	19	9	**72**	
Live in communities where the number of children who died during last five years is	0 to 5 children	21	5	**74**	**0.000**
	6 to 10 children	18	6	**76**	
	11 to 15 children	19	9	**72**	
	16 children or more	16	6	**77**	
Live in communities where the average number of children who died per woman is	0 to 0.4 children	16	5	**78**	**0.000**
	0.4 to 0.8 children	24	6	**71**	
	0.8 to 1.2 children	15	7	**78**	
	1.2 children or more	19	10	**71**	
Live in communities where the proportion of children who died from children ever born is	0 to 10% children	19	5	**75**	**0.000**
	10 to 20% children	23	5	**71**	
	20 to 30% children	15	7	**78**	
	30% or more children	18	9	**73**	
Live in communities where the proportion of children who died from children ever born is	0 to 20% children	23	5	**72**	**0.000**
	20% or more children	16	8	**76**	

5.2.5 Association between the desire for an additional child and contraceptive use.

Contraceptive use was not included in the multinomial logistic models as interpretation might be confounded. Indeed, if women are using contraceptives to avoid pregnancy because they do not want more children, it is not appropriate to use this variable as a possible explanatory variable for the desire of additional children. On the other hand, women may be using contraceptives in order to postpone births, not to stop having them. It can also happen that women do not desire more children but are not using contraceptives for a number of reasons: lack of appropriate knowledge on the different methods, non availability of family planning services, cost of contraceptives, spouse and family pressure for not using contraceptive methods and others.

However, it is important to analyze the relationship between contraceptive use and fertility desires. In the data described in the previous sections, 6.6% of the women are using some contraceptive method. As expected, for the subgroup of women who do not want more children, the percentage increases considerably, 16.5% of this subgroup are using some method, while for women who want more children this percentage is only 4.2%. Contraceptive prevalence among women who are undecided about having additional children is 5.0%.

Contraceptive prevalence varies considerably by the province where women are living: only 0.8% of women in Cabo Delgado province uses any method, while in Maputo City 33.6% of the women uses some contraceptive method. For Maputo City, within the subgroup of women who does not want to have additional children, the contraceptive prevalence is 51.6%, while among women who live in Cabo Delgado and do not want more children, the contraceptive prevalence is only 2.6%.

5.3 Multivariate analysis

5.3.1 Summary of the models

Chapter 3 – Methodology presents an overview of the multinomial logistic model, the model chosen to analyze the MDHS described data. When analyzing the desire for additional children, one obvious explanatory variable stands out: the mother's age. It seems that a model without this explanatory variable cannot properly explain the outcome variable. In addition a variable representing women's children, in this case the number of surviving children, is also essential when explaining fertility desires. Next, the presentation of the multinomial logistic models will follow a similar order for the presentation of the variables and for the bivariate analysis in the previous sections:

- mortality perceptions variables;
- demographic and socioeconomic variables
- community variables.

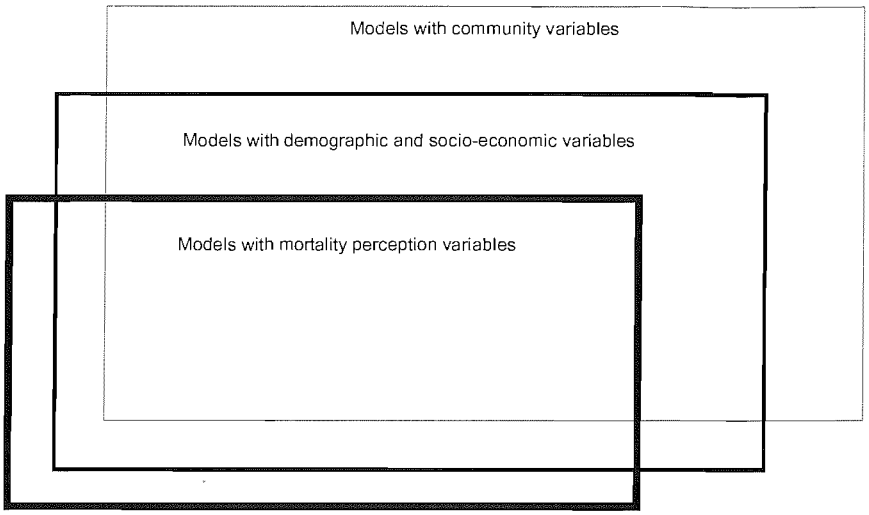
However, the sequence of the analysis that follows differs from the sequence of the analysis on the previous chapter, in that in the present section there is a sequential model building in stages where the stages are the different groups of variables. In each stage, non or less significant variables are dropped and a model is chosen to be nested in the models of the following stage. In Figure 5.1 a diagram of the general procedure is presented.

In summary, the models presented are the following:

- Models with Mortality Perceptions Variables (MP1 and MP2)
- Models with mortality perceptions variables + demographic variables + socio-economic variables (DSE1 and DSE2)
- Models with mortality perceptions variables + demographic variables + socio-economic variables + community level variables (CMP and CW))

For clarity, only the conditional probabilities of wanting an additional child are presented.

Figure 5.1: Model building strategy



5.3.2 Models with mortality perceptions variables

In Table 5.3a, the predicted probabilities of wanting an additional child for two models are presented and the description of the variables are presented in Table 5.1a. Model MP1 and MP2 are almost identical, the only difference is that in model MP1 the variable representing the children who died is the total number of children who died, while in model MP2 this variable is substituted by the dichotomous variable 'any child died during the last five years'.

Several models including each of the mortality perceptions variables indicated in Table 5.1a were tested. The two models here presented were considered the best models within the principle of parsimony, significance of the deviance values, significance of parameters and proportion of variation explained. The conclusions below presented are only preliminary, as these models did not include relevant socio-economic variables. In summary:

Age

As expected, in both models, from the second age group to older age groups, the desire for additional children decreases with the increase of age.

Number of children alive

Also as expected, in both models, the desire for additional children decreases with the increase of the number of surviving children.

Number of children who died (Model MP1)

This variable is highly significant in Model MP1. The desire for an additional child slightly increases when one or two children have died, when compared with the case where no children have died. However, although significant, this increase, is very small, less than 1% in the probability of desiring additional children. In addition, women who experienced a larger number of child deaths, three or more, tend to desire less children than women who did not experience child deaths, or that only one or two of their children died. Interestingly, a similar model to the Model MP1 was tested, where the number of children who died was substituted by the dichotomous variable 'any child had died', but this variable was not significant.

At least one child died during last five years (Model MP2)

This variable is highly significant in Model MP2. There is a considerable difference in the probability of wanting (or not wanting) an additional child, depending on whether any respondent's child died during the last five years or not. The recent death of a child increases the desire for an additional child.

At least one sibling died (Models MP1 and MP2)

This variable is highly significant in both models. The desire for additional children decreases when the respondent reports that at least one sibling have died even when controlling for the respondent's age and the other mortality perceptions variables.

Ever heard of AIDS (Models MP1 and MP2)

If the respondent has already heard about AIDS, she is less likely to declare that she wants an additional child. This conclusion is highly significant in both models. As mentioned earlier, this

variable needs, more than most of the other mortality perceptions variables, to be examined with a range of socio-economic variables controlled.

Exposure to at least one type of media (Models MP1 and MP2)

If the respondent has access to at least one type of media, she is less likely to want an additional child. This conclusion is highly significant in both models. As mentioned earlier, this variable also strongly needs to be examined once we have controlled for a range of socio-economic variables.

Table 5.3a – Predicted probabilities for wanting an additional child (Models with relevant mortality perceptions variables)

	Model MP1 Age + children alive + number children deaths+ sibling death+ heard AIDS + media		Model MP2 Age + children alive + any child died last 5yrs+sibling death+ heard AIDS + media
	Want (%)		Want (%)
Age in five year-groups		Age in five year-groups	
15 - 19	80.5 ***	15 - 19	82.0 ***
20 - 24	87.4 ***	20 - 24	87.9 ***
25 – 29	86.0 ***	25 – 29	86.1 ***
30 - 34	82.3 ***	30 - 34	82.3 ***
35 – 39	76.6 ***	35 – 39	75.2 ***
40 – 44	60.2 ***	40 – 44	58.7 ***
45 – 49 [R]	48.1	45 – 49 [R]	45.8
Number of children alive		Number of children alive	
0 child	90.5 ***	0 child	90.2 ***
1 – 2 children	89.0 ***	1 – 2 children	88.7 ***
3 – 4 children	72.7 ***	3 – 4 children	73.1 ***
5 – 6 children	55.1 ***	5 – 6 children	56.3 ***
7 + children [R]	38.2	7 + children [R]	40.2
Number of children who child died		At least one child died last 5 years	
0 child	82.2***	No	81.4***
1 – 2 children	82.9***	Yes [R]	84.6
3 – 4 children	80.0***		
5 + children [R]	44.2		
At least one sibling died		At least one sibling died	
No	84.1***	No	84.3***
Yes [R]	78.5	Yes [R]	78.1
Ever heard of AIDS		Ever heard of AIDS	
No	84.1***	No	83.6***
Yes [R]	81.2	Yes [R]	81.2
Exposure to at least one type of media		Exposure to at least one type of media	
No	83.5 ***	No	83.4***
Yes [R]	77.6	Yes [R]	77.8

*** p < .001; ** p <.01; * p< .05; [R] reference category.

5.3.3 Models with demographic and socio-economic variables

Table 5.3b presents the results of two models including demographic and socio-economic control variables (DSE1 and DSE2). These two models are almost identical, the only difference is that Model DSE1 aims to analyze the effect of the number of children who died on fertility intentions while Model DSE2 aims to analyze the effect of the death of a child during the last five years on the intention of having an additional child.

The choice of the demographic and socio-economic variables described in Section 5.1.3 to be included in the models, was made by taking each in turn and then adding them to the previous models with mortality perceptions variables (Models MP12 and MP2). These new models were tested and the variables which didn't contribute significantly to the model's performance were dropped. Next, the variables that were significant were put together and the ones which were not significant in these new models were also dropped.

Mortality perceptions variables

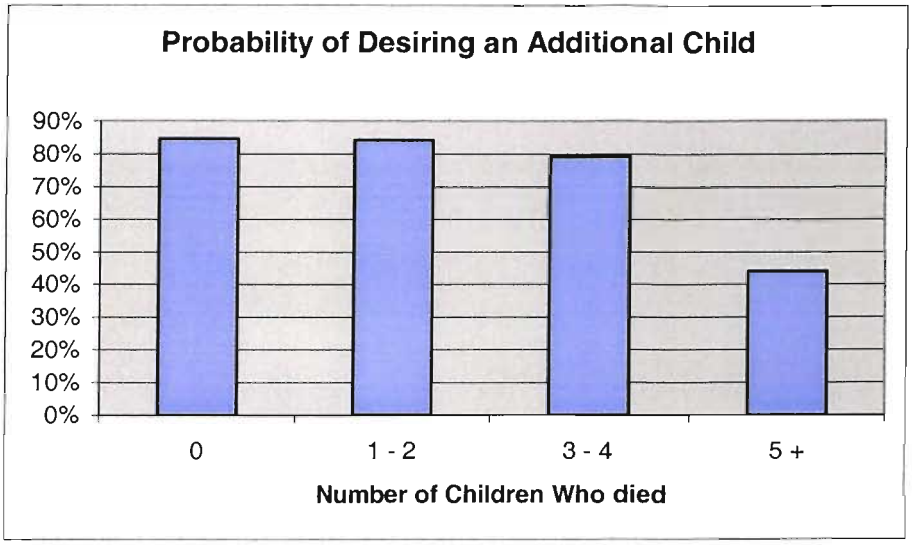
Number of children who died (Model DSE1) – The pattern of the predicted conditional probabilities is the following: the higher the number of children who have died, the lower the likelihood of wanting additional children. This result suggests that the burden of having children who died can be very heavy. Figure 5.2 presents a graph showing these probabilities.

At least one child died during last five years (Model DSE2) - The desire for having an additional child is higher if at least one child died during last five years. As mentioned earlier, this result suggests that a recency effect is quite important to fertility desires.

Ever heard of AIDS (Models DSE1 and DSE2) – Although this variable has a significant deviance in the models, the parameters are not significant. Furthermore, the differences in the probabilities according to whether or not the respondent heard of AIDS are not very sharp.

At least one sibling died (Models DSE1 and DSE2) – If any sibling has died, in both models, women are less likely to report wanting additional children.

Figure 5.2 – Predicted conditional probabilities for wanting an additional child by the number of children who have died (Model DSE1)



Demographic and socio-economic variables

Number of children alive (Models DSE1 and DSE2) – As expected, the higher the number of children alive, the lower the desire for additional children.

Respondent's age (Models DSE1 and DSE2) – Also, as expected, the older the woman the less likely she is to want additional children.

Place of residence (Models DSE1 and DSE2) – As have been reported elsewhere in literature, women in the rural areas tend to desire more children than women in the urban areas and this is confirmed in both models. However, differences in both models are less than 1%.

Marital status (Models DSE1 and DSE2) – The desire for wanting additional children is highest if women are married or living with a partner. This result may suggest that women need to have a partner to support them in rearing their children. In addition, this result may also suggest that

women desire additional children to please their husbands, because men usually want more children, as mentioned elsewhere in the literature.

Education (Models DSE1 and DSE2) - Only the variable representing the highest level of education attended was significant at 99.9% when education variables were added one by one to the previous mortality perceptions models. The other two, 'literacy' and 'number of school years completed' were significant at 99% level. The first variable was then chosen to be included in the larger models, but none of its parameters in the new model were not significant and thus were dropped from the models. This result, unlike that found in most of similar studies reported in literature, may be caused by three reasons. First, the access to education for most of the population in Mozambique is very recent. At the independence of the country in 1975, about 95% of the people were illiterate and nowadays this rate dropped to about 60%. It might happen that the effects of education in depressing the desire for many children found elsewhere, have not yet contra balanced the traditional rule of having many children. Complementarily, the second possible reason for this result might come from the high level of political activity, which included social teaching and learning, involving almost all population during the first ten years after the independence of the country. During this period an unwritten policy for high fertility was promoted. This might have blocked the usually known effects of education in fertility. Indeed, the effects of social learning in demographic variables is not new in literature. Streatfield al (1990), found a significant effect of the education in the clinics of mothers in caring their babies, even after controlling for formal education. Also, Vallin and Behm (1980, cited in Bacci, 1990), found that the levels of infant mortality in Cuba were low and almost the same regardless of the level of education of women, while for other Latin-American countries, infant mortality differentials by education were substantial. Third, the sudden schooling spread at the end of the 1980's equally reached children across different socio-economic status, hence the actual women's education levels may not be very much linked with other socio-economic factors.

Working (Models DSE1 and DSE2) - Whether it is considered the dichotomous variable that indicates if a woman works or not, or the variable with a more detailed measure that takes into

account the women's occupation, employment variables had a deviance at 99% level. Furthermore, in the larger models, those two variables were not significant at all.

Access to electricity and ownership of selected items (Models DSE1 and DSE2) - None of these variables is significant in the larger models. One possible reason for this result might be that extreme poverty is widespread and even for those families that nowadays are slightly better off, their richness is relative and quite recent, hence might not yet be influencing fertility.

Religion (Models DSE1 and DSE2) - Religion is significant at 99.9% and modest differences on the probabilities among the different religious groups can be seen.

Ethnicity (Models DSE1 and DSE2) – Not significant at larger models.

Provinces/region (Models DSE1 and DSE2) – There are significant differences in the desire for additional children among regions, women living in the South region desire less to have an additional child than women residing in the rest of the country.

Access to water (Models DSE1 and DSE2) – Only the variable 'source of drinking water' was significant at 99.9% level in the larger models. Women who get water from their own residence or from the neighbors tend to desire less children than otherwise.

Table 5.3b – Predicted conditional probabilities for wanting an additional child (Models with relevant mortality perceptions and demographic and socio-economic variables)

	Model DSE1 (child deaths represented by 'number of children who died')		Model DSE2 (child deaths represented by 'any child died last 5 years')
	Wants an additional child (%)		Wants an additional child (%)
Number of children alive		Number of children alive	
0 child	92.9***	0 child	92.7***
1 – 2 children	90.5***	1 – 2 children	90.3***
3 – 4 children	73.3***	3 – 4 children	73.4***
5 – 6 children	54.9***	5 – 6 children	56.1***
7 + children [R]	35.5	7 + children [R]	37.2
Number of children who died		Any child died last five	
0 children	84.6***	years	83.2**
1 – 2 children	84.3***	No	85.3
3 – 4 children	79.2***	Yes	
5 + children [R]	44.0		
Ever heard of AIDS			
No	82.7	Ever heard of AIDS	82.3
Yes [R]	83.8	No	83.8
At least one sibling died		Yes [R]	
No	85.8***	At least one sibling died	85.9***
Yes [R]	80.5	No	80.1
Age in five year-groups		Yes [R]	
15 - 19	83.6***	Age in five year-groups	84.9***
20 - 24	87.9***	15 - 19	88.6***
25 – 29	87.0***	20 - 24	87.2***
30 - 34	83.9***	25 – 29	83.8***
35 – 39	78.7***	30 - 34	76.9***
40 – 44	64.4***	35 – 39	62.4***
45 – 49 [R]	54.5	40 – 44	50.7
Place of residence		45 – 49 [R]	
Urban	83.1***	Place of residence	83.2
Rural [R]	83.8	Urban	83.7
Marital status		Rural [R]	
Never married	68.0	Marital status	68.1
Married/living together	85.8***	Never married	85.6***
Other [R]	75.8	Married/living together	76
Religion		Other [R]	
Catholic	81.9***	Religion	81.9***
Protestant	82.8***	Catholic	82.7***
Other or no religion [R]	84.6	Protestant	84.9
Region		Other or no religion [R]	
South	76.2***	Region	76.9***
Center	86.2***	South	85.9**
North	86.6	Center	86.2
Water source		North	
House or neighbor's	84.6***	Water source	84.5***
Other	79.6	House or neighbor's	79.9
		Other	

*** p < .001; ** p <.01; * p< .05; [R] reference category.

5.3.4 Models with community level variables

The multinomial model, as an extension of the logistic model, assumes that the distribution of the error terms follows binomial distributions and that the outcomes are independent. However, women within the same community are likely to have similar desires for additional children, implying that the outcome is not independent within the clusters. This aspect suggests the need for using multilevel modeling so that the heterogeneity between the clusters can be measured and more efficient parameters can be estimated. However, the results of the models studied so far with the inclusion of some community level variables should be checked before using multilevel models.

For community level variables, special attention was given to mortality level variables. However, a community level variable measuring education and another one measuring access to water were also analyzed. The description of the community level variables is presented in Table 5.1c.

Mortality

After dropping the variables that were less significant in Model DSE1 in Seection 5.3.3, a categorical variable of different levels of the proportion of children from women in the community who died was added to both models . The new model were composed of the following variables (Model CMP)

Number of children alive
Number of children who died
Ever heard of AIDS
At least one sibling died
Age in five year-groups
Provinces
Type of residence
Marital status
At least one son alive
Proportion of children who died (community level variable).

All variables have significant parameters and the predicted conditional probabilities of the mortality perceptions and demographic variables follow similar patterns and have similar values of the models in section 5.3.3. The predicted probabilities relative to the community level variable can be seen in Table 5.3c.

As can be observed, the higher the proportion of children in the community who have died, the less women want to have additional children.

Table 5.3c – Predicted probabilities for wanting an additional child (Model with relevant mortality perceptions, demographic, socio-economic and community level perceptions variables), in percentages

	Model CMP		
	Don't Want	Unde-cided	want
Live in communities where the proportion of children from the women in the community who died is:			
0 to 10%	7.3	5.0	87.7 ***
10% to 20%	8.1	5.1	86.8 ***
20% to 30%	9.0	6.6	84.4 ***
30% or more [R]	16.3	9.9	73.8

*** p < .001; ** p <.01; * p< .05; [R] reference category.

Two more variables were tested with almost the same results: the number of children from women in the community who died during the last five years and the ratio of children who died during last five years per woman in the community. For both variables the results obtained were very similar to those ones in Table 5.3c. This result is somewhat unexpected, as it was foreseen that the higher the mortality, the higher the fertility. Indeed, Mahy (1999), in a similar study in Zimbabwe, obtained an opposite result: the higher the community mortality levels, the higher the desire for additional children. However, the variable that represented community level mortality was a composition of mortality rates in the clusters and the mortality rates in the regions. In addition, mortality levels in Zimbabwe, at the time the data used in Mahy' study was collected were much lower than in Mozambique in 1997 (see Mahy, 1999 and National Institute of Statistics, 1998).

Education

The variable considered as a proxy for education was the proportion of women who have no education, categorized in four categories (see Table 5.1c). The deviance of the variable was

significant but none of the parameters was significant. No further analysis was done with this variable.

Access to water

In this case, the variable chosen to represent the access to water was the proportion of women who obtain drinking water from their own residence or from a neighbor's residence, whose categories are shown in Table 5.3d. Model CW was created, almost identical to Model CMP, except that the community variable now is the access to water. All the other variables included in the model had similar patterns and values that had in the Model CMP.

As can be seen, there are sharp differentials on the predicted probabilities of wanting an additional child, corresponding to each level of proportion of women who use different sources of drinking water. It is important, however, to notice that only two parameters corresponding to 'wanting an additional child' are significant.

Table 5.3d – Predicted conditional probabilities for wanting an additional child (Model with relevant mortality perceptions, demographic and community level perceptions variables), in percentages

	Model including the number of children ever born		
	Don't want	Unde-cided	want
Live in communities where the proportion of women who uses drinking water from own residence or from a neighbor is:			
0 %	9.2	6.0	84.8
0% to 30%	7.5	5.2	87.3 **
30% to 60%	6.8	6.2	87.0 **
60% to 90%	14.6	8.0	77.3
90% or more [R]	46.5	7.0	46.5

*** p < .001; ** p <.01; * p< .05; [R] reference category.

5.4 Discussion of the results

Modeling strategy is a complex step-wise process, and in each phase, it is necessary to evaluate if the introduction of a new variable brings sufficiently important additional information about the relationship between the variables that compensate for the lack of precision on the parameters of the variables, when the model has many variables.

From the results of the above models it is not sensible to choose the best one. However, if a certain relationship holds in several of the models, than it is reasonable to consider that that relationship is generally valid. In this sense, some conclusions can be drawn from the above results.

- **Mortality perceptions variables**: Mortality perceptions variables, more exactly, their proxies, do have influence on the desire for additional children, even when controlling for a number of socio-economic and demographic variables. The mortality perceptions variables with more influence on the desire for additional children are:
    - *number of children who died*, the desire for an additional child tend to decrease with the increase of the number of child deaths.
    - *at least one child died in the last five years* (increases the desire for additional children);
    - *at least a child had died* , not significant;
    - *at least one sibling died* (decreases the desire for additional children);
    - *access to media*, not significant;
    - *ever heard of AIDS,* not significant.

  The effect that each of these variables exert on the desire of additional children is different and sometimes apparently contradictory. However a possible explanation can be put forward. The effect of child mortality on the desire for additional children might be a result of two opposite forces: on one hand, women want to have more children as a response to child mortality, partly because they fear to become childless; on the other hand, the emotional and material costs associated with child deaths, or even death in general,

may have a depressing effect on the desire for additional children. Indeed, for example, the variable 'at least a child died during last five years' seems to provoke women's the increase of women's desire for an additional child, while the variable 'at least a child died' is not significant for the model. This result suggests a recency effect in that.

- **Demographic and socio-economic variables:** The demographic and socio-economic variables with higher effect in the desire of additional children are:
  - number of children alive (the higher this number, the lower the desire for additional children);
  - respondents' age (the older the respondent, the lower the desire for additional children);
  - region (significant differences);
  - marital status (living with a male partner makes women to have a stronger desire for additional children than otherwise);
  - water source (if a woman uses water from their own residence or from the neighbor's then she is less likely to want additional children);
  - religion (differences among religions (if a woman professes Catholic religion has the lowest probability of desiring additional children).

In the models studied, socio-economic variables do not seem to be very important in explaining fertility desires. However, it might happen that the constructed socio-economic variables are not the most relevant in analyzing fertility desires.

- **Community level variables:** Two community level variables were found with a high effect on the desire for additional children.
  - mortality (women who live in communities where the proportion of children per women who dies is higher, have a lower probability of wanting additional children).

- access to water (women who live in communities where the proportion of women obtains their drinking water from their own residence or from a neighbour's is higher, are less likely to desire additional children than otherwise).

These results concerning community level variables need to be checked with more appropriate models. First, community level variables should be broadened so that to include additional information on the community mortality levels or water source that is not included in the MDHS. Second, to ensure that community effects are properly assessed, multilevel models should be used.

Mortality seems to have an important role on fertility desires. Because the MDHS does not contemplate mortality perceptions variables, the study of mortality proxies constitutes the best alternative to analyze this issue in large samples. However, as expected, not many important conclusions regarding this issue can be drawn. Perhaps the most important conclusion that can be made from the above study is that the own experience with child mortality might have apparently contradictory effects on fertility desires. The recent losing of a child might prompt women to have more children, but the increasing of child deaths over the years have an opposite effect. This conclusion is not often mentioned in literature. But they are in accordance with Ben Porath (1978) and Becker and Barro (1988)'s models, as presented in sub-section 2.3.5.

It is important to note that the conclusion here presented that there is an effect of decreasing fertility desires with the increase of the number of children who die does not necessarily imply that child mortality provokes decrease in fertility. Indeed, the multinomial models used in this Chapter to draw the above conclusions controlled for 'number of children alive' and not for 'children ever born'. This means that we are comparing women with the same number of *surviving children* and not women that have had the same fertility. In fact, if a woman experienced a child death and has the same surviving progeny that a woman that did not loose any child, than the first woman has had higher fertility than the second woman. Indeed, when controlling for 'number of children alive' somehow the interpretation is related with desired number of surviving children. However, if experience in child death increases the desire for additional children in a model controlling for children alive, then certainly mortality provokes increase in fertility.

Next chapter presents the univariate and bivariate analysis of the quantitative survey carried out in Maputo City.

Chapter 6

Univariate and bivariate analysis of the quantitative survey held in Maputo City

Introduction

This Chapter presents the univariate and bivariate analysis of the data from the quantitative survey held in Maputo City and described in Chapter 3 – Methodology. It is comprised of six sections. The first section presents the main socio-economic and demographic characteristics of the women in the sample. The second section gives a brief account of women's family building processes. It follows a section that details women's ideal number of children concept and its relation with child's sex and child's mortality. The fourth section presents the various estimates women have of infant mortality as well as child' survivorship into adulthood. In the fifth section a brief description of women's knowledge about AIDS and their awareness of AIDS mortality is presented. A summary of the main conclusions finalizes the chapter.

As described in Section 3.3, the quantitative survey is part of the general objective of understanding and measuring the effects of mortality perceptions on fertility intentions. More specifically, this survey aims to quantify women's estimates on mortality perceptions and measure their effects on fertility intentions. In addition, it attempts to evaluate the magnitude of the 'insurance effect'. The survey was restricted to women in Maputo City, the capital of Mozambique, and the sample size was 800 women, aged 20-49 years old. The field work took place in May-June 2003.

6.1 Women's socio-economic and demographic characteristics

6.1.1 Age, marital status, education

The average age of the women in the sample is 30.54 years old. It is slightly lower than the average age of the same age group (20-49 years old) found in the MDHS, which was 31.16.

Most women are married (64.3%), but a considerable proportion (26.5%) are single and the remainder are widowed or divorced. These percentages are similar to the corresponding percentages in the MDHS. The average age at first marriage is 20.1 years old. However, as mentioned in Section 4.5.1, marital status categories are not very clearly delimited.

School enrolment in Maputo City is quite high. In fact, a large majority of women in the sample (93%) attended primary school, but only 39% attended medium or higher levels of the education system. At the moment of the survey, around one fifth of the women were attending school.

6.1.2 Origin and mother tongue

Around half the women in the sample were born in Maputo City. The other half came mostly from the Southern Provinces of Inhambane, Gaza and Maputo. Women who were born in other provinces and elsewhere accounted for 8.3% of the sample.

These percentages, however, vary considerably by age group. In the 20-29 year age group, most women (63%) were born in Maputo, while in the oldest group, 40-49 years, most women (74%) were born outside Maputo. This suggests a changing in migration pattern to Maputo City. Indeed, it seems that once the civil war finished in 1993, people's migration to the city decreased.

The different kinds of mother tongue considered are the same as used in the MDHS, but because this survey is restricted to Maputo City, only the three most representative languages are indicated while the remainder are grouped. The most important mother tongue is Xitsonga and similar

which is the mother tongue for 54.7% of the women. Next, 31.7% of the women had Portuguese as mother Tongue, 10.0% had Xitswa and similar and the remainder 3.7% learnt to talk in other languages. Xitsonga and similar are languages mostly spoken in Maputo City, Maputo Province and Gaza. Xitswa and similar are mostly spoken in Inhambane Province. In other Central and Northern provinces, additional languages – not mentioned in this chapter – are spoken. Portuguese is the national official language. Interestingly, the percentage of women whose mother tongue is Portuguese varies considerably between the women born in Maputo (44.5%) and the women born outside Maputo (18.7%). Furthermore, the percentage of women born outside Maputo whose mother tongue is Portuguese also differs significantly among regions: for women born in the southern provinces (Inhambane, Gaza and Maputo Province), only 12% recognised Portuguese as mother tongue, while for women born in the Central and Northern provinces or elsewhere, the percentage of women with a Portuguese mother tongue was 54.5%. Mother tongue is a reasonable proxie to cultural, traditional customs and may be a good predictor for fertility. Indeed, Agadjanian (1995) found that having Portuguese as mother tongue was an indication for women in Maputo city to be more modern and desire less children.

6.1.3 Religion and media

Most women in the sample are Christians, accounting for 80.2% of all women. Within the Christian group, a little more than two thirds are Protestant and the remainder are Catholic. A small group (4.2%) are Muslim and an even smaller group (2.9%) profess other religions. Finally, a group of 12.7 % belonged to no religion. This latter group tended to be less educated than the rest. Indeed, the percentage of women who claimed no religion among the women who did not study or only attended primary school is 15%, while among the women who attended secondary school or higher is 9%. Furthermore, the more educated the women, the greater was their probability of being catholic, while an inverse relationship was observed for protestant women.

Women have considerable access to media. Only 5.6% of the women never listen to radio or watch TV. Less than half do so once in a while, and the majority, 54.5% listen to radio or watch

TV every day. However, women do not read newspapers as often as they listen to radio or watch TV. About 7.3% read newspapers daily, while 46.3% read them once in a while.

6.1.4 Professional activity, house construction and electricity

More than half of the women interviewed (54%) do not have any professional activity. Furthermore, many women who have declared they work do not have a regular activity: of the 46% who declared to work, 27% of all women declared to be vendors, often with a small stall at the door of their houses. Besides being vendors, the other more frequent professional activity (14%) was domestic workers and cleaners. White collar workers, agricultural labourers, teachers, nurses and others, accounted for only 6% of all women.

Most women in the sample (89%) live in houses built with cement, and only 9% of the women live in houses built from cane and grass. Most women (60.5%) have electricity in their house.

6.1.5 Children ever born and children who died

The average number of children that women in the sample ever had is 2.83. However, 16.3% of them never had any child. Surprisingly, this percentage is much lower than the percentage of women who declared to be single. Indeed, 52% of single women have at least one child.

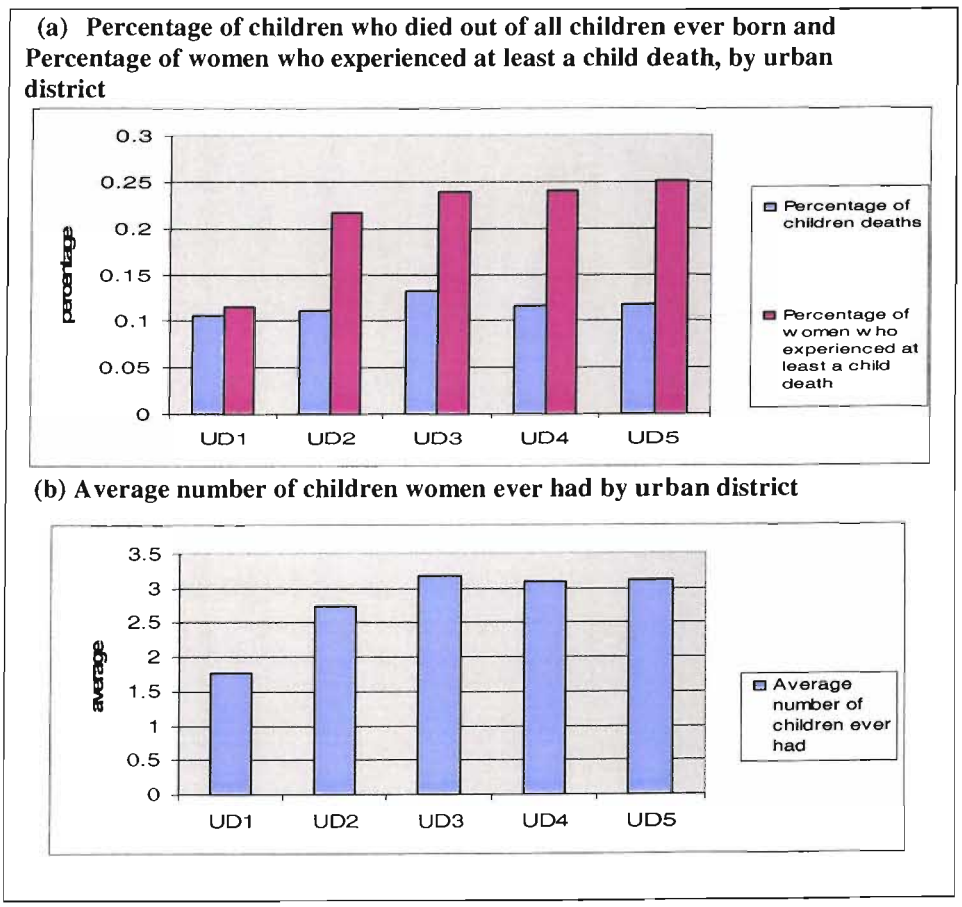
21.7% of the women in the sample had lost at least one child. Comparing the percentage of women who experienced a child death by age group, the data shows that the older women had a greater probability of having experienced child death, as demonstrated in Table 6.1. Furthermore, for the group of women born in Maputo City, the percentage who experienced child death (14.8%) is almost half of that of women who were born outside Maputo (28.6%). However, it is important to recall that women in the sample who were born outside Maputo tend to be older than women who were born in Maputo.

Table 6.1 - Percentage of women who had experienced at least one child death by age group

10 year women's age group	Percentage
20-29 years old	11.5 %
30-39 years old	26.4%
40-49 years old	45.9%
TOTAL	100.0%

More than one third of women who experienced child death, had two or more children who did not survive. Figure 6.1 shows the percentage of women who had experienced at least one child death for each urban district. Interestingly, these percentages seem to be closely linked with the average number children ever born. In Figure 6.1, this relation can be visualized when comparing the

Figure 6.1 – Comparison of the percentage of children who died out of all children ever born with the percentage of women who experienced at least a child death, and with the average of children ever born, by urban district



graph in a) and the graph in b). Furthermore, the correlation between these two variables (percentage of women who experienced at least one child death and the average number of children ever born, by urban district) is 0.991 and the Pearson test shows that it is significant at 0.01 level. This makes sense: the more children a woman has, the greater the probability that one of them dies.

Of the 2244 children born, 265 died, i.e. 11.8% of the children born. Although this figure does not correspond to the most used mortality rates, it may be an important rate when analysing mortality perceptions. Interestingly, this rate is not much different among the five urban districts, as shown in Figure 6.1.

6.2 Family building

6.2.1 Family building process

Slightly more than half of the ever married women (53.4%) discussed with the husband the number of children they sought to have. Age and especially education seem to have a strong influence on whether women spoke with their husbands about the desired family size. Indeed, if women ever married were less than 40 years old, the percentage who discussed with their husbands is 57% while if they aged 40 years or more, then the percentage is 40%. However, education seems to have a much stronger effect than age. As shown in Table 6.2, the percentage of women ever married who spoke with their husbands among the group who never studied is 21.4%, while the corresponding percentage for women who studied medium or higher degrees is almost four times as much.

Table 6.2 – Percentage of ever married women who discussed desired family size with her husbands, by attended education level

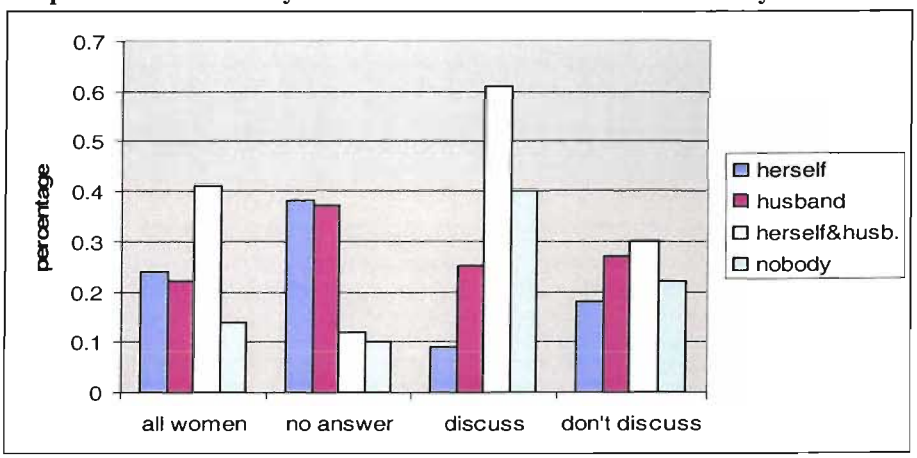
Level of Education Attended	Percentage
Did not attend school	21.4%
Primary school	45.3%
Secondary school	74.8%
Medium school or college	82.4%
All women	53.6%

Asked if they had previously thought about the number of children to have, the great majority (69%) said yes. The mean of the number of children they had thought to have is 3.53. For those who discussed about the number of children, half did so before marrying, one fourth when they got married, and the remainder later on.

According to women's responses, almost one fourth (23.8%) of them said that the number of children to have was their own decision, a similar percentage (21.8%) said it was the husband's

decision, while 40.8% said both decided. Furthermore, 13.5% said it was nobody's decision. Figure 6.2 shows the comparison of the different categories of answers to the question of who decides the number of children, by the answers to the question if she discusses with the husband the number of children to have.

Figure 6.2 – Percentage of women who declared who decides the number of children to have, comparing all women and women who gave different answers to the question whether they discussed with the husband about family size.



6.2.2 Desire for an additional child and the family planning

More than half (55.3%) want to have more children, but they were not asked how soon that would be. A small group (4.5%) is undecided, while (6.6%) declared that they can not have (more) children. Only 33.7% said that they do not want any more children.

Almost all women (87%) think that planning the number of children is a good thing, while a small group (8.8%) believes otherwise. A very small group (4.2%) has no opinion. A little more than half (53%) is doing something to avoid getting pregnant.

The association between the desire for an additional child and family planning is as follows:

- Within the group of women who declared to want more children, 52% is doing something to avoid pregnancy, suggesting that many women in Maputo want and implement childbearing spacing.

- Within the group of women who does not want additional children, 56% is doing something to avoid pregnancy. From this result it can be said that probably a considerable proportion of women do not have access to family planning services or that family pressures prevent them of using these services.

6.3 Ideal number of children

6.3.1 Women's ideal number of children

The question on the ideal number of children used here is exactly the same as used in the Demographic and Health Surveys:

> Question 401 - "(for women without children alive) How many children would you like to have during your lifetime? (for women with children alive) If you could go back in time, when you did not have any child and if you could choose the total number of children you would like to have throughout your life, how many would you like to have?"

Only two women did not answer this question. Table 6.3 presents a summary of the statistics for this question. The table indicates that the average ideal number of children is 3.43 children .

Table 6.3 – Statistics of the Ideal Number of Children

Mean:	3.43
Media:	3.00
Mode:	2
Standard deviation:	1.52
Minimum:	0
Maximum:	15

It is interesting to compare the ideal number of children with the number of children they had thought to have in the past, within the subgroup that had thought about it in the past (see section 6.2.1). Indeed, the average number of children they had thought to have is 3.53, while the average ideal number of children for this subgroup of women is 3.27. In addition, it is interesting to notice that the average ideal number of children for this subgroup of women is smaller than for the group as a whole, suggesting that there is a relationship between women quantifying their family desires and decrease in fertility. Equally interesting is that the correlation of these two variables is 0.63 and that 70% of the women gave the same number to the question on the ideal number of children and the number of children they had decided to have in the past. Furthermore, the percentage of

women for whom the ideal number of children decreases with time is 20%, while those whose ideal number of children increases is only 10%. These results suggest that there might be a transition in the fertility rate under way. This is confirmed by the fact that while the average ideal number of children in Maputo City was 4.00 in 1997 (MDHS), this survey, conducted six years later, found the considerably lower figure of 3.43.

6.3.2 The ideal number of children and the children' sex

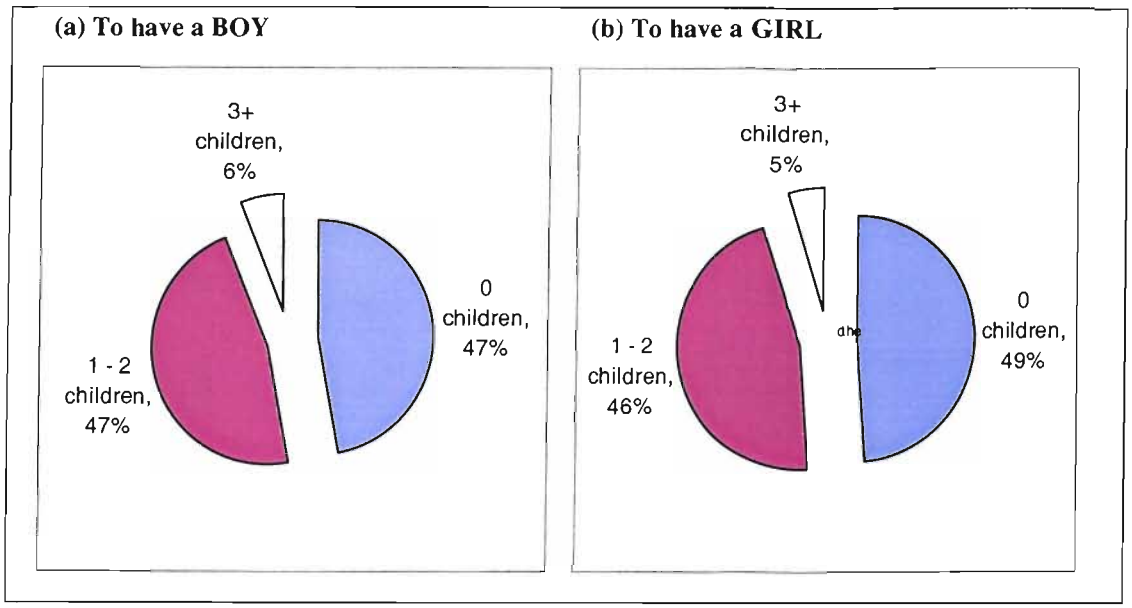
In order to explore what effects, if any, the sex of the children has in pursuing the ideal number of children, two other questions were asked:

> Question 402-a) - "Suppose you have ____daughters (your ideal number of children), no boys. Would you like to have more children? If yes, how many more?"
> Question 402-b) - "Suppose you have ____sons (your ideal number of children), no girls. Would you like to have more children? If yes, how many more?"

Figure 6.3 presents a pie chart of the answers to these two questions. Two conclusions stand out from this figure. First, almost half of the women do not think of having additional children, if they only have children of one sex. Second, their looking for a missing sex child is practically the same whether the missing child is a boy or a girl. However, it can be concluded that if women are to pursue their fertility desires, the achievement of a desired sex composition will probably inflate the original ideal number of children.

From the above answers and those relating to the ideal number of children, we can estimate the number of children expected in addition to the ideal number of children, when the ideal number of children is only one sex and women are searching for a child of the missing sex. In other words, if the implementation of the ideal number of children is certain, with the only exception of searching for a child of the missing sex, an estimate of the average additional children can be done, provided some assumptions exist. The main assumptions are: (i) the probability of a woman having either a boy or a girl is 0.5 in any stage of her reproductive history, (ii) the event of the birth of a boy or a girl are independent from each other and independent from the past childbearing sex results, (iii) no mortality occurs.

Figure 6.3 – Percentage of women who would like to have more children than the ideal number of children, if (a) only have girls (b) only have boys, until they have a child of the missing sex.



The extent of this excess depends on the probability of a woman having the same sex children when they have had one, two or more children. This probability tends to diminish with the increase in the number of children born. Table 6.4 presents these probabilities, taking into account the assumptions outlined above.

Table 6.4 Probabilities of all ideal number of children being all girls, all boys, and all the same sex

Number of children	Probability of all being girls	Probability of all being boys	Probability of all being the same sex
1	.5	.5	1
2	.25	.25	.5
3	.125	.125	.25
4	.0625	.0625	.125
5	.03125	.03125	.0625
6	.015625	.015625	.03125
7	.0078125	.0078125	.015625
8	.00390625	.00390625	.0078125
9	.001953125	.001953125	.00390625

Below is presented the calculation of the expected number of children exceeding the ideal number of children when searching for a missing sex child for some the cases:

Example 1
A woman has ideal number of children = 2 and wants to have one more child if she has only girls, trying to have a boy.
In this case, the expected additional number of children will be: 0.25

Example 2
A woman has ideal number of children N and wants to have more children in order to get the missing child: if all N children are girls, she is willing to have more children until having a boy, maximum three more children; if all N children are boys, she is willing to have more children until having a girl, maximum two more children.
Figure 6.4 shows a decision three representing all possible courses of action. For each outcome, the expected number of additional children should be calculated:

$$\textit{Expected Number of Additional Children} =$$
$$= P(\text{all } N{=}\text{girls}) + P(\text{all } N{+}1 = \text{girls}) + P(\text{all } N{+}2 = \text{girls}) +$$
$$+ P(\text{all } N{=}\text{boys}) + P(\text{all } N{+}1 = \text{boys})$$

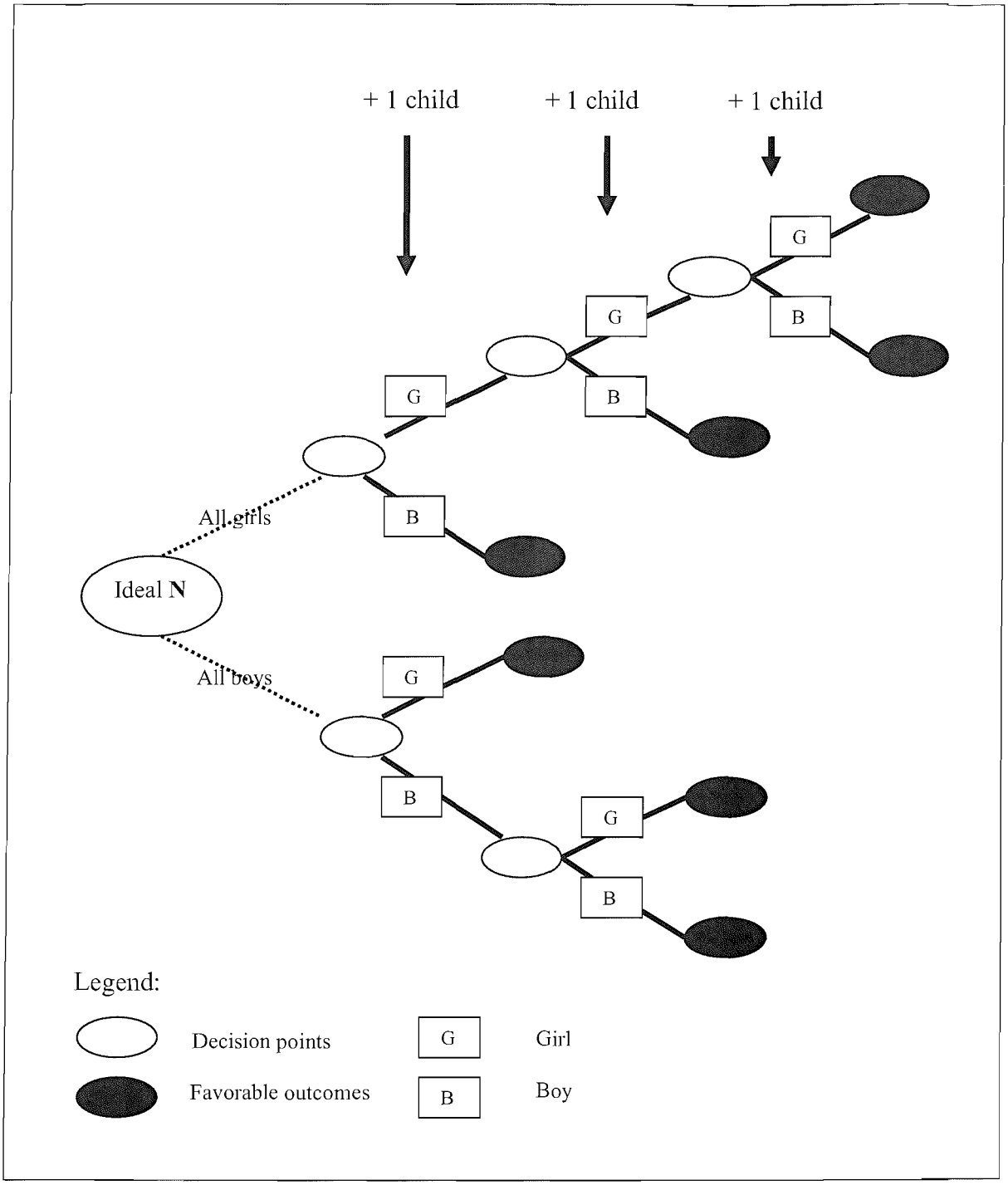
In this case, for example, if the ideal number of children is two, then the expected number of additional children will be 0.8125.

From the answers to the above two questions, all possible cases can be identified (using bivariate analysis) and the expected number of additional children needed can be calculated. The results of these calculations are presented in Appendix D. Furthermore, since the bivariate analysis also evaluates the number of women in each case, the average additional children for all women can be easily calculated. Therefore, the average additional expected number of children when searching for a missing sex for the 418 women who said they would have more children is 0.284. The equivalent figure for all women in the sample is 0.15.

This exercise can be repeated to consider the sex rate (the actual or at birth) different than 1 and thus the probabilities of a woman giving birth to a girl or to a boy will be different.

So, in Maputo City the search for a missing sex would inflate the ideal number of children in 0.15 children. If the desired family size is to be implemented it could be expected that the desire to have at least a child of a desired sex may significantly increase fertility outcomes, but this increase would not be of a considerable magnitude.

Figure 6.4 – Decision tree representing all possible courses of action outcomes in Example 2



6.3.3 The ideal number of children and children's mortality

After having answered the question about the ideal number of children and the other aforementioned related questions, the following question was asked:

> Question 403-a)-"When you think that the ideal number of children for you is ___ are you thinking that some may not survive? In other words, does the possibility that some of the children may not survive influence your choice on the ideal number of children?"

Most women (66%) firmly declared that they were thinking only of survivors. However, a significant proportion (34%) said they were taking into account that some might die. The average ideal number of children for women who answered that they were thinking only on surviving children is 3.26, while the equivalent figure for women who were thinking in the number of births was 3.78.

Interestingly, socio-economic and demographic characteristics seem to have little influence on women's ideal number of children responses in terms of surviving children or in terms of children born (see Table 6.5). When performing a bivariate analysis, the difference in the percentages of women who answered either way were mostly similar for the different characteristics of several variables.

Furthermore, even taking into account the cases where the differences are more significant, it can still be concluded that the majority of women thinks of the ideal number of children as surviving children. However, a significant proportion, not corresponding to any particular socio–economic or demographic group, thinks this number as taking into account that some children might die. If this is the case, the question of obtaining the ideal number of children is somewhat imprecise.

Table 6.5 – Percentage of women who answered the ideal number of children in terms of births, minimum, maximum values and level of significance for selected socio-economic and demographic characteristics.

	Minimum percentage	Maximum percentage	Level of significance *
Age	33%	37%	.717
Marital Status	31%	46%	.205
Attended School Level	28%	43%	.257
Whether was born in Maputo City	33%	35%	.483
Mother tongue	34%	35%	.967
Professional activity	33%	35%	.841
Religion	32%	38%	.340
Listens radio or watches TV	30%	36%	.638
House materials	33%	42%	.278
Has electricity	33%	36%	.421
Number of children alive	31%	37%	.581
At least one child died	33%	38%	.198
Urban District	28%	41%	.043

* Pearson Chi-Square (2-sided)

Two additional questions were asked in order to obtain a more precise figure:

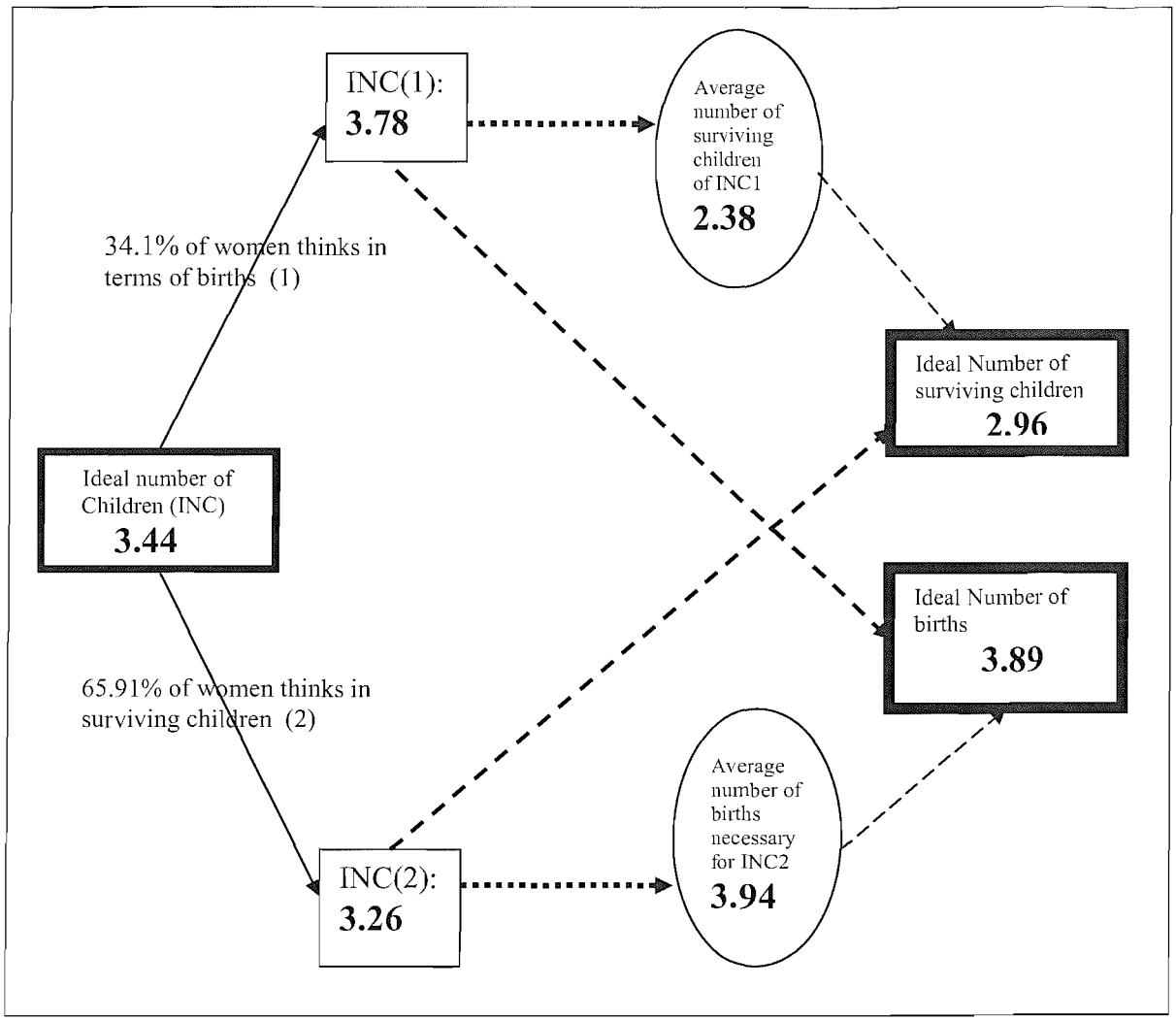
> Question 403-b) -" (If she is thinking in terms of survivors) How many more children do you think you need to have in order to obtain your ideal number of children?"
> Question 403-c) – " (If she is considering the possibility that some will die) How many of these children do you think will be alive when you grow old?"

The answers to these two questions allow for the estimating of (i) the ideal number of children, considering only the surviving children, and (ii) the ideal number of children considering the number of births women would like to have. For women who have thought about the ideal number of children in terms of births only (34.1%), the average number of surviving children can be calculated (2.38) from the answers to question (b). A weighted average of the ideal number of children calculated for the 65.9% of the women who answered the question of the ideal number of children in terms of survivors only (3.26), and the number of surviving children when the ideal was answered in terms of number of births (2.38), will give an estimated value for the ideal number of surviving children for all women: 2.96 (see Figure 6.5).

Similarly, for women who thought of the ideal number of children in terms of surviving children (65.9%), the average number of births necessary to obtain the ideal number of children declared can be calculated (3.94) from the answers to question (a). A weighted average of the ideal number of children calculated for the 34.1% of the women who answered the question of the ideal number of children in terms of births (3.78), and the average number of births necessary to achieve the ideal number of survivors (3.94), results in an estimated value for the ideal number of births for all women: 3.89 (see Figure 6.5).

Given the above calculations, one can infer that women pursue an insurance strategy of considerable magnitude when thinking about the number of children they want to have. Indeed, the difference between the two estimates is almost one child on average.

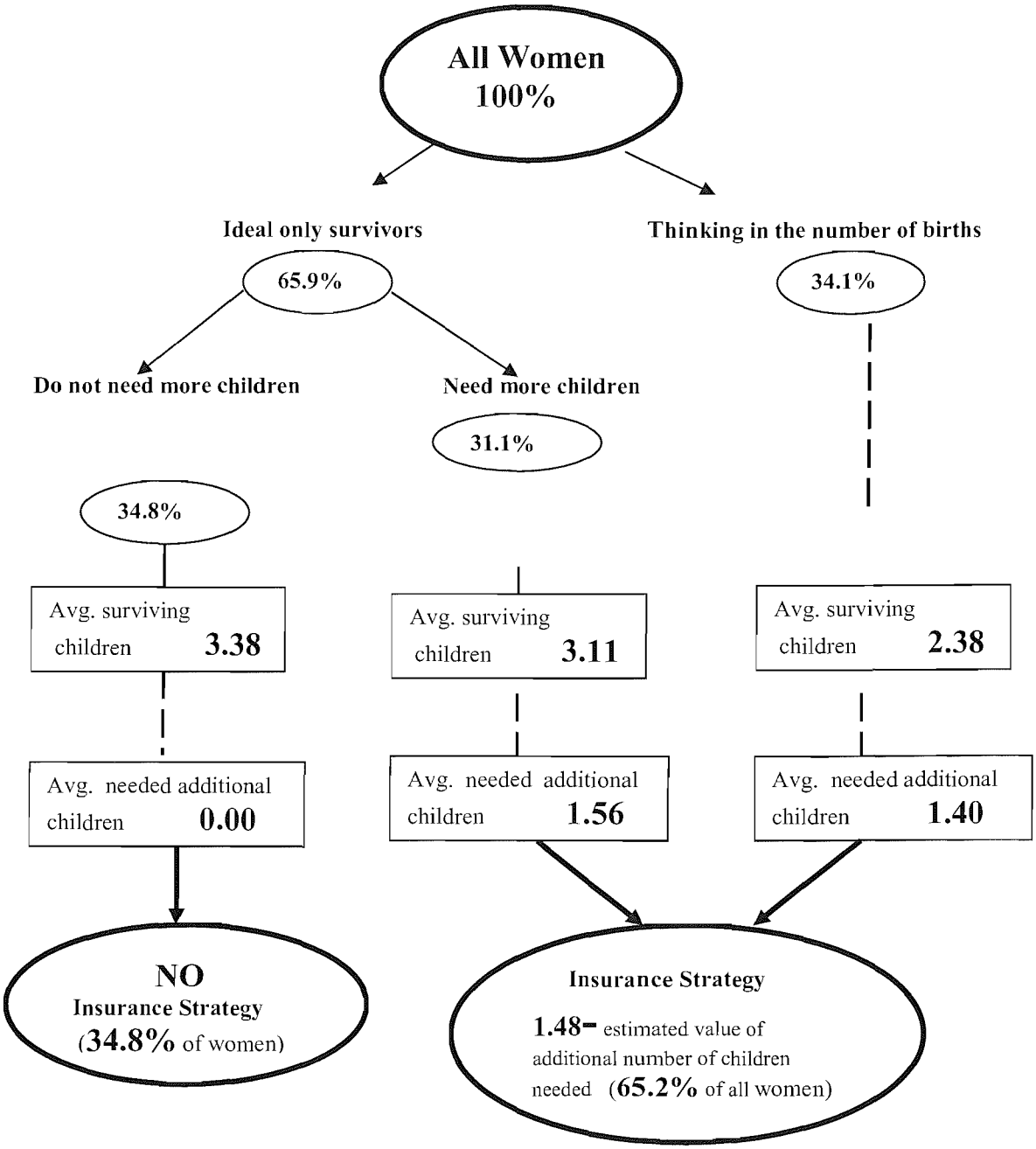
Figure 6.5 - Diagram showing the estimated values for the ideal number of surviving children and the ideal number of births



Not all women mention child mortality when talking about the ideal number of children. In fact, of the 65.9% of women who answered the ideal number in terms of survivors only, a little more than half (34.8% of all women) think they do not need more children to achieve their desired number of surviving children. This subgroup of women has an average ideal number of children of 3.38, and they do not appear to follow an insurance (hoarding) strategy (see Figure 6.6). The other subgroup of women, who thinks only in terms of surviving children when contemplating the ideal number of children (31.1% of all women), has an average ideal number of children of 3.11. This implies that this latter subgroup needs an additional 1.56 children, on average, in order to guarantee that they achieve their ideal (see Figure 6.6). Furthermore, the average additional children needed to achieve the average number of surviving children for women who think of the ideal number of children in terms of births (34.1% of all women) is 1.40 (3.78 average ideal number of children

minus 2.38, the average number of surviving children) as seen above. Combining these two figures for the additional number of children needed as a weighted average, a value of 1.48 additional children needed is obtained for 65.2% of the women (see Figure 6.6).

Figure 6.6– Diagram of the estimate of additional children needed to have, when women thinks of child mortality



So, if women's fertility desires are translated into actual fertility, a large proportion of women, about 65%, would follow an insurance strategy as response to child mortality. The magnitude of this insurance strategy, among the women who would pursue it is of about 1.48 additional children.

Because a significant proportion of women would not follow that strategy, the overall insurance strategy effect on fertility in Maputo City would be of 0.93 additional children. It is important to recall here that the infant mortality rate in Maputo City is reasonably low (41 deaths per thousand live births) when compared with the country's rate (147 per thousand) (see Section 4.4.2).

6.4 Mortality perceptions

Besides the questions relating the ideal number of children with mortality, as described in the previous section, the research team asked questions to ascertain women's perceptions on child mortality levels and survivorship into adulthood.

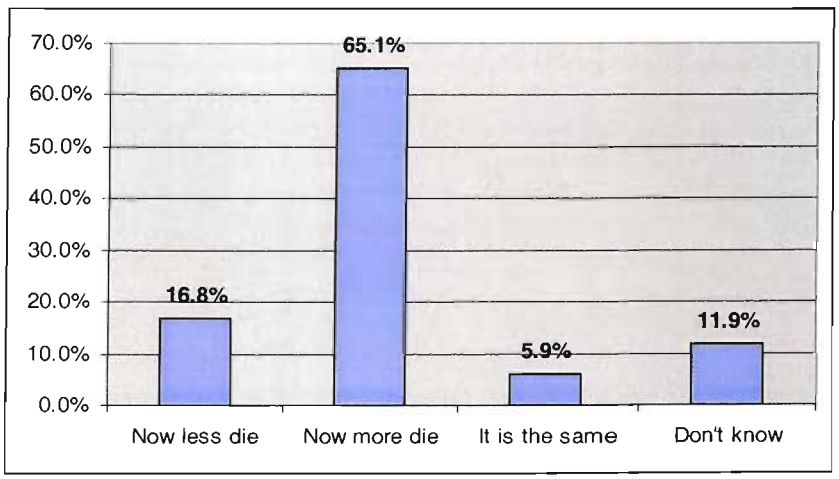
6.4.1 Perceptions on child mortality

The team asked the following general question on mortality levels:

> **Question 503 -** "Do you think more or less infants and small children die now compared to 20 – 25 years ago?

In Figure 6.7, a chart shows the distribution among the four possible answers to this question. Only three women failed to answer it.

Figure 6.7 - Percentages of women who thinks that less children die now, more children die now, it is the same, or do not know



Around two thirds of women think that more children die now than 20-25 years ago. According to the MDHS – 1997, there has been a decrease in the child mortality levels in the 20 years previous

to the date of the MDHS field work, although it had not been a uniform decrease. There is no reliable historical data on mortality rates for Maputo City, but because Maputo City did not suffer directly the effects of war, it seems reasonable to consider that child mortality rates have not increased for the past 20-25 years old. Hence, it seems that women's perception of child mortality levels are higher than the actual mortality rates. This conclusion is corroborated with the other question about child deaths, which is their estimate of infant mortality rate. This latter question was:

> **Question 505** 'Imagine that 10 babies are born in this community. How many do you expect will survive the first year?'

From the answers, the calculated average rate of first year survivorship would be 8.6 out of 10 births. This means that around 140 children out of a 1,000 births would die, which is a much higher rate than 42 children out of a 1,000, the estimated infant mortality rate for Maputo City by MDHS-1997. Interestingly, the average number of survivors for the group of women who think that less children die now (8.70) is higher than the corresponding average for women who think that more children die now (8.58).

6.4.2 Survivorship in reaching the minimum number of children needed when women grow old

Survivorship into adulthood is one of the most important variables to take into account when women consider child mortality. Regarding this issue, the following questions were asked:

> **Question 501a** - 'How many children do you think it is necessary to have in order to support you when you become old?'
> **Question 501b** - 'How many children do you think you must have so that when you are old you have the number of surviving children you mentioned in the last question.'
> **Question 502a** - Imagine that you will be reasonably happy if at least one of your children survive you. How many children do you think you need to have to be sure you get at least one to support you at old age?

The average number of minimum survivors mentioned in Question 501a is 2.76. Interestingly, this number is quite close to the estimated average number of ideal surviving children which is 2.95 (see Sub-section 6.3.3). Furthermore, it was calculated that for 73.8% of the women in the sample, the estimates of the ideal number of surviving children only differ at most by one when comparing to the number of children women deem it required to have when they grow old. Similarly, the average number of children that must be born in order to achieve the desired number of children

declared in Question 501a, given in the answer to Question 501b, is 3.94. This figure is quite close to the ideal number of births estimated in section 6.3.3, which is 3.89. From the answers to Questions 501a and 501b, the average rate of survivorship into adulthood can be calculated: 0.7187.

The average answer to Question 502a, the average number of children needed to guarantee at least one child remaining alive when women grow old, is 2.60. Most women (56.1%) say they need only one or two children to guarantee the survivorship of at least one child into adulthood. However, the remainder need more. Translating this figure into rates of survivorship, results in an average rate of 0.456, a much lower rate than that obtained from Questions 501a and 501b. The difference in the results may partially be explained by the fact that fertility is a discrete variable. This is particularly pertinent to question 2. Indeed, once a person thinks that a child may die, even while attributing a low probability to this event, he/she must think of two children if they want a high degree of certainty that there will be a survivor. In this case, the corresponding estimated rate of survivorship will fall immediately to 50%. On other hand, this also means that the aversion to the risk of becoming childless is an important issue.

These questions are the most important ones when thinking about women's mortality perceptions. In fact, these are the kind of questions that may instigate psychological issues that trouble women in day-to-day life regarding fertility and child mortality.

6.4.3 Estimates of survivorship into adulthood

Additional questions on rates of survivorship into adulthood were asked, as follows:

> **Question 504a** - If someone has five births, how many should she expect that will survive the mother?
> **Question 504b** - If someone has ten births, how many should she expect that will survive the mother?

The reasons for using two similar questions were to: a) ascertain women's quality of answers, and b) find out the extent to which the small numbers used affected the estimated rate of survivorship.

The average number of survivors is 3.55 out of 5 births, and 7.10 out of 10 births. This results in a survivorship rate equal to 71.0%. And, interestingly, these rates are very close to the rate of survivorship to obtain the minimum number of survivors presented in the previous section, which is 71.9%. However, it is also important to mention that the response rates for questions 3 and 4 were much lower than that for the questions in the previous last, as shown in Table 6.6. The reason why the response rates were lower in the questions of this section is that by the time women were asked these questions, they were already tired of answering questions about children's survivorship.

6.4.4 Comparison of the different rates of survivorship

The different rates of survivorship calculated in the previous sections can be compared in Table 6.6. It is interesting to note that the rates of survivorship into adulthood are quite close to each other, except the rate of survivorship to guarantee at least one survivor, which has a much lower rate of survivorship. In addition, the rate of survivorship one year after birth is expectedly higher.

Table 6.6 Averages of the women's estimates of different rates of survivorship

	Averages	Number of cases (N)
Rate of survivorship for minimum survivors	**.72**	**760**
Rate of survivorship for one survivor	**.46**	**744**
Rate of survivorship into adulthood out of 5 births	**.71**	**607**
Rate of survivorship into adulthood out of 10 births	**.71**	**610**
Rate of first year survivorship out of 10 births	**.86**	**614**
Rate of survivorship ideal survivors/ideal births	**.76**	**782**

There is a close relationship between all women estimates. Table 6.7 presents the Pearson correlations between the variables. It is important to notice, however, that small differences in the estimates, such as one child difference, can produce large differences in the rates of survivorship as the values are themselves low (2,3 4,...).

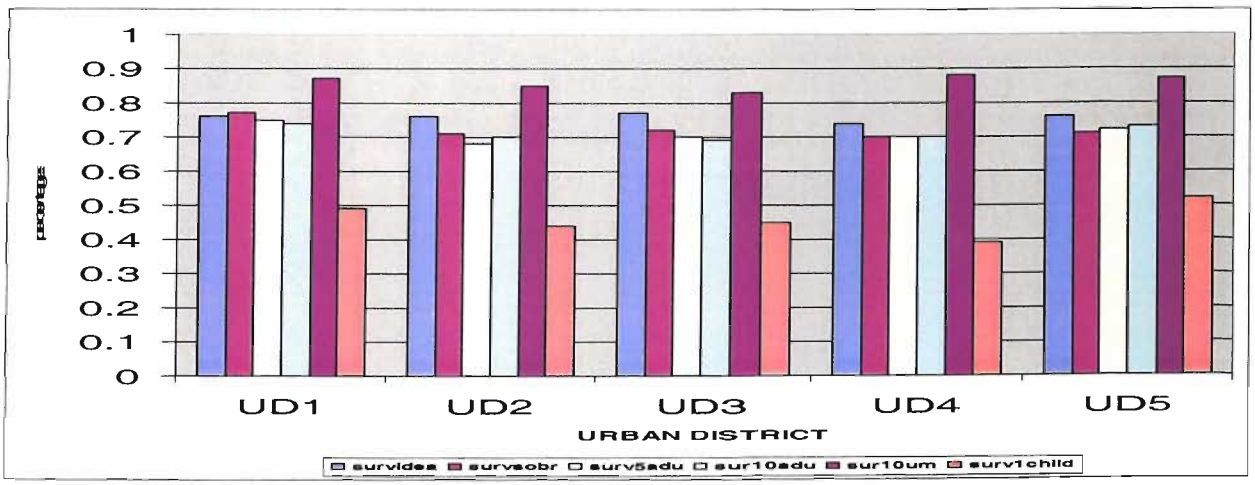
Table 6.7 - Pearson correlations of the women's estimates of different rates of survivorship

	Rate of survivorship for minimum survivors	Rate of survivorship for one survivor	Rate of survivorship into adulthood out of 5 births	Rate of survivorship into adulthood out of 10 births	Rate of first year survivorship out of 10 births	Rate of survivorship ideal survivors/ ideal births
Rate of survivorship for minimum survivors	1.000	**.238** **	.078*	.093*	.029	**.233****
N	760	733	586	589	590	756
Rate of survivorship for one survivor		1.000	**.101****	**.167****	-.008	.035
N		744	577	580	580	739
Rate of survivorship into adulthood out of 5 births			1.000	**.495****	.192	.026
N			607	590	555	600
Rate of survivorship into adulthood out of 10 births				1.000	**.196****	.004
N				610	568	603
Rate of first year survivorship out of 10 births					1.000	.053
N					614	607
Rate of survivorship ideal survivors/ideal births						1.000
N						782

** significant at the 0.01 level (2-tailed) ; * significant at the 0.05 level (2-tailed)

In addition, when taking averages by subgroups, a consistency among answers is observed. For example, Figure 6.8 shows a graph of the averages of the different rates of survivorship by urban district, which demonstrates that the rates into adulthood have similar patterns.

Figure 6.8 - Graph of the different rates of survivorship by urban district

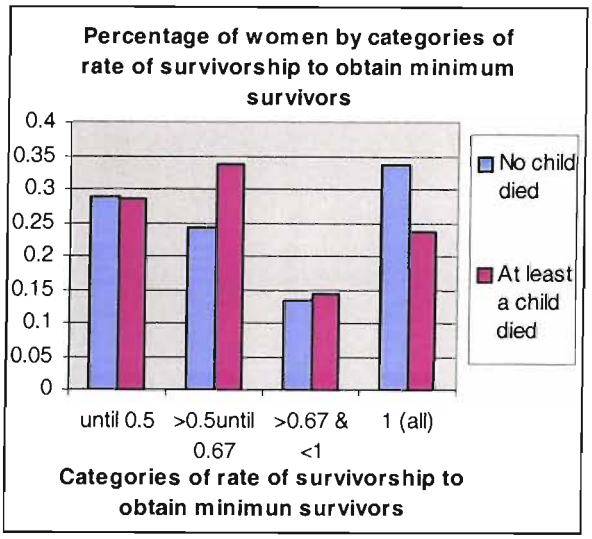


6.4.5 Association between mortality perceptions estimates and experience of child death

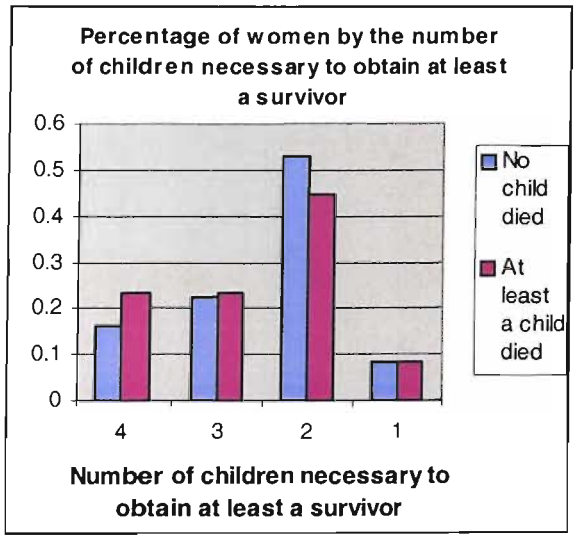
Interestingly, the women's estimation of different rates of survivorship do not seem to be very much related with women's experience of child death. Figure 6.9 shows four graphs comparing the different rates of survivorship with women's experience of child death. As expected, there is a tendency for women having a lower rate of survivorship estimate if at least one of their children has died. However, the differences are not very sharp and sometimes they are even in an opposite direction.

Figure 6.9 – Graphs of the percentage of women by categories of rates of survivorship, for women who did not have experience of mortality and for women who had experience of mortality.

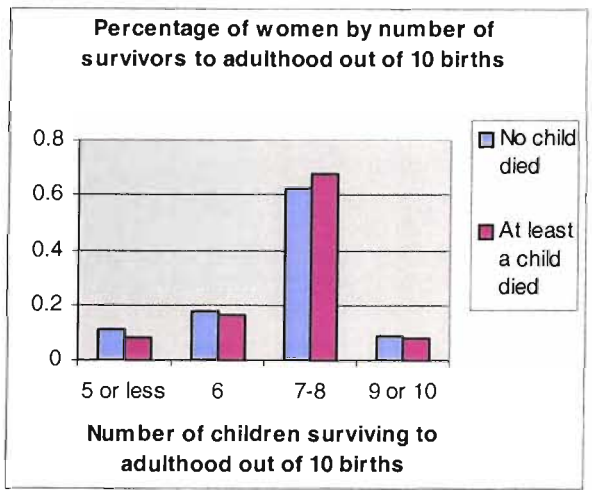
Graph1



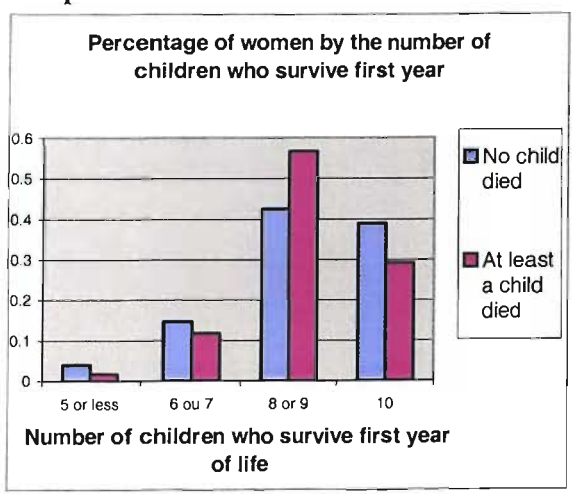
Graph 2



Graph 3



Graph 4



6.4.6 Another response to mortality

In order to capture women's intentions of response when facing the experience of mortality, the following question was posed:

> **Question 506** "(If at least a child had already died) When your child (children) died, did you think of having another one to compensate for the lost child? If yes, have you done anything? (If no child had already died) What do you think, if you had the misfortune of losing a child, would you do anything to compensate for this child, or would you let your children be born naturally?"

Interestingly, most women (69.1%) declared that they did not (they did not intend to) substitute a death child, while 20.8% said that either they had substituted the death child intentionally or they intended to substitute in case one of their children dies. The remainder 10.1% did not answer the question. If we only consider the women who have answered the question, 76.9% declared 'no' to this question and 23.1% declared 'yes.'

Eventually, the answering 'yes' or 'no' could be dependent on the experience of child death but this does not seem to be the case. In fact, among women who answered the question, the fact that a child died only had been substituted in 22.4% of the cases, while 25.5% of the women who did not experience a child death declared they would substitute. Interestingly, however, within the group of women who did not answer the question, 91.3% of women did not experience a child death. In any case, it can be concluded that the great majority of women did not or do not intend to substitute a child death.

In addition, although some differences in the answers could be observed in cross-tabulations with the various socio-economic and demographic characteristics, the maximum percentage who intended to substitute a child that died within a subgroup is 29.3%, which is the subgroup of women who have a precarious materials house.

The results just mentioned are in accordance with literature elsewhere: that the substitution strategy is less than one, and that the rate of substitution using different models varies between 0.2 and 0.5 (see Sub-section 2.3.3).

6.5 AIDS

The AIDS section in the questionnaire begins with the general question on whether women had already heard about AIDS. Only 6 women, i.e., 0.8%, answered negatively. In addition, three questions where made in order to know if they had any contact with someone who has or died of AIDS. Below these questions are presented:

> **Question 702** - Do you have any relative, friend, or colleague infected with AIDS?
> **Question 703-a)** - Do you have any relative, friend, or colleague who have or died with AIDS?
> **Question 703-b)**- Do you have any relative, friend, or colleague who have or died with AIDS?

Taken altogether, most women (62%) do not know anyone that has AIDS or knew someone who died of AIDS. The remainder, either know or knew someone, or has doubts about someone. However, women's awareness of AIDS is somewhat incomplete and imprecise as it is shown in their answers to the questions below.

> **Question 704** - A person who looks healthy can be infected with AIDS?
> **Question 704** - Is AIDS a mortal illness?
> **Question 706** - If you have (unprotected) sexual relation with someone who has AIDS, even if he doesn't appear ill, you will be infected?

Taking each answer separately, a large proportion of women seem to know about AIDS. Indeed, 84% of women knows that a person looking healthy can be infected, 58% thinks that AIDS is always mortal and 68% say that if she has unprotected sexual relationship with an infected man she will always get also infected. However, all answers taken together, few women, only 41% answered in this way to the three questions.

In addition a question on their assessment of their own possibilities to get infected was done as follows:

> **Question 707** - Do you think that the possibility that you are infected or will be infected with AIDS are high, moderate or none (or already is)?

Only 38% of women think that their possibilities of being infected are high. The remainder are evenly distributed by the other categories. Indeed, 42% of the women think that their possibilities of getting infected are minimal or they don't know.

Finally, a last question was done aiming to capture women's intentions of fertility behaviour changing due to AIDS awareness. The majority of the women, 58% do not intend to change their childbearing, while the remainder intend. The great majority of the women who intend to change her behaviour (35% of the total women) think of having less children as a response to AIDS epidemic while a small proportion, 4.8%, wants to have more.

6.6 Summary of the main findings

The objectives of the quantitative survey presented in Chapter I – Introduction state that this survey aims to quantify women's estimates on mortality perceptions and measure their effects on fertility intentions. In addition, it mentions the need to evaluate the magnitude of the 'insurance effect'. In the sections of the present chapter, some answers to these objectives are given. These conclusions are representative of women in Maputo City.

Indeed, it can be concluded that:

- If women are to implement their stated intentions on the ideal number of children, a considerable insurance strategy would occur. Indeed, this strategy might increase fertility by one third to guarantee women's desired family size. The intention to have additional children due to mortality, if implemented, would be translated in about a child, whereas the additional children that would occur if they were to implement their intentions of having additional children in case they look for missing sex child is only about 0.15 children.
- The question on the ideal number of children as stated in the Demographic and Health Surveys is not clear whether it refers to the number of surviving children or the number of births and women answer either way. The way women answer to the question on the ideal number of children, is not strongly associated with any particular women's socio-economic or demographic characteristic. In addition, when isolating the ideal number of

surviving children from women's stated ideal number of children, it closely resembles the minimum number of surviving children they would like to have when they grow old.

- Women's perceptions of child mortality changes are opposite than they occur in reality. While there have been a slow and uneven decrease on child mortality in the past 25 years, the majority of the women thinks that now more children die than a generation ago. In addition, women's estimated rates of survivorship are in general lower than these rates are in reality. Interestingly, however, women's various estimates on mortality and survivorship rates, are in great measure consistent to each other.
- All rates of survivorship are quite consistent to each other. Interestingly, however, women's experience with child death does not appear to have a large impact in the level of their survivorship estimates.

In Chapter 7, a multivariate analysis of the quantitative survey held in Maputo City is presented. The multivariate analysis complements the analysis made in the present chapter.

Chapter 7

Multivariate analysis of the quantitative survey held in Maputo City

Introduction

This Chapter presents a multivariate analysis using the data of the survey described in Chapters 3 and 6. In order to measure the impact of mortality perceptions on fertility intentions, two main outcome variables were considered: the first is the desire to have an additional child and the second is the declared intention to change fertility behaviour due to AIDS. The explanatory variables are the various mortality perceptions, socio-economic, demographic and AIDS awareness variables earlier described. In addition, this Chapter also presents a multivariate analysis where the outcome variable is the variable of mortality perceptions that have most significant impact on fertility intentions, aiming to find out the socio-economic and demographic characteristics that influence women's perceptions on mortality. Multiple regression analysis makes it possible to isolate the contribution of the mortality perceptions variables to the outcome variables on fertility intentions, while controlling for socio-economic and demographic variables. The statistical model used here is the logistic regression model, described in Chapter 3 – Methodology. This Chapter complements the univariate and bivariate analysis of the survey data made in Chapter 6.

7.1 Summary of the models studied

The models presented in this chapter have, as mentioned above, the following main outcome variables:

- the desire to have an additional child;
- the declared intention of fertility behaviour changes due to AIDS.

In addition, the mortality perceptions variable that has most significant impact in fertility intentions is also analyzed.

For each of the outcome variables, several models were tested, using explanatory variables. The explanatory variables were grouped as follows:

- mortality perceptions variables;
- socioeconomic and demographic variables;
- AIDS awareness variables.

Calculations were done using the statistical package SPSS-10

7.2 Explanatory variables

7.2.1 Mortality perceptions variables

The mortality perceptions variables are summarized in Table 7.1. This table also shows the type of each variable and its distribution.

RATE OF SURVIVORSHIP TO OBTAIN THE MINIMUM NUMBER OF SURVIVORS

This variable was constructed as the proportion between the minimum number of surviving children that women needed to have when they grew old and the minimum number of children necessary to achieve this number. This continuous variable was then transformed in a categorical variable, with three categories: low perception of survivorship rate (rate of survivorship inferior to .67), medium perception of survivorship rate (rate of survivorship equal or greater than .67and less than 1), high perception of survivorship rate (rate of survivorship equal to one). These categories were chosen taking into account the meaning of this rate and the percentage of women included in each category.

NUMBER OF CHILDREN NECESSARY TO OBTAIN AT LEAST ONE SURVIVOR INTO ADULTHOOD

This is a categorical variable with four categories: one child, two children, three children and four or more children.

RATE OF SURVIVORSHIP TO OBTAIN AT LEAST ONE SURVIVOR

The rate of survivorship was calculated based on women's responses to the question on the number of children necessary to have to guarantee at least a survivor into adulthood. This continuous variable was then transformed into a dichotomous variable, and the possible values were low perception of survivorship rate (less than .5) and high perception of survivorship rate (equal to .5 or higher). The possible values for this variable represented the possibility that a woman thought that one or two children would be enough to guarantee at least a survivor (high survivorship rate) or that more than two children would be necessary to guarantee at least a survivor into adulthood. It was considered that if a woman thinks that one child can die, this does not mean that she greatly fears her children deaths, and thus should be included in the group of high survivorship rate. The definition of this dichotomous variable also took into account the distribution of the continuous variable.

RATE OF SURVIVORSHIP INTO ADULTHOOD OUT OF 5 BIRTHS

Based on the continuous variable rate of survivorship into adulthood out of 5 births a new 3-category variable was created. If a woman fears that more than one child would die, she has a low level of survivorship rate perception. If she thought that one child would die, than she was considered to have a medium level perception rate. Finally, a women would be included in the high perception rate if she thought that no child would die. The construction of this variable also took into account the distribution of the continuous variable.

RATE OF SURVIVORSHIP INTO ADULTHOOD OUT OF 10 BIRTHS

Similarly to the previous variable, the following categories were created for the continuous rate of survivorship into adulthood out of 10 births: low perception rate - less than .6, medium perception rate – between .6 and .9, and high perception rate – more than .9.

RATE OF FIRST YEAR OF LIFE SURVIVORSHIP OUT OF 10 BIRTHS

This variable was considered only as continuous.

RATE OF SURVIVORSHIP TO OBTAIN IDEAL NUMBER OF SURVIVING CHILDREN

This continuous variable was constructed as the ratio between the ideal number of surviving children and the ideal number of births as presented in Paragraph 6.3.3.

NOW MORE CHILDREN DIE THAN 20-25 YEARS AGO

This is a categorical variable, with the following categories: now less children die, now more children die, and it is the same or does not know.

Table 7.1 - Distribution of Explanatory Variables – mortality perceptions variables

Explanatory Variables		N	%
Rate of survivorship to obtain the minimum number of survivors	1 – less than .67	266	35.0
	2 – more or equal .67 and less than 1	254	33.4
	3 – equal to 1	240	31.6
Number of children necessary to obtain at least one survivor	1 – one child	55	8.0
	2 – two children	349	50.7
	3 – three children	160	23.2
	4 – four or more children	125	18.1
Rate of survivorship to obtain at least one survivor	1 – less than .50	299	40.2
	2 – more or equal to .5	445	59.8
Rate of survivorship to obtain at least one survivor	continuous		
Rate of survivorship into adulthood out of 5 births	1 – less than .8	316	52.1
	2 – more or equal .8and less than 1	202	33.3
	3 – equal one	89	24.6
Rate of survivorship into adulthood out of 10 births	1 – less than .6	170	27.9
	2 – more or equal .6 and less .9	287	67.5
	3 – equal .9 or more	53	4.6
Rate of first of year of life survivorship out of 10 births	continuous		
Rate of survivorship to obtain ideal number of surviving children	continuous		
Now more children die than 20-25 years ago	1 – now less children die	133	16.8
	2 – now more children die	516	61.1
	3 – it is the same or don't know	141	17.8

7.2.2 Socio-economic and demographic variables

The socio-economic and demographic variables are summarized in Table 7.2. This table also shows the type of each variable and its distribution.

AGE

A 10-year group variable was created.

NUMBER OF CHILDREN ALIVE

The number of children alive was grouped into four categories as follows: 0 children, 1 to 2 children, 3 to 4 children and 5 children or more.

AT LEAST ONE CHILD DIED

This variable was constructed as a dichotomous variable, whether a child have died or not.

WHO DECIDES THE NUMBER OF CHILDREN TO HAVE

This variable has four categories, 'you,' 'your husband,' 'you and your husband' and 'others.' In addition, these categories were merged into two new categories, forming a dichotomous variable: one, whether the woman has a voice on the decision concerning the number of children to have and the other, for the case she has no voice.

HIGHEST LEVEL OF SCHOOL ATTENDED

The four categories in this variable are as follows: no school attended, attended primary school level, attended secondary school level, and attended medium or higher level school.

MOTHER TONGUE

Categorical variable, with three categories: Xitsonga & similar, Portuguese and other.

MARITAL STATUS

This variable is a dichotomous variable, it was only considered whether the woman is married or living with a partner or none of these.

BORN IN MAPUTO

A dichotomous variable, it was considered whether a woman was born in Maputo City or not.

RELIGION

A three category variable was created and the categories are as follows: catholic, protestant, and other or no religion.

OCCUPATION

Categorical variable with three categories: vendor, do not work and other. The number of women in each other profession was very low to be considered isolated.

LISTEN TO RADIO OR WATCH TV AND READS NEWSPAPER

These two variables have three categories each. The categories are whether women have contact with the media on a daily basis, sometimes or never.

HOUSE CONSTRUCTION

A dichotomous variable was created on whether the house was build with definitive materials (cement) or not (cane and grass).

PLACE OF RESIDENCE – URBAN DISTRICT (UB)

The Urban Districts were merged, UB1 and UB2, UB2 and UB3 , and the UB4 remained individual.

Table 7.2 – Distribution of Explanatory Variables – socio-economic and demographic variables

Explanatory Variables		N	%
Age	1 – 20 to 29 years old	**427**	53.8
	2 – 30 to 39 years old	**231**	29.1
	3 – 40 to 49 years old	**135**	17.0
Number of children alive	1 – none	**146**	18.4
	2 – 1 to 2 children are alive	**308**	38.8
	3 – 3 to 4 children are alive	**214**	27.0
	4 – 5 or more children are alive	**125**	15.8
Number of children who died	continuous		
At least one child died	1 – none	**621**	78.3
	2 – at least one	**172**	21.7
Who decides the number of children to have	1 – you	**165**	23.8
	2 – your husband	**151**	21.8
	3 – you and you husband	**283**	40.8
	4 – others	**95**	13.7
Who decides the number of children to have, dichotomous	1 – you or you & your husband	**448**	64.5
	2 – your husband or others	**146**	35.5
Highest level of school attended	1 – no school	**55**	6.9
	2 – primary school	**426**	53.7
	3 – secondary school	**210**	26.5
	4 – medium or high level	**102**	12.9
Mother tongue	1 – Xitsonga & similar	**434**	54.7
	2 – Portuguese	**251**	31.7
	3 – Other	**118**	13.7
Marital status	1 – single/widow/divorced	**510**	64.3
	2 - married	**283**	35.7
Born in Maputo	1 – yes	**398**	50.2
	2 – no	**395**	49.8
Religion	1 – catholic	**180**	22.7
	2 – protestant	**456**	57.5
	3 – other or no religion	**157**	19.8
Occupation	1 - don't work	**424**	53.6
	2 – vendor	**213**	26.9
	3 – other	**154**	19.5
Listen to radio or watch TV	1 – everyday	**432**	54.5
	2 – sometimes	**314**	39.6
	3 – never	**44**	5.5

(continue....)

(...continuation) Table 7.2 - Distribution of Explanatory Variables

Reads newspaper	1 – everyday	**57**	7.2
	2 – sometimes	**367**	46.4
	3 – never	**367**	46.4
House construction	1 – definitive materials	**705**	89.1
	2 – precarious	**86**	10.9
Place of residence – urban district (UB)	1 – UB1 & 5	**310**	39.1
	2 – UB2 & 3	**296**	37.3
	3 – UB4	**187**	23.6

7.2.3 AIDS awareness variables

The AIDS awareness variables are essentially the answers women gave to the different questions of the survey questionnaire. In some cases two or more possible responses were merged into a single category, mostly because of the low number of women that chose those alternatives (see Table 7.3).

DO YOU HAVE ANY RELATIVE, FRIEND, OR COLLEAGUE WHO HAS OR DIED FROM AIDS?

This is a dichotomous variable, where the alternative is whether the woman knew someone or has doubts about someone who died of AIDS or not.

CAN A PERSON WHO LOOKS HEALTHY BE INFECTED WITH AIDS?

This is also a dichotomous variable, where the categories are: yes, a person who looks healthy can be infected with AIDS, and no or do not know.

IS AIDS A MORTAL ILLNESS?

The possible values of this categorical variable are: never or sometimes, always and do not know.

IF YOU HAVE A SEXUAL RELATION WITH SOMEONE WHO HAS AIDS, EVEN IF HE DOESN'T APPEAR ILL, YOU WILL BE INFECTED?

The possible values of this categorical variable are: never or sometimes, always and do not know.

DO YOU THINK THAT THE POSSIBILITY THAT YOU ARE INFECTED OR WILL BE INFECTED WITH AIDS ARE HIGH, MODERATE OR NONE (OR ALREADY ARE)?

The possible values of this categorical variable are: minimal, moderate, great and don't know.

Table 7.3 - Distribution of Explanatory Variables – AIDS awareness variables

Explanatory Variables		N	%
Do you have any relative, friend, or colleague who have or died with AIDS?	1- yes or has doubts about someone	**299**	38.0
	2 – no	**487**	62.0
A person who looks healthy can be infected with AIDS?	1 – yes	**663**	83.9
	2 – no or don't know	**127**	16.1
Is AIDS a mortal illness?	1 – Never or sometimes	**256**	32.5
	2 – always	**461**	58.6
	3 – don't know	**70**	8.9
If you have a sexual relation with someone who has AIDS, even if he doesn't appear ill, you will be infected?	1 – never or sometimes	**256**	32.5
	2 – always	**461**	58.6
	3 – don't know	**70**	8.9
Do you think that the possibility that you are infected or will be infected with AIDS are high, moderate or none (or already are)?	1 - minimal	**184**	23.2
	2 – moderate	**159**	20.1
	3 – great	**297**	37.5
	4 – don't know	**151**	19.1

7.3 Effects of mortality perceptions on the desire for an additional child

7.3.1 Outcome variable

The chosen outcome variable, representing women's fertility intentions was defined as whether the respondent would like to have a, or another, child. The phrasing of the question in the survey is: "*(If she is not pregnant or is not sure)* Do you want another child or you don't want more children? *(If she is pregnant)* After having this child do you want more children?" The possible answers to this question are: "want (another) child," "don't want any more," "can't" and "undecided/don't know." Women in the category "can't" were divided in two groups: if they had already a child, they were included in the group of women "don't want any more," while the remainder were discarded from this multivariate analysis. Women who said "undecided/don't

know" were included in the category "want (another) child." In this sense, the variable representing the desire for an additional child became dichotomous and had 786 cases. However, the models studied have fewer cases as some explanatory variables have missing cases.

7.3.2 Models studied

The objective of model building in this section is to capture the effects of the mortality perceptions variables on the desire for an additional child. However, this effect can be blurred if socio-economic and demographic variables are not taken into account. Two obvious explanatory variables stand out from the remaining: age and number of children. The variable concerning women's children is the number of children women have now. In Table 7.4 are presented the results of a binary logistic model, where all variables are categorical.

Table 7.4 - Predicted probabilities for wanting an additional child

	Model A1 *Age + Children alive*
Age in 10-year groups	
20 to 29	0.77 ***
30 to 39	0.66 ***
40 to 49 years[R]	0.33
Number of children alive	
0 child	0.97 ***
1 - 2 children	0.72 ***
3 - 4 children	0.40 **
5+ children[R]	0.25

*** p < .001; ** p < .01; * p < .05.

Next, all the remaining explanatory variables, both mortality perceptions variables and socio-economic and demographic variables (see Tables 7.1, 7.2) were added to this base model, one by one, separately. In addition, AIDS awareness variables (see Table 7.3) were added. The addition of most variables was not significant. Even when trying variables with different categorization, only one appeared to be significant: the rate of survivorship to obtain at least one survivor into adulthood.

Two models (see Table 7.5) were fitted: Model A2, where the variable "rate of survivorship to obtain at least one survivor into adulthood" was included as a dichotomous variable (see Table 7.1), and Model A3 where all variables where taken as continuous, including the rate of survivorship into adulthood.

All variables in the two models were significant. The percentage of variance explained is quite high with the Nagelkerke R square of 47.8% for models A2 (an increase from a Nagelkerke R square of 46.6 in Model A1) and a Nagelkerke R square of 47.9 for model A3. All parameters are significant in both models, although some less significant than others (see Table 7.5). In addition, several possible interactions were tested and none were significant.

Table 7.5 - Predicted probabilities for wanting an additional child

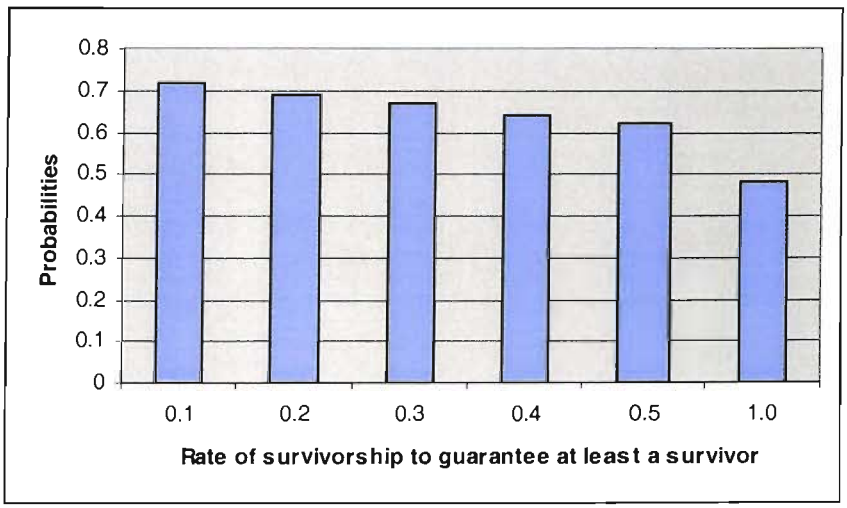
	Model A2 Age + Children Alive + Survivorship of a Child into Adulthood, (categorical) N =738		Model A3 Age + Children Alive + Survivorship of a Child into Adulthood, (continuous) N =738
Age in 10-year groups		Age	
20 to 29	0.79 ***	20 years	0.82***
30 to 39	0.67 ***	25 years	0.74***
40 to 49 years[R]	0.36	30 years	0.64***
		35 years	0.53***
		40 years	0.41***
		45 years[R]	0.31***
Number of children alive		Number of children alive	
0 child	0.98 ***	0 child	0.89***
1 - 2 children	0.73 ***	1 child	0.81***
3 - 4 children	0.43 **	2 children	0.70***
5+ children[R]	0.24	3 children	0.56***
		4 children	0.41***
		5 children	0.27***
		6 children[R]	0.17***
Rate of survivorship to obtain at least one survivor		Rate of survivorship to obtain at least one survivor	
less than .50	0.75 *	0.1	0.72*
more or equal to .50 [R]	0.66	0.2	0.69*
		0.3	0.67*
		0.4	0.64*
		0.5	0.62*
		1.0[R]	0.48*

*** p < .001; ** p < .01; * p < .05.

As expected, the probability of wanting an additional child steeply decreases with age and number of children alive.

Furthermore, the probability of wanting an additional child is higher when women's perceptions of the survivorship rate of at least a child into adulthood is lower, in both Models A2 and A3. Indeed, all being equal, in Model A2, women who think that in order to guarantee at least one survivor into adulthood they will need to have three or more children have a probability higher of wanting more children than women who think that one or two children suffices to guarantee at least a survivor. This conclusion is confirmed in model A3 (see Table 7.5), where the rate of survivorship was taken as a continuous variable. Indeed, for the different values of this rate the differences of the probabilities of wanting an additional child are sharper than in model A2, and can be visualized in Figure 7.1.

Figure 7.1 – Probabilities of wanting an additional child, by the rate of survivorship to have at least a survivor



7.4 Characteristics of the intention to change fertility due to AIDS

7.4.1 Outcome variable

The outcome variable is the women's intention to change fertility behaviour due to AIDS. The possible answers to this question were: to have more children, to have fewer children or to have the same number of children. Because only 38 women declared that they would have more children, this group was discarded from this analysis and the outcome variable only have two possible values: intention to change fertility behaviour and to have less children, or intention not to change fertility behaviour.

7.4.2 Models

The first step in modelling the intention to change fertility behaviour due to AIDS, was to analyze whether women's AIDS awareness have any effect on that change. Then, socio-economic and demographic variables were added, as well as mortality perceptions variables. Three models were chosen (see Table 7.6)with the following explanatory variables:

- Model A4: whether AIDS is a mortal illness, women's assessment of own possibility to get AIDS, age, mother tongue and survivorship of at least one child into adulthood (dichotomous variable);
- Models A5: same variables as A4, but in Model A5 the rate of survivorship into adulthood is represented by the number of children necessary to guarantee a survivor;
- Model A6: same variables as Model A4, with two additional variables, one indicating who decides the family size and the other the number of children alive.

All the other variables in Tables 7.1, 7.2 and 7.3 not included in these models were not significant.

The Nagelkerke R-Square for Models A4, A5 and A6 is 19.2%, 19.4% and 25.64% respectively. Furthermore, the percentage of women who declared an intention to change her fertility behaviour (40%) is close to the corresponding predicted probability in models A4 and A5 which is 0.35, and even closer to Model A6's, which is 0.37. However, not all parameters are significant, especially

for the 'Age,' 'Mother Tongue' and 'children alive' categories. Interestingly, in the three models significant parameters correspond to the variables representing the perceptions of rate of survivorship.

Table 7.6 - Predicted probabilities for the intention to change the fertility behaviour due to AIDS

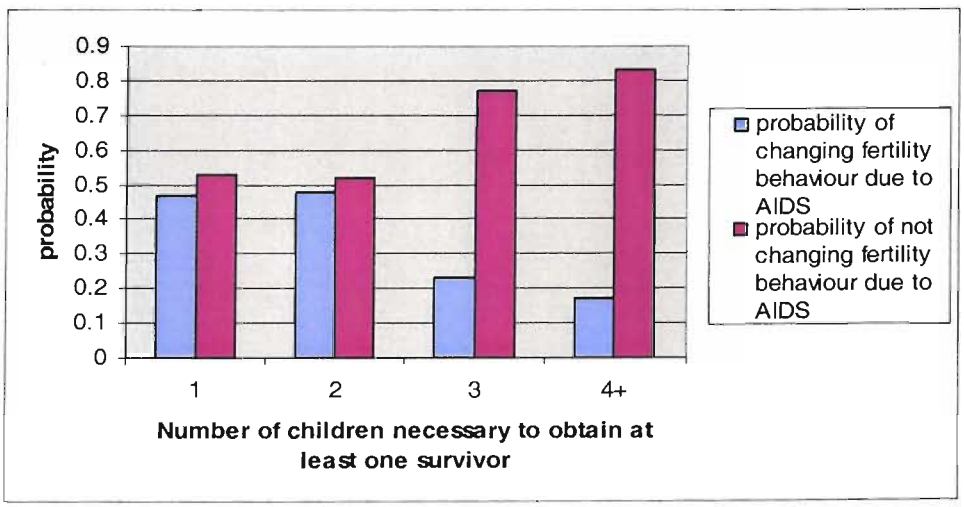
	Model A4 N= 608	*Model A5 N=608*	*Model A6 N=608*
Is AIDS mortal			
Sometimes	0.28	0.28	0.29
Always	0.41 *	0.41 *	0.44 *
Don't know [R]	0.25	0.25	0.25
Possibilities of getting AIDS			
Minimal	0.30	0.30	0.31
Moderate	0.43 *	0.43 *	0.43 *
Great	0.39 *	0.39 *	0.43 *
Don't know [R]	0.27	0.26	0.28
Age (grouped)			
20 to 29 years old	0.40	0.40 a)	0.45 a)
30 to 39 years old	0.30 a)	0.30	0.30
40 to 49 years old [R]	0.29	0.29	0.29
Mother Tongue			
Xitsonga &similar	0.42	0.42	0.41
Portuguese	0.23 **	0.23 **	0.24 *
Other [R]	0.42	0.42	0.44
Rate of survivorship to obtain at least one survivor			
less than .50 [R]	0.20***		0.21 ***
more or equal to .50 [R]	0.48		0.50
Number of children necessary to obtain at least one survivor			
One child		0.47 ***	
2 children		0.48 ***	
3 children		0.23	
4 or more children [R]		0.17	
Who decides the number of children to have?			
The woman or woman and husband			0.43 ***
The husband or others [R]			0.27
Number of children alive			
0 child			0.49
1 – 2 children			0.31
3 – 4 children			0.36
5 + children [R]			0.45

*** p < .001; ** p < .01; * p < .05. a) almost *

The variables representing the perceptions of rate of survivorship have a greater range of the predicted conditional probabilities. This is truer for the number of children necessary to guarantee at least one survivor into adulthood in Model A6. In Figure 3.2, these probabilities can be visualised in a graph. So, the greater the number of children needed to obtain at least one survivor, the smaller the probability of women changing their fertility behaviour due to AIDS.

In addition, if a woman thinks that AIDS is a mortal illness, the probability of changing her fertility behaviour is much higher than otherwise: a woman who thinks that AIDS is always mortal has a probability of changing behaviour of 0.41, while if a woman thinks that only sometimes this illness is mortal, or if she does not know if AIDS is mortal, the probability of changing behaviour are 0.28 and 0.25 respectively.

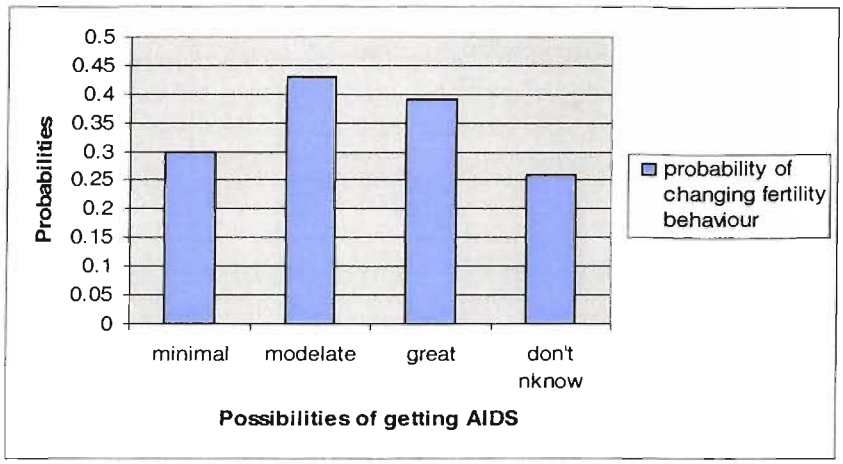
Figure 7.2 – Predicted probabilities of changing and of not changing fertility behaviour due to AIDS, by the number of children necessary to guarantee at least one survivor into adulthood.



Age also has some effect on the intention of changing fertility behaviour due to AIDS, which is greater for younger women. Furthermore, for women whose mother tongue is Portuguese, the probability of changing fertility behaviour due to AIDS is much smaller than for women with another mother tongue. Another important variable in explaining women's intention of changing fertility intentions is their own assessment of getting AIDS. In Figure 7.3 the probabilities for each level of own assessment are shown. Indeed, if a woman thinks that her possibility of getting AIDS

is moderate or high, the probability of changing fertility behaviour is greater than if she thinks that her possibilities of getting AIDS are small or if she doesn't know her own risk of getting AIDS.

Figure 7.3 – Predicted probabilities of changing and of not changing fertility behaviour due to AIDS, by the women's own assessment of getting AIDS



Finally and interestingly, the probability of intending to change fertility behaviour due to AIDS is greater if women have a say on the decision of the number of children to have than otherwise. Indeed, the introduction of the dichotomous variable representing "who decides the number of children to have" in Model A6 produced an improvement of 6.4% on the percentage of the variance explained. In addition, the parameter estimate is significant at the level 0.01.

7.5 Socio-economic characteristics of the variable "rate of survivorship of at least one child into adulthood"

7.5.1 Outcome variable

As seen above, the only mortality perception variable that is significant in explaining fertility desires is the 'rate of survivorship of at least one child into adulthood.' It is thus important to understand the socio-economic and demographic characteristics of women who have a perception of high rate or low rate of survivorship. In this sense, models using an outcome variable as the dichotomous variable used in the models in the above Paragraphs 7.3 and 7.4 were studied.

7.5.2 Models

Logistic regression models including all socio-economic and demographic variables in Table 7.2, included one by one, were checked. In addition, the significant variables were grouped. Model A7, shown in Table 7.7 was the best model found. The place of residence defined as urban districts grouped, the number of children alive and religion are all significant variables for women's perceptions on the rate of survivorship of at least one child into adulthood. However, the percentage of variation explained is quite low: the Nagelkerke pseudo R-Square is only 8.5. In addition several possible interactions were tested but none was significant.

Table 7.7 - Predicted probabilities for having low perception of rate of survivorship of at least one survivor into adulthood

	Model A7 N=744
Urban District (grouped)	
UB1 & UB5	0.30 ***
UB2 & UB3	0.41 **
UB 4[R]	0.54
Number of children alive	
0 child	0.36 *
1 - 2 children	0.34 **
3 - 4 children	0.43
5+ children[R]	0.52
Religion	
Catolic	0.33
Protestant	0.41
Other	0.55 *
No religion[R]	0.37

*** p < .001; ** p < .01; * p < .05.

Nevertheless, it seems that some characteristics of women's level of mortality perceptions can be hypothesized. In fact, the probability of having a low rate of survivorship perception in the model is 0.40, which is similar to the percentage of women who has a low rate perception, which is also 0.40.

Women living in Urban District 4 seem to think that they need more children to guarantee at least a survivor than women living in other Urban Districts. Women bearing less children have a lower

probability of having a low rate survivorship perception. Finally, women with 'other' religion probably fears mortality much more than women professing other religions or without religion.

Interestingly, the variables corresponding to own children's death, either categorical, dichotomous or continuous have no influence on the number of children needed to obtain at least one survivor into adulthood. This result is consistent to the bivariate analysis of mortality perceptions variables and the experience of child death presented in section 6.4.5.

7.6 Summary of the multivariate analysis

The main conclusions regarding the effects of mortality perceptions on fertility desires using multivariate analysis are representative of women in Maputo City and they are as follows:

(A) Concerning the desire for an additional child:

- Women's estimate of the survivorship rate into adulthood to guarantee at least one surviving child influences the desire for an additional child: the higher the estimated rate of survivorship, the lower is the probability of women desiring an additional child.

(B) Regarding the intention of changing fertility behaviour due to AIDS:

- AIDS awareness influences fertility intentions. If women think that AIDS is always mortal, the probability of changing attitude and having less children is much higher than otherwise. In addition, if a woman considers that her possibility of getting AIDS is moderate or high, the probability of changing fertility behaviour and having less children is higher than otherwise.
- The probability of the intention to change fertility behaviour due to AIDS is much lower (less than half) for women who think they need more than two children to guarantee at least a surviving child than otherwise.

- The probability of women's intention of behaviour due to AIDS is greater if the decision of having children is hers or both hers and her husband's; this result suggests that women's empowerment in the family have a positive effect in having an informed choice fertility decisions when facing AIDS.

From the above, it can be concluded that the mortality perceptions variable representing women's estimate of survivorship to obtain at least one survivor into adulthood is a very important explanatory variable, either for the desire of having additional children or for the intention of changing fertility behaviour due to AIDS. Indeed, this variable represents the women's fear of becoming childless due to mortality.

It is important to point out that with a larger sample more estimates of the rates of survivorship may become significant. However, even if this happens, the fact that with a smaller sample the rate of survivorship to guarantee at least a survivor into adulthood is the only mortality perceptions variable significant in explaining fertility desires, stresses the importance of this variable. This makes sense. Indeed, if a woman wants to have three surviving children when she grows old, but she ends up with two, she probably will be reasonably happy. Hence, the number of children needed to have the minimum number of survivors, in this case three, may be a figure that does not guarantee the three survivors, as if the number of survivors becomes two, the woman will still be happy. However, she needs to have a sufficiently large number of children that guarantees that she will not become childless.

Moreover, the fact that other estimates of the rates of survivorship are not significant may have an additional explanation. Indeed, it would be expected, for example, that the rate of survivorship obtained from the number of children needed to obtain the minimum number of survivors into adulthood, is also significant in explaining fertility desires. This rate of survivorship was calculated on the basis of women's answers to the questions regarding the minimum number of desired surviving children and the number of children women need to have to guarantee these survivors into adulthood. Some of them are probably inexact. Indeed,

during the interviews, women often mentioned two adjacent figures, but the interviewer asked them to choose only one. Because these figures are small integer numbers, their lack of exactitude may confound the results of the multivariate analysis. However, the number of children needed to obtain at least a survivor, suffers less from this lack of exactitude, hence this variable represents more accurately women's perceptions of mortality and its influence in fertility desires becomes more clear.

In addition to the above conclusions, it was found that there is a relationship between the levels of the estimates of this mortality perceptions variable and the place of residence, the number of children alive and religion. However, it was not found any relationship between the rate of survivorship into adulthood to obtain at least a survivor and the experience of child death.

In the next chapter the qualitative survey analysis is presented. As it was aimed, the qualitative survey complements the analysis of the quantitative survey presented in Chapters 6 and 7, in contributing to the understanding of women's thinking about fertility decision making, with especial emphasis on mortality perceptions effects on fertility behaviour.

Chapter 8

The qualitative survey

Introduction

This Chapter analyses the results of the qualitative survey held in a Maputo City neighbourhood and in a Maputo Province village in July 2003. The methodology applied in this survey is described in Chapter 3 – Methodology and was conducted two months after the quantitative survey field work, also described in Chapter 3. The qualitative survey's primary aim was to complement the quantitative survey held in Maputo City. Additionally, it helps to understand some of the MDHS analysis results presented in Chapter 5. The interview guide of the qualitative survey borrowed extensively from the questionnaire and the results of the quantitative survey. This Chapter comprises the following sections: methodology of analysis, desired family size, mortality perceptions and their effect on fertility, and AIDS awareness and fertility. The Chapter ends with a section on findings and discussion.

8.1 Methodology of analysis

8.1.1 Objectives

This study focuses on the extent to which mortality perceptions affect the fertility decision-making process. The specific objective of the qualitative survey is to gain a deeper understanding of the underlying reasons and motivations for the answers in the quantitative survey, particularly the effects of mortality perceptions on fertility. It also intends to analyse in greater depth some conclusions of the statistical analysis of the MDHS data (see Chapter 5). In other words, the

qualitative survey intends to explain the "why" of the results of the quantitative analysis, instead of attempting to characterize or represent the whole population. Qualitative tools can be used as the sole research method or in conjunction with other methods. In this case, it complements the analysis presented in the preceding chapters. As mentioned in the introduction, the methodology used is presented in Chapter 3. This methodology includes justification of the in-depth interviews choice, interview guide, location, participant's choice, language utilized and registration procedures.

8.1.2 Participant's composition

The number of women interviewed was: 13 in Maputo City and 15 in Massaca, totalling 28 women. It proved difficult to find young women with child death experience, so only one such woman was interviewed in each of the survey locations. Furthermore, when an interviewee did not answer many questions, another one was sought.

Age and children

The description of the women's individual basic characteristics is shown in Appendix C. The number attributed to each woman in this appendix is also indicated in the quotations: women living in Massaca are numbered 1 – 15, and those living in Maputo City are numbered 16 – 28. Their age varied between 20 and 40 years, as anticipated, and the average age was 31.6 years old. The subgroup aged 30-40 years old had more women than the group of younger women because it was difficult to find women within this age group who had had an experience of child death. Therefore, the final composition of the sample by age and child death occurrence was as follows:

Maputo City (13 women):

- 3 women aged 20-29 years old, no child died
- 4 women aged 30-39 years old, no child died
- 1 woman aged 20-29 years old, at least one child died
- 5 women aged 30-39 years old, at least one child died;

Massaca (15 women):

- 5 women aged 20-29 years old, no child died
- 3 women aged 30-39 years old, no child died
- 1 woman aged 20-29 years old, at least one child died
- 6 women aged 30-39 years old, at least one child died.

The group had an average of 3.57 children (a total of 100 children), and two women never gave birth. Of these children, 19 died, i.e. 19% of the children born by these women. For 15 women, corresponding to just over half of the group, no child had died. Most of the children that died passed away before reaching their first year (13 children), while 4 died between one and five years of age, and the remaining 2 were over five years old.

Marital status, education and profession

Most of the women interviewed were married at the time, while one was separated/divorced, another a widow and three single. However, it is difficult to draw clear lines between the usual concepts of marital status, since many women had mixed situations. While a couple may be formally married, for example, the husband could live elsewhere with another woman without supporting the official wife. On the other hand, two single individuals with children could live together, with the man supporting both the woman and the children.

Almost all women had gone to school, while only three lacked education. The average number of total school years attended was 4.25.

Half of the women did not have a regular job. The job most often reported was 'vendor', which is usually an irregular job. Others were farmers and teachers, while one said she was a dressmaker.

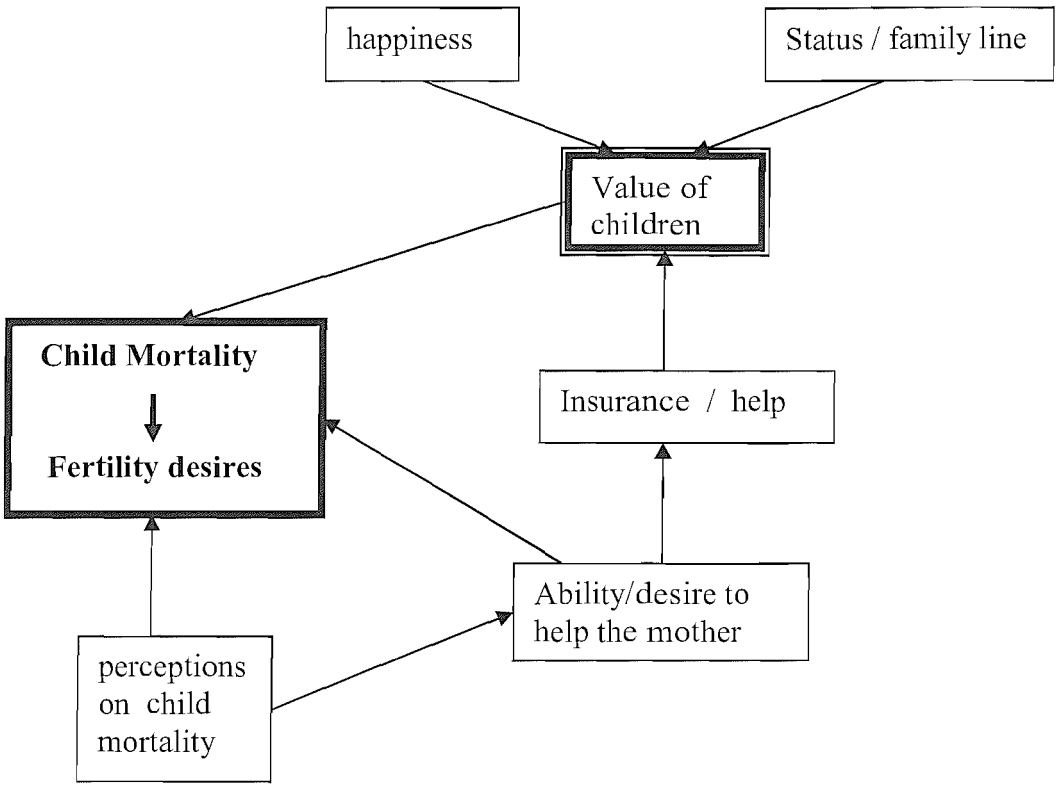
8.1.3 Method of analysis

Content analysis is undertaken by identifying concepts, placing them into categories and developing these into common themes, using a systematic approach (see Ingham et al, 1999). To reduce error and biases, the process of analysis was documented in detail.

The answers were initially registered in the questionnaire paper. Then, all of the answers were entered into a computer file and reordered by topic, i.e. all the answers to each topic were combined while keeping each woman's identification in each answer. This grouping of questions provided a first overview of the themes in each topic, with some themes occurring in multiple

topics. Next, diagrams were drawn to better understand the links among the various themes. When the main themes were identified, all possible answers were registered. Figure 8.1 shows a diagram identifying some themes and the relationships among them.

Figure 8.1 - Diagram displaying some relationships between the various themes from the analysis of the respondents' answers on the influences of child mortality on fertility desires



For each group of interrelated themes, a two-way table was designed, where each row represented a woman and each column represented a theme. The first two columns included women's basic characteristics and the children they had, including any mortality occurrences. When this frame was completed, the various entries were filled with figures, signs and words. The diagrams and tables provided a more detailed view of the answers and the possible relationships between the various themes. The answers were then thoroughly analysed, first by summarizing the main findings and then by quoting the most significant responses. The researcher sought to quote women sufficiently to portray a wide range of women's thinking.

The analysis that follows consists of three main sections: desired family size, perceptions of mortality and influences on fertility desires, and AIDS awareness and fertility. As mentioned

above, each quotation is linked to the serial number of a particular women as shown in Appendix C. Women numbered from 1 to 15 live in Massaca, the survey's rural area, while women numbered 16 to 28 live in Maputo City.

8.2 Desired family size

Before contemplating women's perceptions of mortality and how these may influence fertility desires, it is important to understand how women perceive the value of children, i.e., what motivates them to have children. First, they were asked *"What is for you the value of having children?,"* followed by more detailed questions aimed at ascertaining the importance of children. These additional questions inquired about the advantages and disadvantages of having large families, the ideal number of children, networking and family size decision making, and support at old age.

8.2.1 The value of children

From the women's answers, the main aspects regarding the value of children are summarized as follows: women's status, insurance for old age, help in the house, happiness and continuation of the family line. 'Women's status' is the attribute of their being important in the family and in the society. 'Insurance for old age' is the need women have for children to support them when they grow old and are no longer able to support themselves. "Help in the house' refers to the chores that children can help in the house, such as taking care of younger children and helping out in the farm. 'Happiness' is the joy of simply having children around the parents. Finally, 'family line' refers to the importance of continuing the family name which is guaranteed by having male children. Some of these aspects are interlinked and they would often be mentioned collectively by women. However, for simplicity, the author decided to use this classification system of presenting these aspects separately.

The most mentioned aspect was by far 'insurance' for old age, immediately followed by 'help in the house'. Indeed, only one woman did not mention the 'insurance aspect' while 'help in the house' was mentioned by the great majority. Often the two aspects appeared together and interlinked. Below, the transcription of two women's statements give an idea of their thinking and the importance they attribute to these aspects.

> (24) "It is for the children take care of me when I get old and help in the chores at home when I'm sick."
> (9) "The value of children is that one day the child is going to help the parents and the brothers and sisters. The child can buy "capulanas", scarves and other things, if the child studies can help the government."

The importance of insurance was also present in the answers to other questions, as shown in the next sub-sections. The next most mentioned aspect of the value of children was 'status', with ten women talking about it. How a woman perceives other people's comments, her family and relatives' opinions on her child bearing and even her children's feelings about the mother's efforts in raising many children constitute important attributes of the value of children. The following statements provide a taste:

> (10) "It has value because the woman is valued in the society, when people see her children they will say 'these are the children of so and so' and also when children grow up they help the parents."
> (2) "I've born children thinking of tomorrow, when they are grown up, they are going to remember that they have a mother who helped them grow up, even when one day I die they are going to value me because I've born so many."

Interestingly, only four women talked about 'family line'. However, this aspect is closely linked with 'status'. Literature elsewhere posits that African societies generally consider women highly valued when they have many children, and this is greatly due to the continuation of the family line. Some examples of women's opinions are illustrated below.

> (3) "It is important to have children to guarantee the maintenance of the family, when a woman makes children the husband' s family values her."
> (6) "It is for helping in the household chores and in old age, and they also make the family grow, specially the boys."

It is important to note that while 'family line' was not mentioned by the majority it does not necessarily mean that it is not an important issue for them. It may suggest, however, that it is only marginally important. Interestingly, the four women who said that family line is an important issue for them, originated and grew up in rural areas. In addition, only one of them is currently living in the city.

'Happiness' was mentioned by nine women, and their opinions showed that this happiness is linked with beauty, well being and sense of power. The following are some examples:

> (18) "I've always dream having children because without children nobody is happy. Children make the women beautiful."
> (17) "They are important because they help the family in the works, and having them at home brings happiness to the home, and when parents get old they help them with things."

From the above it can be concluded that insurance for the old age might be the most important aspect attached to the value of children. However, the fact that a certain aspect is not mentioned by a woman does not necessarily imply that this aspect is not important for her, but may mean that it is less important than the ones she mentioned.

Above all, having children is very important for the women. When asked what happens when a couple is childless, they were unanimous in mentioning the great sadness that all the family feels. Here are some samples of their comments on childless couples:

> (1) "Between the two, they do not consider a family."
> (3) "The husband's family despises the woman."
> (5) It is a great poverty because there is no happiness in the home."
> (6) "There is fighting and sadness in the family, because the parents will not have anybody to command nor will they have a heir."
> (4) "The parents grow old without support, even when they are ill, they do not have children around."
> (27) "It is a poverty, when they die they don't have anybody that one day will remember them, everybody will forget them."

Many women said that nobody can be blamed if "children are not coming", but some mentioned that witchcraft is sometimes ordered by someone else to prevent certain persons from having children.

8.2.2 Large/small families

The first questions on the value of large or small families were: *"In your opinion, a) what are the advantages of having big families? b) and disadvantages?."* Women were divided in their answers. In general they showed similar concerns about the problems of having large families (difficulty in feeding the children, lack of money to send them to school, lack of money to take them to the hospital, difficulty in rearing up the children harmoniously) and the positive aspects of

having many children, as presented in the above sub-section (status, insurance, help, happiness and family line). However, they disagree in their choice between large and small families - while six women only mentioned advantages, seven women only mentioned disadvantages. The remainder mentioned both, some with a declared choice and others just presenting their opinions on the advantages and disadvantages of large families. Examples of advantages presented are:

> (1) "The advantage of big families is that if there are lots of children, it is easy to divide the costs for helping the parents."
> (19) "To have big families is good because when they grow up they are going to help, even when they are still little they will help in the works of the mother."
> (6) "The advantage of the family is that they help the parent in the works and when they all grow up it is a pride for the parents."
> (17) "The family grows up and the surname continues and the parents are greatly honoured by the family and society."
> (18) "There is a lot of help. The older children help the parents and the younger children."

Similarly, examples of declared disadvantages are:

> (17) "Disadvantages are that the feeding, education and health cost more."
> (19) "The disadvantage is that due to many illnesses, one of the children can die."
> (22) "The big families have the disadvantage to suffer privations, because times now are not the same as in the past. In our grandmother's times, they made many children because there were not many problems of hunger, it was sufficient to go to the "machamba" (small farm) and produce, today there is nothing to give to the children."

It is interesting to note, as woman #22 stated, that some considered it easier to raise a large family in the past. It was also mentioned that it is easier to have a large family in the countryside than it is in the city, as shown below:

> (23) "Big families are advantageous in the country side, because they help in the 'machamba' (small farm) and also in the pasture, and also in the old age when they go to South Africa. Disadvantages are in the city because the costs of living are very high."

As said above, some women only mentioned disadvantages, others only mentioned advantages. This suggests that there was an underlying option as to which was better for them. Others mentioned both advantages and disadvantages and stated their preference:

> (4) "The disadvantage is to have little to give to the children, but this is nothing, it is preferable to take the little the parents have and share."
> (27) "Big families have more disadvantages than advantages, because it is difficult to educate them. Many people think that to have many children is good to help them, they forget that if you only have a son and he studies well, he will help you more than if you have 50 children and they don't do anything."

Finally, there were others that did not show a strong preference, choosing merely to present their views on the advantages and disadvantages of different family sizes. It is interesting to note the difficulty in making a choice, as shown in the following statement:

> (15) "The disadvantage is that my house is small and poor, when it rains we sleep standing up and the food is not enough because I don't have a farm of my own, I work in a borrowed farm. The advantage is that they will help when are grown up."

To complement the understanding of women's choice between large and small families, another question was asked: *"What do you think is better: to have a small and rich family or a big and poor family?"* The answers to this question were also quite diverse: 32% of the women said they would prefer a large and poor family, while 39% prefer a small and rich family, and the remainder say that family size and wealth are questions of luck or dependent on God's will. These results are mostly in accordance with the answers to the small vs. large families presented above. Furthermore, the answers were also compatible at the individual level. For example, a woman that only mentioned disadvantages in having large families, also stated it would be better to have a small and rich family. Some comments on choosing 'small and rich' can be seen in more detail, as follows:

> (5) "I prefer a small family and rich, because it is possible to educate the children and there is no shortage of bread."
> (22) "If I have many children without money how can I rear them up? I'm going to make the house full and nobody goes to school, what's good in it? Nobody is going to help me when I grow old."

On the other hand, having a 'large and poor' family also evoked some interesting comments:

> (1) "It is better a big and poor family, because poverty one day may finish and we will become rich."
> (2) "It is better to have a big family but poor, because the number of children is also a wealth, I may want a small number of children, but not to get rich."
> (4) "I prefer to be poor but with a big family, what is good in being rich and not have children to appreciate that richness?"
> (13) "For me is better a big but poor family, because my boys will bring me daughters in law and grandchildren and this is important for me because I'll have support in old ages."
> (21) "To have a big family and poor is better, because it is nothing to be few and rich, because when they are many, they can help each other."
> (9) "That's not the pattern, a small family can be poor and a big family can be rich."

8.2.3 Ideal number of children and support in old ages

Some additional questions were made to ascertain the desired family size. The first question concerns the ideal number of children, with the same formulation as asked in the Demographic and Health Surveys. Women were also asked to elaborate on their answers and state whether the sex of the children was important. Some women did not answer, while others provided no explanation for their choice. The main issues they mentioned are: preference for boys, insurance for old age, and child behaviour. The following comment exemplifies the issue of insurance:

> (27) "Four children because if I want 3 children and God takes one, I would remain without anything because two children is very few, three children is reasonable. Having four, if God takes one, I still remain with three."

Most of the women who preferred a particular sex indicated they were more interested in males. The preference for boys is greatly due to the fact that girls traditionally 'belong' to the husband's family after marriage, thus reducing her links to her blood family. Examples:

> (2) "5 children. The sex depends on Jesus, but my preference is three boys and two girls I already have. I prefer boys because girls will go away to other homes."
> (3) "Maximum I want six , two girls and four boys because the girls are not going to work for me, I prefer boys because they will bring daughters-in-law."
> (21) "6 children, 4 boys and 2 girls, because the boys increase the family and the surname doesn't disappear."

While there are still women who prefer boys, it is nevertheless interesting to notice that this tradition is becoming weaker, especially in the urban areas. Indeed, many women said that their children's gender does not matter at all, and some even preferred girls. However, one must be cautious about jumping to conclusions: the fact that several women want many children confuses the sex issue, since there is a high probability of having children of both sexes when having many children. Other women simply stated that the number of children is up to God:

> (22) "I don't know how many children I could desire because I don't think in advance, everything depends on God, maybe God prepared only four for me, I've to accept, if God gives me more, I'm going to accept."
> (24) "I want 5 children, I'm going to give birth to five children, then God is who knows the future."

Nevertheless, a complete strategy is more clearly explained in the following statement:

> (1) "I've always dreamed of having 6 children, 3 boys and 3 girls. This number is the minimum a woman should have, because she doesn't know who will help her tomorrow, the more, the better. Everything depends on the children behaviour, may be only one will help me, but I think that six is good, three couples."

When asked about the minimum number of surviving children they would like to have when they grow old, many women said it was difficult to ascertain how many they would like to have supporting them when they are old. The reasons for this view varied. Some women said that they could not talk about the surviving children because this depends on God, as evidenced by a woman who said, "It is not easy to answer to that question because it depends on God." However, the most often mentioned concern relates to the children's willingness in helping the parents, as illustrated below:

> (9) "No, I don't know the exact number, because everything depends, I only can talk about my older daughter that already helps me, about the younger I still don't know their sense. I also don't know about the sex, anyone can help me."
> (15) "I can't be precise, the one who has good heart will take care of me, because I only born his body, the thinking will be his."
> (26) "One more child (she has 3 children alive, two died), I have to think that one or the other might abandon me and if I have two more I won't be alone and abandoned."

In addition, others talked about the lack of ability of some children in helping their parents, either because they had difficulties in their studies or because they were not lucky to get a good job.

> (17) "I would like that all will support me, but I know that not all will help, because it will depend on the conditions they will have and on the heart of each of them."
> (21) "4 children, because not all will be luck in the studies and in the work so that they can help me."

8.2.4 Networking and fertility decision making

8.2.4.1 Networking

A few questions were asked to determine how kin, friendship and social networks influenced their desire for children. In general, there was no clear relationship between networking and women's desire for large or small families. First, women were questioned about what they thought of other people's desires of family size, aiming to ascertain if their declared interests in family size were in accordance with their closer relatives' opinions. However, no apparent relationship was discovered.

In addition, from the answers to the question about whether they knew someone with a very successful family, there was no strong relationship between the family size of these successful families and their desires for large or small families.

Most women said that they had never received any advice regarding family size, nor would they be influenced by outside opinions. Additionally, for the small group that received some advice (usually a family member), the advice ranged from large to small families, but this was not related with their desired family size.

However, a slightly different conclusion can be drawn from the question of who was the most important person to the woman when she grew up. For the great majority of women, the most important person for them when they grew up was someone in the family, but not necessarily the mother or the father. Interestingly, the family size of the person who was most important to the woman when she grew up was related to her desired family size. This result suggests that kin networks during childhood might be more important for her desired family size than her actual friendship and social networks. However, this causal relationship needs further research, which is beyond the scope of this thesis.

8.2.4.2 Husbands

Most women declared that they discuss the family size with their husbands. However, when asked who finally decides the family size, many of them (around one third) did not answer the question, and the most of the remainder said that the final decision was their husbands'. Examples include:

> (2) "We discuss this issue, his opinion is that we can't have many children, life is very expensive. The final decision is his, if he wants many children I have to make them, even if I don't want anymore."
> (3) We discuss, the decision is my husband's, because he his the man who "lobolou" [1], he takes care of me and he knows how many children he can support."

[1] "lobolou" refers to the money and goods the husband had to pay to the father of the bride for their marriage

8.2.5 Summary of the findings on the desired family size

A significant conclusion of the section on 'desired family size' is that insurance (children's support for their parents when they grow old) seems to be the single most important issue for parents contemplating having children. Indeed, taking into account that most women questioned live near subsistence level and without social security, it is understandable the importance placed on children as a means of providing them with income when they can no longer work. Similarly, the troubles faced by childless couples can be dramatic, particularly for the women. Consequently, the problems arising from mortality, children's lack of material conditions when becoming adults, and potential unwillingness to support parents impel women to prefer a large family size.

There are also other aspects to be considered. Happiness, status and family line are all part of the women's universe of thoughts regarding family size, but they are not as decisive as the need to insure for old age support. However, harsh economic conditions, which translate into the lack of basic needs such as food, education and health, is beginning to make the women in the sample rethink the value of large families.

8.3 Perceptions of mortality and influence on fertility desires

Of particular interest in this study are the effects of mortality perceptions on fertility desires. Such an analysis, however, can only be properly performed if it is clearly situated among all the forces that drive the desired family size. In this section, perceptions of mortality are mainly related to infant and child mortality. However, some references are also made to adult mortality. This section begins with a sub-section on women's perceptions of the relationship between mortality and health, followed by one on women's perceptions of mortality levels, and another on formation of mortality perceptions. Finally

a sub-section on women's attitudinal strategies as a response to child mortality levels is presented.

8.3.1 Health and mortality

8.3.1.1 Mother's and children's health

Women were divided in their opinions on whether having many children negatively affects the mother's health. 32% of the women said it causes no harm while 57% said there were negative side effects, and the remainder think that it depends on the woman or do not know. Among the women who said that many children may harm the mother, some said that this happens only after the 5th to 7th child. Women's opinions regarding this issue are not affected much by where they live - city or countryside.

Furthermore, according to 11 women (39%), having many children in a family does not harm the children's health. Most women who think that children's health is compromised in a family of many children, justified this harm with the woman's own weakness resulting from having many children. Only two women gave different reasons: one said that many children might reduce the interval between births while the other said that the mother would be too old to take care of the children properly, especially the younger ones.

8.3.1.2 Children's causes of death

All women attributed the death of children to the usual illnesses: malaria, cholera, measles, respiratory infections, tuberculosis and AIDS. In general they mentioned two or three of these illnesses, but malaria was always reported. These perceptions are quite accurate, since malaria is by far the main cause of death of children under five. In addition, when asked who was to blame for the children's death, most women said 'nobody'. Nonetheless, a few added that children's death is often caused by witchcraft, which is ordered by family members or neighbours that hate the family. Examples of these comments are shown below:

> (3) "The witches (male) are the guilty, because of the jealousy of some people that ask for the killing of the children of the others."

> (14) "In this village there is witchcraft, this is even discussed in the meetings. There are many old men who are witches and they are the ones to be blamed."

Asked whether children's deaths depend on the families, most women stated that it ultimately depends on the economic conditions and care that parents provide. A few said that some mothers are weaker than others, thus giving birth to weaker children. Finally, others said it depends on God. The following extracts are an interesting mixture of need of health care, religion and witchcraft:

> (14) "The survivorship of the children depends on the families, because they have to guarantee conditions of hygiene, take them to the hospital whenever she gets ill and go to the Church to prevent witchcraft."
> (1) "If a child becomes sick and the parents don't care, they are responsible in the case of death. Each person has his own fate, but it is important to fight."

Interestingly, no woman related children's death with shortage of money due to a large number of children. As mentioned in Sub-section 6.3.2, however, several women said that large families would reduce the money for nourishment and for providing health for a large number of children. Therefore, a different perception would be expected when thinking about children's health.

8.3.2 Perceptions of mortality levels

If mortality is an important issue when women think about fertility, the decisions that take into account mortality might be driven by the women's perceptions of mortality levels. The important point is to understand which rates they are thinking about: are they thinking about infant mortality rate, or survivorship into adulthood? To understand this, an exploratory approach was pursued so that the main aspects with mortality perceptions were covered. Consequently, this sub-section details the levels of mortality perceptions and explores the factors that lead to these perceptions.

8.3.2.1 Comparison of child mortality levels now and in the past

This sub-section analyzes the answers to the question: *"What do you think, do more or less children die now than a generation ago? Explain your answer."* This question seeks to understand how women perceive the decrease in mortality levels during the last 20 years

(see Chapter 3). Interestingly, fifteen women, i.e. just over half, said that more children die now than before, while only nine thought that fewer children die today. One said that the number of child deaths has remained the same, and the last three had no opinion. The reasons for thinking that more children die today are the following:

> (2) " Now more children die, in the past the illnesses were curable, even at home, it was not necessary to go to the hospital, but with the illnesses now a person has to take the child to the hospital and sometimes he doesn't get better."
> (4) "Now more children die because the temperature is not good, in addition girl's bodies are tired because they are having sexual relationships before their time."
> (11) "Now more children die, because lately there are many illnesses, especially malaria."
> (18) "Now more children die because now there are lots of diseases, violence, it exists sexual abuse of minors, with those diseases like AIDS and Malaria, more children are affected."
> (20) "Now more children die because this disease malaria, for example, in the colonial times that illness didn't exist."
> (28) "Now more children die, there are many illnesses, for example now there is a lot of AIDS and malaria that kill many children."

The two women that mentioned AIDS in the above quotations are the only ones that mentioned this illness in this question. For the women who thought that fewer children die now, the reasons presented are:

> (1) "Now less children die, I'm talking in my neighbourhood, in general I don't know, but here in Massaca this year there were not many problems with deaths."
> (6) "Now less children die, because now there is vaccination."
> (16) "Now less die, because many mothers take the children for vaccinations and when they are sick they take them to the hospital."
> (17) "Now less children die, because the mother takes the children for vaccination."

Complementing this question another question was made, "*What do you think, do you think mortality is mainly in young ages, let's say 0-5 years old, or many children also can die later?*". As expected, most women (61%) said that mortality predominantly affects the younger children, and a few even added that deaths occur mainly in smaller children, less than 2 years old. However, a significant number of women (six) said that mortality affects mainly the older children.

Interestingly, some women perceive that rather than the increase of mortality in children, there has been an increase in adult deaths. Two women said that fewer children die now, and that the higher mortality rates are with adults. Examples include:

> (19) "Now fewer children die. More adults die due to AIDS and other illnesses."

(24) "Now few children die because lately more men die than children, because there are now many illnesses that kill the adults."

8.3.2.2 Rates of child survivorship

Two questions aiming to determine women's perceptions of children survivorship to one year old or into adulthood were made. The first question "*Out of six births, how many children would survive the first year?*" was only answered by 13 women. The others simply did not answer, or would said 'Don't know, it is up to God'. Of the 13 women who answered this question, only two said that all children will survive the first year of life. For the remainder, the estimates varied between 3 and 5, and the average estimate of first year of life rate of survivorship is 4.1 for the thirteen women who answered the question.

The second question, *"Out of 6 births, how many children will survive into adulthood?"* was responded by even less women: only eight gave a quantitative answer. Interestingly, however, all those that did respond gave an estimate of survivors into adulthood between two and four, with an average near three. This means that the rate of survivorship 'into adulthood' is estimated at around 50%.

The low response rate for these questions is understandable, even comparing with the almost 100% response rate for similar questions asked in the quantitative survey (see Chapter 5). Indeed, in the quantitative survey this question was crucial and the interviewers were told to insist to obtain answers. However, for the qualitative survey, not only was this question not crucial but it was also asked differently. Indeed, when doing the qualitative survey, the interview should come across as a pleasant conversation, and thus the interviewers were told not to insist on the answers for any question.

However, it is interesting to note that the survivorship rates suggested by the women are considerably lower than they are in reality, recalling that the infant mortality rate in Maputo City is 49 in a thousand live births (MDHS-97) and the survivorship rate to 25 years old estimated in Chapter 3 was around 78%. In addition, there is no obvious reason

why women who did not respond to these questions would fear child mortality less, and thus perceive a significantly higher rate of survivorship.

8.3.2.3 Estimation of women's life expectancy

The answers to the question "*In general, how many years can a woman live?*" was answered by 16 women, slightly more than half. The answers of the majority who answered the question lie in the range 45-55 years old, with a mode of 50. The great majority of women who did not answer or said 'don't know', live in Massaca. This result suggests that women living in the countryside have a lower numerical tendency than those living in the city, although they share a similar average school attendance.

The National Institute of Statistics (see National Institute of Statistics, 1998), based on the results of the Census conducted in 1997, estimated that women's life expectancy at birth in Mozambique at 44 years old. Because infant and child mortality rates are very high, the number of years a woman can expect to live after passing childhood is significantly higher. Indeed, according to the mortality tables calculated in the demographic survey carried out in 146,331 households in 1991 all over Mozambique, women's life expectancy at birth was 44.78 years and women's expectancy of life at 20 years old was 39.81 years (see National Institute of Statistics, 1995). Therefore, if a woman reaches 20 years old, she is expected to live until approximately 60 years old.

The question in the survey was put in an inexact form, from a demographer's point of view. Indeed, the life expectancy asked did not consider the base age, i.e., if it was expectancy of life at birth, or after the first year of life or after some other age. The reason for following this unorthodox approach was to facilitate the interviewee's understanding of the question. However, because the question asked about the number of years a *woman* can live, it is reasonable to think that the interviewees thought about life expectancy once a girl becomes a woman, and that they were not taking into account the girls that did not survive into adulthood. In this sense, a woman reaching 20 years could expect to live 60 years in total, and not around 50 years as declared by the respondents.

8.3.3 Formation of mortality perceptions

The previous sub-section discussed questions that defined women's assessment of mortality levels. This sub-section identifies some factors that contribute to women's level of mortality perceptions.

8.3.3.1 Women's own experience with death and growing up child mortality environment

The research attempted to understand the relationship between the level of mortality perceptions and personal experience with child death, and the death of children in the surrounding environment whilst growing up. First, a classification of mortality perception levels was made, which was divided into low, medium and high. Then, these levels were compared with personal child death experience and with the child mortality environment during the upbringing.

A woman was classified as having a 'high level of mortality perception rate' if either her estimates of mortality rates were high, or (in case a quantitative estimate of these rates was not done) if she showed to greatly fear the death of her children during the interview. A 'medium level of mortality perceptions rate' was attributed to women who, showed only moderate fear for their children's death and did not perceive high rates of survivorship. A woman was attributed 'low level of mortality perceptions rate' if the perceived high survivorship rates and if she was unconcerned about child mortality.

This classification was rather simplistic and inexact, requiring additional rules occasionally. For example, there were cases where women would show a high level of mortality perceptions in terms of mortality rates, while showing little fear for their own children's death. This can happen when the women think they can properly take care of their children and afford proper medical treatment, but thinks that community mortality rates are high. In these cases, they would be placed in the 'low level' category.

Personal experience with child death seems to have some causal effect on the perceptions of mortality level. With no child death, the woman's mortality perceptions can be low, medium or high, without a specific pattern. However, of the twelve women who experienced child death, none had a low level of child mortality perceptions, three were classified as 'medium level', while the majority (nine) showed a high level of mortality perceptions.

The death experience in the upbringing environment was dependent on whether the most important person for the woman when she grew up had experienced child death or not. The most important person(s) varied considerably: parents, grand parents, aunts and uncles, older brothers or sisters, and occasionally someone outside the family. While the relationship between contact with child mortality while growing up and the level of mortality perceptions seems not to be as relevant as personal experience with child death, it is nonetheless important. If the most important person(s) for the interviewee did not experience child death, her perception could be any of the levels. However, if that person(s) had experience of child death, her attribute would be mainly 'high level'. This happened in thirteen of the nineteen women whose most important person experienced child death. However, among this last group were also women who were classified 'medium level' and 'low level.'

Joining the two variables, own experience of death and experience of death in the growing up environment: the great majority of women who had an encounter with death was classified as having 'high level' mortality perceptions, while the great majority of women without such encounter, was classified as 'low level'. However, there were only four women in the last group, so the value of this conclusion is dubious.

8.3.3.2 Formation of perceptions on mortality and mortality in the community

In order to appreciate the relation between perceptions on mortality and community, women were asked how many funerals they had attended during the last 12 months. This question aimed to check the frequency of contact with mortality in the community. Interestingly, the great majority of the answers was 6 or more funerals, or simply 'many'. Only three women avoided answering the question and another three reported to have attended 3 or 4 funerals. The funerals attended were of family members, friends, colleagues and neighbours, both children and adults. An example is described below:

> (13) "They are many, friends, neighbours, relatives, where there is a funeral I'll participate because I also don't know who is going to bury me, it is necessary to have solidarity."

In addition, some additional women's comments relating to mortality in the community are presented here. One woman said that nowadays not many children die, compared with last year, 'I've not heard of any baby who have died.' Another one said that she does not want to have many children, because this increases the likelihood of one death. This idea that large base rates increase the number of deaths is also expressed in the following statement, but in this case relative to the neighbourhood:

> (10) "Now more children die, I think that it is because we live in a village where the houses are many, it is normal to hear that here died someone."

8.3.4 Fertility response to child mortality: Insurance (hoarding) and substitution strategies

In this sub-section, the two possible women's attitudinal strategies for fertility in response to child mortality are analysed: insurance ('hoarding') and substitution. The insurance strategy as response to child mortality here described, as elsewhere in demographic literature, refers to the parents' attitude of setting fertility goals in anticipation of child deaths, when child survival is still risky and reversible family planning methods are not widely available. This concept is different from the one used in previous sub-sections, in which 'insurance' refers to the goal of guaranteeing a certain number of surviving children to take care of the parents when they grow old. Naturally the

two concepts are linked, but in order to avoid confusion, the term 'hoarding' will be used when referring to the response to child mortality. The other behavioural strategy, the direct replacement or substitution strategy, is the conscious decision of parents to have an additional child in order to substitute the one who has died. To capture women's potential attitudinal response to child mortality, the following question was asked *"How does mortality influence your desires and decisions about having children?"*

The results show that out of the 28 women, 18 mentioned a 'hoarding strategy', corresponding to 64% of the respondents. The following comments exemplify this:

> (1) "When I think in six children, I'm counting that I can loose one or two, and I still have the security of having four, which is not a bad number if all of them will help me."
> (4) "There are people that only make 2 children, but I've always thought in doing at least 7,8, 9 thinking that if I only make two and they die, I become childless, now having 7 I can have more security, because I don't know how many will live and it is also necessary to take into account the ones who will become bandits."
> (10) "The woman gives birth to many children to guarantee insurance, because to give birth to one or two children is not good, because nobody knows what happens ahead, if they are 3 or more children, and one dies, two will remain."
> (17) "I gave birth to a few (seven) because I was afraid of loosing children."
> (19) "I want to have four children, so I prefer to make five taking into account problems."
> (21) "I have six children because if 2 or 3 die, I still have 3 children."

The direct replacement strategy was also mentioned, but by a considerably smaller group: only six women stated that they had an additional child to substitute a child who had died or that they intended to do so in case a fatality occurs. Examples of this strategy are shown below:

> (3) "It is easier for me, when a child dies I can make another one as I'm still in reproductive age. I don't know if I'm making a substitution, but as I want children if some die than I'm not going to stop making children, my age is still young for doing it."
> (2) "Mortality influences, but all depends on the living conditions of the couple. For example, I want five and I'll stop when I have five, but if any dies, I'll do another one only if living conditions improve, if it continues with many deprivations, I'll let like that."

The last statement exemplifies how some women link the attitudinal strategies in response to mortality with conditions of life. Others linked the behavioural strategies with the prospective misbehaviour of the children, as elucidated here:

(9) "If I was young and had possibilities, I would make 8 children, taking into account that some could die, some would deviate from the good path, so that some would remain to take care of me at old ages."

However, four women said that children's death depends on God, and thus no attitudinal response to mortality was mentioned. In addition, two others said that they only think of having children, and that if any of them dies, then that is up to God. What is unclear is the motivation of women who do not state any strategy in response to mortality, but it does not necessarily mean that she is not worried about child mortality. Examples of these statements include:

(5) "It doesn't influence because I only think of the children that are born."
(11) "This is relative, because few or many children, if God wants to take, takes."
(15) "I only think in the total number of children I have, because the death's part depends more on God."
(22) "It happens in the case a person has two children and God takes one the couple is left with only child, then the couple has another child. But for me the solution is not to make more children counting with the death neither substitute them. Let the children get born, it all depends on God."

8.3.5 Summary of the findings on mortality perceptions and fertility

Mortality is generally a very delicate issue, and even more so when a woman is talking about her own children. It can be painful to talk about past deaths, and dreadful to talk about the possibility of a child dying in the future. Religious beliefs and fear for the supernatural impregnated in traditions, add more complexities to this issue. It may be easier to talk about future survivors or deaths for a childless woman beginning her childbearing, but these women constitute a very small proportion in the group of women in their childbearing age. These are the premises that should be assumed when analysing perceptions of mortality and evaluating their influences on fertility. And these premises prevent or at least make difficult an accurate, precise analysis of this complex human issue. Mortality perceptions seem to be formed throughout one's lifetime, and it might happen that, for some women, a single event is strong enough to shape their perceptions. For others, however, these perceptions are built up through a series of relatively important events that occur throughout their lives.

In general, it seems that women's perceptions of mortality are higher than they are in reality. This conclusion holds true for all the questions attempting to evaluate women's perceptions on the level of mortality rates: estimates for infant mortality rates, estimates of survivorship into adulthood, the expected number of years a woman can live and the evaluation of how child mortality levels change over time. It was not possible in this study to ascertain which factors determine this high level of mortality rate perceptions. However, women's contact with mortality as they grow up and women's own experience with child death, indicate some causal relationship. The frequent attendance of funerals and increase of base rates might play a part as well. Finally, the enormous fear of becoming childless might also increase the fear of children dying, and thus increase their levels of perceptions on mortality rates.

Although perceptions of mortality levels are higher than they are in reality, they do not differ much from the actual values, and follow a logical pattern. Probably more children die today in absolute numbers than did a generation ago. Although mortality rates have decreased, the population increase caused the total number of child deaths to increase. For example, according to the DHS carried out in 1997 (MDHS, 1998), for the period 1993-1997, the infant mortality rate in the country was 163.2 per thousand while for the period 1973-1977 this rate was 134.9 per thousand. With a natural rate of population increase of 2.3% a year, it is expected that the number of infants who died in 1997 is higher than the number of infants who died 1977.

Furthermore, the fact that the women's estimates of survivorship rates differ considerably depending on whether they estimated the number of children necessary to achieve a desired minimum number of survivors or the number of children necessary to achieve at least one survivor may also be explained mathematically. Indeed, the answers of the women in the sample probably have an implicit degree of certainty, which varies with the question. The degree of certainty needed to guarantee at least one survivor might be near 100%, as the event of becoming childless is unacceptable. On the other hand, the event of

ending up with a smaller number of survivors instead of the initial number sought of survivors, might not be such a dreadful event and thus the degree of certainty might be relaxed. Mathematically, the risk aversion attitude of becoming childless, translated into a very high degree of certainty of the outcome of having at least a survivor, produces a lower rate of survivorship than otherwise.

The need for support during old ages, originating primarily from the fear of becoming childless, associated with the fear that the children may abandon the mother or will be incapable of supporting her, constitute strong forces in forming their fertility desires. Consequently, most women have a hoarding attitude in their fertility intentions, desiring to have more babies to guarantee a minimum of survivors.

8.4 AIDS awareness and fertility

This section addresses AIDS awareness and its eventual influence on fertility. Understanding AIDS awareness helps to capture women's perceptions of mortality due to AIDS. Indeed, understanding how women perceive the risk of death of those infected with AIDS, how AIDS can be transmitted and the risk they think they incur if infected by AIDS, will help to evaluate the degree of fear of death women have due to AIDS. In addition, a question trying to capture women's fertility response to the AIDS epidemic was made.

8.4.1 General awareness

The first general question for the interviewee inquired whether she had heard about AIDS and what did she thought about it. All women had heard about it and many said that it is an illness that kills. Almost half the women, however, had incomplete knowledge of the disease. Examples of the different ignorance levels are revealed below:

> (4) "I heard on the radio. I don't know anything, I only hear people saying that people are dying because of AIDS."
> (9) "Yes, I heard. I hear some people to say that so and so has AIDS, but why, or how, I don't know."

(10) "Yes, I heard, they say that this disease kills, I still didn't see anybody sick."
(15) "I've heard but I don't know nothing about it."
(21) "Yes, but I don't know anything."
(13) "I don't know nothing about that, I hear when they talk in the radio, they say for us to take care of ourselves, if we sleep with someone that we don't know, we should wear the condom."
(18) "I only know that it is an illness."

The remaining women showed a higher degree of knowledge, as witnessed in the following statements:

(2) "Yes, I've already heard about AIDS. I know it is an illness without cure, that should be avoided, don't 'go out'[2] often or when go out often a person should wear 'jeito' [condom]. I've also heard that a woman should advise the husband and children not to 'go out' often. I've already said to my husband not to go out often and when he has a girl-friend, I tell him to stop, he gets angry but at the end he respects me. The problem is that the men can't hold."
(16) "Yes, I've already heard, I know that this disease has no cure, can be get by different ways, sexual relations with someone infected and without condom, razors, syringes, blood transfusion and also from mother to child."
(22) "Yes. They say in the radio to avoid it. But what is the form of avoiding it? I may avoid, but I don't know how my husband avoids it and he can bring to me and all the family."
(25) "I know that AIDS kills, the person should take care of herself/himself making the HIV test."

Women's knowledge about AIDS, as explored in this first question, varied geographically. The women in Maputo City had a better appreciation for the dangers of the illness than those in Massaca. However, this may be due to the fact that women in Maputo can express themselves better than women in Massaca. Indeed, as shown ahead, the differences of knowledge in the more specific questions are not as significant.

8.4.2 Knowledge of people who has or who died of AIDS

Two separate questions were posed to explore if the women in the sample knew someone who had contracted AIDS or had died of it. The vast majority said that they did not know anybody who had AIDS; only two women said that they knew someone who perhaps has the illness, but they were not sure. Below, some respondents' comments about this issue are presented:

(1)"Now if anyone gets ill, the others are suspicious of AIDS."

[2] 'go out' is a widely used expression meaning to have sexual relationships with someone who is not the usual partner

(9) "I've a sister in law, I'm not sure if it is AIDS, but she has many pimples. But they don't say anything, people who have this illness make secret about it, even my sister in law, she says that it is not AIDS, she says that it is head ache."
(13) "I don't know anything about that, I hear when they talk in the radio, they say for us to take care of ourselves, if we sleep with someone that we don't know, we should wear the condom."

Indeed, the impossibility of identification is a major concern, as it prevents women from becoming aware of the incidence of the disease and makes them less careful about having sexual relationships with someone obscurely infected. As some interviewees argued, a healthy-looking person might be infected without anybody knowing, and anybody who is sick becomes immediately identified with contracting AIDS.

However, the number of women who knew someone that had died as a result of AIDS was considerably higher: ten women. In this respect, there is no significant difference between women living in the urban and rural areas, with five women in each declaring that they knew someone. The persons they know that had died of AIDS are cousins, nieces and nephews, husband, colleague, and neighbours.

8.4.3 Basic knowledge about AIDS

Asked whether a person looking healthy can be infected, most women in the sample answered affirmatively, while seven women said they did not know, and three answered negatively. There was a slight difference in the results between Massaca and Maputo, with Maputo's women apparently knowing slightly more. Here are some examples of women who answered the question affirmatively:

(1) "Yes, it can. That my cousin had a very healthy look and nobody imagined [that she was sick], and suddenly, the hair fall down and lost weight."
(3) "Yes, the person can be infected with AIDS, sometimes a person puts on weight while it is AIDS that provokes the fattening, but one day the person will lose weight."

Examples of women who answered "no" to the above question are:

(12) "No, if I see a person walking and living well, without problems, he can't have AIDS. Only if he is ill I can suspect."
(19) "No, who is infected has a mark."

They were also asked if a person with AIDS 'always dies', 'sometimes dies' or 'never dies' with this illness. The vast majority, twenty four women, said that people 'always dies', while two women said that perhaps a person dies, and another two said they did not know. However, the fear of death caused by AIDS showed in these responses seems to be only slightly apparent. Indeed, several respondents who said 'always dies,' added that the infected person can live several years, as shown in the examples below:

> (1) "Now with the treatments, people live more, but always die, others die of unhappiness thinking they have AIDS."
> (8) "Doesn't die immediately, it can take some years."
> (19) "Always die, but there are persons that take long to die."
> (26) "They die, but there are people that take long, the virus is not very harmful to them."
> (27) "They always die, but if one discovers early may increase the years of life with treatments at the hospital and others that know the medicines."

The following are examples of declarations of women who did not know or think that AIDS might not kill everybody or simply did not know:

> (4) "I don't have opinions, everything I know is what I listen in the radio. If a person takes certain medicines, lives."
> (13) "In the radio they say that a person dies of AIDS."
> (22) "I don't know because now they say that there are some medicines."

Finally, the last question related to basic knowledge of AIDS was *"If you have sexual relationships with a person infected with AIDS, can you get the disease?"* Most women (17) said "always", others (9) said "maybe/ sometimes" and the remainder (2) said that they did not know. There is a considerable difference between Massaca and Maputo, as most of the women who said "always" are from Massaca, while most of the women who said "may be/ sometimes" are from Maputo. It is difficult to determine what causes this difference, whether it is Maputo's women greater knowledge on this issue, or whether they are less afraid of AIDS spreading. Nonetheless, this difference might imply that women in Maputo fear getting infected less than women in Massaca. Below are examples of women who think that the illness might not be transmitted through sexual relationships.

> (25) "Yes, gets it, but it depends on the organism of the person."
> (8) "Can get – always" (the interviewer noted that the respondent was not sure if it is always so, but commented that they say so)."
> (13) "If a person doesn't use condom a person can get it, but if a person uses it, doesn't get, it is what they say in the radio, I don't know if it is true."

8.4.4 Own risk of getting infected

The assessment of the women's own risk of getting infected is not very clear. Although the interviewer asked the women if their chances of getting AIDS were great or small, only thirteen women gave a definitive answer, while the remainder declared that they did not know how great their risks of getting infected were. Of the thirteen that responded, four said that the risks were great and nine said that they were small. Great or small, most women attribute their risk of getting infected to their husbands. Examples of respondents' comments explaining why they have small risks of getting infected are:

> (4) "For me they are small because I don't go anywhere, my attention is with my children."
> (8) "They are minimal, because I'm faithful to my husband and he is also very much afraid of this disease, I think he doesn't have many partners."
> (9) "They are minimal, because I don't go after the man's money, only to provoke my death. I only can get from my husband if he has it."
> (17) "Small, because now I'm separated from my husband and I don't have another partner."
> (18) "They are small because I know how to prevent. My prevention is to have only a partner, if I go out with someone else I use the condom as they say on radio, television."
> (23) "They are minimal, because my behaviour doesn't bring me that illness."

However, while women claimed to have a low risk of getting infected, this does not necessarily correspond to reality. Indeed, from the responses of most of this group, it can be seen that their risk of getting infected is probably higher than they think. Examples of respondents' comments explaining why they have great risks of getting infected are:

> (5) "They are great because my husband is a miner and I don't know how he lives there in South Africa."
> (25) "It is big because I'm young and I'm in the risky age group."

In addition, the women who said that they did not know the infection risk level, also show a high degree of infection risk, as their statements show below:

> (1) "I expect everything in life, I can say that they are small, while I already have the disease."
> (3) "This disease is like gonorrhoea, I can't trust because I don't know if my husband uses condom when he goes out, I tell him, please use the condom, and he doesn't say anything or laughs and says he never goes out with other women."
> (2) "AIDS is not faraway because there is already many people with this illness, radio everyday talks about these issues. I can get AIDS because I don't know where my husband goes."
> (12) "I don't know because I think that this illness is far from me because my husband doesn't go out much."

(13) I can't deny that I can get AIDS, but is not because of me, I can only be contaminated by my husband if he gets from another lady. I only have my husband, I don't go out much."
(21) I don't know, because lately is not sufficient not to make sex, who knows, perhaps I already have
(22) I don't think anything because this illness can be caught when you don't expect, even at home, the husband takes the illness to the wife if he is not careful. I can't say anything

Only one woman pointed out other forms of contamination, as shown below:

(27) "I always think about it, because the contamination is not only by sexual relationships, I can go to the hospital and if they give me a contaminated syringe I'll get the virus."

8.4.5 Mortality changes

Two questions were made to ascertain women's perceptions of mortality levels due to AIDS, both over time and by age. The first question asked their opinions about mortality level changes over time due to AIDS. The great majority of the women in the sample think that more people die now of AIDS than before. Women's comments on this issue are as follows:

(3) "Now more people die because this disease exists for long time, but here in Mozambique began recently, the first time I heard about it was last year."
(5) "Now they die more, I think that the persons that are dying now are the persons that were contaminate in past years."
(6) "Since the disease have began until now people die, but now it seems that more people die, because people bring the disease from South Africa."
(8) "Now more people die, I think that they die more now because they got the disease long time ago but only now it began to kill."
(23) "Now more people die because in the last years people talk that some of their relatives have died because of AIDS."

A small group, only three women, said that there is no change, as exemplified below:

(22) "Before many died, but now they say that some are able to stay longer because some medicines help people."
(26) "Now there are some that can resist with treatments of herbs, it is not like before, a person would die as soon as got the illness."

Finally, four women said they did not know:

(13) "I don't know, because we only hear in the radio, here, I've never seen, if exist someone who has or who died of AIDS, I don't know, I never know when somebody has this illness."
(21) "I don't know, here in my neighbourhood I've never heard of anybody dying of AIDS."

The second question attempted to evaluate women's perceptions of mortality age differentials due to AIDS: *"Who do you think dies more of AIDS, children or adults?"* The majority said it was adults, but several women stressed that young people were more exposed to the illness:

> (4) "More adults die because they got the disease years ago."
> (13) "The majority are adults, I heard."
> (22) "I don't know, but it seems that it is more the young people, specially the girls, the adults go out a lot, but not as the girls."
> (14) " they are young people, as much as girls as boys, because they don't control themselves, each of them have several partners and they don't use condom."
> (23) "Mainly adults and young people, because these last ones change of boyfriends and girlfriends often."

Other women think that both children and adults are dying of AIDS:

> (4) "AIDS don't choose. Today is Friday, the day of men going around to spread the disease."
> (5) " Children and adults is the same, because the children are born infected."
> (25) "It is the young people and the children that are born contaminated."

The above quotes suggest that child mortality is not yet perceived to be significantly affected by AIDS. Indeed, only the woman (25) above talked about children being contaminated.

8.4.6 AIDS and fertility decision making

The question aimed at capturing the ability of AIDS mortality to change women's mind regarding fertility intentions was formulated as follows: *"Do you think that AIDS has an effect in your reproductive decision making? How?"* Only two women in the sample showed an immediate concern and had proactive responses:

> (16) "Now I have stopped, because I'm afraid of having children, because if I'm infected I can pass to the children."
> (25) "I'm going to make the same number of children but first I'm going to make the HIV/AIDS test."

Another very small group said that they would change their childbearing intentions if they got infected, as presented below:

> (13) "I don't think so, only if a person gets it is better to stop making children because when she dies and the children will be left alone."
> (3) "If I know that I have AIDS I can't have more children because otherwise my children will suffer without anybody that takes care of them. I've never talked about this issue with other women."

Another small group also talked about other people's change in attitude towards fertility due to AIDS:

> (1) "In my opinion, I can't say that I can't make children because I'm afraid of the illness, but there are people that wouldn't like to make many children."
> (4) "Many women are afraid to get AIDS and leave the children alone, but this depends, for example I see many women who go on making many children."
> (27) "Many women talk about decrease the number of children because if the mother has AIDS the child is born with AIDS and the mother won't take long to die, many women now have fears."

Of great worry is that the great majority, eighteen women, said that they would continue to have the same number of children regardless of AIDS, as elucidated here:

> (2) "AIDS can't prevent people of having children. Some people say that they are afraid to let the children alone, but I don't agree with them."
> (14) "The woman should trust her husband and make children with him, without thinking in fears because of AIDS, but she should tell him to control himself when he goes out."
> (22) "Here we don't talk about AIDS, we women among us don't talk about AIDS, but I think that people won't stop of making children because of AIDS."

8.4.7 Summary on the findings on AIDS awareness and fertility

Attitudinal fertility response facing AIDS has two possible forms. First, women can decide to reduce their childbearing, fearing that they might have a smaller lifespan due to AIDS or that they might transmit the illness to the children if infected. Second, women can choose to have more children, as a result of the increase in child mortality. The evidence suggests that most women in the sample do not intend to change their fertility plans due to AIDS.

The first possible attitudinal fertility response would make sense if the women in the sample strongly felt they might get infected and that their deaths were imminent, but this does not seem to be the case. First, although there is a feeling that adult mortality levels have increased, they do not see themselves belonging to the group of people who is or can get infected. Second, many are not very worried of getting infected, because they think they are careful enough. Despite questioning the health and behaviour of their husbands, they appeared to be quite unconcerned about it. It may be that they are quite worried in reality, but choose not to show it. Nevertheless, even if they have this strong feeling, it does not translate into an intention of changing childbearing attitudes. In addition, since several women think that there are currently medicines that prevent infected people

from dying immediately, they lessen their fears. Finally, the low estimate of life expectancy might also contribute to the maintenance of their fertility plans. Indeed, a woman in her thirties who thinks that she will live until fifty or so, might not have a strong reason to stop having children, especially if she perceives a low infection risk, and has great faith in medicine prolonging life in case of infection.

The fear that women can infect their own children was mentioned by very few women in the sample, but this question was not asked directly. However, the low mentioning of this issue affecting fertility desires implies that, at the moment, this issue is probably not very important for women.

The idea of women's intention of increasing the number of children due to an increase of child deaths due to AIDS is not easy to capture, as it is integrated in the more general problem of child mortality. Some women mentioned that child mortality is increasing due to AIDS, but none mentioned a change of attitude as a response to this increase. Indeed, while it is not yet clear that there is a drastic increase of child death rates due to AIDS in the country or in Maputo City, it seems that it is not yet a great preoccupation for women, as shown above.

Therefore, in the short term, no significant change of fertility behaviour as a response to the AIDS epidemic is expected to take place. However, in the medium to long run, the situation will probably change. Indeed, there are already signs of awakening fears. Women begin to speak about the need to take the HIV test before having children. Furthermore, some women say that others are stopping their childbearing due to AIDS, and one even said that she had already stopped, afraid of already being infected.

8.5 Conclusions and discussion

Since the sample used in this study was small, it is not realistic to draw definitive and generalised conclusions about women either in Maputo City or in the Province of Maputo. However, for the women interviewed, this study strongly indicates the following outcomes:

(A) Concerning desired family size:

- The value of children is a multifaceted issue, in which the problem of insuring against old age merges with the concern for having help in the house, and the desire to continue the family line intertwines with the issue of women's status in society. Complementary to these four elements lies the most basic and eternal of justifications: the natural desire to fulfil a woman's reproductive destiny. Despite the complexity of this issue, the most crucial and decisive aspect emanating from the survey is insurance, defined here as receiving help from children when the mother becomes old.
- Complementarily to the above point, women have an enormous fear of becoming childless.
- There is a significant trade-off between the advantages of having large families and the costs of living, particularly the rising costs of raising children.
- A relatively large number of minimum surviving children is needed to take care of the women when they grow old, to compensate for those who will lack the economic conditions or are unwilling to help.

(B) Concerning child mortality perceptions and fertility intentions:

- The women in the sample perceive higher mortality rates than they are in reality, and most of them fear the death of one or more of their children.
- The need for support during old age appears to drive the fear of becoming childless, which is associated with the fear that children will abandon the mother or will be incapable of supporting her. These elements strongly affect the mother's fertility desires. For many of the women in the sample, these fears are translated into the

desire to have more babies to guarantee a minimum of survivors. Consequently, most women intended to pursue a hoarding attitude or already had it.

(C) Concerning perceptions of mortality caused by AIDS and their influence on fertility desires:

- Women in the sample did not appear to strongly fear the risk of getting infected with AIDS, nor to face their own death due to AIDS nor its capacity to kill.
- Consequent to the aforementioned finding, most women in the sample appeared to keep their fertility plans unchanged in the face of the AIDS threat, at least in the near future.
- There are, however, signs of awakening fears: some women began to speak about the need to take the HIV test before having children, and a few others mentioned that there are women stopping their childbearing due to AIDS. The reasons stated for changing their childbearing attitudes are: the fear of eventually infecting the new-born children, and the fear of dying early, thus leaving their children unprotected.

Interestingly, these results appear to be independent of geographic location: the responses were similar in the city and in the countryside.

Perceptions of mortality and their influence on fertility is a very complex, albeit important issue. It is important because its understanding might shed some light on the theory of demographic transition, because it helps to forecast fertility, and, above all, because it can help to plan improvements both for the mother's and the child's health within an AIDS environment.

Next chapter, Discussion and Conclusions, presents the main results of the studies presented in Chapters 5 to 8 and discusses them. In addition, the chapter presents some implications of the results for policy and suggests new research directions.

Chapter 9

Discussion and conclusions

Introduction

This chapter highlights and discusses the main findings of the study. In addition, it presents a brief note on the implications of these findings for policy on population development. Finally, the chapter highlights its limitations and suggests directions for future research.

9.1 Main findings

The dearth of research on mortality perceptions and their relationships with fertility behaviour hinders the assessment of the reliability and generalization of the research results. However, this research has contributed to the understanding of women's fertility intentions and of women's fertility behaviour when facing mortality. Indeed, some conclusions are quite definitive, while others raise new issues based on sound evidence. Three sets of data, of which two were collected by the author, were analyzed, and produced results with different levels of significance and different populations' representativeness. Indeed, the results from the MDHS analysis are representative for the whole country, while the results from the quantitative survey held in Maputo City are only representative of this city. In addition, the qualitative study highlights some important issues concerning the group of women interviewed, that might be common to a broader group, but can only be generalized when supported by additional evidence. Next, a summary of the

main findings obtained in this study is presented, in light of the research questions posed in Chapter 1 – Introduction.

Question 1: What are the perceptions of mortality levels and how are these perceptions formed?

Mortality perceptions constitute a very multifaceted issue and this research only grasps part of its complexity. The main conclusions of this study are presented below.

- The levels of women's mortality perceptions are higher than mortality rates are in reality: women erroneously think that now more children die than a generation ago, women's estimates of rates of child' survivorship of first year of life and into adulthood are lower than they are in reality (Chapter 6). Furthermore, women who were questioned about their estimate of women's life expectancy apparently have a lower estimate than the life expectancy is in reality (Chapter 8).
- Although it is unclear how perceptions on mortality are formed, the fact that most women in the qualitative survey declared that they attend funerals often, suggests an environment of high mortality levels.
- There are indications that a current or recent death experience might be more important to actual mortality perceptions than mortality events in the past (MDHS and quantitative survey, Chapters 5, 6, 7). Indeed, the death of a sibling when a woman was 5-15 years old has no effect on her fertility intentions while if a sibling died later in her life there is an effect on the desire for an additional child. In addition, the variable representing whether a child died in the last five years has a stronger effect on fertility than the variable representing whether a child died throughout the women's life. This stronger effect of more recent mortality events on fertility intentions suggests that there is a 'recency effect,' as described in Section 2.6.
- It is not clear whether socio-economic variables influence women's perception levels of mortality. However, it was found that there is a relationship between the levels of the estimates of the variable survivorship rate to obtain at least one survivor and the place of residence, the number of children alive and religion (Chapter7).

Question 2: In which ways are perceptions of mortality linked with fertility intentions?

There are different ways and aspects to be considered regarding the influence of mortality perceptions on fertility intentions. The main conclusions on this issue are described below.

- It is not clear whether the question on the ideal number of children as stated in the Demographic and Health Surveys refers to the number of surviving children or the number of births, and women answered both ways in the quantitative survey carried out in Maputo City. The way women answered this question is not strongly associated with any particular women's socio-economic or demographic characteristic (quantitative survey, Chapter 6).
- Women's estimate of the survivorship rate into adulthood to guarantee at least one surviving child influences the desire for an additional child: the higher the estimated rate of survivorship, the lower is the probability of women desiring an additional child (quantitative survey, Chapter7).
- The number of children who had already died also influences the desire for an additional child: the higher the number of dead children, the lower the probability to desire an additional child, when it is controlled for the number of children alive (Chapters 5). Although this variable is not a measured mortality perceptions variable, it can be considered as a proxy to mortality perceptions.
- Women who live in communities where the proportion of children per women who dies is higher, have a lower probability of wanting an additional child (Chapter5).

Question 3: How does the insurance strategy operate and what is the approximate extent of this strategy in high mortality settings?

Part of the answer to question 3 is given in the answers presented for Question 2, and here repeated. Some additional results are presented below.

- In Maputo City, if women are to implement their stated intentions on the ideal number of surviving children, they pursue a considerable insurance strategy. Indeed, this strategy might increase fertility, in average, by one third to guarantee women's desired family size.

This intention to have additional children due to mortality, if implemented, translates to having one extra child, whereas the additional children that would occur if they were to implement their intentions of having additional children in case they seek for a missing sex child is only about 0.15 children (Chapter 6);

- The fact that the higher the women's estimate of the survivorship rate into adulthood to guarantee at least one surviving child, the lower the probability of women desiring an additional child, also shows some degree of insurance strategy. The dimension of this strategy is given by the different probabilities: if a woman thinks that she needs more than two children to guarantee at least one survivor then the probability of wanting an additional child is around 15% higher than the probability of having an additional child if she thinks that one or two children will be enough to guarantee that at least one child will survive (Chapter 7).

Question 4: How does AIDS epidemic awareness influence fertility intentions?

- Although most women had heard about AIDS, a much smaller proportion, around 41%, demonstrated a more complete grasp of key AIDS awareness issues (Chapter 6).
- AIDS awareness influences intentions of changing fertility behaviour. If women consider AIDS to be always mortal, the probability of changing attitude and having fewer children is much higher than otherwise. In addition, if a woman considers that her possibilities of getting AIDS are moderate or high, the probability of changing fertility behaviour and having fewer children is higher than otherwise (Chapter 7).
- The probability of the intention to change fertility behaviour due to AIDS is much lower (less than half) for women who think they need more than two children to guarantee at least a surviving child than otherwise (Chapter 7).
- The probability of women's intention of changing behaviour due to AIDS is greater if the decision of having children is hers or both hers and her husband's. This result suggests that women's empowerment in the family has a positive effect in making informed choice on fertility decisions when facing AIDS (Chapter 7).

9.2 Discussion

The first main point of this study, regards the insurance strategy. The value of children is a multifaceted issue, in which the problem of insuring against old ages merges with the concern for having help in the house, and the desire to continue the family line intertwines with the issue of women's status in society. Complementary to these four elements lies the most basic and eternal of justifications: the natural desire to fulfil a woman's reproductive destiny. Despite the complexity of this issue, the most crucial and decisive aspect emanating from the qualitative survey is insurance, defined here as receiving help from children when the mother becomes old. Complementarily to the above point, women enormously fear of becoming childless. The need for support during old age appears to drive the fear of being childless, which is associated with the fear that children will abandon the mother or will be incapable of supporting her. These elements strongly affect the mother's fertility desires. It is impractical to determine the true dimension of this strategy, but a crude estimate was done for Maputo City. An increase of about one third of the desired number of surviving children will be needed to achieve the desired family size. In addition, the probability of women desiring an additional child for women who think they need two or more surviving children to guarantee at least a survivor is fifteen percent higher than for women who think they need only one or two children to guarantee a survivor, when controlling for surviving children.

Secondly, an important conclusion of this study is that child mortality seems to have also a depressing effect on fertility desires, in the sense of achieving a certain number of surviving children. This depressing for fertility desires suggests the cost of child deaths. The author only found reference on child death' costs on the Ben Porath's (1978) and Barro and Becker's (1984) fertility models. However, an estimate of the effect of these costs on fertility was not found in literature. So, if the intention of having an additional child is controlled for the number of children alive (data from MDHS) than the experience of child deaths decreases the probability of women

having additional children. It seems that there is a trade-off between a woman's desire to achieve a certain number of surviving children and the high human costs of her children's death. It is important to note that this effect does not necessarily mean that overall fertility will decrease as a result of child mortality. Indeed, the multinomial models used in Chapter 5 to draw the above conclusion controlled for 'number of children alive' and not for 'children ever born'. This means that the models compare women with the same number of *surviving children* and not women that have had the same fertility. In fact, if a woman experienced a child death and has the same surviving progeny that a woman that did not lose any child, than the first woman has had higher fertility than the second woman. Indeed, when controlling for 'number of children alive' somehow the interpretation is related with desired number of surviving children. Nevertheless, it is important to point out that if experience in child death had the opposite effect, i.e., if it increased the desire for additional children in a model controlling for children alive, then it could certainly be concluded that mortality provokes increase in fertility.

Thirdly, results from both the qualitative and quantitative surveys strongly suggest that women's perceptions on mortality levels are higher than these rates are in reality. Indeed, these higher levels of mortality perceptions might prompt women to use insurance strategies that lead to a family size larger than their ideal's. However, because they may be more concerned about guaranteeing at least one child than stressed by an unwanted additional child, the decision of decreasing their fertility is not their main concern. Another possible consequence of the perception of low levels of survivorship, regards AIDS fear. Indeed, if they think that their lives will be short, the possibility of getting infected with AIDS might be viewed as a fatalist event, added to all the other events that will make their lives short anyway.

Fourthly, the effects of mortality perceptions and AIDS awareness on fertility behaviour tends to gain strength in the near future. AIDS awareness is still somewhat low, but it will probably increase soon with the increase of death rates due to AIDS. Indeed, only 35% of the respondents of the quantitative survey declared their intention of changing fertility behaviour (Chapter 6) and, as mentioned in Chapter 8, respondents to the qualitative survey did not seem very worried that they

could be infected with AIDS or that AIDS would constitute a problem for childbearing. Somewhat different are women's attitudes as reported in the studies in other countries referred to in Sub-section 2.5.3. There are, however, signs of awakening fears: some women began to speak about the need to take the HIV test before having children, and a few others mentioned that there are women who have stopped their childbearing due to AIDS. The reasons stated for changing their childbearing attitudes are: the fear of eventually infecting the new-born children, and the fear of dying early, thus leaving their children unprotected. There are some important characteristics associated with women's intention of changing fertility behaviour due to AIDS. Indeed, women who do not intend to change fertility behaviour due to AIDS, are women who: i) do not think that AIDS is always mortal, ii) think that her possibilities of getting AIDS are low, iii) have a low rate of survivorship perception to obtain at least one child for their old ages, and iv) have no voice in the decision to have children.

From the above, it can be concluded that the mortality perceptions variable representing women's estimate of survivorship to obtain at least one survivor into adulthood is a very important explanatory variable, either for the desire to have additional children or for the intention of changing fertility behaviour due to AIDS. Indeed, this variable represents women's fear of becoming childless due to mortality. Other perceptions on mortality rates do not seem to be as important for explaining fertility desires, while the survivorship into adulthood in order to guarantee at least a survivor is crucial in explaining women's intention to have an additional child. This apparent contradiction may have a simple explanation. Indeed, from the answers to the qualitative survey, women seem not to have an exact number for their ideal number of children. If a woman, for example, would like to have three surviving children and thinks she needs to have five children to guarantee the three survivors, she might end up with four or five survivors, which will still please her. Because the intended fertility for most women is a low integer number, differences in one or two units will confound individual regression analysis.

Finally, the results of this research unfolded more complexities regarding fertility intentions. Women are faced with conflicting, but crucial interests. There is a significant trade-off between

the advantages of having large families and the costs of living, particularly with the rising costs of raising children. There is also a significant trade-off between the need to have a large number of children in order to guarantee at least one survivor until adulthood and the depressing effect of the costs of death children on the number of desired number of surviving children. However, with the increase of economic pressures and the fast spread of AIDS, it is likely that fertility decreases in the near future.

9.3 Results of the study and the demographic transition

This study brought some light to the relationship between mortality and fertility in high mortality settings. According to Cleland (2001), empirical research on mortality -- fertility relationships in developing countries has not yet provided a strong support for the thesis that parents have many children as insurance against possible child losses. This study presents a new empirical approach to this issue and promising results point to a significant value of the insurance strategy: most women in the qualitative survey mentioned the importance of having many children to guarantee survivors that will take care of them; the ideal number of surviving children was estimated as approximately one third less than the ideal number of births (in Maputo City); the higher the estimated rate of survivorship to obtain at least a surviving child, the lower is the probability of women desiring an additional child (in Maputo city).

If these results prevail for the Mozambican population at large, implications for the demographic transition are straightforward: if women perceive that their own children have a low probability of surviving into adulthood, then women will tend to have more children. Moreover, it seems important to make a distinction between women's mortality perceptions in general and women's perceptions on the mortality of their own children. Although the different measures of rates of survivorship estimated in Chapter 6 are reasonably consistent to each other, only the rate of survivorship to obtain at least a surviving child has effect on fertility desires.

According to Mason (1997) more than one cause can trigger or simply contribute to fertility decrease and one factor can be more important than others in explaining demographic transition in different countries or regions. However, most demographers agree that mortality decrease is a necessary condition for fertility declines, while some of them (Davis, 1963; Cleland, 2005) consider that this mortality decrease is also a sufficient condition for the onset of fertility transition. The argument for considering mortality decrease as a necessary condition is that the decrease in mortality provokes larger families and this can bring an array of disadvantages. Particularly in less developed countries, the families' meagre income tend to be stressed even further, obliging parents in a first phase to resort to various demographic means to be able to cope with this family increase. A continued mortality decrease will thus conduct to a fertility decrease. While this reasoning is based on sound past evidence, it may happen that for some countries or regions, this effect of mortality on fertility is complemented by other aspects of the complex relationship mortality-fertility.

In this sense, the results of this study are not in contradiction with the major theories of the demographic transition presented on Chapter 2. Indeed the conclusions here presented, complement these theories in highlighting the importance of a minimum childbearing threshold in societies of high mortality and extreme poverty. This result makes sense: in a population where social security is almost inexistent, parents cannot afford to become childless when growing into old ages.

9.4 Implications for policy

Fertility desires are not fertility outcomes, but population history shows that they are reasonable predictors of future fertility levels (Bongaarts, 1991). Furthermore, understanding the forces driving fertility desires might help reproductive health and family planning officers to better fulfil their goals and to support women in making an informed choice. Women should have the right to make their own reproductive decisions, namely to decide if, when, and how often to reproduce. In the exercise of this right, "they should take into account the needs of their living and

future children and their responsibilities towards the community"(World Conference on Women, 1995, pp.911).

As Lloyd and Ivanov (1988) have noted, the cause of the mortality decline may affect the mortality level at which people feel confident that their children will survive into adulthood, and, as a result, decrease fertility. Indeed, these authors argue that if mothers can improve their child's survival by using techniques that they control, such as the use of oral rehydration techniques, they will more easily perceive mortality declines and be more confident to obtain at least a surviving child.

Luis Rodero Bixby (1998) argues that the replacement or insurance strategy for having children assumes the perfectly rational type of behaviour implicit in the belief that people's perceptions and beliefs may lead to predictable outcomes. However, reproduction decisions may not be just a day-to-day conscious affair but also guided by cultural norms and reference groups. In this case, it is probable that high fertility as a response to high mortality is implicit in cultural norms. While mortality is high, high fertility may be advantageous for parents, but a drastic reduction in mortality may result in the parents becoming 'enslaved' by too many children and clashes with high fertility norms may occur. However, a response from the institutions that are important for people, in promoting fewer children might have important effects on fertility. Furthermore, associated with the campaign for decreasing fertility, a strong valorisation of health improvements, so that parents become more confident in their children's survival, might increase the speed of fertility decline.

Moreover, Mason and Sinding (1998), among others, stress the importance of diffusion theories of fertility change for population policies, as the application of these theories can influence fertility, even when socio-economic conditions are not the best for fertility decline. Furthermore, diffusion of ideas may be highly effective in influencing reproductive behaviour without punitive social policies. In doing so, Beijing's platform on reproductive health might be reinforced with this strategy and, at the same time, contribute to a more balanced population development.

It appears that although people's perception of the survival rate of children is lower than in reality in most studies in Africa, economic pressure may have an effect of diminishing fertility and make parents to switch from a hoarding strategy (that apparently still exists) to a replacement one. And if the reality is such that this new strategy proves efficient, it may take on a more relevant role. In this sense, the magnitude of the hoarding strategy will diminish with the decline in mortality rates and economic development will act as a fertility repressor.

An increased awareness of AIDS' deadly role, will probably influence women to decide for fewer children. Furthermore, women's empowerment within the family will also reduce their childbearing. This is particularly important because AIDS continues to spread at high rates and it seems that a great part of the infected women are not yet aware of their infectious condition. This empowerment could not only prevent future contagions by an increase use of condoms, but also it will probably decrease the number of children born with AIDS.

9.5 Limitations of the study and future research

Albeit that it would be interesting to obtain a true value for the insurance strategy, it might not be a priority for a research agenda, due to its complexity. Indeed, the ideal way of estimating the hoarding strategy would be through a longitudinal survey, tracing people's reproductive lives. However, by the time a certain cohort reaches the end of its childbearing period and an estimate of the true value of the insurance strategy for this cohort can be calculated, the social and economic environment for the younger cohorts will be much different from the first cohorts. So, policy measures resulting from that estimate might no longer have importance or be appropriate. Nonetheless, understanding the main reasons and contradictory forces behind fertility desires is crucial for policy making. There is no doubt that mortality issues are not yet well understood and that they play a fundamental role in fertility.

The undertaking of this study was hindered by the shortage of funds for its implementation. This lack of funds prevented the author to perform some important tasks, as mentioned in the previous chapters.

A first, crucial limitation of this study is the absence of the other half of the decision makers (or perhaps greater than half of the fertility decision makers): men. There is abundant literature highlighting the importance of analyzing men's behaviours and their role on fertility decision making (Mason and Mahotra, 1987). A similar study to this one should be made with men to compare the results.

For both surveys carried out by the author, the number of respondents should be greater in order to increase representativeness and to allow more in-depth analysis. This is the case, for example, with child mortality variables, where the number of women who experienced more than one child death was too small. In addition, the quantitative survey questionnaire should include more detailed socio-economic variables in order to better relate the socio-economic aspects with mortality perceptions.

Although the qualitative survey also took place in a rural area and the MDHS had a nationwide representativeness, more information about mortality perceptions on the rural areas is needed. Indeed, not only was the quantitative survey not performed in a rural area, but the rural area where the qualitative survey took place is also not representative of the country's rural areas. Its proximity to the capital and its socio-economic characteristics, particularly the rates of mortality, perhaps make this region more similar to the capital than to the central and northern rural areas of the country.

The theoretical method used to analyze community level variables in the MDHS data could be improved. If people's attitudes and behaviours are related with some groups or community characteristics, this means that the individuals in a given sample might not be independent of each other, as they share the same group or the same community. Multilevel modelling with more

detailed community level variables would enable a better understanding of where and how the effects are occurring. In addition, the use of other statistical package such as STATA, instead of using SPSS, would contribute to a more precise statistical analysis.

Furthermore, qualitative methods focusing more on mortality perceptions formation should be conducted nationwide. More than one method should be implemented so that data can be compared through the different methods.

Because AIDS will tend to become a major force behind fertility decision making, perhaps the inclusion of intention of changing behaviour questions should be incorporated in the Demographic and Health Surveys. Furthermore, a few additional questions on mortality perceptions, such as survivorship of at least a child into adulthood should also be added to the questionnaires of these surveys.

A major contribution of this study is that it is possible to produce a wide range of reliable information with very scarce resources. This is particularly important to allow the monitoring of fertility changes expected from the sudden and profound socio-economic changes, particularly due to the increase of AIDS mortality. In addition, by using quantitative and qualitative in-depth interviews in a complementary fashion, this study raised new ideas about the complex and dynamic forces involved in fertility decisions and have pointed the way towards more sensitive educational interventions and further studies.

APPENDIX A: Quantitative survey questionnaire

UEM - CENTRO DE ESTUDOS DE POPULACAO
UNIVERSIY OF SOUTHAMPTON, UK, Dep. of Social Statistics
STUDY ON THE EFFECTS OF PERCEIVED MORTALITY ON FERTILITY – CITY OF MAPUTO

Date ____/____/____ Questionnaire No. |___|___|___|

Urban District |____|Neighborhood_____ |____|____| Block |___|____|____|

Interviewer _____ |____| Name of the interviewee_____

I - CARACTERISTICS OF THE INTERVIEWEE

No.	Question	Answers	Cod.
101	Date of birth	Day/ month /year _____/_____/_____ YEARS	 |___|___|
102	Marital Status	MARRIED SINGLE SEPARATED/DIVORCED WIDOW	1 2 3 4
103	*(Except for single)* How old were you when you married first time?	YEARS OLD	|___|___|
104	Have you ever studied? Which is the higher level you enrolled?	DIDN'T STUDY PRIMARY SECONDARY MEDIUM OR HIGHER	1 2 3 4
105	Are you studying?	YES NO	1 2

106	Where have you born?	NIASSA	1
		CABO DELGADO	2
		NAMPULA	3
		TETE	4
		ZAMBEZIA	5
		MANICA	6
		SOFALA	7
		INHAMBANE	8
		GAZA	9
		PROVINCIA DE MAPUTO	10
		CIDADE DE MAPUTO	11
		OTHER	12
107	In which language have learn to speak?	XITSONGA & SIMILAR	1
		XITSWA & SIMILAR	2
		PORTUGUESE	3
		OTHER	4
108	Are you working? (at least half of the day)	DON'T WORK	1
		WHITE COLLAR WORKER	2
		SERVICES (EDUCATION, HEALTH)	3
		FARMER/ FSHERWOMAN	4
		BLUE COLLAR WORKER/ARTISAN	5
		VENDOR	6
		OTHER	7
109	Which church do you go?	CATOLIC	1
		PROTESTANT	2
		ISLAMIC	3
		OTHER	4
		NO RELIGION	5
110a	Do you regularly listen to radio, watch TV?	EVERYDAY	1
		SOMETIMES	2
		NEVER	3
111b	Do you regularly read a newspaper?	EVERYDAY	1
		SOMETIMES	2
		NEVER	3
112	Your house is made of	CEMENT & DEFINITIVE MATERIALS	1
		CLAY AND PRECARIOUS MATERIALS	2
		GRASSS AND OTHER PRECARIOUS MATERIALS	3
113	Do you have electricity?	YES	1
		NO	2

II - CHILDREN

201. a) Do you have children? If yes, how many children do you have?
|___|___|

b) Do you have any son living with you? Number |___|___|

c) Do you have any daughter living with you? Number |___|___|

202. Have you ever had a son or daughter that was born alive, but have died later? Even if it was a very small baby that at the birth time cried or showed any life signal, but that died soon after?

a) How many sons have already died? |___|___|

b) How many daughters have already died? |___|___|

203 - 217. (only if she ever had a child) Now, we would like to know the names of all the children you ever had, including the ones that didn't survive, beginning with the first one.

	Name	Sex	Month, year he/she was born	Is he/she alive	If he/she is alive, how old I he/she?	If he/she is not alive, in which month/year did he die?
1			/			/
2			/			/
3			/			/
4			/			/
5			/			/
6			/			/
7			/			/
8			/			/
9			/			/
10			/			/
11			/			/
12			/			/
13			/			/
14			/			/

So, the total number of children born alive you ever had is |___|___|

III – FERTILITY DECISION MAKING PROCESS

No.	Question	Answers	Cod.	Go
301	(If she is married) have you ever talked with your husband about the number of children you should have	YES NO	1 2	
302	Have you ever decided how many children you would like to have?	YES NO	1 2	 → **305**
303	If yes, When?	BEFORE MARRYING WHEN MARRIED LATER	1 2 3	

304	How many children did you decide to have?	NUMBER	____	
305	Who decides the children you have are enough?	YOU	1	
		YOUR HUSBAND	2	
		YOU AND YOUR HUSBAND	3	
		OTHER FAMILY MEMBERS	4	
		NOBODY	5	

IV - DESIRED FAMILY SIZE

No.	Question	Answers	Cod.	Go
401	(for women without children alive) How many children would you like to have through all your life? (for women with children alive) If you could go back in time, when you didn't have any child and if you could choose the total number of children you would like to have through all the life, how many would you like to have?	NUMBER	____	
402a	Suppose you have ____daughters (your ideal number of children), no boys. Would you like to have more children? If yes, how many more?	NUMBER	____	
		UNTIL A BOY IS BORN	**99**	
402b	Suppose you have ____sons (your ideal number of children), no girls. Would you like to have more children? If yes, how many more?	NUMBER	____	
		UNTIL A GIRL IS BORN	**99**	
403a	When you are thinking that your ideal number of children is ____ are you thinking that it can happen that some will not survive? In other words, does the mortality of children in any way influence your ideal number of children?	YES	1	**→403b**
		NO	2	**→403c**
403b	(If she is thinking in terms of survivors) How many more children do you think you need to have in order to obtain your ideal number of children?	NUMBER	____	**→404a**
403c	(If she is considering the possibility that some will die) How many children you are thinking you will have alive when you grow old?	NUMBER	____	
404a	If a daughter of yours is about to get married, how many children would you advice he/she to have?	NUMBER	____	
404b	And a son?	NUMBER	____	
405	(if she is married) How many children do you think that it is the ideal number of children for your husband?	NUMBER	____	
406	Which are your church advises regarding the number of children you should have?	MANY CHILDREN	1	
		FEW CHILDREN	2	
	That you should have:	NO ADVICE	3	
		DON'T GO TO CHURCH	4	

V - MORTALITY PERCEPTIONS AND ITS RELATION WITH FERTILITY

501a	How many children do you think it is really important to have when you get old, in order to support you at that age?	NUMBER	_____
501b	Is their sex important?	BOYS ARE BETTER GIRLS ARE BETTER IT IS THE SAME	**1** **2** **3**
501c	How many children do you think you must have so that when you are old you have the number of surviving children you mentioned in the last question.	NUMBER	_____
502a	Imagine that you will be reasonably happy if at least one of your children survive you. How many children do you think you need to have to be sure you get at least one to support you at old age?	NUMBER	_____
502b	Is it important the sex of the survivor?	HAS TO BE A BOY HAS TO BE A GIRL IT IS THE SAME	1 2 3
503	Do you thing that now more or less infants and small children die then 20 – 25 years ago?	NOW DIE MORE NOW DIE LESS IT IS THE SAME DON'T KNOW	1 2 3 4
504a	If someone has five births, how many should she expect that will survive the mother?	NUMBER	____
504b	If someone has ten births, how many should she expect that will survive the mother?	NUMBER	_____
505	Imagine that 10 babies are born in this community. How many do you expect will survive the first year?	NUMBER	_____
506	(If at least a child had already died) When your child (children) died, have you thought to have another one to compensate the lost child? If yes, have you done anything? (If no child had already died) What do you think, if you have the misfortune of loosing a child, would you do anything to compensate this child, or would you let your children go on to be born naturally?	YES NO	1 2

VI - FAMILY PLANNING

No.	Questions	Answers	Cod.
601	Do you thing that to plan the number of children is a good or bad thing?	IT IS A GOOD THING IT IS BAD THING NO OPINION	1 2 3
602	Are you making anything to avoid pregnancies?	YES NO	1 2
603a	Are you pregnant?	NO/NOT SURE YES	1 2

603b	*(If she is not pregnant or is not sure)* Do you want another child or you don't want more children? *(If she is pregnant)*After having this child do you want more children?	WANT (ANOTHER) CHILD DON'T WANT MORE CAN'T UNDECIDED/DON'T KNOW	1 2 3 4

VII - AIDS

No.	Question	Answers	Cod.
701	Have ever heard of AIDS?	YES NO	1 2
702	Do you have any relative, friend, or colleague infected with AIDS?	YES NO DOUBTS ABOUT SOMEONE	1 2 3
703a	Do you have any relative who died of AIDS?	YES NO DOUBTS ABOUT SOMEONE	1 2 3
703b	Do you have any friend, or colleague who died of AIDS?	YES NO DOUBTS ABOUT SOMEONE	1 2 3
704	A person who looks healthy can be infected with AIDS?	YES NO DON'T KNOW	1 2 3
705	Is AIDS a mortal illness?	NEVER SOMETIMES ALWAYS DON'T KNOW	1 2 3 4
706	If you have sexual relation with someone who has AIDS, even if he doesn't appear ill, you will be infected?	NEVER SOMETIMES ALWAYS DON'T KNOW	1 2 3 4
707	Do you think that the possibility that you are infected or will be infected with AIDS are high, moderate or none (or already is)?	LOW RISK MODERATE HIGH RISK DON'T KNOW HAS AIDS	1 2 3 4 5
708	AIDS may influence your thinking about having Children. Because of AIDS, do you think that now you want to have more or less children than you would like to have before?	Now wants TO HAVE MORE CHILDREN TO HAVE LESS CHILDREN THE SAME	 1 2 3

FINAL COMMMENTS THANK YOU !

APPENDIX B: IN-DEPTH INTERVIEW GUIDE

Introduction

Welcome! We are here to talk about children. Children we have, children we would like to have. Children who came earlier than wanted. This talk will help us to find ways to improve our support to you in having the children you would like to have, when you would like to have them. So, let's talk about children.

Please tell me about your life starting from your childhood and going through to today. Tell me about your family and where you grew up and any pertinent information that you felt was important in your life. [Probe on siblings, children, husband, school friends, other relatives, living with grandparents. When deaths are mentioned probe as to reason why, how it changed family life. Reproductive histories are critical; also try to find out how decisions are made regarding reproduction. Hoarding attitude, since the beginning, later, never?]

What is your age, marital status, education, working status?
Where are you from? Where did you grow up?
Where have you lived most of your life?
Tell me about who lives here with you.
Tell me about your husband.

1 - Value of Children/ desired family size

- What is for you the value of having children? *probes: emotionally, economically, socially, old age insurance*)
- In your opinion, a) what are the advantages of having big families? b) and disadvantages? (*probes: economic, education, health, insurance for old ages, house space*)
- What do you consider as a small family? And a big family? (*indicate maximum, minimum, averages*)
- What do you thing is better, to have a small, rich family or a big poor family?
- (for women without children alive) How many children would you like to have through all your life? (for women with children alive) If you could go back in time, when you didn't have any child and if you could choose the total number of children you would like to have through all the life, how many would you like to have? Why do you think this number is good for you? Is their sex important?
- What happen if a couple become childless?
- How many children do you think you need to guarantee support when you grow old? Do you have any preference for the sex?
- What do you think it is your husband ideal family size?

2 - Mortality, mortality perceptions and fertility; children's survivorship

- How does mortality influence your desires and decisions about having children? *(probe: insurance versus replacement)*

. When you are thinking on the ideal number of children, are you considering only survivors or the total number of children you would like to give birth?

a)If you are thinking only in terms of survivors, how many more do you think you'll need to get your target?

ii) If you are thinking in the total number of children born, what do you consider to be the minimum of surviving children you hope to have?

. What do you think: more or less children die now than a generation ago? Explain your answer.

. What are your estimates for:

a) Number of children who survive one year out of six births?

b) Number of children who survive into adulthood out of 6 births?

. You said you need at least ___ children to take care of you when you grow old. How many children do you need to guarantee this number? Is their sex important?

. Which funerals you usually attend? How many funerals you attend for the last 12 months? Of whom?

. What do you think, mortality is mainly in young ages, let's say 0-5 years old, or many children also can die later?

. In general, how many years a woman can live?

3 - Diffusion / Networks

. With whom do you speak about fertility preferences?

. What do you think other people think about having small/large families?

. Who, in your opinion, had a successful childbearing? Why do you think so? What do you think this people did in order to have a successful childbearing?

. Please, name people who were most important to you *as a child.* For each of these persons, tell if they had any child. If yes, has any of them died?

. Please, name people who were most important to you *currently.* For each of these persons, tell if they had any child. If yes, has any of them died?

4- Household family size decision making

. Does anyone give you advice on how many children to have?

. What is your family and your husband's family (friends, mass media, religion) influence in the number of children you should have?

. How do you discuss with your husband the number of children you should have? Who makes the decision about having children and how many?

. When do you think is better to begin having children? When do you stop having children?

. If children "are not coming", who is blamed?

5 - General Health Concerns

. What are the min diseases here in this neighborhood? What causes these diseases? In your opinion, which are the causes of death among infants and small children?

. Do you think that children's survival depend on the families? (access /distance to the health center, socio-economic conditions, different types of body)

. Do you think that having many children can harm the mother's health?

i) If yes, how? If yes, how many children you consider that can become harmful for the mother's health?

ii) If not, why?

. Is the mother's health an important issue to take into account, or should mothers have as many children as possible?

. Do you think that having many children can be harmful to the children's health? If yes, how? (probe: birth intervals)

. Do you think that anyone can be blamed for the death of the children?

6 - AIDS

. Have you heard about AIDS? What do you think about AIDS? [*probe: how harmful is the disease*]

. Any of your relatives, friends, neighbors, has AIDS? Who?

. Did any of your relatives, friends, neighbors, died of AIDS? When? Who?

. **A** person who appears healthy can be infected with AIDS?

. Do you believe that a person infected with AIDS never dies, sometimes dies or always dies of this disease?

. If you have sexual relationships with a person infected with AIDS, you can get the disease? (even if he looks healthy)

. Do you think that your possibilities of getting AIDS are small, moderates or great?

. Do you think that AIDS has an effect in your reproductive decision making? How? And other people?

. Do you think that now more people die because of AIDS or there is no alteration?

. Who do you think that dies more of AIDS, children or adults?

Final comments

APPENDIX C - Composition of the interviewees and of children they ever had (qualitative survey)

		CHILDREN
MASSACA (1-15) **1 - Joana Bila**	**Age: 26** **Marital status: single** **Born: Massaca (Prov. Maputo)** **Grow up: Same place** **Education: grade 7** **Professional Activity: unemployed**	**1 child** female, 9 years old, alive **(No deaths)**
2 – Ana Jorge	**Age: 24** **Marital status: casada** **Born:Namaacha (Prov. Maputo)** **Grow up: Maputo, Malhazine** **Education: grade 5** **Professional activity: none**	**3 children** the first (girl) died with 5 months, girl, three years old, alive girl, 6 months, alive **(1 death)**
3 – Olga	**Age: 20** **Marital status: married** **Born: Magude (Prov. Maputo)** **Grow up: Massaca** **Education: grade 5** **Professional activity: none**	**2 children** one male, 3 years old, alive one male, 10 months, alive **(no deaths)**
4 – Helena	**Age: 39** **Marital status: married** **Born: Mafuiane (Prov. Maputo)** **Grow up: Massaca** **Education: grade 1** **Professional activity: none**	**8 children** first, a girl, died 5 boys 2 girls **(1 death)**
5– Carlota	**Age: 35** **Marital status: MARRIED** **Born: Maputo – urban area** **Grow up: Manjacaze, Gaza (rural)** **Education: grade 10** **Professional activity: teacher**	**2 children** girl, 11 yrs old boy, 2 yrs **(no deaths)**
6 – Celeste	**Age: 39** **Marital status: married** **Born: Gaza-Manjacaze** **Grow up: Gaza** **Eucation: None** **Professional activity: vendor**	**11 children** 2 children died, one aged 1,5yrs, the other 5 months (middle children) **(2 deaths)**
7 – Inacia	**Age: 40** **Marital status: married** **Born: Nampula, Moma** **Grow up: Nampula/ Chimoio,** **Education: 4th grade** **Professional activity: none**	**4 children** only the 2nd, a boy, is alive, 9 yrs old. Others died in 1-60 days **(3 deaths)**
8 – Leotina	**Age: 20** **Marital status: married** **Born: Maputo-Boane** **Grow up: Boane**	**1 child** 1 girl, 3yrs

	Education: 7th grade **Professional activity: none**	**(no deaths)**
9 - Maria Feliciano	**Age: 40** **Marital status: married** **Born: Chibuto, Gaza** **Grow up: Chibuto** **Education:grade 2** **Professional activity: none**	**5 children** 3 alive, two died (middle) aged 2 and 3 **(2 deaths)**
10 – Teresa Antonia	**Age: 33** **Marital status: MARRIED** **Born: Boane** **Grow up: Boane** **Education: grade 2** **Professional activity: none**	**3 children** First, a boy, died one week 2 girls, 3 months and 2 yrs **(1 death)**
11 – Claudina	**Age: 21** **Marital status: married** **Born: Gaza- Magude** **Grown up: Maputo City** **Education: grade 4** **Professional activity:none**	**2 children** 2 girls, alive **(no deaths)**
12 – Felismina	**Age: 34** **Marital status: married** **Born: Inhambane** **Grown up: Maputo City** **Education: grade 5** **Ocupation: farmer**	**5 children** all alive, boys and girls **(No deaths)**
13 – Elisa	**Age: 32** **Marital status: casada** **Born: Gaza** **Grown up: Chibuto & Manjacaze** **Education: none** **Ocupation: farmer**	**4 children** 3 boys, one girl, aged 1-15 yrs **(no deaths)**
14 – Luisa	**Age: 20** **Marital status: married** **Born : Massaca** **Grown up: Massaca** **Education: grade 8** **Professional activity: none**	**1 child** girl, 7 days. **(no deaths)**
15 - Sara Carlos	**Age: 36** **Marital status: widow** **Born : Gaza (rural)** **Grown up: Gaza (rural)** **Education: grade 2** **Professional activity: unemployed**	**7 children** 4 boys, 3 girls, aged 1-18 1 boy, middle, died 7 months **(1 death)**
MAPUTO CITY **(16 – 28)** **16-MARIA**	**Age: 39** **Marital status: MARRIED** **Born: Maputo City** **Grow up: Maputo** **Education: grade 7** **Professional activity: works in a crèche**	**5 children** 4 girls 1 boy died, 18 months **(1 death)**
17 – LUCIA	**Age: 37** **Marital status: separated**	**7 children** boys and girls

	Born: MAPUTO **Grow up: Maputo e Gaza** **Education: grade 4th** **Professional activity: Market vendor**	1 girl died when she was 8yrs last child, a boy, died 1 week **(2 deaths)**
18 – Ana	**Age: 33** **Marital status: MARRIED** **Born: Nampula** **Grow up: Angoche (Nampula)** **Education: 8th grade** **Professional activity: none**	**3 children** 1 girl 2 boys **(no deaths)**
19 – Josefina	**Age: 20** **Marital status: single** **Born: Alto Mae - Maputo** **Grow up: Alto-Mae - Maputo** **Education: grade 5** **Professional activity: vendor**	**No children**
20 – Teresa	**Age: 39** **Marital status:married** **Born: Beira** **Grow up: Beira** **Education: None** **Professional activity:none**	**6 children** boys & girls 5-20 yrs **(no deaths)**
21 – Cristina	**Age: 25** **Marital status: married** **Born: Sofala, Machanga** **Grow up: Machanga and Maputo** **Education: grade 4** **Professional Activity: None**	**1 child** girl, 3 yrs **(no deaths)**
22 – IVONE	**Age: 40** **Marital status: married** **Born: Vilanculos, Inhambane** **Grow up: Vilanculos, Inhambane** **Education: grade 3** **Professional activity: domestic / vendor**	**4 children** all girls, 8-18 yrs **(no deaths)**
23 – Helena	**Age: 40** **Marital status: casada** **Born: Xai-Xai, Gaza** **Grow up: Xai-Xai** **Education: grade 4** **Professional activity: none**	**3 children** 1 boy 20yrs 1 girl 18yrs 1 boy died 17 yrs **(1 death)**
24 – Alcinda	**Age: 27** **Marital status: married** **Born: Gaza** **Grow up: Gaza** **Education: grade 3** **Professional activity: none**	**1 child** boy, 3 yrs **(no deaths)**
25 – Isabel	**Age: 30** **Marital status: married** **Born: Maputo City** **Grow up: Maputo** **Education: grade 6** **Professional activity: dressmaker**	**No children**

26 – Faustina	**Age:** **Marital status:** **Born** **Grown up** **Education:** **Professional activity:**	**5 children** 4 girls, 2 died (the first 2 children, very small) 1 boy 4yrs **(2 deaths)**
27 – Sara	**Age:** **Marital status:** **Born** **Grown up** **Education:** **Professional activity:**	**5 children** 2 boys, 1 died (first child, less than 1 year) 3 girls **(1 death)**
28 – Cristina	**Age:** **Marital status:** **Born** **Grown up** **Education:** **Professional activity:**	**1 child** 1 boy, died with 9 months **(1 death)**

APPENDIX D

Calculations for the expected number of intended additional children when searching for a missing sex child (Figures in (A), (B), (C) and (D) taken from cross-tabulations of Questions 401,402-a) and 402-b)).

Ideal (A)	Number of additional children to have a girl (B)	Number of Additional children to have a boy (C)	no.cases (women (D)	expected number of additional children needed (E)	(D) * (F) (F)
1	1	0	1	0.500000	0.50
	0	1	1	0.500000	0.50
2	1	0	2	0.250000	0.50
	2	0	1	0.375000	0.38
	0	1	7	0.250000	1.75
	1	1	75	0.500000	37.50
	0	2	2	0.375000	0.75
	1	2	2	0.625000	1.25
	2	2	23	0.750000	17.25
	3	2	1	0.812500	0.81
	2	3	1	0.812500	0.81
	3	3	2	0.875000	1.75
	0	4	1	0.468750	0.47
	4	4	1	0.937500	0.94
	99	99	5	1.000000	5.00
3	1	0	1	0.125000	0.13
	3	0	1	0.218750	0.22
	0	1	3	0.125000	0.38
	1	1	55	0.250000	13.75
	0	2	1	0.187500	0.19
	1	2	2	0.312500	0.63
	2	2	17	0.375000	6.38
	0	3	1	0.218750	0.22
	3	3	1	0.437500	0.44
	0	5	1	0.031300	0.03
	99	99	4	0.500000	2.00
4	1	0	7	0.062500	0.44
	3	0	1	0.109375	0.11
	0	1	7	0.062500	0.44
	1	1	56	0.125000	7.00
	3	1	1	0.171875	0.17
	0	2	3	0.093250	0.28
	1	2	4	0.156250	0.63
	2	2	46	0.187500	8.63
	1	3	1	0.171875	0.17
	3	3	1	0.218750	0.22
	4	4	1	0.234375	0.23
	99	99	9	0.250000	2.25
5	2	0	1	0.046625	0.05
	1	1	12	0.062500	0.75
	2	1	2	0.078125	0.16
	2	2	10	0.093750	0.94
	0	2	1	0.046625	0.05
	0	99	1	0.050000	0.05
	2	99	1	0.096625	0.10

	99	99	1	0.125000	0.13
6	2	0	1	0.023313	0.02
	0	1	1	0.015625	0.02
	1	1	5	0.031250	0.16
	1	2	2	0.039063	0.08
	2	2	9	0.046875	0.42
	3	2	1	0.051344	0.05
	3	3	1	0.054688	0.05
	1	99	2	0.040625	0.08
	2	99	1	0.048313	0.05
	99	99	2	0.062500	0.13
7	1	1	1	0.015625	0.02
	1	2	1	0.019531	0.02
	2	2	3	0.023438	0.07
	99	99	2	0.031250	0.06
8	1	1	1	0.007813	0.01
	2	2	1	0.011719	0.01
10	1	2	1	0.004883	0.00
	2	2	1	0.005859	0.01
	3	3	1	0.006836	0.01
	4	4	1	0.007324	0.01
	99	99	2	0.007813	0.02
Total			418		118.59

Avg= 0.283708

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