Child spacing in Southern and Eastern Africa: Eight countries and a case for exceptionalism

Tom A Moultrie, University of Cape Town

Paper presented to Session 67 of the XXV[th] International Population Conference
of the International Union for the Scientific Study of Population (IUSSP)
Tours, France, July 2005

Address for Correspondence:
Centre for Actuarial Research
University of Cape Town
Private Bag
Rondebosch
7701 South Africa

E-mail:	tmoultri@commerce.uct.ac.za
Telephone:	+27 21 650 5479
Fax:	+27 21 689 7580

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Abstract

In the early 1990s, Caldwell and others suggested a hypothesis that an African fertility decline would be characterised by declines in fertility at all ages and parities simultaneously, unlike that observed elsewhere in the developing world. Earlier research has documented the development of exceedingly long median birth intervals in South Africa, and suggested that the combination of political, economic and institutional factors associated with Africans' lives under apartheid were responsible for that pattern. At the time, tentative evidence from Zimbabwe suggested that similar features may be identifiable there, and that - in fact - the 'South African' pattern was simply a harbinger of demographic change elsewhere in the region. These ideas are explored, with particular emphasis placed on the measurement and analysis of patterns of childbearing in eight countries using DHS data. Three distinct regional patterns of childbearing are identified, all of which are fundamentally different from those observed in a South East Asian country. This provides strong empirical support for the Caldwell hypothesis.

Ex Africa semper aliquid novi
(Always something new out of Africa)
Pliny the Elder, 23-79 AD

1 Introduction

Not much has been written on the patterns of childbearing and child spacing in Southern and Eastern Africa since Ron Lesthaeghe's seminal edited volume of fifteen years ago (Lesthaeghe 1989). Barney Cohen has twice touched on the topic in his reviews of fertility dynamics in the region (Cohen 1993, 1998), but in both of these cases, the emphasis was on describing the fertility declines (such as they were) in the region rather than on child spacing. That said, the earlier of the two papers contains important analyses of the dynamics of family formation in Botswana, Zimbabwe and Kenya using the Brass-Juárez method (Brass and Juárez 1983) for estimating the proportion of women progressing to a next birth within 60 months of her previous birth (i.e. B_{60}s).

This paper seeks to remedy the lacuna in our knowledge of birth spacing and fertility in Southern and Eastern Africa using the same technique as Cohen (1993), but expanding the analysis to include many more countries, and making use of a variant of that technique proposed by Aoun (1989a; 1989b) to estimate the length of median birth intervals by age, and parity. A further refinement to locate these estimates in calendar time has been proposed by Moultrie (2002), which allows trends in the length of median birth intervals to be analysed according to age, parity and secular time.

The following section briefly reviews the little known about fertility dynamics and birth spacing in Southern and Eastern Africa, and seeks to recast the debate about whether South Africa is, or should be regarded as being, *sui generis* to the rest of the region. The third section describes the data used in the investigations and the Brass-Juárez method in greater detail. The fourth section presents the results observed, with a discussion and conclusions drawn from the investigations conducted presented in section five.

It must be emphasized at the outset, however, that the purpose of this paper is not to seek anthropological explanations for the phenomena observed. Rather, the intention is more specific, namely to interrogate the available data on child spacing in Southern and Eastern Africa with a view to elucidating patterns of childbearing and child spacing in the region; to identify whether common patterns in childbearing and birth spacing in Southern and Eastern Africa exist; and to pinpoint the modalities of those commonalities.

2 Background: Birth spacing in Southern and Eastern Africa

In the absence of easily available modern methods of contraception, birth spacing in sub-Saharan Africa traditionally has been shaped by long durations of breastfeeding and postpartum abstinence (Greene 1998; Schoenmaeckers, Shah, Lesthaeghe *et al.* 1981). A common theme running through the literature on fertility in the region, however, is that cultural change and modernisation, in the absence of changes in contraceptive use, shorten the duration of both postpartum abstinence and breastfeeding, "thus increasing the risk of short intervals between births" (Greene 1998). Caldwell, Orubuloye and Caldwell (1992) have suggested that, in many African societies, contraception will be used to substitute for these traditional practices, and hence be used primarily for birth spacing rather than fertility limitation, a view echoed by many other authors too (see, for example, Cohen (1993), Greene (1998) and Kirk and Pillet (1998)).

Schoenmakers *et al.* (1981) indicate that, historically, postpartum abstinence of a year or more was common among almost all the larger ethnic groups in Southern and Eastern Africa. However, the anthropological inquiries pursued by the contributors to Page and Lesthaeghe (1981), for example, may not add greatly to our understanding of the dynamics of childbearing in South Africa, except for purposes of historical comparison. Relative to the other countries of sub-Saharan Africa, South Africa's population is larger, more urbanized, and its economy is incomparable to that of any other country in the region in terms of size, sophistication or output (Moultrie 2002). Also, cultural change and modernisation have been important features of South African society for the better part of forty years. As early as the 1950s and 1960s, research into the lives of urban Africans (Pauw 1963) revealed a syncretism of modern and traditional beliefs and practices, with both subject to continual reinterpretation. This process still continues (van der Vliet 1991). Even studies conducted in very traditional and rural parts of the country point out the degree to which these communities interact with, and are affected by, broader social influences (see, for example, Kuckertz (1990)). However, beliefs and practices are not the only aspects of culture that have been subject to change. Recent ethnographic research in South Africa (James and Kaufman 2001) shows that ethnic identity itself is increasingly fluid and constantly shaped and reshaped according to the social situations in which people find themselves. In these circumstances, it is improbable that cultural determinants of postpartum abstinence and breastfeeding have remained strong among African South Africans. Evidence from the 1998 South Africa Demographic and Health Survey supports this view. The mean duration of postpartum abstinence (across all parities and age groups) between births among African women is 8.4 months, which is much shorter than that suggested above as an historical average.

Earlier research into the dynamics of fertility and childbearing in South Africa using data from two censuses (those of 1970 and 1996), and two demographic surveys conducted in 1987-9 and 1998 (Moultrie 2002; Moultrie and Timæus 2002, 2003) has provided strong evidence that, while the level of fertility among African South Africans[1] was (and remains) much lower than in any other country in the region, the age-pattern of fertility is essentially similar (Table 1 and Figure 1).

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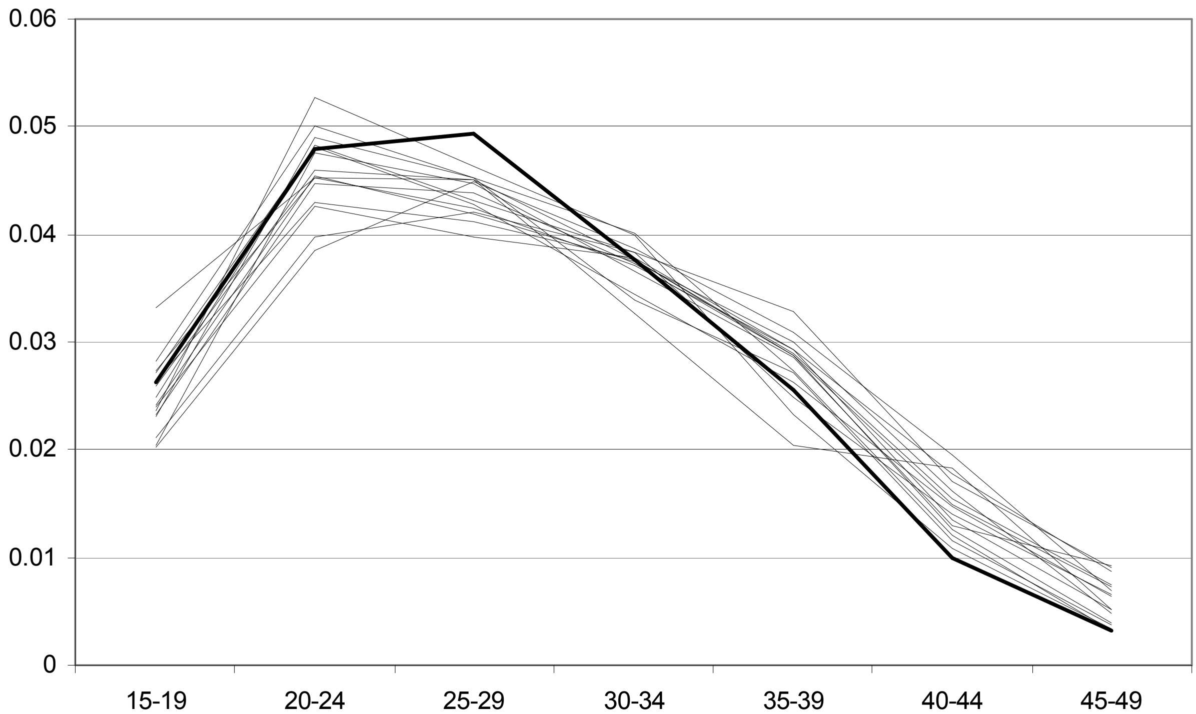
[1] This paper refers only to the fertility of African South Africans. Fertility levels in the country vary markedly by population group, in no small measure a long-term consequence of apartheid policies in the country. Levels of fertility by population group are analysed in Moultrie and Timæus (2003). The restriction to only African South Africans (who comprise almost four-fifths of the entire South African population) makes even greater sense when attempting to draw comparisons with the populations of other countries in the region (which have negligible non-African populations).

Table 1 Age-specific and total fertility rates from 16 Demographic and Health Surveys conducted in Southern and Eastern Africa, 1992-2000

	Age group							
Country and year	*15-19*	*20-24*	*25-29*	*30-34*	*35-39*	*40-44*	*45-49*	*TFR*
Botswana 1988	0.129	0.209	0.200	0.183	0.141	0.075	0.036	4.9
Kenya 1993	0.110	0.257	0.241	0.197	0.154	0.070	0.050	5.4
Kenya 1998	0.111	0.248	0.218	0.188	0.109	0.051	0.016	4.7
Malawi 1992	0.161	0.287	0.268	0.255	0.197	0.120	0.058	6.7
Malawi 2000	0.172	0.305	0.272	0.219	0.167	0.094	0.041	6.4
Mozambique 1997	0.171	0.234	0.233	0.169	0.105	0.094	0.027	5.2
Namibia 1992	0.109	0.207	0.241	0.208	0.166	0.105	0.037	5.4
Namibia 2000	0.088	0.166	0.176	0.160	0.137	0.071	0.038	4.2
South Africa 1998	0.076	0.139	0.143	0.109	0.074	0.029	0.009	2.9
Tanzania 1996	0.135	0.260	0.255	0.217	0.167	0.087	0.042	5.8
Tanzania 1999	0.138	0.268	0.240	0.213	0.138	0.078	0.037	5.6
Zambia 1992	0.156	0.294	0.271	0.242	0.194	0.105	0.031	6.5
Zambia 1996	0.158	0.280	0.274	0.229	0.175	0.077	0.024	6.1
Zambia 2001/02	0.160	0.266	0.249	0.218	0.172	0.079	0.030	5.9
Zimbabwe 1994	0.099	0.210	0.194	0.172	0.117	0.052	0.014	4.3
Zimbabwe 1999	0.112	0.199	0.180	0.135	0.108	0.046	0.015	4.0

Figure 1 Standardised fertility schedules from 16 Demographic and Health Surveys conducted in Southern and Eastern Africa, 1992-2000



Note: The solid bold line represents the data for South Africa (1998).
Source: MeasureDHS StatCompiler

The distribution of age-specific fertility rates suggests that family size limitation is as uncommon in South Africa as elsewhere in the region. As Cohen (1993) has argued in relation to other African countries, high levels of fertility among older women are incompatible with a desire for parity-specific fertility limitation:

> Unlike Western populations, childbearing [in Africa] continues throughout a woman's reproductive years with no obvious "stopping" behaviour. The peak of childbearing occurs between 20 and 29 and falls slowly, indicating little parity-specific limitation. In societies that practice fertility limitation, fertility rates depart from a natural fertility schedule as women age, because women use efficient methods of contraception to prevent pregnancy once they have achieved their desired family size. There is little evidence of a stopping pattern in any of the fertility schedules for sub-Saharan Africa, despite the reported practice of terminal abstinence in some societies. (Cohen 1993:30)

The similarities in the fertility schedules presented in Figure 1 are remarkable. Only at the oldest ages of childbearing does the fertility schedule for African South Africans differ noticeably from that of women in other African countries. As Cohen noted in relation to other African countries, Figure 1 indicates that the mode of childbearing in South Africa also occurs between ages 20 and 29 (in fact, the schedule was constant between these ages in the 1996 census).

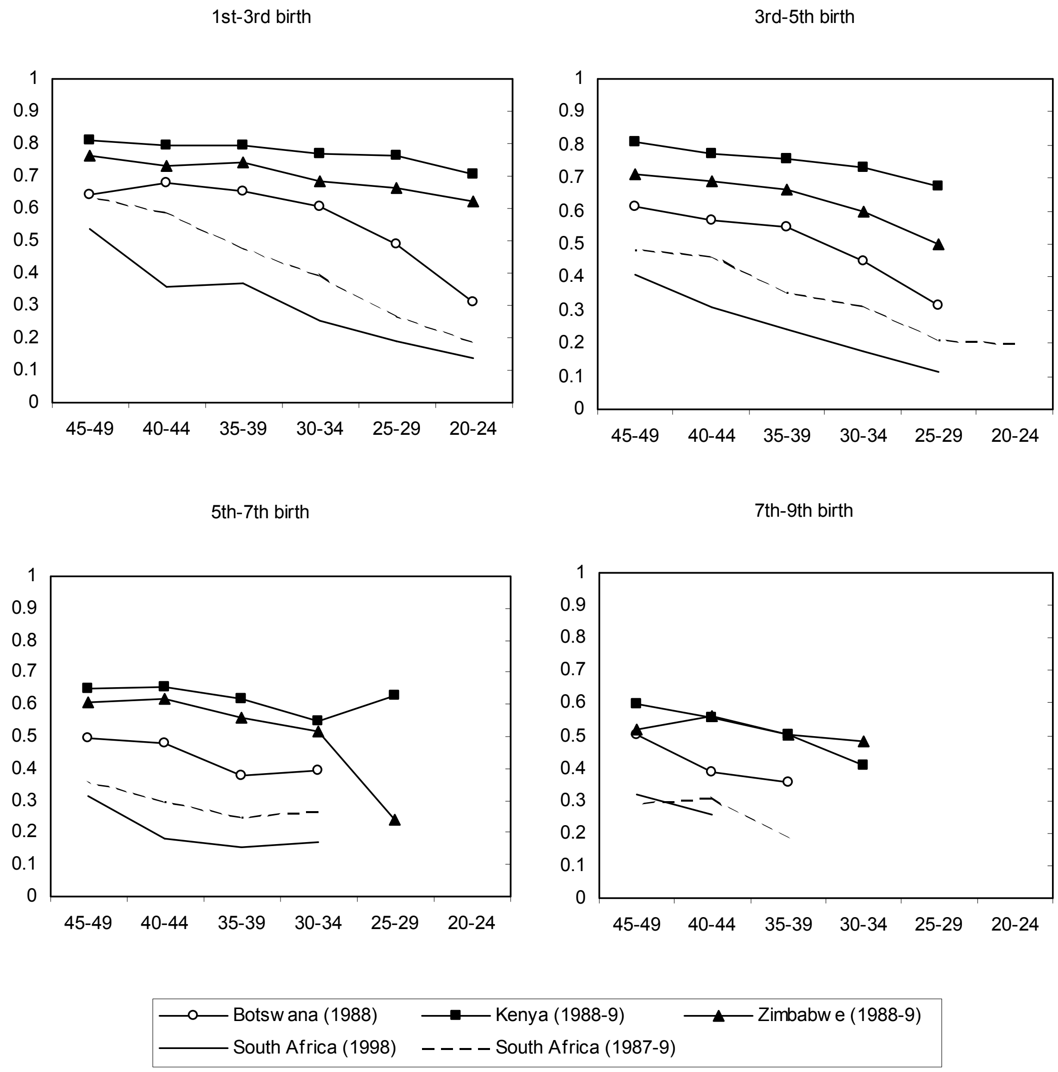
These results offer an ambiguous answer to the question of whether South Africa should be regarded as *sui generis* in the context of the African fertility transition. In terms of the trend in the level of fertility, South Africa is qualitatively different from other African countries. However, in terms of the age distribution of fertility, South Africa exhibits fundamental similarities not only with the countries that border it, but also with sub-Saharan African countries generally.

Further, the results show that the age patterns of fertility across the region are similar even though in South Africa, the fertility decline had started much earlier, levels of fertility are lower and contraceptive use in the country is higher than elsewhere in Southern and Eastern Africa.

Further insights into the similarity (or otherwise) of the South African fertility transition relative to other countries in sub-Saharan Africa can be gained from a comparison of values of B_{60} for South Africa with those for other African countries presented by Cohen (1993). Cohen had derived estimates of B_{60}s for the three countries that – in 1993 – had shown some evidence of commencing a fertility transition: Zimbabwe, Botswana and Kenya. When these are compared with estimates from the two South African demographic surveys, it is apparent that the proportion of women expected to progress to higher-order births is much lower in South Africa relative to those other three countries (Figure 2), but the pattern by age across all four countries is remarkably similar, especially after parity three has been achieved.

By this measure, the fertility decline in South Africa again shows both similarities to (and differences from) that in other African countries. Indeed, these data encourage (and demand) further reflection on the nature of the South African fertility decline relative to that elsewhere in Southern and Eastern Africa.

Figure 2 Values of B_{60}, by cohort and grouped parity, selected African countries



Source: Moultrie (2002)

Strong similarities in the pattern of childbearing in Zimbabwe and Kenya are evident, while the pattern of B_{60}s in Botswana lies between those for those two countries and South Africa. The two sets of data from South African surveys show how the proportion of women progressing to a subsequent birth within five years of their last has fallen over a fairly short period of time. The fall in the values of B_{60} in South Africa, and the similarity to other African countries in their pattern across cohorts raises the possibility that the pattern of fertility decline in South Africa may be a harbinger of the pattern of decline in other African countries.

The data presented above suggest that there is a general pattern in parity progression that stretches across the region. If this is so then, again, the South African fertility decline exhibits some similarities to that in other countries in the region. Furthermore, the decline has resulted more from a general fall in the proportion of women progressing to higher parities than from parity-specific fertility limitation. In many respects, then, the South African fertility decline is occurring as Caldwell, Orubuloye and Caldwell (1992) hypothesised. Fertility decline is occurring at all ages and parities simultaneously.

Thus, the evidence presented this far is contradictory – South Africa shows a pattern of fertility that is more-or-less indistinguishable from that observed anywhere else in the region; but the trend in B_{60}s can be used to argue the case either way: evidently patterns of parity progression are different in South Africa, which is following its own variant of the fertility transition. In the alternate, the evidence could be read to suggest that fertility dynamics in South Africa may simply be leading the experience across the region. The picture is further complicated by a comparison of median intervals in sub-Saharan Africa produced by Greene (1998).

As part of those earlier investigations into trends and patterns of fertility in South Africa, evidence was marshaled for the first time to document the evolution of a pattern of exceedingly long median birth intervals in the country that set it quite clearly apart from other countries in the region. Greene's data (Table 2) indicate that there is some variation in median birth intervals across the sub-continent, ranging from 28 months in Madagascar and Uganda to 39 months in Zimbabwe. Countries in this sample that neighbor South Africa (Zimbabwe and Namibia) have longer intervals and, *a priori*, one might have expected birth intervals for African South African women to be of a similar magnitude. However, comparison of Greene's estimates with equivalent estimated from the 1998 demographic survey showed that birth intervals are indeed markedly longer among African South Africans (at 59 months) than anywhere else in sub-Saharan Africa.

As elsewhere in the region, birth intervals, and their determinants, have received only cursory attention in the literature on South African demography. With the exception of the surveys conducted between 1969 and 1970 in four major metropolitan areas (Mostert 1972; Mostert and du Plessis 1972; Mostert and Engelbrecht 1972; Mostert and van Eeden 1972) that indicated a mean closed birth interval length of around 30 months, no data relating to birth intervals in South Africa have been published.

Furthermore, birth intervals in South Africa have lengthened enormously over the last thirty years, certainly by African standards and also in comparison with those observed elsewhere in the developing world. In this regard at least, the pattern of childbearing in South Africa is – and has been historically – qualitatively different from that seen elsewhere in the developing world. International comparisons may be of little help in understanding or explaining why this pattern has emerged. From this perspective, South Africa could be argued to be following a new variant of the fertility transition, characterised by both lengthening birth intervals and low parity progression ratios.

Table 2 Median birth intervals (months) for births in the three (or five) years prior to the DHS, to non-sterilised married and cohabiting women, 13 sub-Saharan African countries

Country and year	*Median birth interval (months)*
Madagascar 1992	28
Uganda 1995	28
Kenya 1993	31
Malawi 1992	32
Rwanda 1992	32
Senegal 1992-3	32
Tanzania 1991-2	32
Côte d'Ivoire 1994	33
Namibia 1992	33
Zambia 1996	33
Benin 1996	36
Ghana 1993	36
Zimbabwe 1994	39

Source: Greene (1998:32)

The central question raised by these observations is whether South Africa is indeed *sui generis* relative to the rest of Southern and Eastern Africa. This rest of this paper seeks an answer to that question by examining projected parity progression ratios and projected median birth intervals. The next section describes the data and methods used.

3 Data and methods

Census data are not used to investigate the questions at hand, as the data requirements for most methods of investigating parity progression and birth intervals are fairly onerous. For the more advanced methods, detailed maternity history data giving the date of each birth to each woman in the survey are required. Consequently, the data collected in censuses are generally inadequate to the task.

Table 3 DHS data used to investigate child spacing, by country and year

Country	*Years*		
Kenya	1993	1998	
Malawi	1992	2000	
Mozambique	1997		
Namibia	1992	2000	
South Africa	1987*	1998	
Tanzania	1996	1999	
Zambia	1992	1996	2001
Zimbabwe	1994	2001	

Further investigations into patterns and differentials in childbearing are performed using data from sixteen Demographic and Health Surveys (DHS) conducted in eight Southern African countries between 1992 and 2001. A list of the countries' data and the years in which the surveys were conducted is shown in Table 3.

The 1987-9 South Africa 'DHS' is not an official DHS data set. The international academic boycott of South Africa that was in place at the time meant that this survey does not form part of the international programme of surveys conducted with the assistance of the United States Agency for International Development (USAID) and Macro International Inc. However, the South African Human Sciences Research Council's survey used a questionnaire very similar to that used in the first round of DHS surveys. Almost 22 000 women of reproductive age, across all population groups, and across the entire country, including – importantly – the so-called "independent" and other homelands were interviewed. The methodology underlying the survey and the quality of the data collected have been investigated in detail by Carol Kaufman (1997). In her assessment,

> in spite of methodological shortcomings and hazardous fieldwork conditions, careful analysis and presentation of results based on these data can provide useful and important information regarding the demographic processes of South Africans in the late 1980s … Responsible use of these data will provide important insights into the history of fertility processes, health conditions, and mortality in South Africa … (Kaufman, 1997:22)

The fertility and childbearing data were subject to particularly close scrutiny by Moultrie (2002) and compared against historical data from the 1998 South Africa DHS. At least in respect of these portions of the questionnaire, the data are strongly congruent with each other.

For the purposes to which the data are applied here, the crucial limitation of the data from the 1987-9 survey is that the criteria for inclusion in the survey specified that women must either have been married, or have borne a child. Consequently, many, if not most, childless women were excluded from the survey, rendering impossible the investigation of entry into motherhood from these data. Notwithstanding this limitation, the data permit the analysis of trends in parity progression and childbearing among parous women over time, the focus of this paper in any event, and it bears no implication for the analysis of birth intervals since all women, married or not, who had borne a child would have been deemed eligible for inclusion in the survey.

In the final section of the paper, use is also made of fertility and maternity data from the DHS conducted in the Philippines in 1998 to demonstrate that – despite obvious differences – the patterns of childbearing in Southern African countries have more in common with each other than they do with those observed in a completely different setting. It must, however, be emphasized that the choice of this country for purposes of comparison is fundamentally arbitrary.

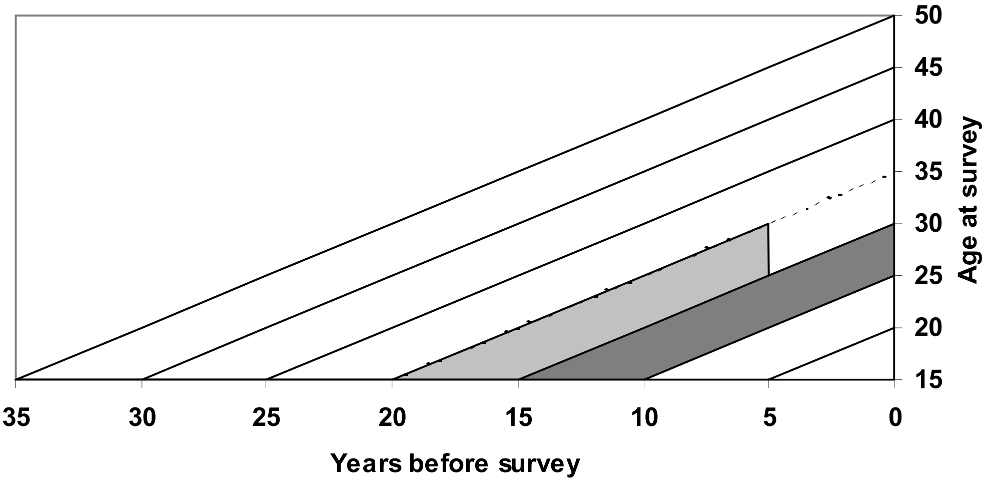
3.1 Methods

Techniques that seek to shed light on patterns of childbearing must confront two unrelated issues. The first is that data on women's birth intervals are censored – by definition, all women have a last, open, birth interval. When information on childbearing is sought in a survey, the survey date truncates our knowledge of what may happen afterwards. However, the information relating to the length of the censored interval is valuable, and should not simply be discarded. Life-table techniques offer the standard approach to dealing with truncated data.

The second issue is that birth interval data, censored or not, are select. Women who are predisposed to have shorter birth intervals by definition contribute more data on births than women who have longer intervals. Hence, methods that seek to address patterns of childbearing must find a mechanism to limit the effects of selectivity.

B_{60}s, as originally formulated by Hobcraft, Rodríguez and others (Hobcraft, Goldman and Chidambaram 1982; Hobcraft and Rodríguez 1992; Rodríguez and Hobcraft 1980) pioneered the use of a life-table approach to enhance understanding of fertility dynamics. These authors also identified the problems associated with selectivity and suggested that the problem could be circumvented through the application of judicious controls (for example, by residence, duration of marriage). The problem with this solution is that it runs the risk of fragmenting the data excessively: without any controls, approximately 70 life tables are required to estimate B_{60}s (one for each combination of seven age groups and ten parity progressions)[2]. The number of life tables would increase by a factor equal to the product of the number of dimensions of controls applied: thus if the data were to be stratified by four durations of marriage as well as urban/rural residence, the number of life tables required would increase eightfold. When DHS data frequently contain records on 15- 20 000 births spread over almost four decades, the consequences (in terms of fragmentation of the data) of adopting this mode of analysis are severe. In any event, it is uncertain that selectivity can be controlled for sufficiently using this approach.

Figure 3 Lexis diagram showing cohorts used in methods based on truncated paired-cohort comparisons



An alternative to stratifying by several variables is to use the Brass-Juárez paired comparison technique (Brass and Juárez 1983). This method seeks to limit the effect of selection by means of comparing the experience of adjacent cohorts of women, the older of which cohorts' experience is

[2] An issue that needs to be mentioned here is that twins and higher order multiple births are excluded from the analysis of birth intervals. Instead, a woman experiencing the birth of a single child, followed by twins, followed by a fourth child would be regarded as progressing from parity 1 to 2 (since at the time of the conception of the twins she was almost certainly not intending to have twins), and then from parity 3 to 4 (since she has had three children at the time of the fourth conception). The adjustment is logically correct, even if trivial since only around one per cent of all confinements result in a multiple birth.

truncated to render it comparable to the younger cohort. Figure 3 provides a graphical explanation. The cohort aged 25-29 at the survey date is represented by the dark-shaded diagonal bar. If the experience of the older cohort (30-34) in the five years before the survey are ignored as shown, the truncated light-shaded bar represents the experience of the older cohort up to the point that it was aged 25-29, and can therefore be compared directly with the experience of the younger cohort, aged 25-29 at the survey date.

Of course, the comparison will not be exact: at the extreme, the oldest woman in the older cohort may be just short of 10 years older than the youngest women in the younger cohort, but on average the lag between the experience of the older and younger cohorts will be five years. Fertility patterns are – on the whole – relatively durable and, while constantly changing, tend not to change hugely in a five-year period, and even less so among women who are of essentially similar ages.

The method makes use of this comparability to derive "indices of relative change" for each combination of age and parity progression, defined as the ratio of the proportion of women in the younger cohort closing their birth intervals (depending on the precise specification of the method being applied, either within a specified period (e.g 60 months) or generally) to the equivalent proportion amongst women in the truncated, older, cohort. The "indices of relative change" are a measure of the change in fertility between the two equally truncated cohorts. An index less than one implies that the fertility of the younger cohort has fallen relative to the older cohort's fertility five years previously, and conversely.

The technique's originators suggest two major variants of the paired-comparison approach. The simpler version, the Projected Parity Progression Ratio (P_n) method, controls only for selection effects; the more complex version (Projected B_{60}s) allows for both censoring and selection effects. These methods are described in more detail below.

3.2 Projected parity progression ratios (P_n)

To avoid selection biases, Parity Progression Ratios are typically only calculated for women beyond, at, or close to the end of their childbearing years (Preston, Heuveline and Guillot 2001). Through the application of the paired comparison technique, a more detailed measure of the evolution of women's propensity to limit the size of their families can be obtained. The Projected Parity Progression Ratios (PPPRs) method, originally proposed by Brass and Juárez (1983) and denoted P_n, are derived from the proportions of women in two contiguous cohorts (aged [x, x +5) and [x+5, x+10) respectively, with the older cohort's experience truncated by 5 years) with *n* children who have had an $n+1^{th}$ child (i.e. the parity progression ratios). On the assumption that the relative speed at which women in each pair of cohorts progress to the next parity will differ by the same amount in the future as in the past, these indices of relative change can then be chained to derive projected values of the proportion of women who will ever close their birth intervals within a specified period, or generally.

This is achieved iteratively by means of the following relationship

Projected Parity Progression [x,x+5) =
Projected Parity Progression [x+5,x+10) x Index of Relative Change [x,x+5),
where Projected Parity Progression [45, 50) is the parity progression ratio of women aged 45-49, as conventionally calculated; and
where Index of Relative Change [x,x+5) = P_n[x,x+5) / $P_n{}^t$[x+5,x+10)

However, the reliance on 'chaining' successive indices of relative change makes some estimates resulting from the procedure unreliable, particularly those where only a small proportion of women have actually experienced the parity progression in question. As a result, Moultrie and Timæus (2002) recommend attaching a high degree of credibility only to those results where the underlying proportion of women who have undergone a particular parity progression is greater than 80 per cent, while placing a lesser degree of confidence on results based on 65 to 80 per cent of eligible women having experienced the parity progression of interest.[3]

3.3 Truncated pairwise measures of parity progression (B_t)

Before developing the simplified approach set out in the previous section, Brass and Juárez proposed a more elaborate method to derive unbiased estimates of quantum changes in fertility, using life table techniques to deal with the problem of censoring. This method is a variant of that proposed by Rodríguez and Hobcraft (1980), but avoids the structural bias introduced in this latter approach arising from its systematic exclusion of women with long birth intervals.

Like Rodríguez and Hobcraft's method, the method uses the proportion (B_t) of women progressing to a subsequent parity within *t* months of the last birth. The additional refinement, however, lies in the derivation of projected B_ts using a truncated pairwise comparison method identical to that used to derive projected parity progression ratios, except that the indices of relative change are now defined to be the ratio of unadjusted B_ts, and the calculation of projected parity progression ratios begins with the unadjusted B_t (as per Rodríguez and Hobcraft) for women aged 45-49. As with the P_ns this approach deals with the fact that "fast breeders" are more likely to move from one parity to the next at younger ages than "slow breeders", and hence with the problem of selectivity. However, B_ts deal more carefully with the problem of censoring than the P_n method discussed above. The method is preferable since the P_n are biased if the distribution of exposure-to-risk of women is changing, while the use of life table methods standardises for this. In addition, use

[3] Incidentally, other measures can also be derived from these projected parity progression ratios. The projected completed fertility of women in each cohort by the end of their childbearing years can be calculated in a manner analogous to the calculation of cohort fertility rates from conventionally-calculated parity progression ratios.

of this method also allows one to calculate median birth intervals, which cannot be done with the projected parity progression ratio approach.

Typically, a value of t is chosen so that the values of B_t are close to the proportions of women ever progressing to a higher parity (i.e. the projected parity progression ratio, P_n). The value of P_n can be thought of as the limiting value of B_t as t tends to infinity. A value of 60 months (i.e. 5 years, and hence the occasionally used term *quintum*) is frequently suggested as being long enough for most women who will ever do so to progress to a next birth, while avoiding the problem of increasingly sparse data when higher values of t are chosen. However, in South Africa, Namibia and Zimbabwe, the median progression time from one birth to the next is close to, or in excess of, 40 months for most age groups and parities. Accordingly, a value of t of much greater than 60 months is required to estimate parity progression. After examination of the data, and calculating adjusted B_ts (using the same truncation approach as above), a more appropriate value of 84 months was adopted for t – thus allowing seven years between births. Values of the adjusted B_t closer to the P_n could be achieved through use of B_{90}s, but the additional data loss is not justified.

One limitation of the B_{84}s is that they mask the effect of changing times within that seven-year period during which women have a subsequent birth. This is investigated through the analysis of projected median birth intervals, which are presented below.

3.4 Assessing the length of median birth intervals

As a summary measure of the length of birth intervals, the median is to be preferred over the mean for two reasons. First, the distribution of birth intervals must, of necessity, be strongly skewed to the right, and hence the mean may be very far removed from the mode or median. Second, since all women, by definition, have a last, open, birth interval, the calculation of a mean that takes these potentially infinite intervals into account quickly runs into conceptual problems. By contrast, the median requires no further data once half of the women who start in a given state have exited.

Survival analysis (or life table techniques) can reduce censoring bias by including truncated observations in the calculation of the exposed to risk. Summary measures of birth interval lengths that suffer less from censoring bias than simple means and medians can thus be derived from application of these techniques. Whereas life tables typically record the numbers of people surviving at a given age, those used in the evaluation of birth intervals record the numbers of women of parity i who have yet to have an $i+1^{\text{th}}$ birth t months since the i^{th} birth. The survival function (a function of time, t) gives the probabilities of survival (i.e. not having a next birth within t months) and the median birth interval length is calculated (interpolating if necessary) as the time in months for which the survival function is equal to 0.5.

A refinement of this approach that seeks to accommodate the fact that, where not all women have yet to experience the parity progression of interest (by virtue of their not yet being exposed to risk of progression from parity *k* to parity *k*+1 if they have not yet attained parity *k*), the median will be biased downwards, is to calculate projected median birth intervals, as described by Aoun (1989a; 1989b). The method is an extension of Brass and Juárez' truncated projected parity progression technique. Projected median birth intervals are calculated in the same manner as that used to calculate adjusted B_ts, but instead of using the proportion of women progressing from one parity to the next, the method uses the median birth intervals for the untruncated and truncated cohorts to derive "indices of relative change", which are then applied to the untruncated median intervals to derive projected median birth intervals.

As with the derivation of projected B_ts, the method produces reasonable results only where the proportion of women who have actually experienced the parity progression of interest is high. In other circumstances, where only a few women have done so, the projected median birth intervals are distorted by the magnitude of the adjustment made in respect of the indices of relative change. Hence, projected median birth intervals are presented only for those combinations of age and parity where more than 65 percent of women have actually progressed to that parity.

A further (albeit somewhat crude) refinement of Aoun's approach is to locate the median birth intervals in chronological time, so as to understand better the secular trend in birth intervals. This is done by estimating the mean date of births to women, by mothers' cohort and parity, and assuming that this is a reasonable estimate of when, on average those births (and hence birth intervals) prevailed.

4 Results

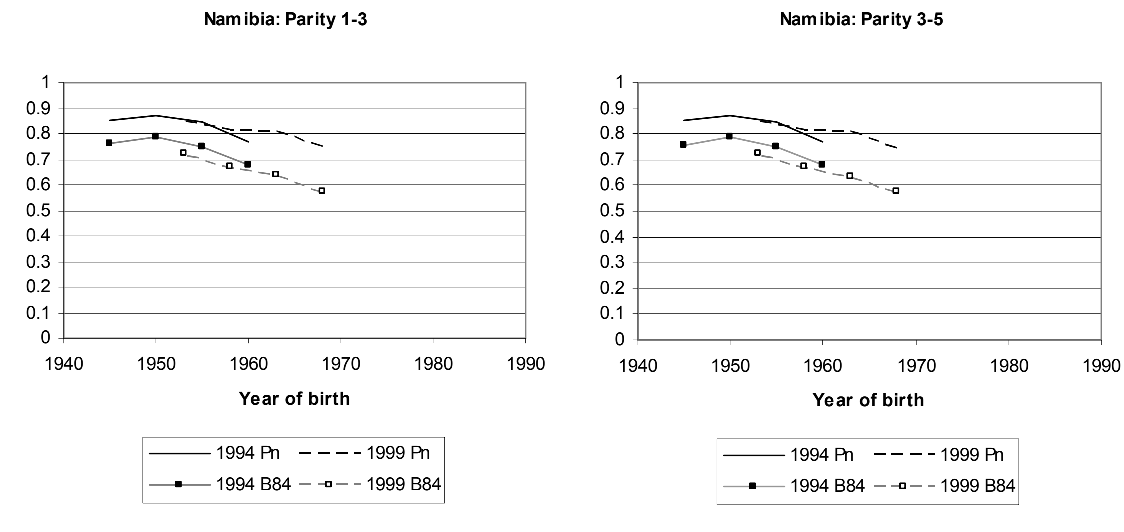
An enormous quantity of data is produced in the course of these investigations. For each survey, approximately 3 000 lines of output, consisting of truncated and untruncated life tables by age group and parity, are required to estimate the P_ns, B_{60}s, B_{84}s and projected median birth intervals. The results presented will first touch briefly on the values of P_n, B_{60}s and B_{84}s derived from each of the surveys, before moving to a more detailed discussion of the results on median birth intervals.

4.1 Projected parity progression ratios and projected B_{60}s

Graphs of the P_n, B_{60} and B_{84} for each survey are included after the references as Figure 13 - Figure 21. The categories on the x-axis are reversed, showing the data for the oldest women on the left, and the youngest on the right (more intuitively, the x-axis can be interpreted as a series of birth cohorts, starting with those born the longest time ago). Where parity progression within 60 or 84 months is not changing, the line will appear as a horizontal line, showing a roughly constant proportion of women progressing to a higher parity irrespective of their age. Reading the series from left to right also gives some idea of a secular trend, since – for example – women aged 45-49 progressing from their first to their second birth would have done so possibly 25 years before the survey, while younger women experiencing the same parity progression would have done so more recently. Thus, for example, in Malawi (Figure 14, page 32) parity progression has hardly changed at all, with the possible exception of parity progression at very high orders (parity 6+) and then this effect is only visible in the 2000 survey. This would be consistent with an assessment of high and – until very recently – constant fertility – as is indeed the case in the country. By contrast, in Zimbabwe (Figure 21, page 39), the proportions of women progressing to higher order births has been falling between successive cohorts for as far back as the data go.

The estimated B_{60}s, B_{84}s and P_ns from different surveys conducted in the same country provide a useful check on the quality of the data and the robustness of the method, because data points from two surveys conducted five years apart (for example, in Zimbabwe) should overlap. Even where the time between surveys is not exactly five years, we can approximate the calendar year of a cohort's birth to which estimates apply by means of subtracting the midpoint of each age group (i.e. 17 ½ … 47 ½) from the year of the survey, and assuming that the survey was conducted in the middle of the year. Doing this in the case of the Namibian data, where the surveys were conducted 8 years apart from each other, for example, shows a high degree of robustness of the results (Figure 4).

Figure 4 Pn and B84 for Namibian women progressing from 1st to 3rd, and 3rd to 5th births, by year of birth, Namibia 1992 and 2000 DHS



It is interesting to note that the B_{84} are more consistent than the P_n when compared across two surveys. This is almost certainly a function of the fact that the projected B84 accommodate both censoring and selectivity effects, whereas the P_n do not allow for the effect of censored data.

Applying the same approach to the data from the other seven countries leads to the welcome conclusion that the fertility and child spacing data within countries are essentially reliable and carry within them no severe contradictions[4].

4.2 Projected median birth intervals

A standard indicator produced as part of the DHS rounds is a measure of birth interval length. Median birth intervals by selected background characteristics from the data sets used, and calculated by MeasureDHS, are shown in Table 4. From these data, South Africa would indeed appear to be *sui generis* relative to other countries in the region: in aggregate, median birth intervals (47.1 months) in this country are almost 20 per cent longer than those observed in the countries with the next longest birth intervals (Namibia and Zimbabwe – South Africa's neighbours). However, simplistic measures such as medians often hide distortions in the data. Looking at the median birth intervals for women in their teens versus those in their twenties, for example, it is evident that the use of simple medians contains biases towards 'fast breeders' – those women predisposed to close their birth intervals early. However, despite these potential problems with the data, aggregate birth intervals in all countries under observation have lengthened over time, with the exception of Tanzania between 1996 and 1999.

Table 4 Median birth intervals by background characteristics, DHS surveys

	Type of place of residence		*Respondent's age*				*Birth order*			*Total*
	Urban	*Rural*	*15-19*	*20-29*	*30-39*	*40+*	*2-3*	*4-6*	*7+*	*Total*
Botswana 1988	36.6	35.8	24.4	34.1	37.5	38.9	36.8	36.3	32.6	**36.0**
Kenya 1993	30.8	30.1	24.3	28.6	31.8	34.7	29.4	30.7	30.5	**30.1**
Kenya 1998	34.8	32.7	23.9	30.6	35.2	39.8	32.5	33.1	33.3	**32.9**
Malawi 1992	32.1	32.8	24.2	30.7	34.6	36.6	31.6	33.4	33.4	**32.7**
Malawi 2000	36.2	33.6	25.7	31.6	36.8	39.7	32.1	35.2	36.1	**33.8**
Mozambique 1997	33.9	34.7	28.9	32.7	36.3	41.7	34.7	34.8	33.4	**34.6**
Namibia 1992	38.2	32.2	24.4	31.2	35.0	37.2	35.0	33.0	32.2	**33.5**
Namibia 2000	44.8	38.1	27.8	36.1	42.0	47.4	40.7	40.2	36.1	**39.9**
South Africa 1998	53.7	42.9	28.4	40.7	53.0	-	49.7	45.6	36.1	**47.1**
Tanzania 1996	36.8	33.1	26.2	31.2	35.8	38.1	33.4	33.8	33.9	**33.7**
Tanzania 1999	43.2	32.2	24.5	31.2	36.4	37.3	32.6	33.3	34.4	**33.3**
Zambia 1992	31.4	31.5	26.3	29.8	33.2	36.2	30.2	31.9	32.6	**31.4**
Zambia 1996	32.0	31.8	24.2	30.4	33.8	38.5	31.3	31.7	33.9	**31.9**
Zambia 2001/02	35.5	32.5	27.1	31.7	34.7	40.8	32.6	33.7	35.0	**33.3**
Zimbabwe 1994	41.1	36.7	29.0	34.7	40.6	41.2	36.9	39.2	36.3	**37.4**
Zimbabwe 1999	43.4	38.9	28.9	37.1	45.2	44.1	39.5	41.6	39.4	**39.9**

Source: MeasureDHS STATCompiler
Note: Data for South Africa (1998) are for all South Africans.

[4] An exception to this is in the South African DHS data, where, despite the general level of agreement between the parity progression ratios calculated from the two South African surveys, the large discrepancy between the ratios at younger ages in the transition from a first to second birth is surprising. One explanation for the discrepancy may be that the sampling design of the 1987-9 survey (which included only married women, or unmarried women who had borne a child), encouraged fieldworkers to omit births to younger, unmarried women.

The rest of the section deals with an exposition of more careful measurements of median birth intervals, using methods and techniques that seek to avoid common biases and pitfalls.

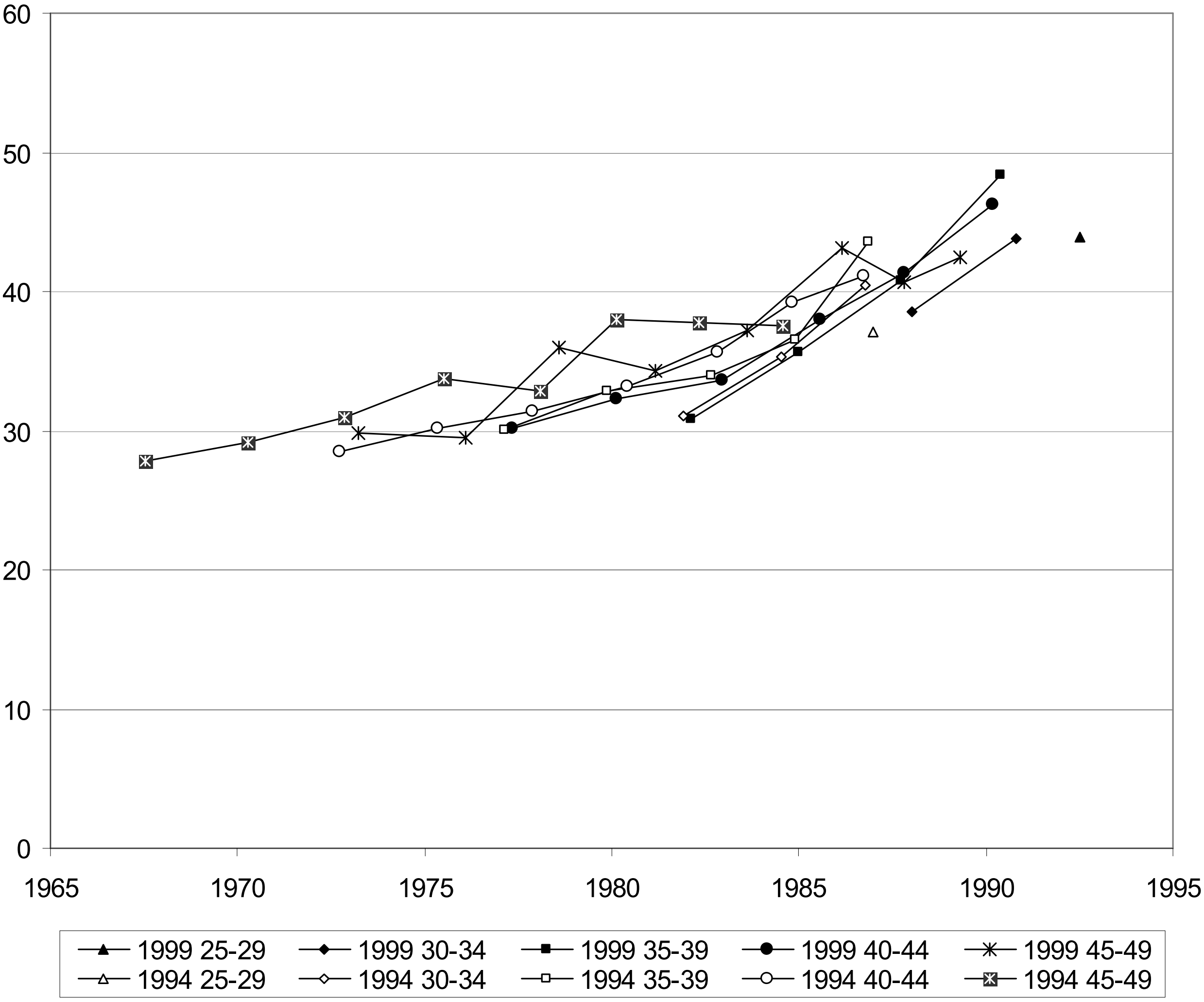
Two entirely distinct results are presented here. The first is that there is a generalized pattern of child spacing in Southern and Eastern Africa that manifests itself in median birth intervals that are contingent neither on age nor on parity. The length of a woman's birth interval, it would appear, is solely a function of the calendar year in which the birth interval is closed. This provides strong empirical proof of the Caldwell's hypothesis that fertility decline would happen at all ages and all parities simultaneously.

Results showing projected median birth intervals for each country are shown in Figure 22 to Figure 29. Each series shown represents the projected median birth intervals of women in a particular cohort (defined by her age at the survey date) in a particular survey. In each series, the first point shown represents the transition from first to second birth, the second that from second to third, and so on. The median birth interval is shown on the y-axis, and the x-axis shows the approximate date at which that birth interval applies, using the time-location approach outlined above. Space considerations do not permit a detailed analysis of each country's data. As a result, data from Zimbabwe will be used for illustrative purposes. Figure 5 reproduces Figure 29 for ease of reference.

The Zimbabwean data is typical of the data from the 16 surveys from the eight countries, although perhaps a little better behaved than that from some of the other surveys. It can be observed from the ten series of data that there is little variation in the length of projected median birth intervals by age cohort, parity or survey – but that the defining characteristic of these data is their association with secular time. Thus, for example, women aged 45-49 in the 1994 survey progressing from their 8th to their 9th birth (roughly in 1984) had birth intervals hardly any different from women aged 35-39 at the time of the 1999 survey progressing from their second to third births.

By comparison, the trend in birth intervals in an arbitrarily chosen South-East Asian country (the Philippines DHS of 1998, which showed a Total Fertility Rate of 3.73 children per woman) shows a very strong pattern of birth intervals increasing by parity, but remaining invariant across calendar time. These data also show a strong asymptote at around 40 months, something not remotely identifiable in any of the African data. Also, the median birth interval for women progressing from their first to their second birth has remained almost constant at 25 – 27 months, again not a feature of any of the African data.

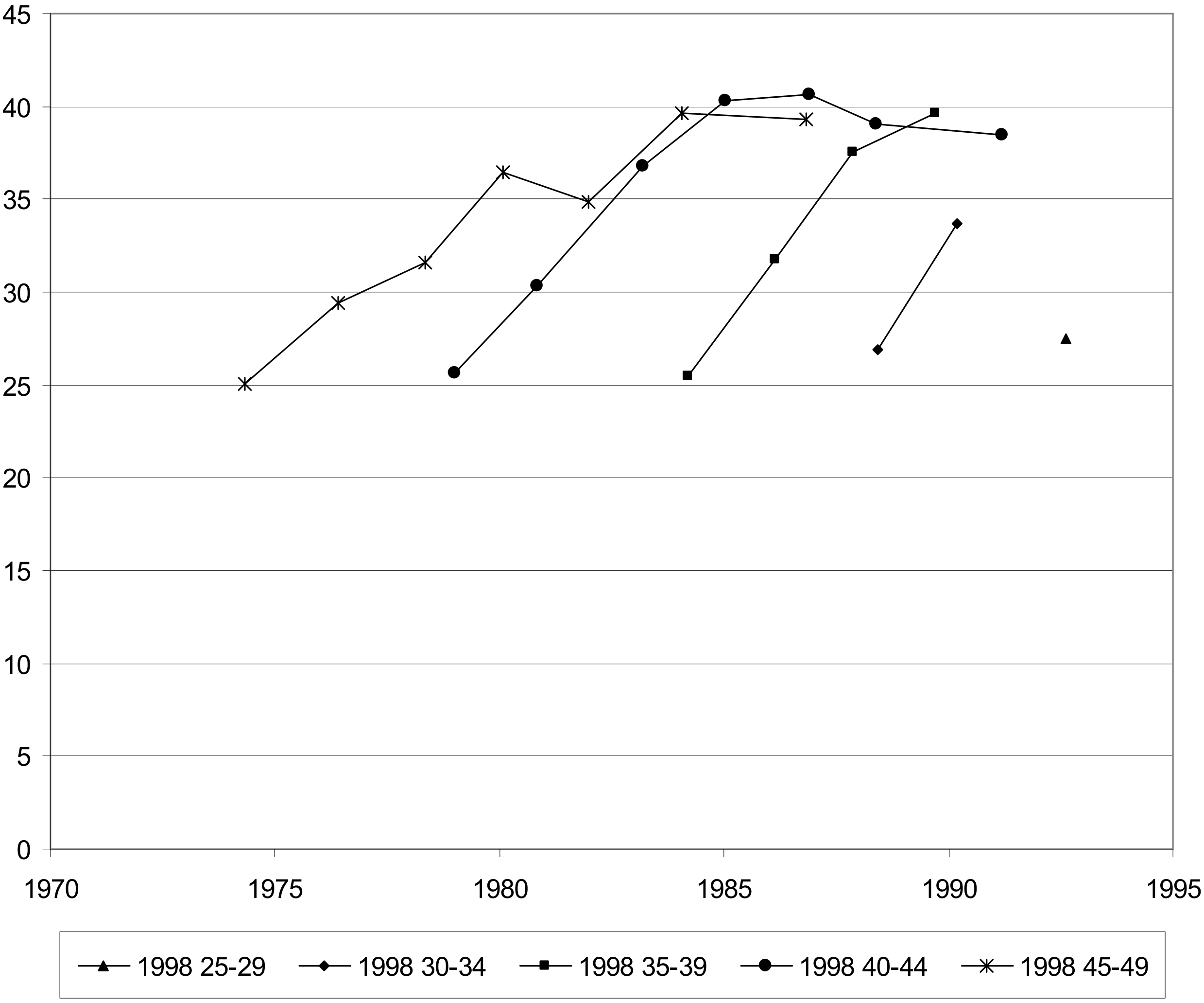
Figure 5 **Projected median birth intervals for Zimbabwe, by cohort, year of child's birth and survey – 1999 and 1994 DHS**



Thus, on substantive grounds, it can be argued that – even though there are substantial intraregional differences in the length of median birth intervals – there are more similarities in birth spacing patterns within the region than outside of it.

The second conclusion drawn relates to the patterns of increase in projected median birth intervals in Southern and Eastern Africa. Having established that, in the countries under examination, in no country is as significant an age-parity effect observed as in the Philippines and that birth intervals would appear to be most strongly determined by the calendar year in which those births are estimated to have taken place, we can progress to an investigation of intraregional variations in median birth intervals.

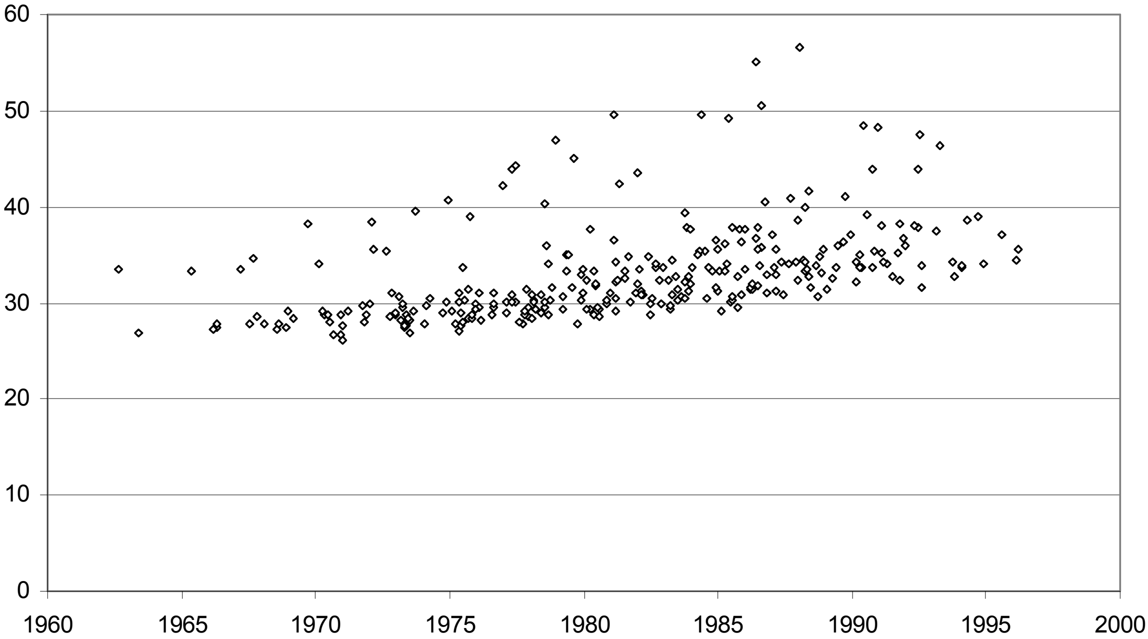
Figure 6 **Projected median birth intervals for Philippines, by cohort, year of child's birth and survey – 1998 DHS**



Data on projected median birth intervals, by age and parity as well as their calendar year time location, from the 16 surveys were used – a total of 303 data points. These are shown in the figure below.

The data relating to South Africa are readily identifiable at the top of the graph. However, to better understand the dynamics of fertility and child spacing in the countries being studied, a very simple generalized linear model was fitted to these 303 data points with the projected median birth interval as the dependent variable. The independent variables included in the model were the (normalized to centre on 1980) date to which the projected median birth intervals apply, the square of this variable and a categorical variable related to the country to which the survey data apply. Interaction terms between the country variable and both the date variable and its square, were required in the model, but – importantly – fitting a different model to different surveys within the same country did not lead to a statistically significantly better fitting model.

Figure 7 Projected median birth intervals by year, 16 surveys from 8 countries



Also, as anticipated, the inclusion of neither age nor parity resulted in a better fitting model. The regression model fits exceptionally well – even in this highly simplified form, the model has an adjusted R^2 of 0.899, implying that only 10 per cent of the variation in projected median intervals is not captured by this model specification. The resulting fitted values are shown in Figure 8.

The fitted model illuminates a most interesting finding: that there are – in effect and despite the multitude of data analysed – only three patterns of child spacing that can be distinguished in Southern and Eastern Africa, one for South Africa; a second for Namibia and Zimbabwe; and a third for Kenya, Tanzania, Malawi, Zambia and Mozambique. Again, as would be expected, the results are intuitively reasonable. Birth intervals in all countries have increased over time, a factor associated with rising use of contraception, first as a substitute for – and then to supersede – traditional postpartum taboos.

Since the fitted model is so close to the actual, removing the clutter associated with the actual plots, and graphing the fitted plots for each of the eight countries allows the pattern to be elucidated a little more clearly.

Figure 8 Actual and fitted values, projected median birth intervals: 16 surveys from 8 countries

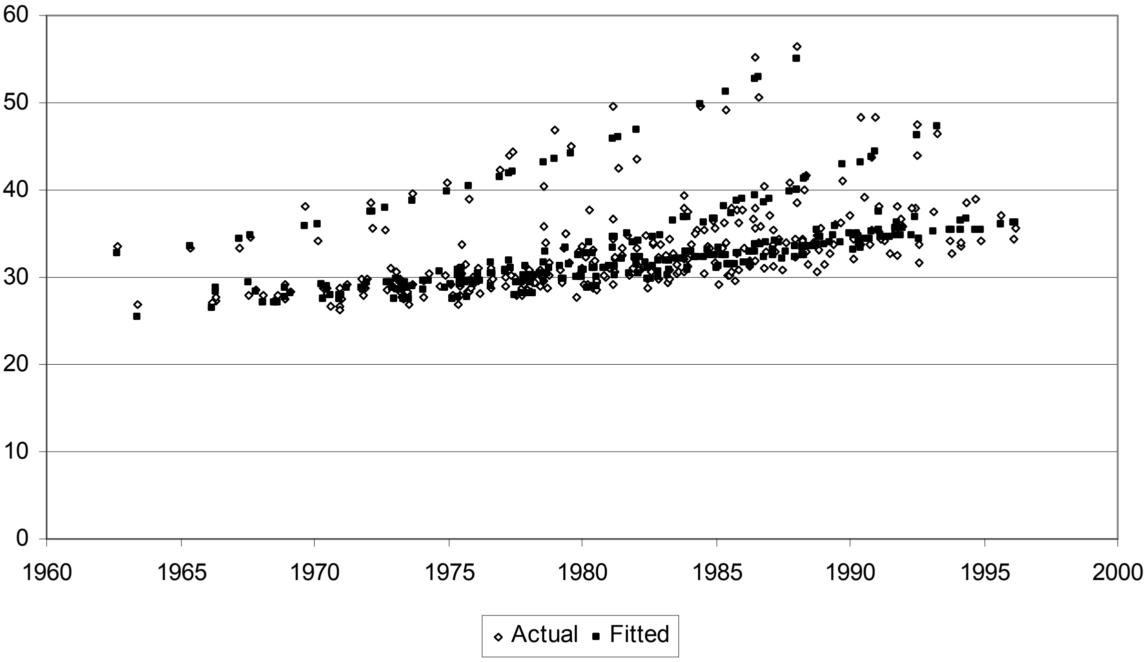


Figure 9 shows the fitted projected median birth intervals for South Africa, Namibia and Zimbabwe. South Africa's birth intervals show a monotonically increasing trend, and it is unclear from the data to hand at what point before the 1960s median birth intervals were constant (although the actual data points lead to the supposition that perhaps the upward trend in the 1960s is exaggerated: this would be consistent with what is known about the provision of family planning services and contraception in South Africa under apartheid (see, for example Brown (1987), Kaufman (1998; 2000) and Moultrie (2001)). The patterns of child spacing evinced in Namibia and Zimbabwe are, to all intents and purposes, indistinguishable from each other with both showing approximately constant birth intervals (of approximately 30 months' duration) until 1975, and then increasing.

Figure 10 shows the fitted projected median birth intervals for the third group of countries. There is little to distinguish the child spacing dynamics over time in these five countries. Nonetheless, in all cases, the pattern is the same: median birth intervals are short and constant at around 30 months until the mid-1980s, after which they begin to increase. There is astonishingly little variation in the fitted curves for the five countries covering more than three decades of history.

Figure 9 **Projected median birth intervals for South Africa, Namibia and Zimbabwe by year of occurrence of birth, multiple Demographic and Health Surveys**

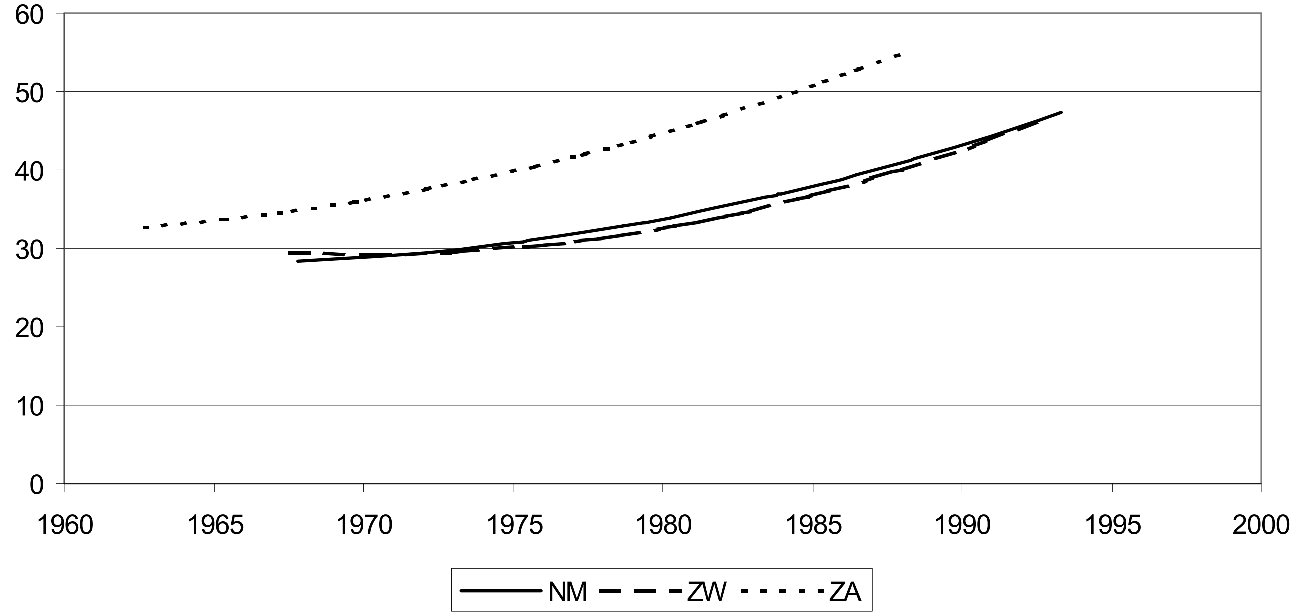
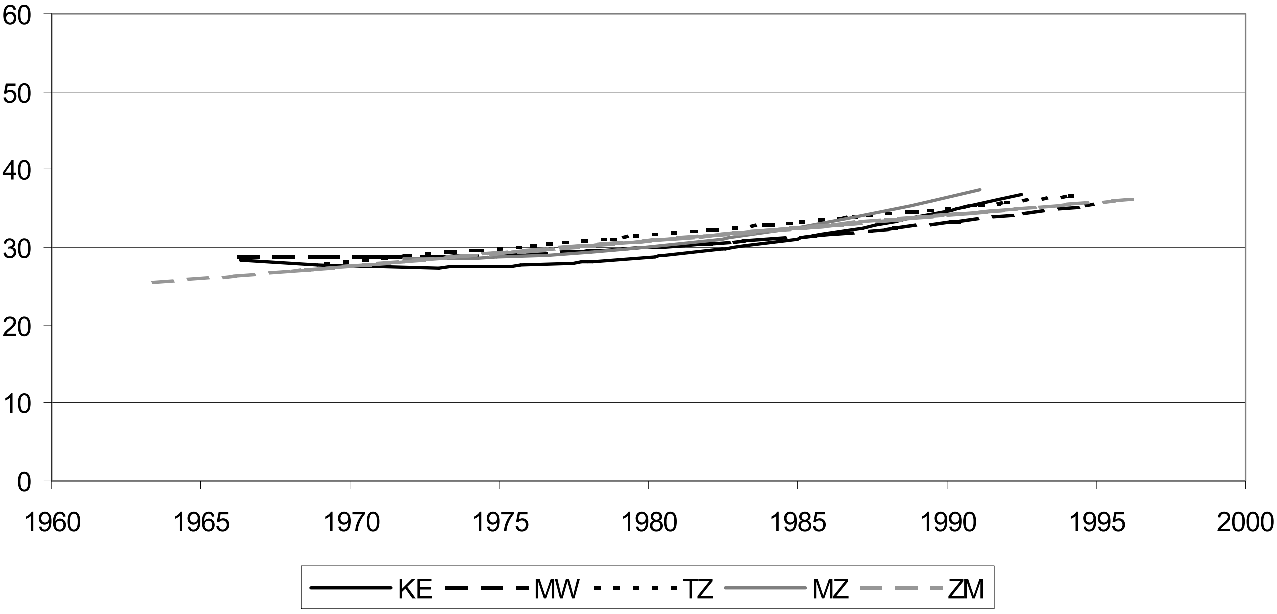


Figure 10 **Projected median birth intervals for Kenya, Malawi, Tanzania, Mozambique and Zambia by year of occurrence of birth, multiple Demographic and Health Surveys**



5 Discussion

This section puts forward a number of hypotheses relating to the results presented above. The first is that – while forming a distinct trend of their own – the data from South Africa are not that different from fertility patterns elsewhere in the region. The justification for this lies in the fact that the method has proven its robustness in the context of the earlier investigations carried out into

South African fertility by Moultrie (2001, 2002) and Moultrie and Timæus (2003), which showed (gratifyingly) that the median birth interval among women who have never used modern forms of contraception before a given birth order have increased by only a very small amount over the full 35 years covered by the investigations, while the intervals among women who have made use of modern contraception have risen even more rapidly than shown above. In aggregate then, as one would have anticipated, the national picture is confounded by the prevalence of modern contraceptive usage at a national level.

In this regard, South Africa is different – but, at least in this context, it is less clear whether having a higher level of contraceptive use makes South Africa stand out, or whether it marks South Africa as a harbinger of fertility change (and quite possibly, other demographic dynamics too) in the region. Further evidence for this lies in the fact that the two countries with the next highest level of contraceptive prevalence are Namibia and Zimbabwe.

Again, South Africa, Namibia and Zimbabwe stand out, a finding that – on the basis of the evidence in Figure 11 and Figure 12 – contributes to an explanation of the childspacing dynamics being strongly conditioned by the prevalence of contraceptive use in the country.

Figure 11 Projected median birth intervals (months) of African South African women, by ever use of contraception prior to birth, 1998 DHS and 1987-9 DHS

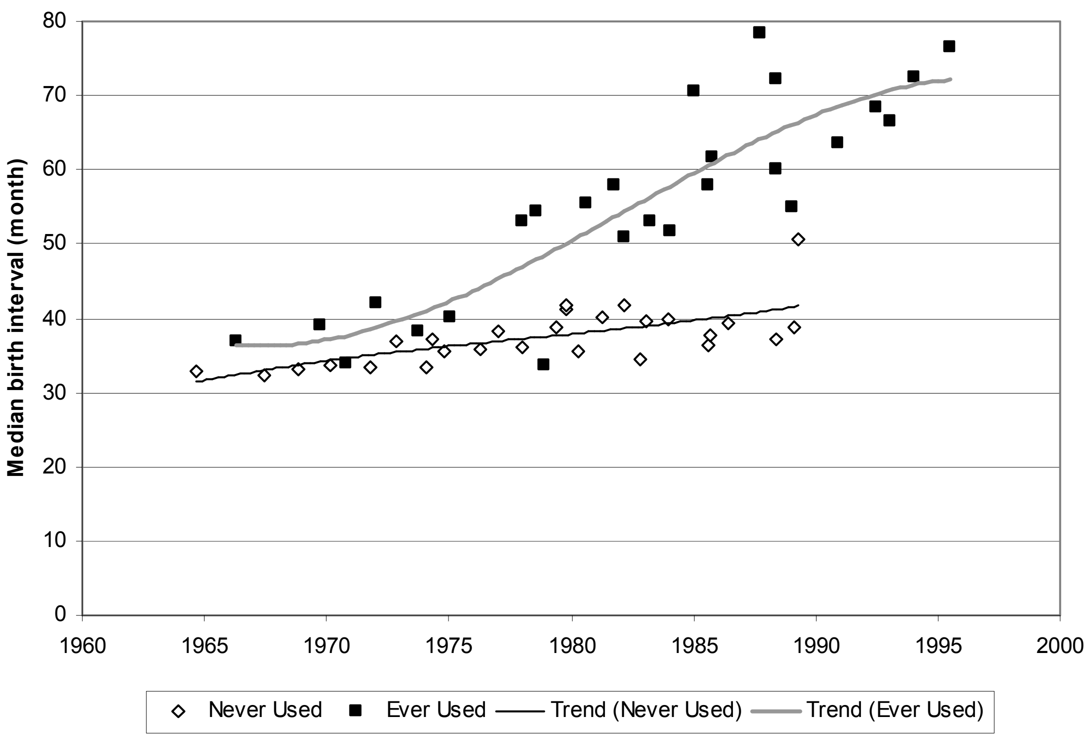
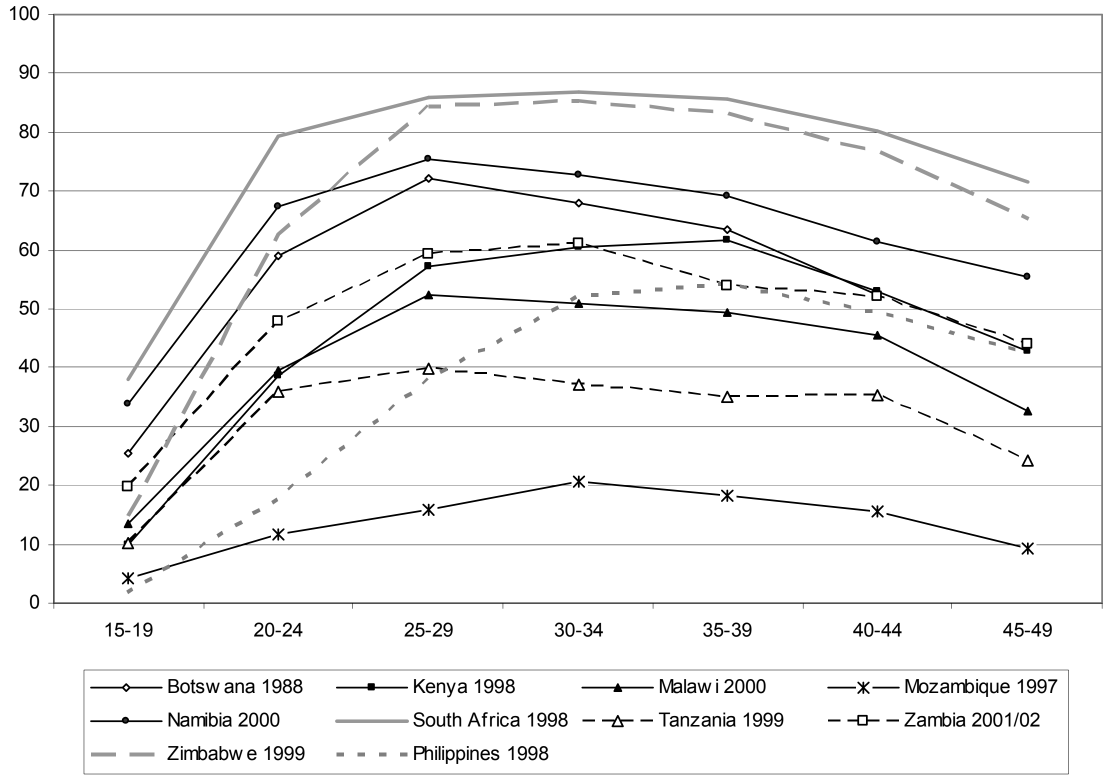


Figure 12 Percentage of women who have ever used modern contraception, by age, selected (more recent) DHS surveys



Source: STATCompiler Measure DHS
Note: South African data is for South Africans of all population groups

A case for the prolonged birth intervals in the South Africa, Zimbabwe and Namibia being directly correlated with levels of contraceptive use is, however, undermined by data from the third group of countries. There is a very wide disparity between the levels of contraceptive use in Mozambique and (say) Zambia, yet both countries evince a fundamentally similar pattern of child spacing. Thus, while widespread use of contraception may explain the evolution of exceptionally long birth intervals, it does not explain the gradual increase in settings where use is limited (or non-existent, as in the case of women who have never used contraception, as shown in Figure 11).

The evidence on South Africa's fertility transition relative to that observed elsewhere in the region returns us to the question of whether (at least in respect of fertility decline) South Africa should be regarded as *sui generis* or not. The literature on birth spacing and birth intervals elsewhere in sub-Saharan Africa is possibly inappropriate to South Africa, and of little help in understanding the changes in South African birth intervals over the last 30 years. The data for the 1987-9 South Africa were, at the time of Cohen's writing, not in the public domain, and Cohen would therefore have not been able to draw the comparisons made in Figure 2. Nevertheless, it was felt that perhaps comparisons would not be meaningful, and that South Africa should be regarded as *sui generis*:

> There will probably be a great deal of debate about the extent to which comparisons should be drawn between the South African experience and the experience of other countries in the region. (Cohen 1993:24)

Until recently, South Africa was systematically excluded from comparative analyses of regional fertility trends and levels. Apartheid-era secrecy regarding access to official data and international isolation further ensured that the demography of South Africa's population remained unknown and uninvestigated for longer than in almost every other country in sub-Saharan Africa. It has been argued elsewhere (Moultrie 2001, 2002) that the particular combination of low fertility and exceedingly long birth intervals in South Africa was one that made intuitive sense given the country's political and institutional history, with the timing of the commencement of the increase in birth intervals coinciding neatly with the roll-out of the country's first national family planning program in the early 1970s, and its official launch in 1974.

As has been argued elsewhere (Timæus and Moultrie 2003), this increase – coupled with only a slow and gradual decline in fertility over several decades – represents a pattern of childbearing that is characteristic neither of family limitation (i.e. parity-specific limitation), nor spacing as conventionally defined (i.e. child spacing predicated on the age of the youngest child). Rather, it is argued that a third mode of childbearing (neither spacing, nor limiting, but 'permanent postponement' in Lightbourne's phrase (Lightbourne 1985)) exists in South Africa which hinges on women's desire to delay pregnancy and its associated costs *sine die*, and without consideration for parity or age of other children.

The evidence presented in this paper, unless it is argued that the lengthening of birth intervals in South Africa, Zimbabwe and Namibia is conditioned to a very large extent by their (relatively more similar) colonial histories, argues against an overtly institutional set of explanations. It is more likely now, I propose, that the lengthening of birth intervals (and, quite possibly, the widespread adoption of 'permanent postponement' as a childbearing strategy) is a feature of the region's demography, amplified in the case of those three countries by their institutional histories.

A second line of explanation that must be considered also relies on the distinction between the median birth intervals between South Africa, Namibia and Zimbabwe and the rest of the region (on the one hand) and the Philippines (on the other). These comparisons suggest the possibility that Maire Ni Bhrolcháin's 'contraceptive confidence hypothesis' (Ni Bhrolcháin 1988) may hold. Ni Bhrolcháin suggests that women who lack access to methods that they are confident that they can use successfully to avoid becoming pregnant may space out their births in order to minimize the risk of overshooting their desired family size by having one or more accidental births. The evidence from the Philippines might seem to suggest that Filipina women, confident in their usage of contraception, may be consciously targeting birth intervals of around 40 months, whereas African women are less confident, and hence continue to space their births by longer and longer amounts of time. Unfortunately, the data on contraceptive prevalence (Figure 12) in the Philippines completely undermines this line of argument, with its very low levels of contraceptive use (lower than that in Kenya or Zambia), relatively low levels of fertility but very different pattern of birth spacing that indicate an ability to restrict birth intervals to no more than 40 months.

The contraceptive confidence hypothesis as applied here is further undermined by the fact that countries in the same region with similar patterns of birth intervals have very different levels of contraceptive use.

6 Conclusions

This paper began by raising the question of whether South African fertility patterns were *sui generis*, and qualitatively different to those observed elsewhere in Southern and Eastern Africa. The answer, now, would appear to be 'no'. While fertility rates in South Africa are indeed lower than anywhere else in Southern and Eastern Africa, the age distribution of that fertility (characterized by a much flatter schedule than that which typically prevails in middle-to-low fertility countries) is indistinguishable from that found elsewhere in Southern and Eastern Africa. The pattern of fertility and family formation evinced by the P_n and the B_{84}s, too, suggest that South Africa may not be as exceptional as one might have presupposed: the projected median birth intervals presented here argue more strongly for the fact that South Africa, on account of its greater level of socio-economic development, presages what might occur elsewhere in the region several decades hence. Thus, if there is a case to be made for exceptionalism, it is for the exceptionalism of the region as a whole, and not simply for South Africa. On these grounds and using the evidence presented here, strong support can be marshaled for Caldwell, Orubuloye and Caldwell's hypothesis that fertility decline in sub-Saharan Africa will happen at all ages and parities simultaneously.

In any event, the conclusion drawn here is at variance with that drawn by Bongaarts (1997) who argued that, over the course of a fertility transition, birth intervals remain "relatively invariant", with contraceptive use substituting for 'traditional' means of spacing births – postpartum abstinence and lactational amenorrhoea. Manifestly, birth intervals in Southern and Eastern Africa have not remained invariant over the course of their fertility declines, which in turn lends further weight to the argument that the pattern of childbearing in the region is qualitatively different from that elsewhere in the developing world.

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Figure 13 B60s, B84s and Pn for Kenya – 1998 DHS (top) and 1993 DHS (bottom)

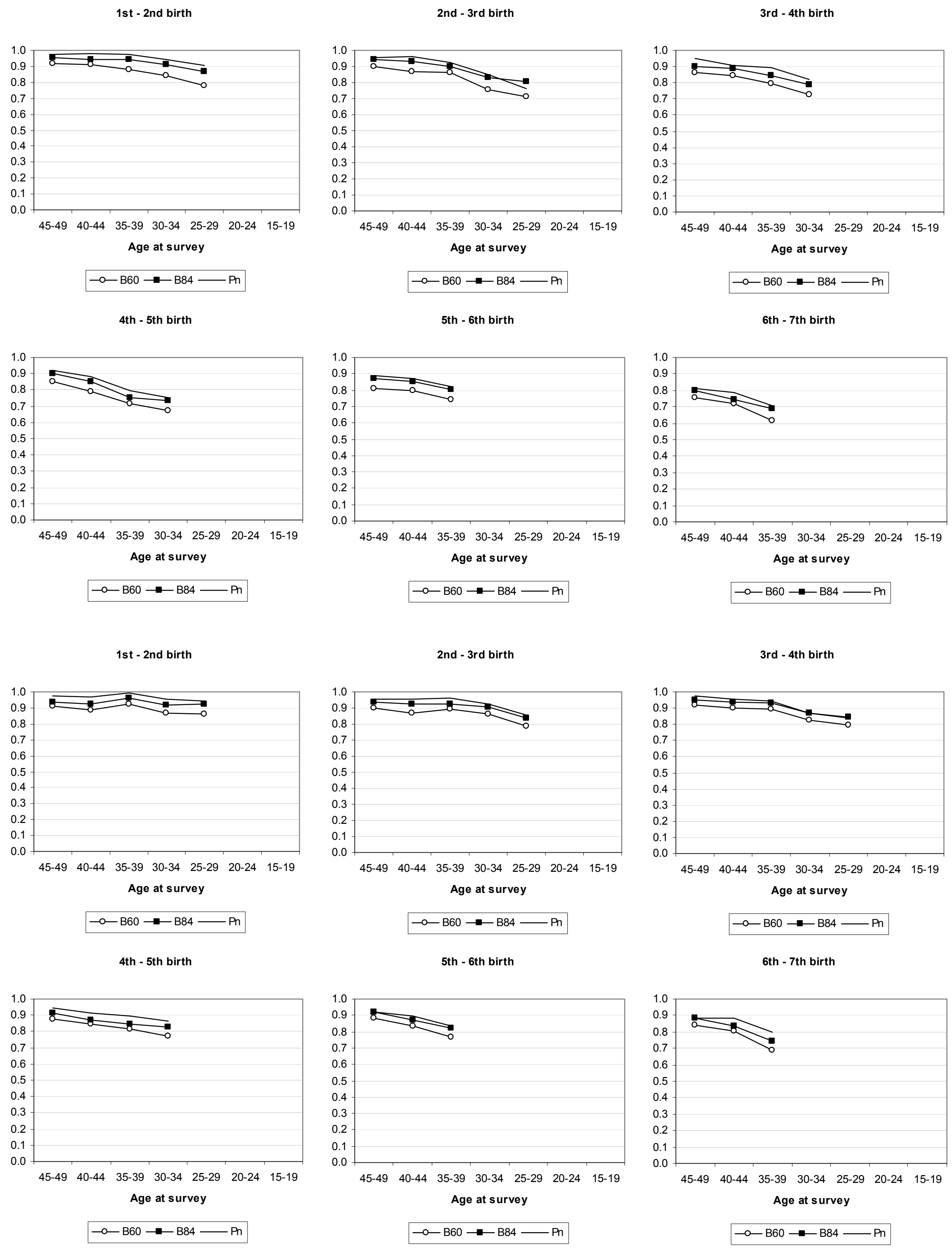

Figure 14 B60s, B84s and Pn for Malawi – 2000 DHS (top) and 1992 (bottom)

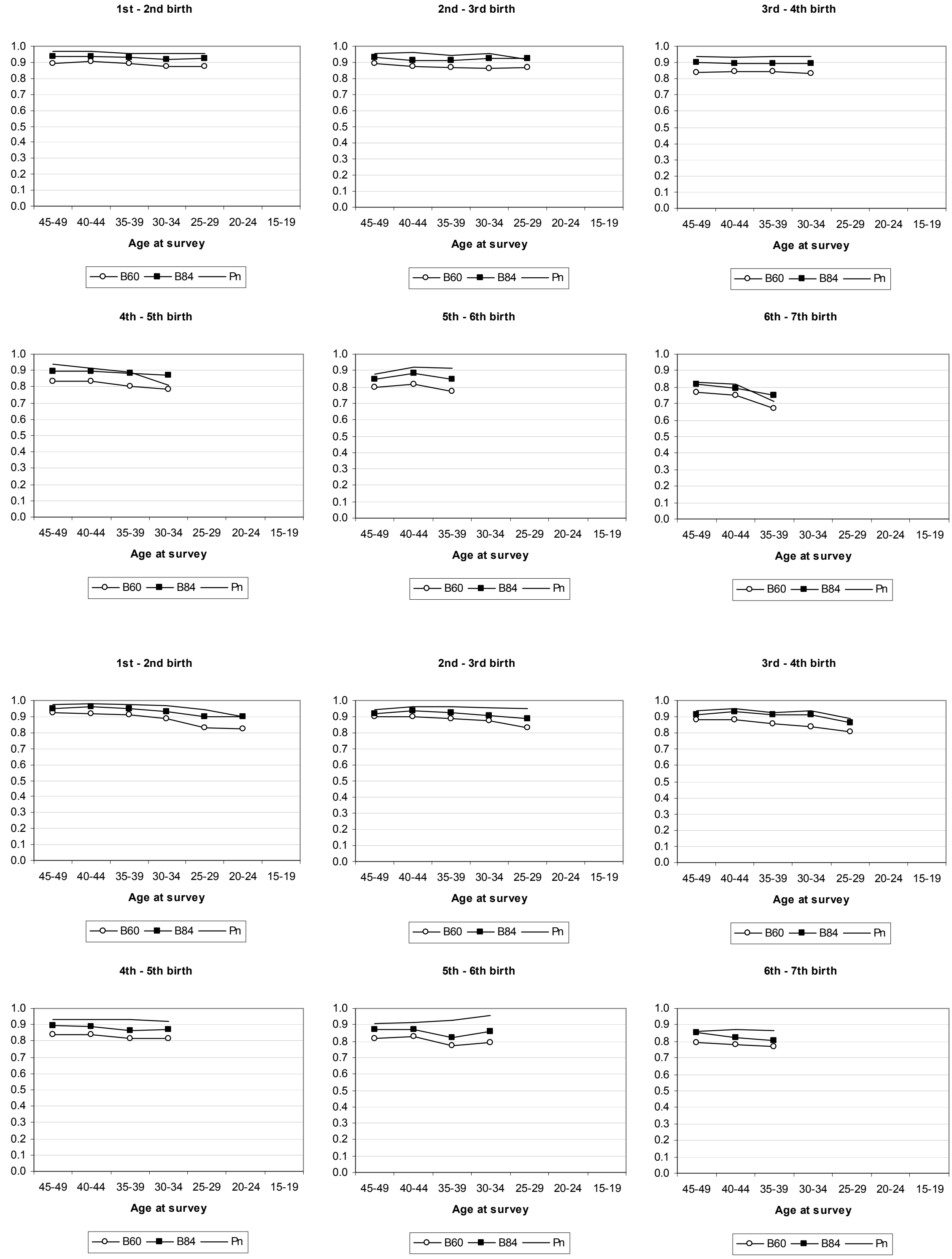

Figure 15 B60s, B84s and Pn for Mozambique – 1997 DHS

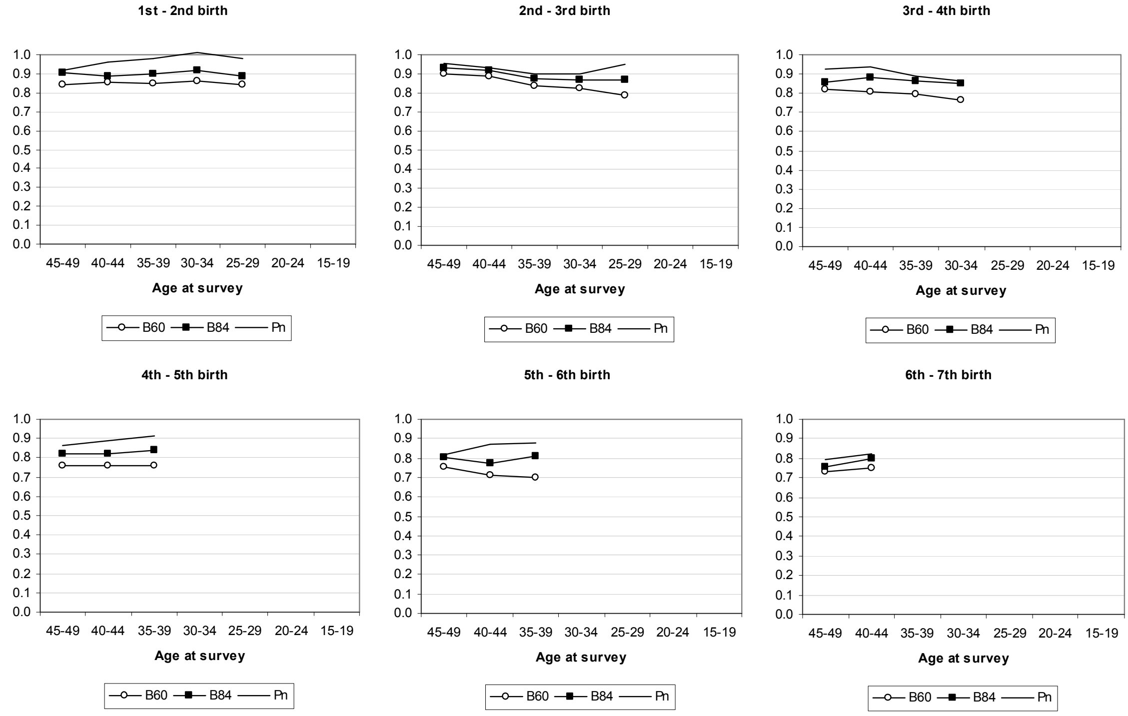

Figure 16 B60s, B84s and Pn for Namibia – 2000 DHS (top) and 1992 (bottom)

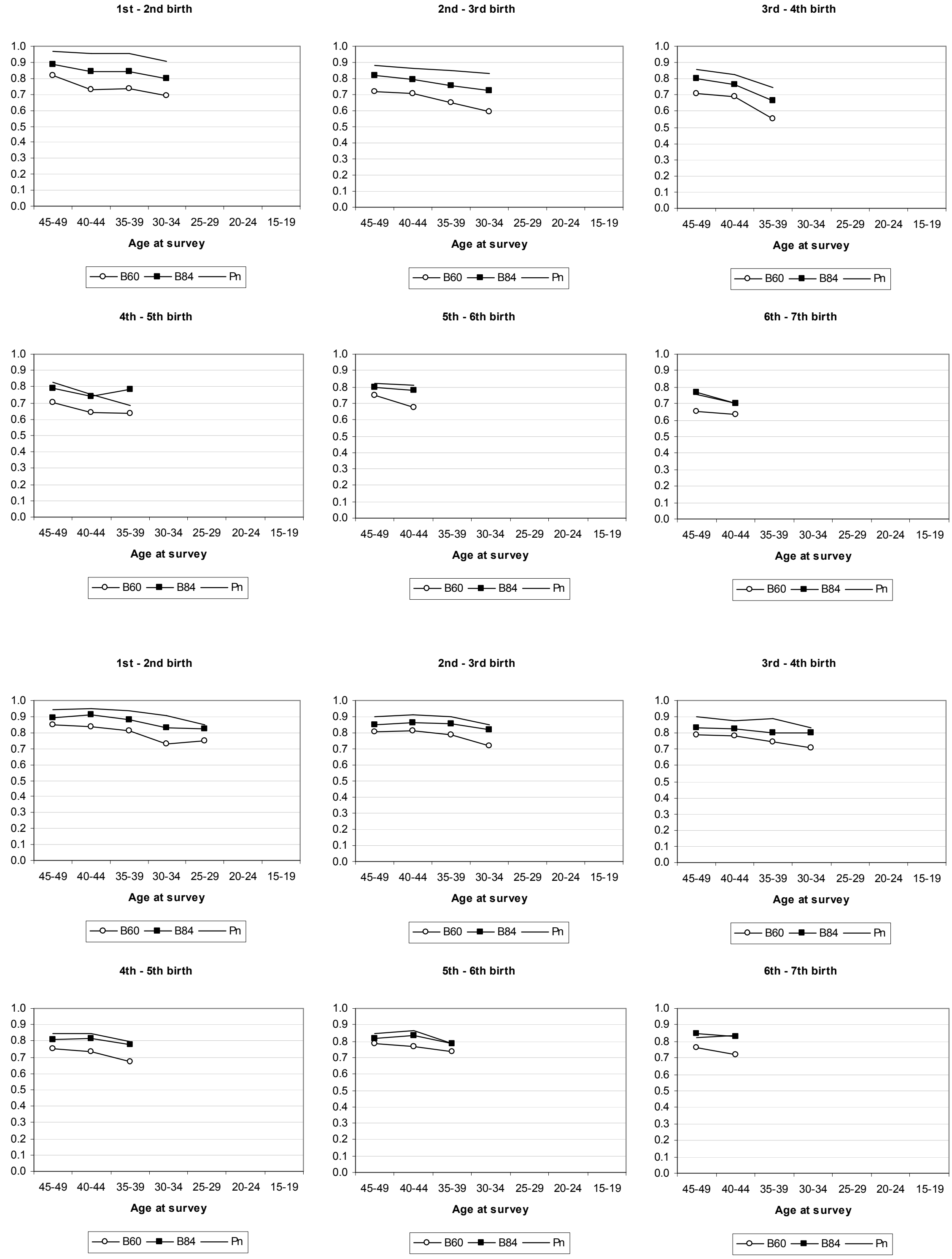

Figure 17 B60s, B84s and Pn for South Africa – 1987-9 DHS (top) and 1998 DHS (bottom)

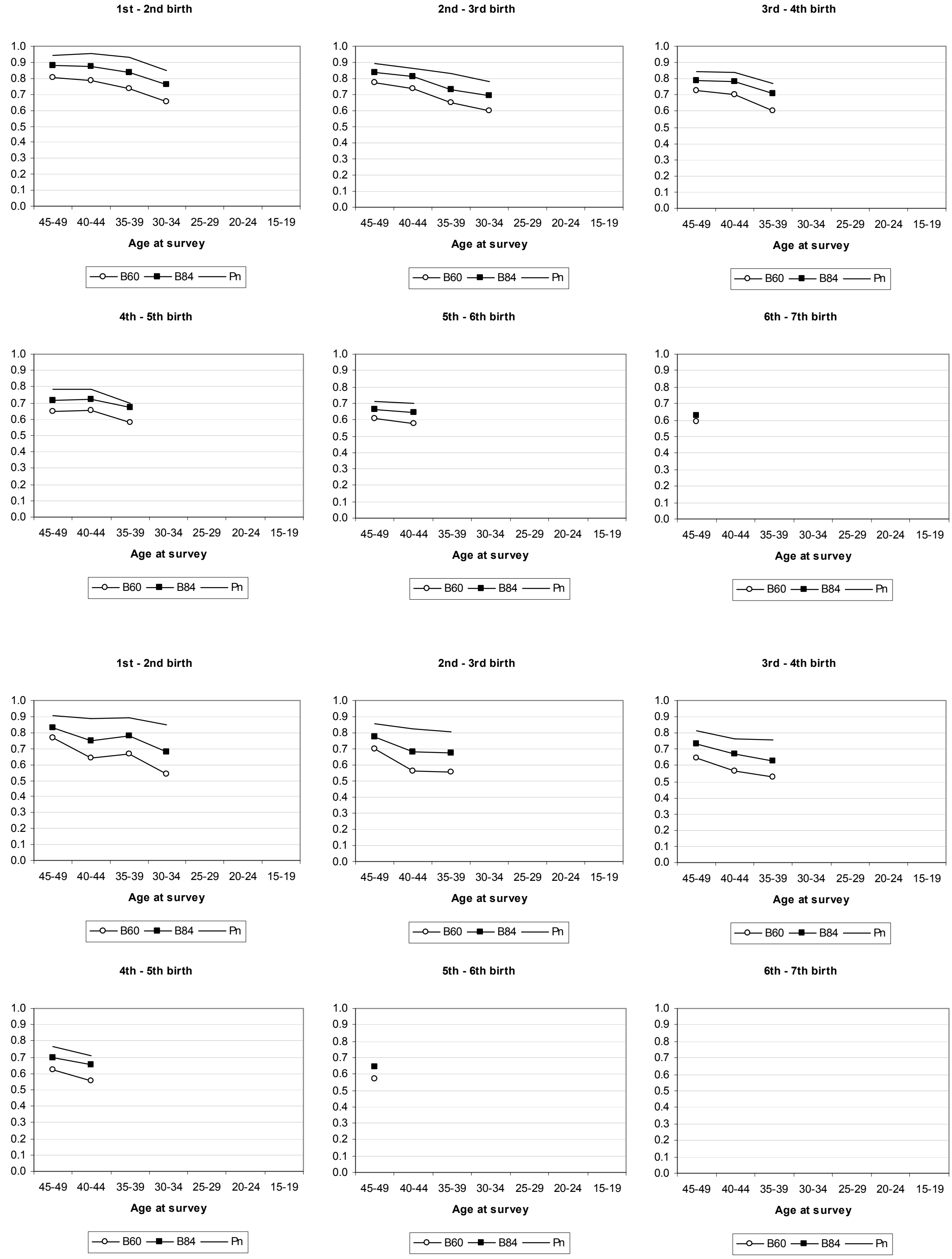

Figure 18 B60s, B84s and Pn for Tanzania – 1999 DHS (top) and 1996 DHS (bottom)

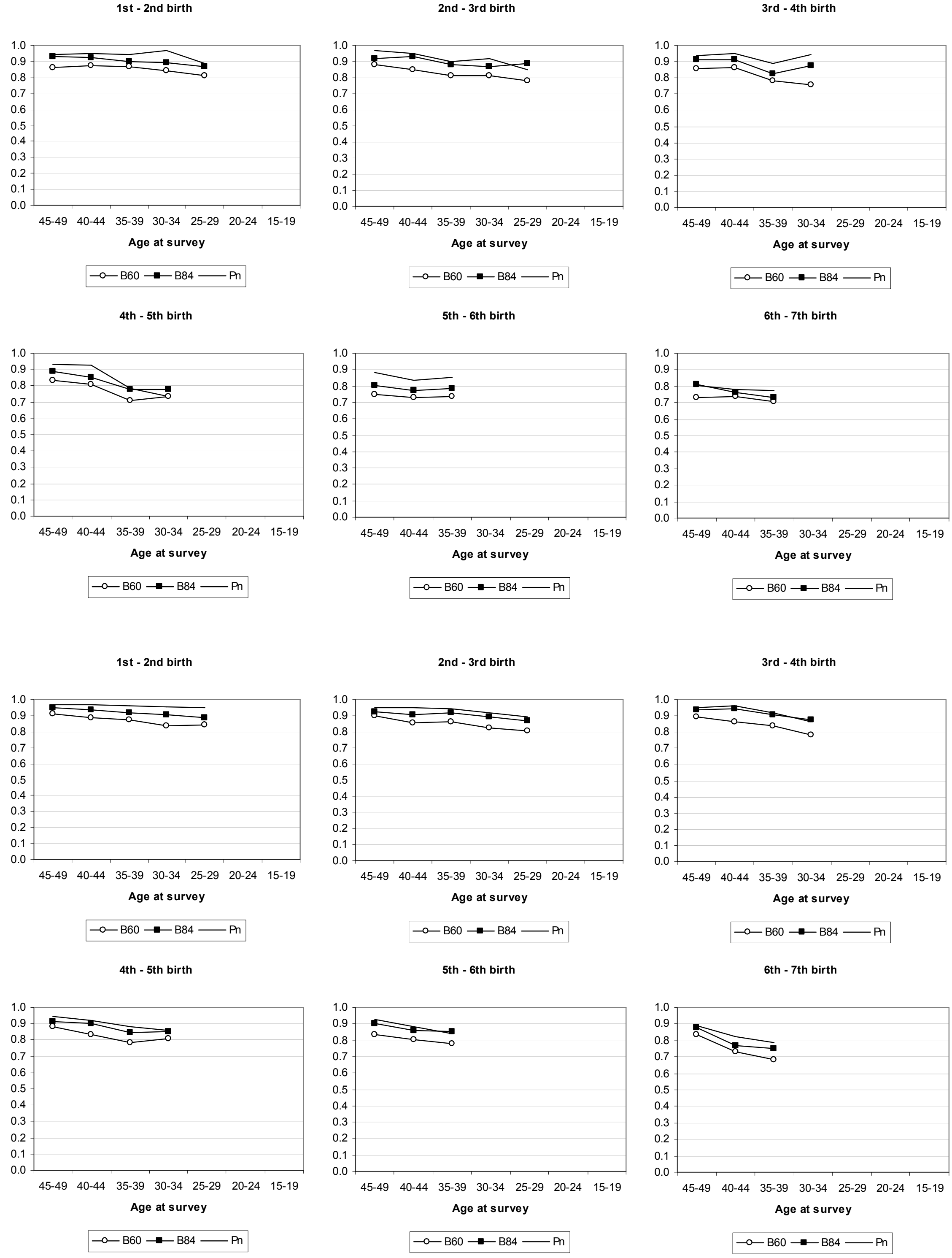

Figure 19 B60s, B84s and Pn for Zambia – 2001 DHS (top) and 1996 DHS (bottom)

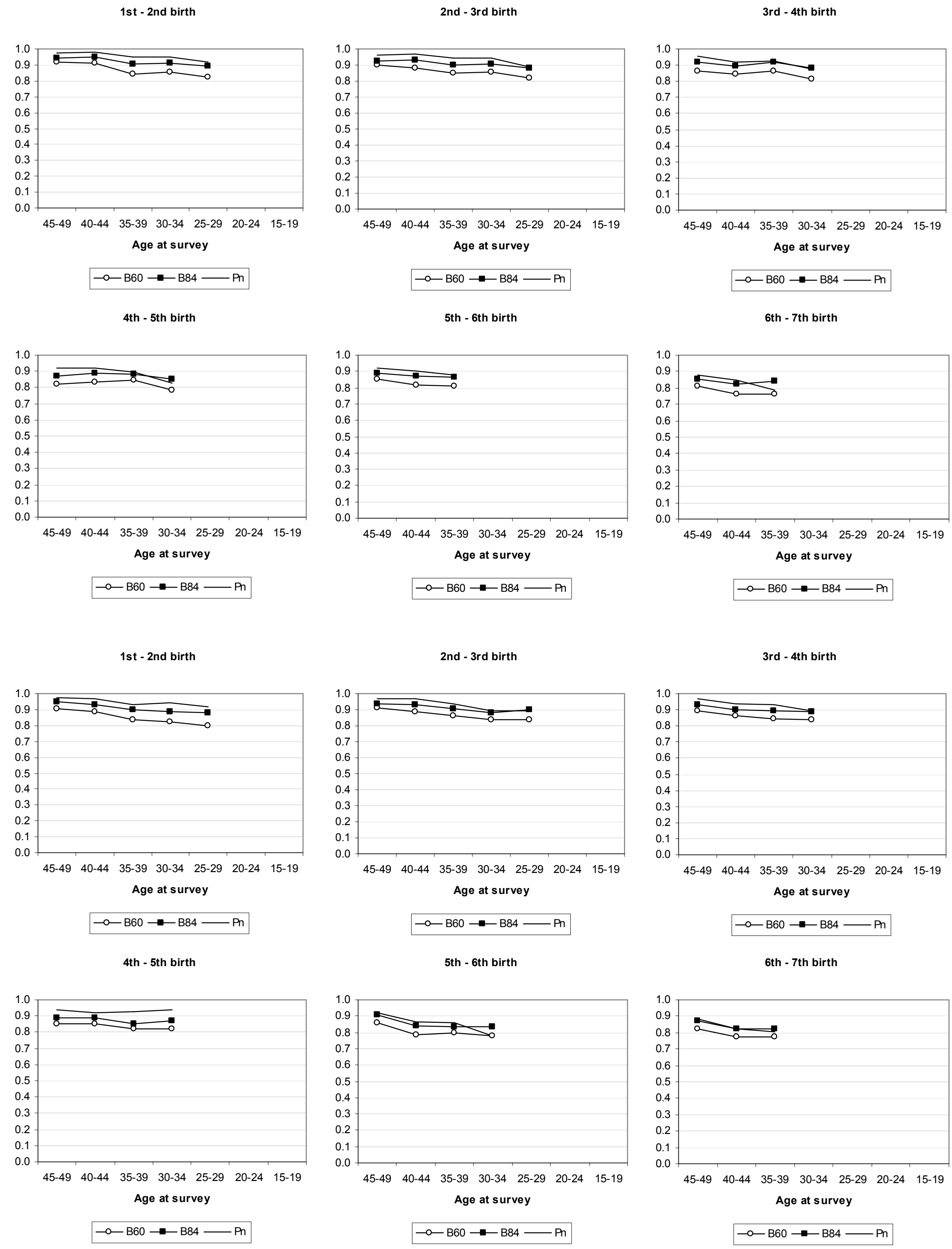

Figure 20 B60s, B84s and Pn for Zambia – 1992 DHS

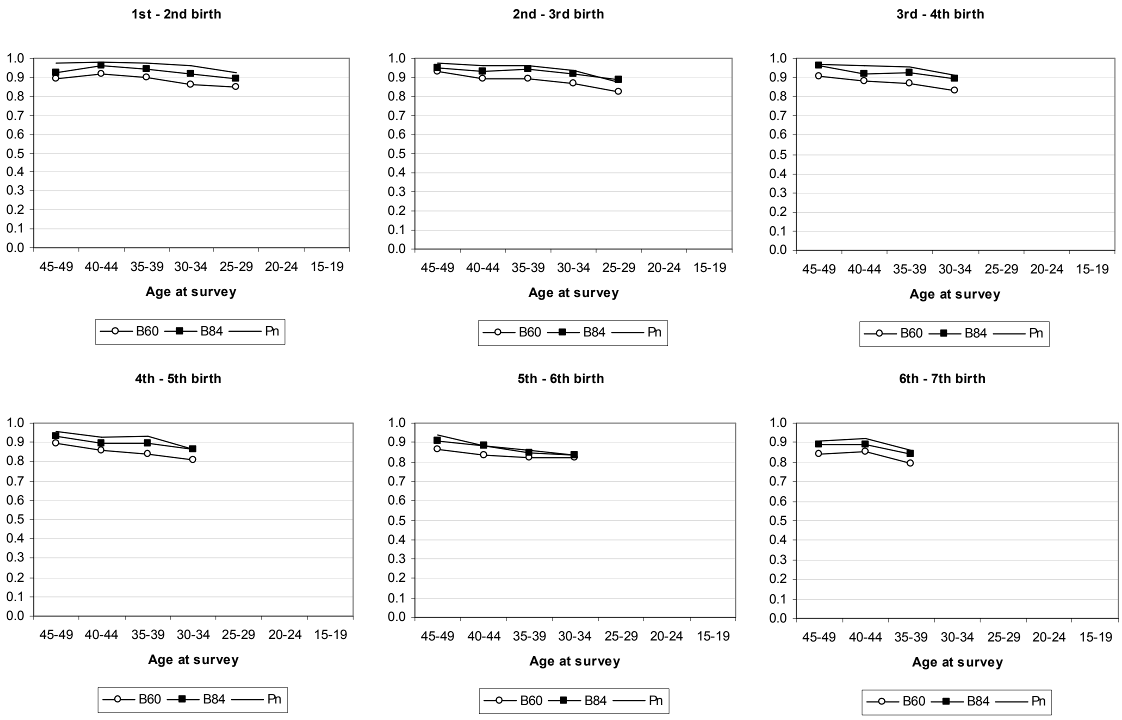

Figure 21 B60s, B84s and Pn for Zimbabwe – 1999 DHS (top) and 1994 DHS (bottom)

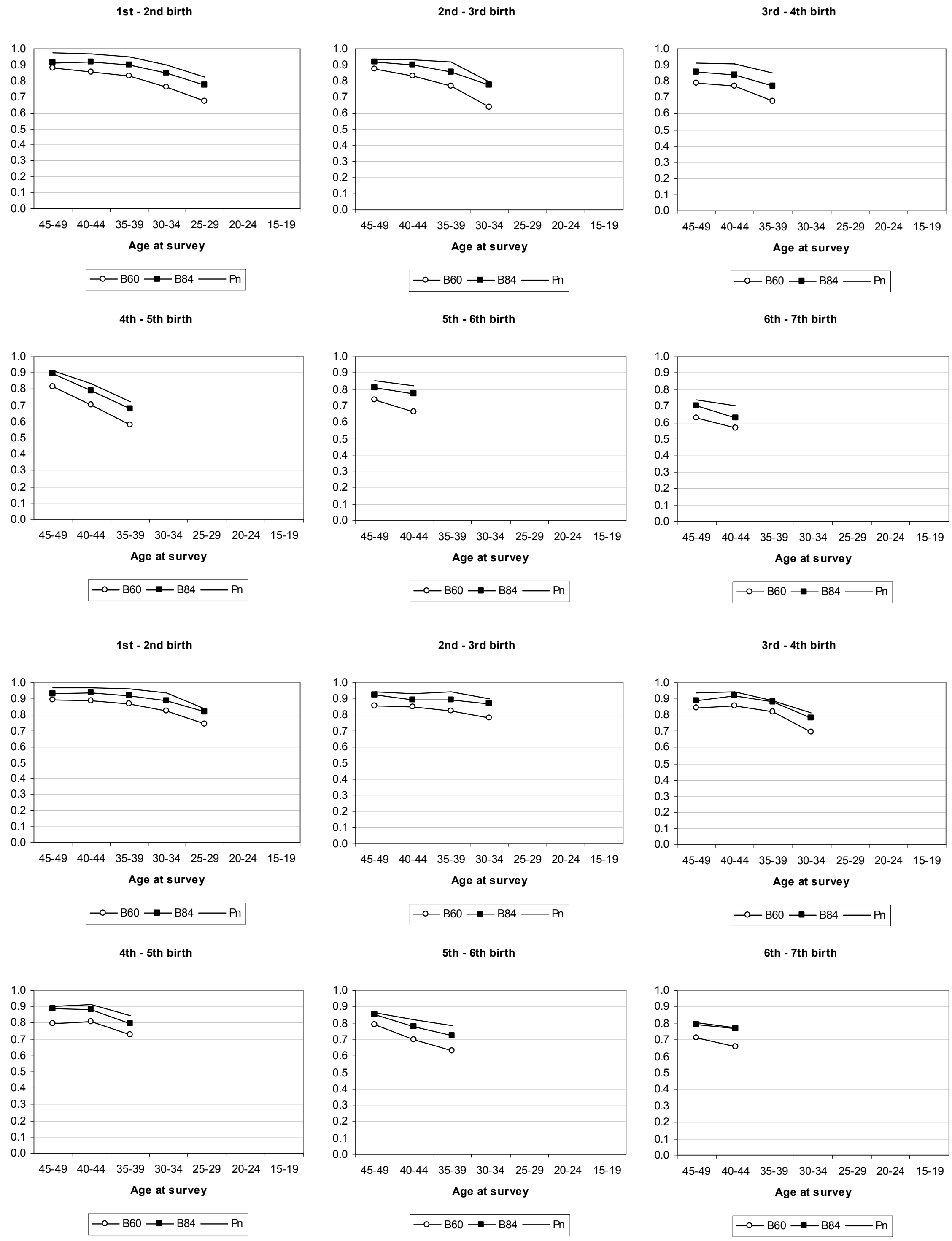

Figure 22 Projected median birth intervals for Kenya, by cohort, year of child's birth and survey – 1998 and 1993 DHS

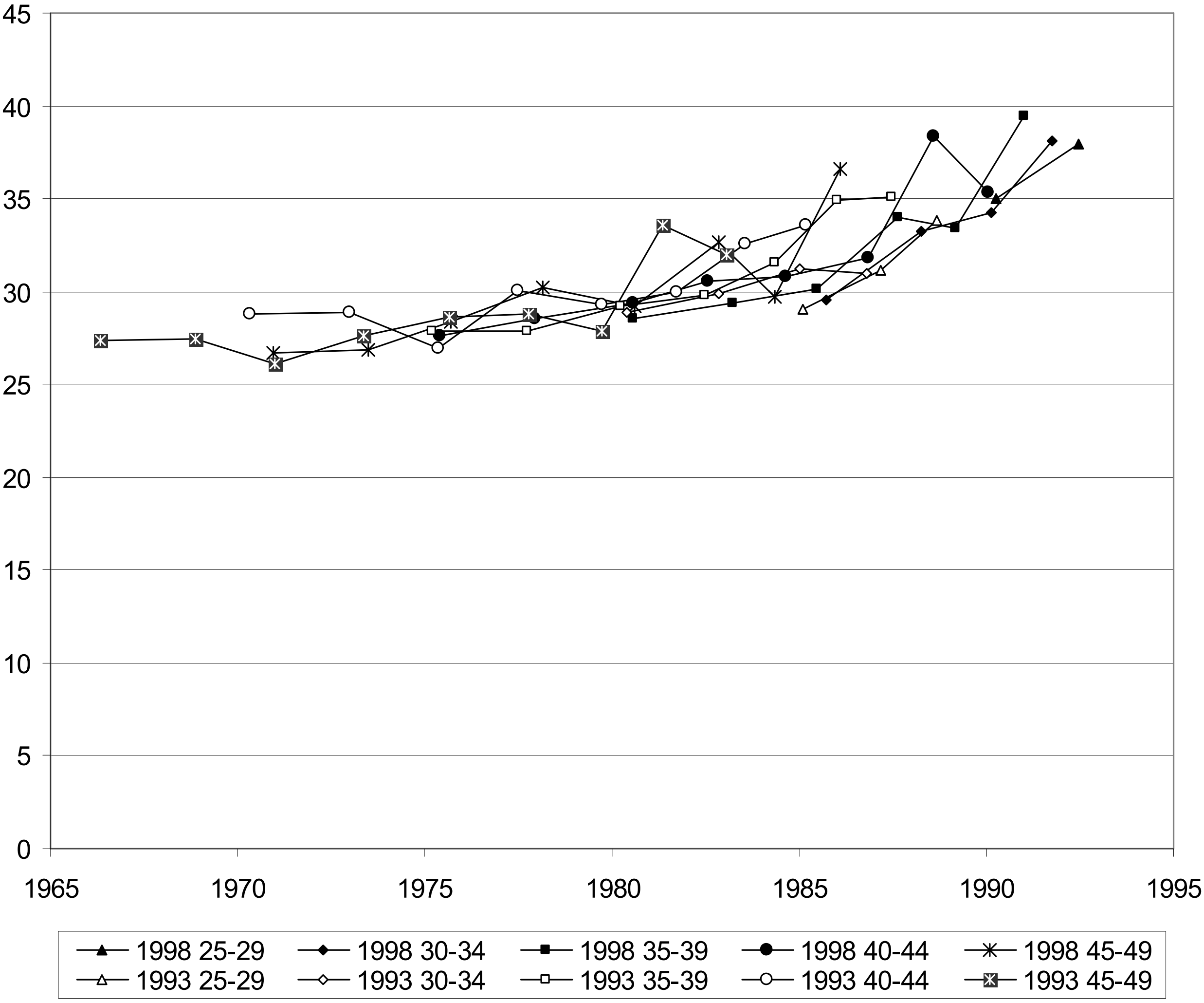

Figure 23 Projected median birth intervals for Malawi, by cohort, year of child's birth and survey – 2000 and 1992 DHS

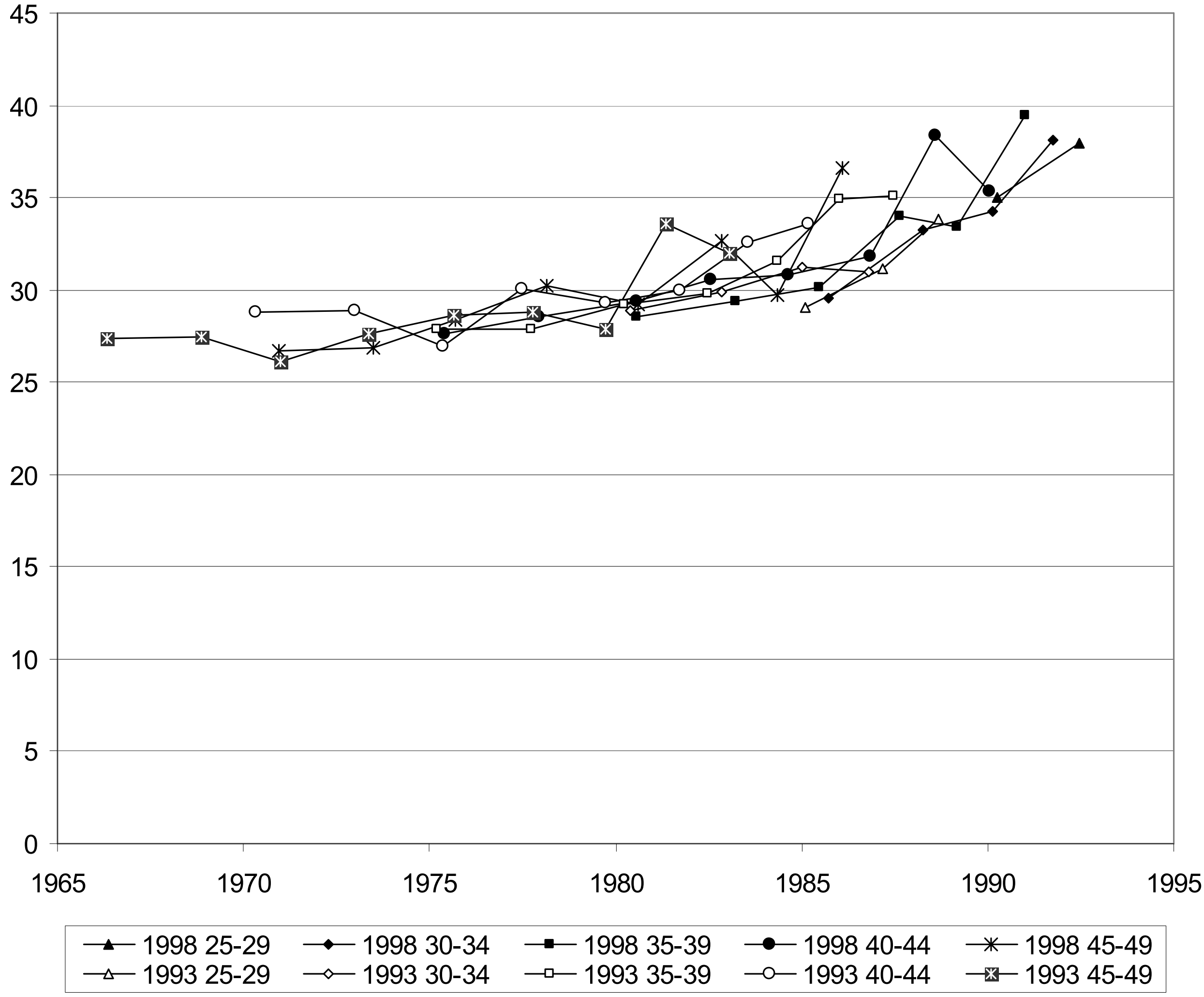

Figure 24 Projected median birth intervals for Mozambique, by cohort, year of child's birth and survey – 1997 DHS

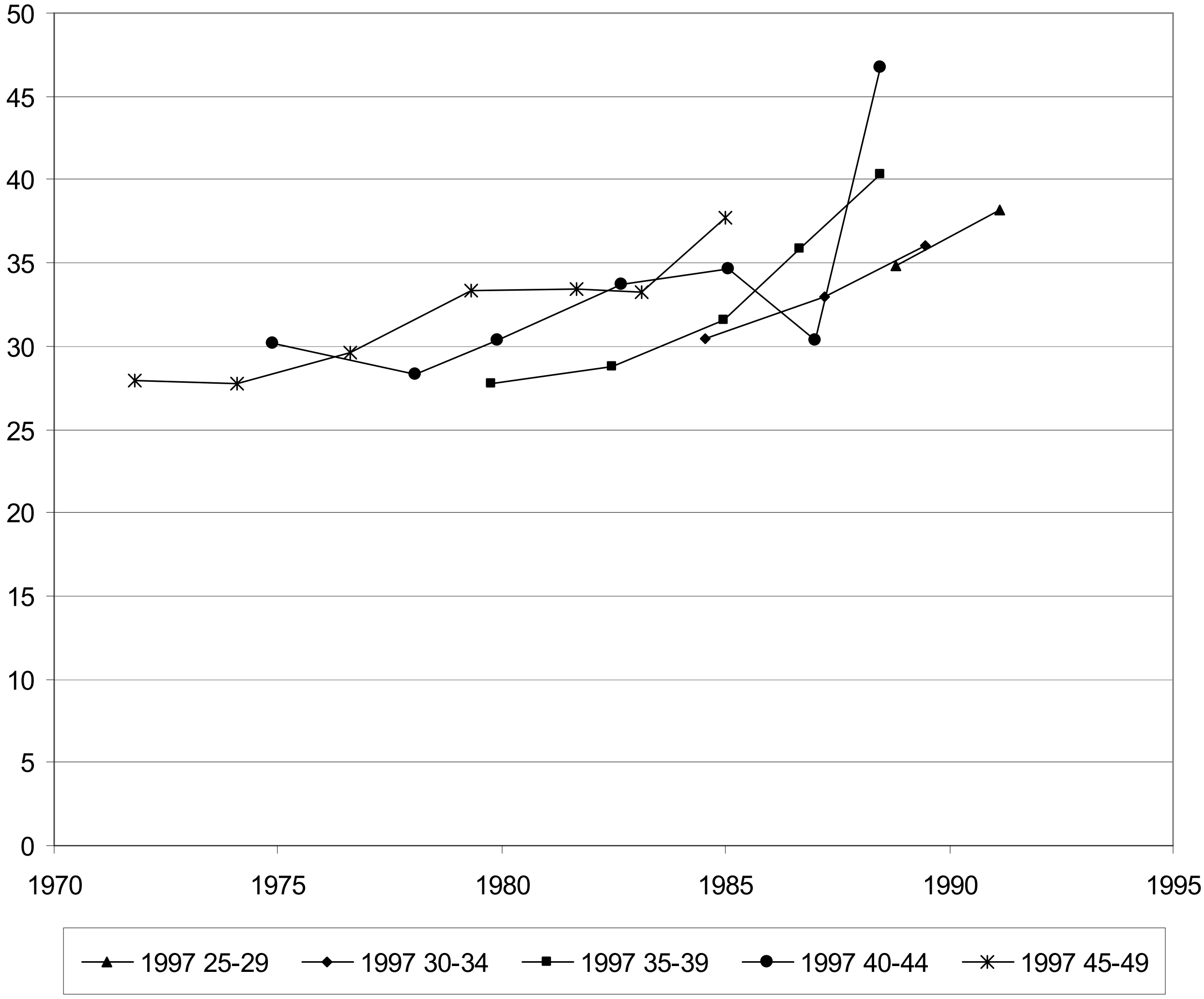

Figure 25 Projected median birth intervals for Namibia, by cohort, year of child's birth and survey – 2000 and 1992 DHS

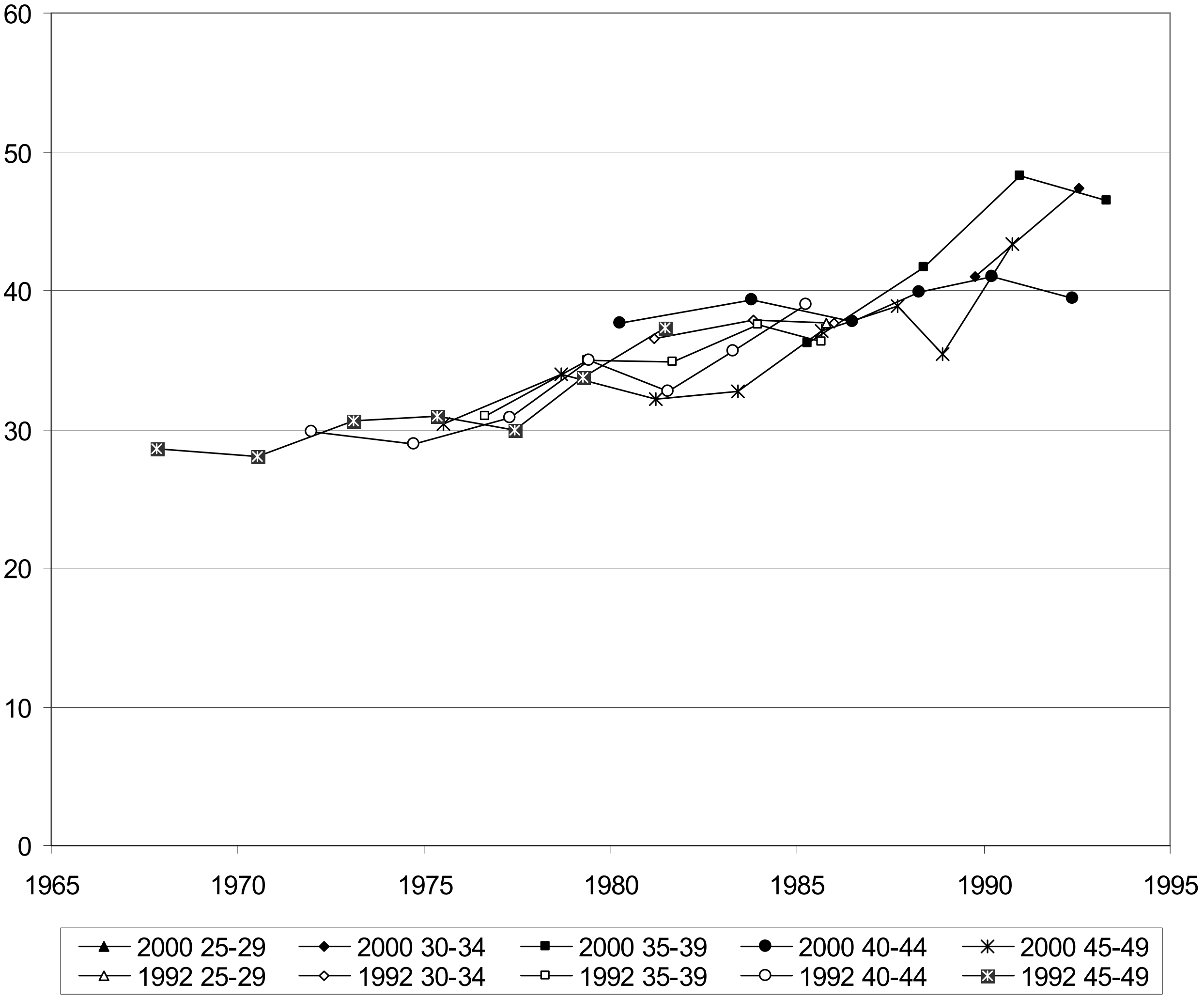

Figure 26 Projected median birth intervals for Tanzania, by cohort, year of child's birth and survey – 1999 and 1996 DHS

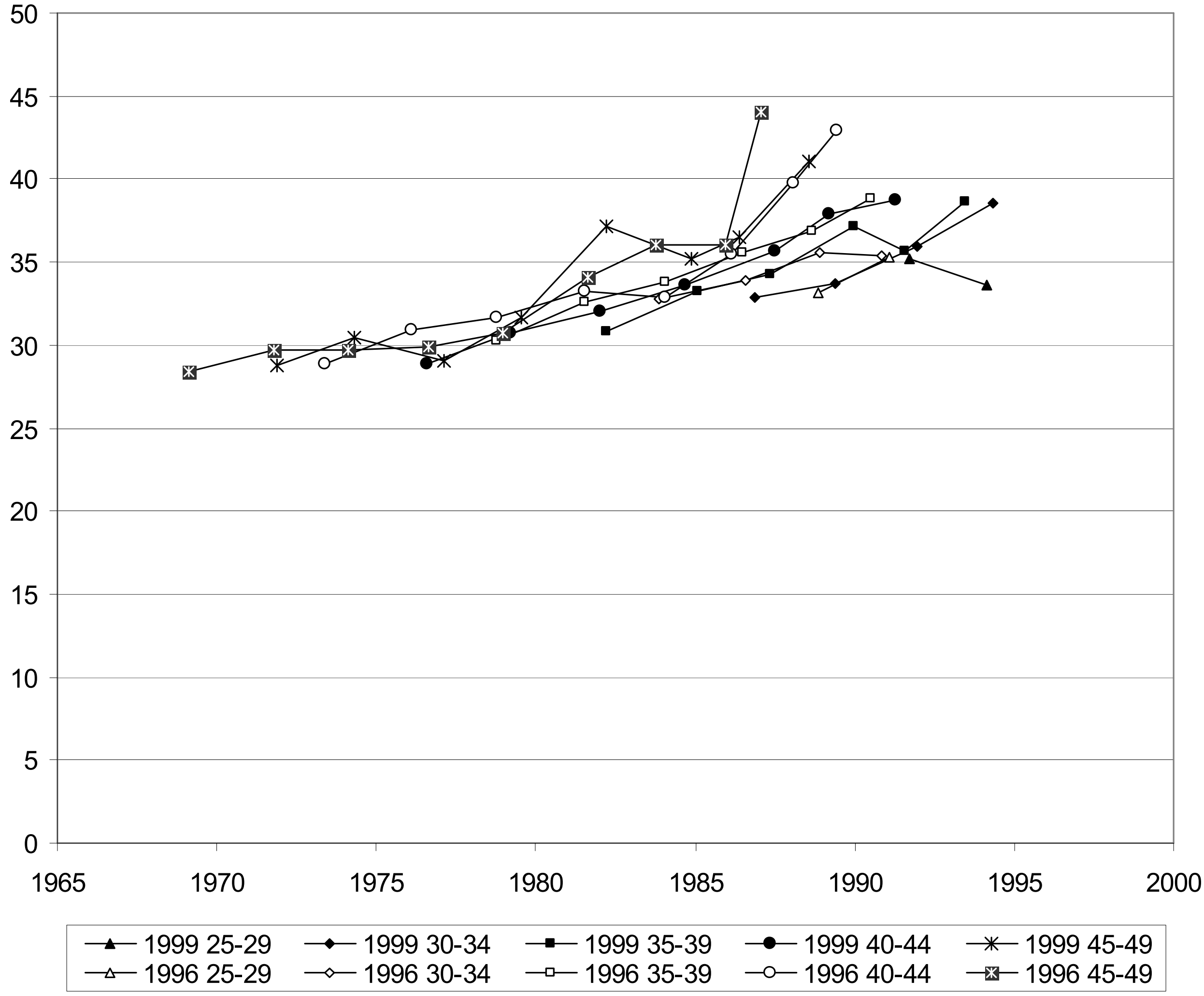

Figure 27 Projected median birth intervals for South Africa, by cohort, year of child's birth and survey – 1998 and 1987-9 DHS

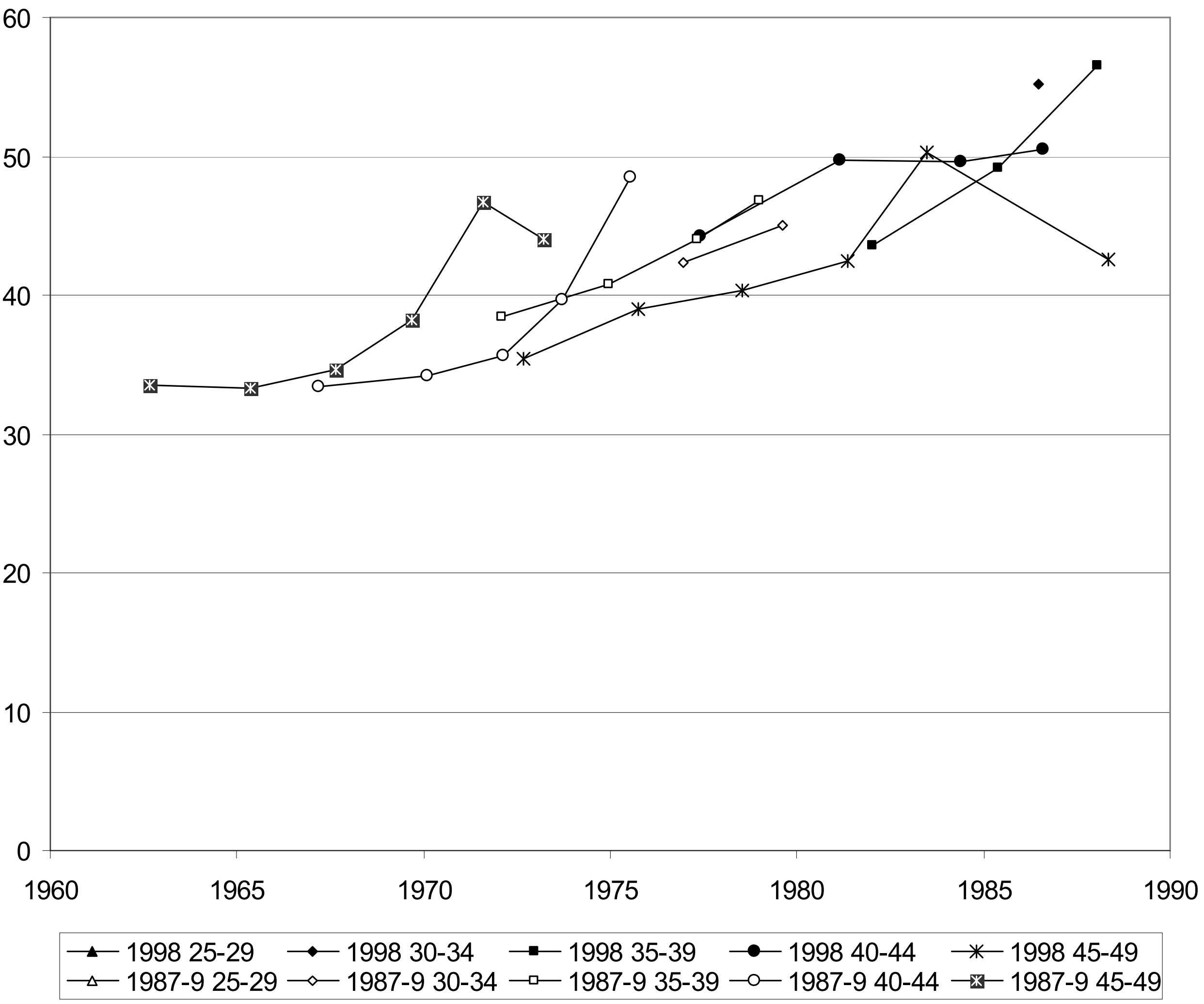

Figure 28 Projected median birth intervals for Zambia, by cohort, year of child's birth and survey – 1992, 1996 and 2000 DHS

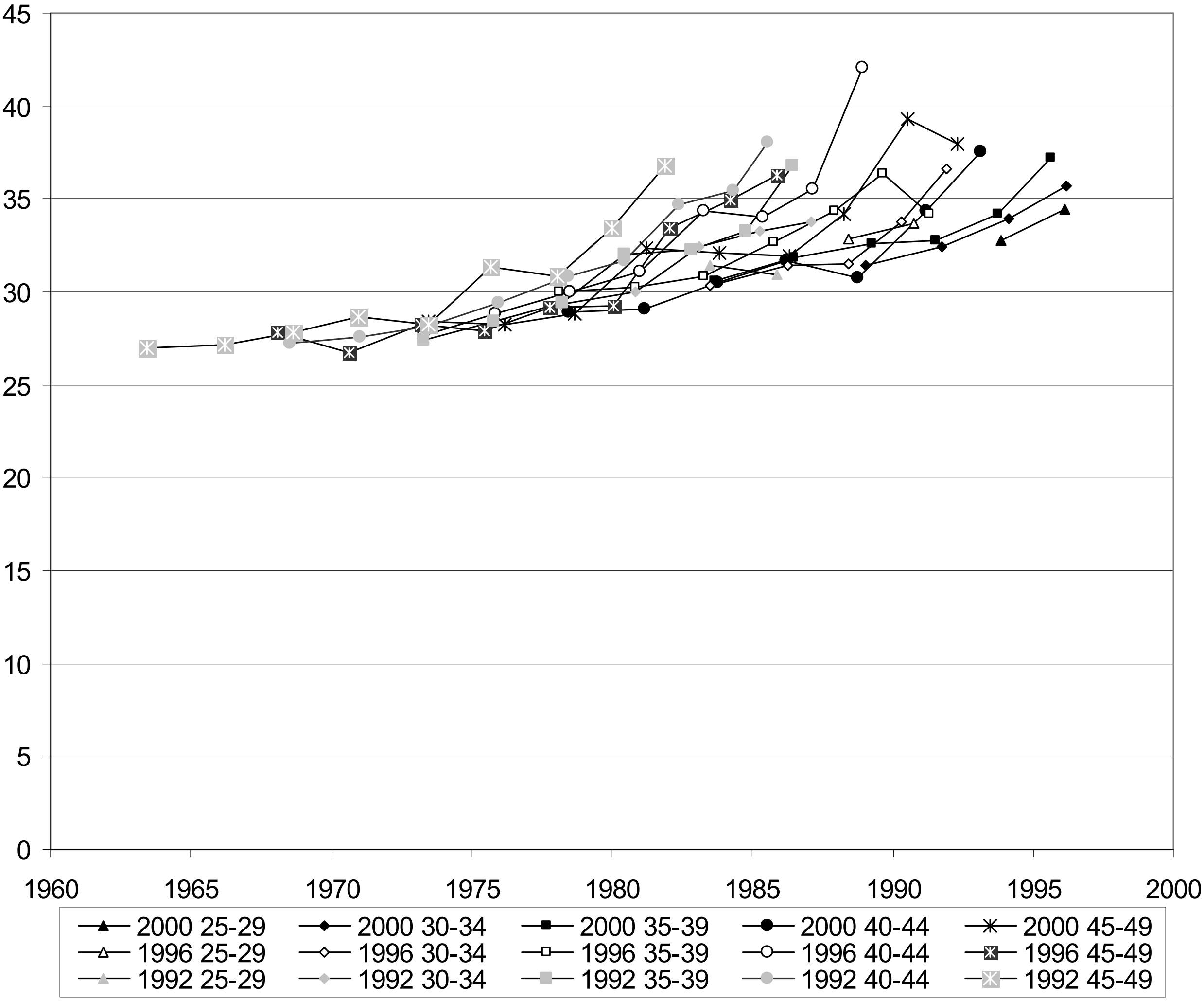

Figure 29 Projected median birth intervals for Zimbabwe, by cohort, year of child's birth and survey – 1999 and 1994 DHS

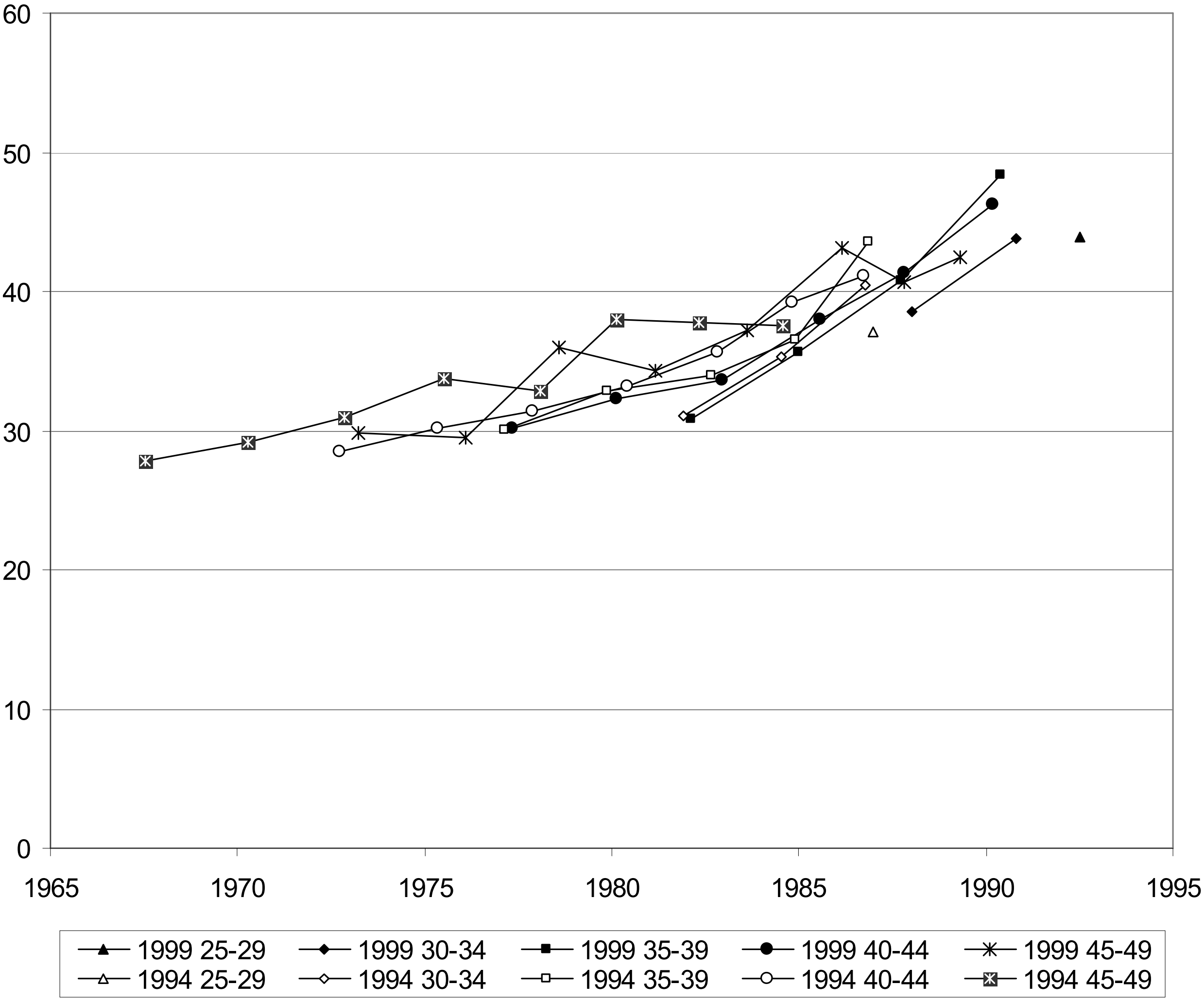

Figure 30 Projected median birth intervals for Philippines, by cohort, year of child's birth and survey – 1998 DHS