Fertility in Lesotho: Analysis of change over time based on parity-dependent measures and birth intervals

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Abstract

The Lesotho Population Census of 1996 provided first evidence of a decline in fertility following high and stable fertility for over two decades. Recent demographic inquiries point to further decline in fertility. However, detailed studies of the nature of the fertility transition in Lesotho remain limited. The paper seeks to document the family formation patterns underlying the fertility transition in Lesotho through an assessment of changes over time in parity progression and birth intervals. The paper also investigates whether Lesotho's fertility transition conforms to the pattern of fertility transition suggested by Caldwell and colleagues (Caldwell, Orubuloye and Caldwell, 1992). The primary sources of data are the 1996 population census fertility data and birth history data derived from the Lesotho Demographic and Health Surveys (LDHS) of 2004 and 2009.

Parity progression ratios and projected parity progression ratios are derived from census fertility data using a method that was developed by Brass (1985) and is described in Zaba (2011). A different set of projected parity progression ratios is derived from 2004 and 2009 LDHS birth history data using a truncated pair-wise comparison procedure proposed by Brass and Juarez (1983).

Parity progression measures are estimated using the Brass and Juarez (1983) method which is an extension of the life table analysis approach proposed by Rodriguez and Hobcraft (1980). The assessment of median birth intervals is done using an approach proposed by Aoun (1989). Results show that the median birth intervals increase with each parity progression within each age cohort. The median birth intervals also increase as the age groups become younger. Assessment of both parity progression measures and median birth intervals suggest that declining parity progression across all ages and parities and lengthening median birth intervals could be the key factors leading to fertility decline in Lesotho.

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A review of the demographic literature in Lesotho reveals a very limited exploration of fertility dynamics in Lesotho. Most of the literature is limited to official reports, places greater emphasis on levels and trends in fertility, and offers very little in terms of explaining the trends observed. The demographic literature indicates that total fertility has declined from 4.1 children per woman in 1996 (Bureau of Statistics, 1998) to 3.5 children per woman in 2004 and further to 3.3 children per woman in 2009 (Ministry of Health and Social Welfare [Lesotho], 2005; Ministry of Health and Social Welfare (MOHSW) [Lesotho] and ICF Macro, 2010).

The availability of the 2004 and 2009 birth history data as well as census data provides an opportunity to bridge the gap in knowledge of fertility dynamics in Lesotho. The paper seeks to document patterns of family formation underlying the fertility transition in Lesotho through an assessment of changes over time in parity progression and birth intervals. The paper also investigates whether the Lesotho's fertility transition conforms to the pattern of fertility transition suggested by Caldwell and colleagues (Caldwell et al., 1992).

Theoretical Framework

Caldwell et al. (1992) suggest that the African fertility transition will be quite distinct from that of other regions of the world, particularly the Asian fertility transition. The authors argue that the African fertility transition will be characterised by a decline in fertility across all ages simultaneously and significant levels of contraceptive use among both married and unmarried women of all ages. They argue that the motivation for contraceptive use among unmarried women is to avoid pregnancy and delay marriage while the use of contraceptives among married women is for maintaining birth spacing and limiting patterns formerly achieved through sexual abstinence. Brass, Juárez and Scott (1997) attested to the distinctiveness of the African fertility transition noting that fertility not only declines across all ages but also occurs in all parities. More recent research (Timæus and Moultrie, 2008) identifies lengthening birth intervals resulting from postponement of births as the primary driver of the transition to low fertility. Casterline, el.Zeini and Odden (2011) have however argued that lengthening birth intervals are not unique to African fertility transition but characterise most contemporary fertility transitions. The foregoing observations relating to the African fertility transition inform the present analysis of Lesotho's fertility transition.

Data

The primary sources of data for this paper are the 1996 census fertility data and the maternal birth histories of women aged 15 to 49 years derived from the 2004 and 2009 Lesotho Demographic and Health Surveys. Although Lesotho conducted a census in 2006, an assessment of the quality of the fertility data indicated that those data are of poor quality, while significant problems in the overall enumeration have also been identified. The data have no missing values suggesting that they have been heavily edited. The current fertility age distribution indicates higher fertility among women aged 15 to19 years suggesting possible imputation of births to women missing data who should otherwise be childless. Across all age groups the observed number of births is about half of the expected births derived using the 2004 Lesotho Demographic Health Survey (LDHS) age specific fertility schedule.

The 2004 LDHS data were derived from a nationally representative probability sample of 7095 women aged between 15 and 49 years who were present in the selected household on the night before the survey irrespective of whether they were usual residents or visitors. The 2009 LDHS followed the same sampling procedure and interviewed 7624 women aged between 15 and 49 years.

Methods

This paper uses two methods, one applicable to census data and the other to births history data, to assess changes in parity progression over time. The key element of these methods is that they extend the estimation of parity progression measures, conventionally limited to women at the end of reproduction period, to cohorts with incomplete fertility. The method used to estimate parity progression ratios and projected parity progression ratios using census data was developed by Brass (1985) and is described in Moultrie and Zaba (2011). In addition to the conventional parity progression ratios, this method uses the current age-order-specific fertility rates derived from births in the last year data to project the expected parity distribution of cohorts with incomplete fertility if they were to experience the given age-order-specific fertility rates and estimate the total order-specific rate. The difference between the total order specific rate and the order specific rate achieved by women in the given age group, an estimate of the additional proportion of women in each age group that

will have reached the given birth order by the end of childbearing, is then added to the parity progression ratio to derive the projected parity progression ratio.

The assessment of changes over time in parity progression implied by the birth history data is based on parity progression measures (Projected Parity Progression Ratios (PPPRs) and the summary index B_i, the proportion of women having the next birth within i months) derived using two approaches proposed by Brass and Juarez (1983). The estimation of the projected parity progression ratios, denoted P_n, uses a truncated pair-wise comparison of the proportions of women with n children who go on to have $n+1$ children for two adjacent cohorts. The cohorts are rendered comparable through excluding the births in the five years before the survey for women in the older cohort. The indices of relative change, the ratio of the birth experience of women in the younger cohort to the truncated birth experience of the older cohort, are then used to calculate the projected parity progression ratios denoted as P_i through a multiplicative process taking the parity progression ratio of women in the age group 45-49 as the base.

Whereas the projected parity progression ratios approach effectively deals with the selection bias, emanating from the fact that parity data are skewed toward women who have children faster, a problem more acute in the younger cohorts, it does not deal with the problem of censoring effectively. This is adequately addressed in the summary index B_i derived using life table analysis. This method, originally proposed by Rodriguez and Hobcraft (1980), was further developed by Brass and Juarez (1983). The Brass and Juarez approach applies truncated pair-wise comparison procedure similar to the one used in estimating projected parity progression ratios to untruncated and truncated summary indices B_is derived from corresponding life tables for each cohort and each birth order to estimate adjusted B_is. This adjustment deals more effectively with the problem of selection bias discussed above.

The assessment of birth intervals is done using an approach outlined in Aoun (1989). In this method median birth intervals are estimated using the life table analysis and the truncated pair wise procedure proposed by Brass and Juarez (1983) is used to estimate projected median birth intervals.

Level of total fertility

Current fertility estimates derived from the 1996 census and data from the two surveys are presented in Table 1. The data indicate that total fertility declined by almost one child per woman between 1996 and 2004. Total fertility declined from 3.5 children per woman in 2004 to 3.3 children per woman in 2009, translating into a seven per cent decline in total fertility between the two surveys. This fertility decline increases with age and cuts across all age groups. This pattern of fertility decline is consistent with that derived from the analysis of the 1976, 1986 and 1996 censuses data (not presented).

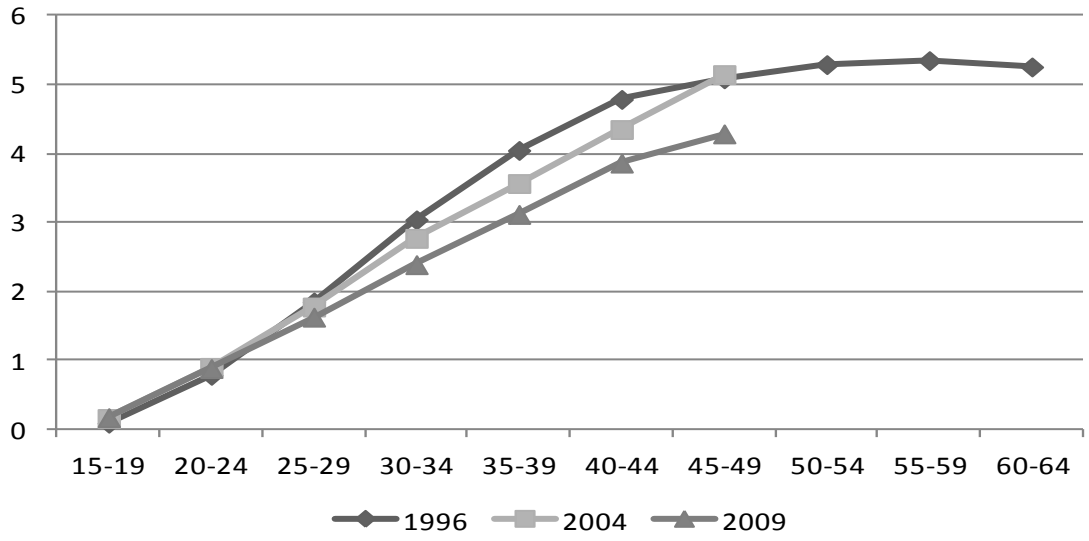
Table 1 Fertility estimates and percentage change by age group, 1996, 2004 and 2009

Age Group	*1996 Census*	*2004LDHS*	*2009 LDHS*	*Percentage change (2004 to 2009)*
15-19	0.069	0.092	0.096	5.3
20-24	0.199	0.177	0.171	-3.2
25-29	0.223	0.160	0.155	-3.5
30-34	0.187	0.122	0.117	-3.8
35-39	0.131	0.102	0.074	-27.6
40-44	0.055	0.046	0.040	-12.5
45-49	0.006	0.009	0.007	-24.8
TFR	4.35	3.54	3.3	-6.8

Sources: 1996-Own calculation; Ministry of Health and Social Welfare [Lesotho] and Ministry of Health and Social Welfare (MOHSW) [Lesotho] and ICF Macro (2005) and (2010)

Figure 1 presents the average parities for 1996, 2004 and 2009. As expected, the average parities generally increase with age up to the age 45-49 indicating that the data are not hopelessly inconsistent. The average parity for cohorts with complete fertility remain relatively constant and slightly decline for the oldest cohort, aged 60-64. This could be due to either omission of births, likely to be marked for older cohorts, or constant fertility. A comparison of corresponding cohorts across the years points to decreasing lifetime fertility over time.

Figure 1 Average parity by year of census/survey



Parity progression measures

Projected parity progression ratios derived from the 1996 census fertility data are presented in Figure 2 and Table 2. The parity progression ratios from zero to one indicate that the proportion of childless women has been, and can be expected to remain relatively constant across cohorts. A similar trend is observed for the parity progression ratios from one to two and from two to three.

Figure 2 (Projected) parity progression ratios by parity and age group, Lesotho 1996

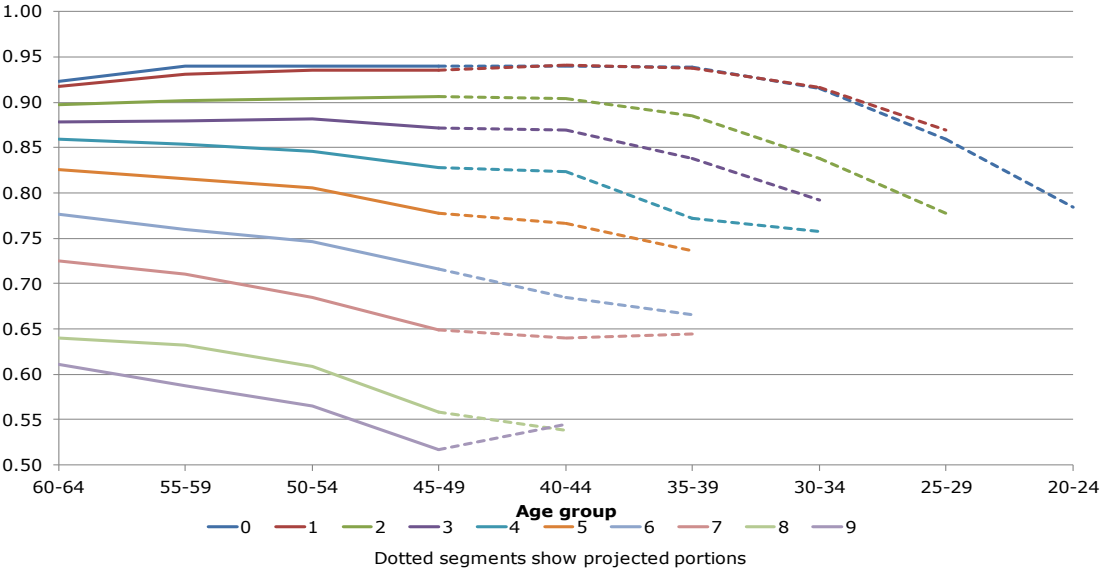


Figure 2 points towards decreasing parity progression for younger cohorts at parities three and greater. The decrease in progression to middle order parities (3 and greater) seems to have started with the cohort aged 55-59 with a pronounced decline for the cohort 45-49. The projected parity progression ratios for women aged 40-44 and 30-39 indicate possible further declines in the progression to parities 3 to 6.

The zero to one projected parity progression ratios for the 35-39 and 40-44 cohorts shown in

Table 2 suggest that the proportion of women who have ever had a child which stands at 0.9399 for the 45-49 cohort, can be expected to remain relatively constant. The projected parity progression ratios for progressions 1 to 2 up to 4 to 5 for the cohorts 30-34 up to 40-44, which from

Table 2 seem less erratic, point to systematic decline in the proportion of women expected to progress to the next parity with each younger cohort. These data are indicative of declining fertility.

Table 2 (Projected) parity progression ratios, 1996

	Projected		*Completed*			
Parity (i)	35-39	40-44	45-49	50-54	55-59	60-64
0	0.9384	0.9393	*0.9399*	*0.9401*	*0.9394*	*0.9229*
1	0.9371	0.9404	*0.9356*	*0.9348*	*0.9311*	*0.9169*
2	0.8849	0.9044	*0.9067*	*0.9042*	*0.9017*	*0.8968*
3	0.8384	0.8689	*0.8716*	*0.8811*	*0.8792*	*0.8784*
4	0.7718	0.8234	*0.8284*	*0.8460*	*0.8531*	*0.8595*
5	0.7359	0.7663	*0.7780*	*0.8052*	*0.8158*	*0.8255*
6	0.6657	0.6849	*0.7162*	*0.7466*	*0.7601*	*0.7766*
7	0.6440	0.6398	*0.6487*	*0.6848*	*0.7108*	*0.7253*
8	0.5537	0.5381	*0.5581*	*0.6085*	*0.6320*	*0.6395*
9	0.5341	0.5453	*0.5175*	*0.5652*	*0.5874*	*0.6115*
10	0.4222	0.4188	*0.4204*	*0.4689*	*0.4793*	*0.4939*
11	0.4669	0.4376	*0.4479*	*0.4995*	*0.5170*	*0.5701*
12	0.3762	0.4219	*0.3865*	*0.4505*	*0.4128*	*0.4590*
13		0.4431	*0.4895*	*0.4675*	*0.4455*	*0.5014*
14			*0.5286*	*0.4957*	*0.4184*	*0.5057*
15			*0.3243*	*0.4561*	*0.5366*	*0.5341*
16			*0.4167*	*0.3077*	*0.6818*	*0.4468*
17			*0.6000*	*0.7500*	*0.6000*	*0.6190*

The projected parity progression ratios derived from the 2004 and 2009 birth history data are presented in Figure 3. The data show that the proportion of women who have a least one child can be expected to remain relatively constant over time, results that are consistent with those derived from the 1996 census presented in Figure 2 and

Table 2. The projected parity progression ratios for 2004 and 2009 suggest a systematic decline in the proportion of women progressing to the next parity for each younger cohort for parity one and greater. The data for the cohorts 35-39 to 45-49 suggest steeper declines in the progression to parities 4 and greater.

Figure 3 Projected parity progression ratios, 2004 and 2009

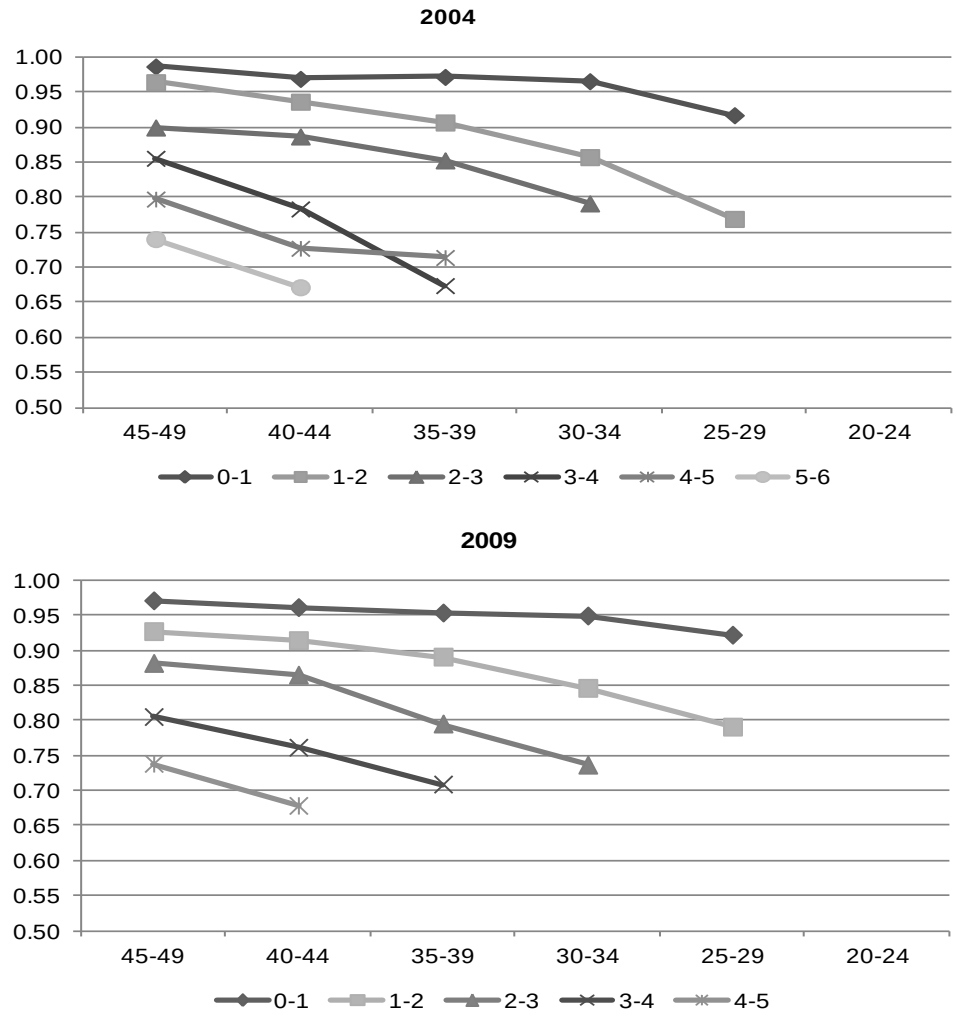
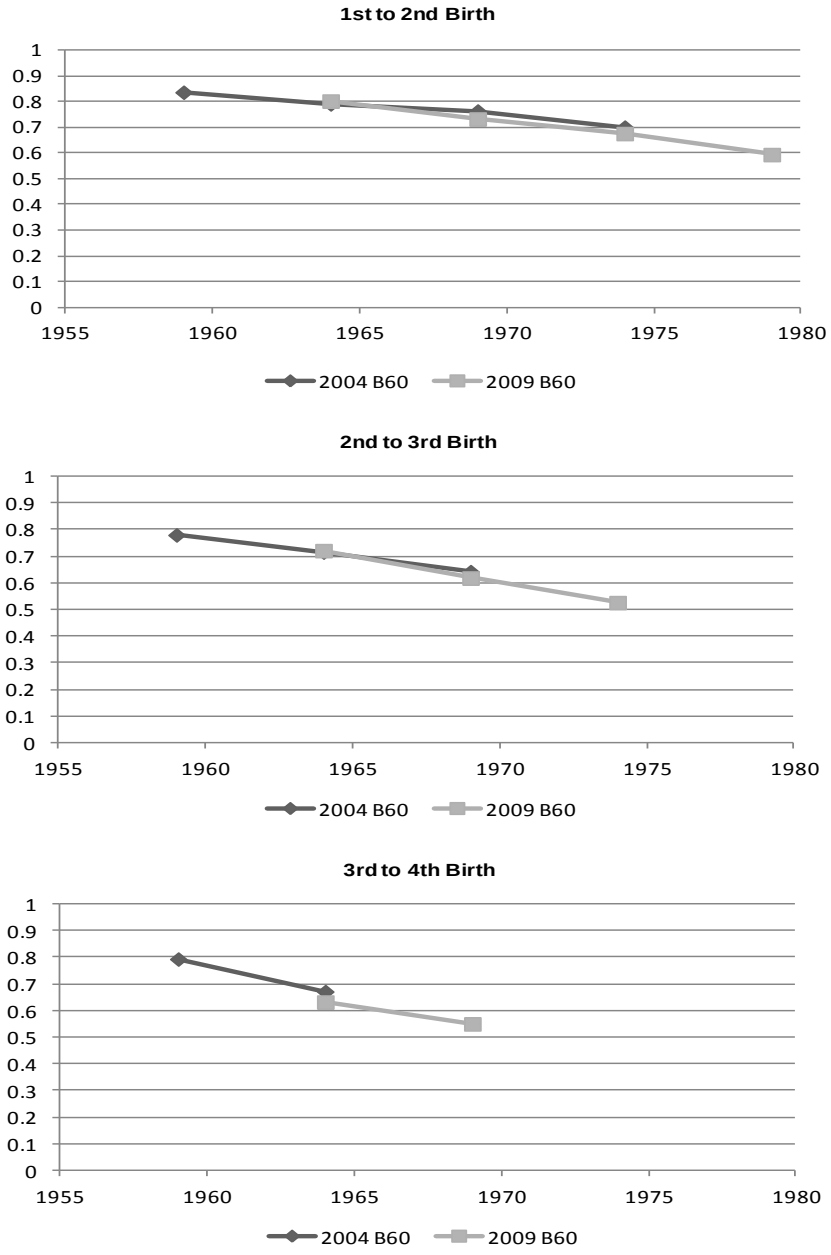


Figure 4 Indices of parity progression, 2004 and 2009



The indices of parity progression namely the adjusted B_{60}s derived from the 2004 and 2009 survey data are presented in Figure 4. The presentation is limited to B_{60}s, the proportion of women having a next birth within 60 months, because in both surveys the overall median birth interval and the longest sub-group median birth interval are less than 60 months.

The data point to a decrease over time in the proportion of women who proceed to a higher birth order irrespective of parity. This decrease becomes more pronounced with increasing birth order and is steeper among the younger cohorts. The indices of parity progression for the progression from third to fourth birth show relatively steeper declines suggesting that fewer women proceed to have a fourth birth. Comparison of the indices across surveys suggests a systematic fall in the proportion of women progressing to a higher birth order irrespective of parity and in turn a continuing fertility transition. The results are indicative of parity specific fertility limitation across all ages and imply decreasing fertility at all ages.

Median birth intervals

Table 3 presents the projected median birth intervals derived from the 2004 and 2009 data. The median birth intervals for each parity progression are expected to increase for each successive younger cohort. The median birth interval for the progression from first to second birth can be expected to increase from around three years for the 45-49 cohort to almost five years for the 25-29 cohort. Additionally, the projected median birth intervals for each cohort are expected to increase with parity. The data are indicative for lengthening birth intervals over time.

Table 3 Projected median birth intervals, 2004 and 2009

2004 LDHS	*Parity Progression*			
Age Group	*1-2*	*2-3*	*3-4*	*4-5*
25-29	54.7	56.5		
30-34	45.5	52.3	63.4	
35-39	39.6	45.5	60.7	54.2
40-44	37.7	42.2	52.6	48.9
45-49	35.3	37.1	41.9	44.4
2009 LDHS	*Parity Progression*			
Age Group	*1-2*	*2-3*	*3-4*	*4-5*
30-34	49.6	59.5		
35-39	42.8	54.3	59.0	
40-44	39.4	49.4	53.6	62.0
45-49	38.0	41.7	44.6	50.2

A comparison of projected median birth interval across surveys and corresponding cohorts suggests that birth intervals can be expected to further lengthen with time. Whereas

the projected median birth interval for the progression one to two for the cohort completing their reproduction in the 2004 survey is 35 months the corresponding figure for the cohort completing reproduction in the 2009 survey is expected to be 38 months. This pattern prevails for all cohorts and parity progressions suggesting that birth intervals will lengthen among all women. These results are indicative of declining fertility in all cohorts over time.

Conclusions

Results from all measures of parity progression are consistent and indicate that parity progression ratios are declining with each younger cohort and can be expected to decline further as the younger cohorts reach the end of the reproductive period. These parity progression declines are more pronounced in higher order parities suggesting increasing preference for smaller families among all women with time. The results suggest that Lesotho's fertility transition characterised by decreasing parity progression across all parities and ages.

Results have shown that median birth intervals are lengthening for all parity progressions and with each successive younger cohort and that the expected increases in median birth intervals are significant enough to have an impact on fertility decline. The declining parity progression and lengthening birth intervals are possible drivers of the fertility decline in Lesotho and Lesotho's fertility transition has followed the pattern of fertility decline suggested by Caldwell and colleagues (1992) and further defined by Timæus and Moultrie (2008).

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