Trends and transition times in parity progression among women of reproductive age in Nigeria between 1998 and 2012

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Abstract

Context: This study assessed the trends and transition times in parity progression among women of reproductive age in Nigeria between 1998 and 2012.

Data Source & Method: This is a descriptive, cross-sectional study which utilized data from the 2003, 2008 and 2013 Nigeria Demographic and Health Survey. Data were analysed using Descriptive statistics, Brass P/F Ratio, Pandey and Suchrinder Parity Progression Method and Feeney and Yu Method of Period parity Progression.

Findings: Our findings show that the proportion of women progressing to next parity was fairly equal for periods 1998-2002 and 2003-2007 with a slight decrease for period 2008-2012. There was a relatively consistent reduction in the speed of progression to high order parities from 1998 – 2012.

Conclusion: In conclusion, not much progress has been made with respect to fertility reduction in the country. However, a reduction in the pace of progression to high order parities suggests Nigeria is experiencing a consistent but slow total fertility decline.

Keywords: Fertility, Parity Progression, Total Fertility Rate, Fertility Trend, Birth interval

Introduction

There have been some major changes in the world fertility levels over the years howbeit most of the changes have occurred in developed countries (Boulhol et al. 2005). Some have even moved from high fertility to lowest low fertility (e.g. Japan, Sweden etc). The case appears to be somewhat different in most developing countries (Nigeria inclusive) as fertility level remains high. Nigeria in particular have only experienced 11% decrease in TFR from 1960 to 2014 compared to Bangladesh and Ecuador who have experienced more than 60% decrease in TFR during the same period (The World Bank 2017). Although the Nigerian Government and a number of non-governmental organisations have made efforts to reduce completed fertility through family planning programs, only little has change. This is in light with the fact that high population growth rate in many part of developing countries have been linked with increased poverty, urban pollution, lack of access to portable water, and poor health outcomes (Osotimehin 2011).

Over the years, the simplicity of TFR computation, ease of interpretation (Bongaarts and Feeney, 1998) and its advantage over many other fertility measures (for example, CBR and GFR) have made TFR a widely used fertility measure in fertility analysis and discussion than any other fertility measure. However, there have been considerable concerns by some demographers (John Bongaarts and Feeney, 1998; Kohler and Ortega, 2002) on the TFR's ability to truly measure the fertility experience of women in a given geographical location. The doubts expressed are based on the fact that the TFR which is derived from period data will not truly measure the fertility experience in a country if a sizeable amount of women are postponing fertility (Tempo effect) or if the period when the data was collected coincides with the time when most of the women who postponed fertility decides to have a child.

In light of the apparent flaw of the TFR, various attempts have been made to derive a method that produces an adjusted TFR which is free from the tempo effect, but demographers have not been able to reach a consensus on a particular method (Kohler and Ortega, 2002). However, the Parity Progression Ratio (PPR) has been set forth by some to be less affected by tempo effect because it focuses on the current rate at which women are progressing from a parity to the next(Yadava, Tiwari, and Sharma, 2006). Measuring its trend could show how these rates are increasing and decreasing overtime. It therefore

detects quick changes in fertility (International Union for the Scientific Study of Population 2017). Although the PPR also poses a little challenge to fertility analysis as it can be somewhat difficult to conceptualize by non-demographers compared to TFR, due to multiplicity of ratios. Nevertheless, when graphically presented, conceptualization becomes easier.

There is a plethora of studies on fertility levels, trends and differentials but most have focused on period total fertility rate. Only few studies(Adebowale and Palamuleni, 2014) are available at national level that examined fertility in Nigeria using the parity progression approach. Transition time to next parity is also an important measure that has not received much attention in Nigeria until recently. This indices is of much importance because of the effect parity progression transition time has on completed fertility, maternal and infant mortality.

Few studies (Adebowale and Palamuleni, 2014; Adebowale et al., 2011; Fagbamigbe & Idemudia, 2016) have been conducted with respect to this in Nigeria, however virtually all focused their explanation of transition time to the time it will take half of the study population to proceed to next parity (median survival time). Although this provides good enough information in understanding transition time, the minimal attention given to other percentiles might conceal some information that could be useful. For instance, It might take 3 years before half of the study population progress to next parity (which looks good based on WHO (2005) recommendation on birth spacing), whereas; about 40% of the population might have proceeded to next birth two years after previous birth (having a short birth interval). Therefore, in order to pay more attention on transition time, this study analysed parity progression ratio by interval duration. This study therefore assesses the trends and transition times in parity progression among women of reproductive age in Nigeria between 1998 and 2012.

Data and methods
The study uses the data from 2013, 2008 and 2003 Nigeria Demographic and Health Survey (NDHS), which are national-level probability sample surveys that were implemented by the National Population Commission (NPC) in an attempt to assess the trends and transition times in parity progression among women of reproductive age in Nigeria between 1998 and 2012. The three NDHS are all descriptive cross-sectional studies. 7,864 households, 36,800 households and 40,680 households were selected for NDHS 2003, 2008 and 2013 respectively.

The sample for the 2003 and 2008 NDHS were selected using a stratified two-stage cluster design while 2013 NDHS was a stratified three-stage cluster design. Three questionnaires were used for the NDHS 2003, 2008 and 2013: household questionnaires, women's questionnaires and men's questionnaires. However, only women's questionnaires were utilized for this study. The women's Questionnaires were used to collect information from women of reproductive ages 15-49 years. The population of interest in this study is women of reproductive ages (15 – 49 years) who reside in Nigeria regardless of country of origin.

Data analysis
To describe the data, simple frequency distribution was used to examine the proportion of women in each category of each background characteristics. To obtain the proportion of women progressing to next parity, Pandey & Suchindran (1995) method of Period Parity Progression was utilized, while the Feeney & Yu (1987) Synthetic Cohort Parity Progression approach was used to obtain the parity progression transition times. The Brass P/F ratio was also calculated in an attempt to derive an adjusted TFR which was required in computing the Pandey & Suchindran (1995) Period Parity Progression Ratio.

Brass P/F ratio
This method entails the adjustment of the observed age specific fertility rates, which are assumed to represent the true age pattern of fertility, to be consistent with the fertility level depicted by the average parities of women in age groups less than 30 – 35, which is assumed to be accurate. See page 32 of Indirect Techniques for Demographic Transition (DISA 1983) for details on this model.

Pandey and Suchindran method of period parity progression
To achieve period parity progression ratio, Pandey and Suchindran (1995) modelled the maternal age at any given birth. Using the survival analysis technique, m(t) was regarded as the instatenous birth rate, which is the probability that a woman of age (t) will have a birth in the small interval (t, t+dt) on the condition that she will not have that birth before age (t).

$$CFR = \int_{\alpha}^{\beta} m(a)da \quad \dots\dots\dots\dots\dots\dots(1)$$

To derive an expression for the distribution of maternal age at a given birth (i) where (i≥1). Pandey and Suchindran defined the probability that a woman will have her i-th child in the age interval (z, z+dt), as:

$$f_i(t) = \int_\alpha^t m(t)e^{-\int_z^t m(a)da} f_{i-1}(z)dz, \ \alpha \le z < t < \beta \ \dots\dots\dots\dots\dots\dots (2)$$

Pandey and Suchindran (1995) through induction, reduced equation (2) above to be:

$$f_i(t) = m(t)e^{-CFR(t)} \frac{[CFR(t)]^{i-1}}{(i-1)!}$$

$$P_i = \frac{F_{i+1}}{F_i}$$

The Cumulative Fertility Rate (CFR) at the end of the reproductive age range, is equivalent to the Total Fertility Rate (TFR). Therefore, to compute the CFR in this study, the Brass P/F ratio method based on data about all children was used to obtain an adjusted current age specific fertility schedule that provides a better estimate of current fertility than that obtained by the traditional Age Specific Fertility Rate computation.

Feeney and Yu method of parity progression ratio
The Feeney and Yu (1987) method of Parity progression as calculated in the parity progression section of the International Union for the Scientific Study of Population (2017) webpage is used to compute the parity progression by duration to next parity.

Results
Background characteristics
Table 1 shows the background characteristic of the sample population of this study. More (30.5%, 24% and 27.5%) of the sample population for the three waves of Nigeria Demographic and Health Survey (NDHS) (2003, 2008 and 2013) resides in the North-West. Another 16 percent, 14.8 percent and 11.5 percent for NDHS 2013, 20 percent, 12.8 percent and 12.3 percent for NDHS 2008 and 12.6 percent,

The probability of a woman ever experiencing the i-th birth (F_i) can be obtained by integrating $f_i(t)$ over the reproductive age range (α, β).

$$F_i = \int_\alpha^\beta f_i(t) = \int_\alpha^\beta m(t)e^{-CFR(t)} \frac{[CFR(t)]^{i-1}}{(i-1)!}$$

$$F_i = 1 - e^{-CFR} \sum_{j=0}^{i-1} \frac{(CFR)^j}{j!}$$

The Period Parity Progression denoted by P_i is then: 17.9 percent and 9.7 percent for NDHS 2003 resides in the South-West, North-East and South-East respectively. More than half (57.9% for 2013, 64.3% for 2008 and 65.5% for 2003) are rural dwellers, while most are uneducated (37.8% for 2013, 35.8% for 2008 and 41.6% for 2003) or with a secondary education (35.8% for 2013, 35.7% for 2008 and 31.1% for 2003). Very few have a higher education. About half (50.3% for 2013, 45.3% for 2008, and 44% for 2003) of the women who participated in this study are self-employed.

With respect to wealth status, 43 percent of the sample population are rich, while about thirty-eight percent are poor for the three waves of NDHS. Religion wise, more (52%, 44.6%, and 50.7% for NDHS 2013, 2008 and 2003 respectively) of the women in this study are Muslims while about 36 percent (NDHS 2013), 42 percent (NDHS 2008) and 35 percent (NDHS 2003) are non-Catholic Christians. About two-third are in monogamous marriage. As regards age at first cohabitation, a little above one-quarter (26.6%) of the sample population were less than age 15 when they first cohabited for NDHS 2013and 2008, while it was 36 percent for NDHS 2003. In terms of age at first birth, exactly two-fifth (40%) had their first birth before they became 18 years old for NDHS 2013and 2008 while 47 percent had their first birth before they became 18 years old for NDHS 2003.

Table 1: Distribution of respondents by socio-demographic characteristics

Variable	Categories	2013		2008		2003	
		N	(%)	N	(%)	N	(%)
Region	North Central	5572	14.3	4748	14.2	1121	14.7
	North East	5766	14.8	4262	12.8	1368	17.9
	North West	11877	30.5	8022	24.0	2095	27.5
	South East	4476	11.5	4091	12.3	737	9.7
	South South	4942	12.7	5473	16.4	1342	17.6
	South West	6314	16.2	6789	20.3	958	12.6
Place of residence	Urban	16414	42.1	11934	35.7	2629	34.5
	Rural	22534	57.9	21451	64.3	4991	65.5
Wife Education	No Education	14729	37.8	11942	35.8	3171	41.6
	Primary	6734	17.3	6566	19.7	1628	21.4

	Secondary	13927	35.8	11904	35.7	2370	31.1
	Tertiary	3558	9.1	2974	8.9	451	5.9
Husband Education	No Education	11498	39.2	9463	38.5	2382	42.4
	Primary	5454	18.6	5317	21.6	1281	22.8
	Secondary	8314	28.3	6715	27.3	1259	22.4
	Tertiary	4064	13.9	3084	12.5	700	12.5
Type of Occupation	Work for someone	5038	13	5764	17.3	1085	14.3
	Work for self	19504	50.3	15101	45.3	3331	43.9
	Not working	14260	36.8	12464	37.3	3177	41.8
Wealth Status	Poor	14560	37.9	12428	37.2	2853	37.4
	Middle Class	7486	19.2	6341	19.0	1513	19.9
	Rich	16902	43.4	14616	43.8	3254	42.7
Ethnicity	Hausa	10699	27.5	7431	22.4	-	-
	Igbo	5636	14.5	5295	15.9	-	-
	Yoruba	5482	14.1	5924	17.8	-	-
	Others	17068	43.8	14597	43.9	-	-
Religion	Catholic	4316	11.1	3848	11.6	998	13.1
	Other Christian	13922	35.9	14060	42.3	2656	34.9
	Islam	20149	52.0	14826	44.6	3862	50.7
	Others	369	1.0	481	1.4	98	1.3
Family Type	Monogamous	18600	67.3	15715	67.1	3390	64.0
	Polygamous	9051	32.7	7702	32.9	1909	36.0
Age at first cohabitation	<15 years	7869	26.6	6685	26.8	2084	36.6
	15 – 19 years	13187	44.5	10771	43.1	2399	42.1
	20+ years	8566	28.9	7533	30.1	1211	21.3
Age at first Birth	<18 years	11033	40	9227	39.4	2466	46.9
	18 – 21 years	9303	33.7	7842	33.5	1763	33.5
	22+ years	7278	26.4	6335	27.1	1029	19.6

Parity progression ratios from 1998 – 2012

Table 2 below shows the proportion of women progressing to next parity for the three periods 1998-2002, 2002-2007 and 2008-2012. The parity progression ratio (PPR) decreased continuously from the first parity to the seventh parity for all periods between 1998 and 2012. Ninety-nine percent of women who had cohabited before 2002 gave birth to a child for period 1998 – 2002. The PPR then reduced by 3% where ninety-six percent of the women with a child progressed to their second birth. It was observed that the difference between the PPR of a parity and the next kept increasing by one percent with the exception of parity seven. The difference between the PPR for parities 1 and 2, 2 and 3, 3 and 4, 4 and 5, then 5 and 6 is 3, 4, 5, 6, and 7 respectively.

For periods 2003 – 2007, the PPR reduced from 99% for the first birth to 96% for the second birth and further declined to 92%, 87%, 80%, 74% and 68% for the third, fourth, fifth, sixth and seventh parities respectively. Furthermore, 99 percent, 96 percent, 91 percent, 86 percent, 79 percent, 73 percent and 67 percent progressed to their first, second, third, fourth, fifth, sixth and seventh parities respectively for period 2008-2012.

Table 2: Parity progression ratio from 1998 – 2012

	a_1	a_2	a_3	a_4	a_5	a_6	a_7
1998-2002	0.9883	0.9629	0.9191	0.8616	0.7978	0.7342	0.6745
2003-2007	0.9888	0.9641	0.9213	0.8645	0.8013	0.7380	0.6784
2008-2013	0.9872	0.9599	0.9139	0.8545	0.7895	0.7253	0.6655

Parity progression ratio by interval duration
Trend of progression to first birth by duration since first cohabitation from 1998 – 2012

Table 3 below shows that between 1998 and 2002, close to one-fifth (18%) of Nigerian women had commenced childbirth 17 months after first cohabitation. However, about twenty-two percent

and one-quarter (25%) had given birth to their first child before 17 months after first cohabitation for the periods 2003 – 2007 and 2008 – 2012 respectively. The rate at which women were progressing from first cohabitation to first birth kept increasing from 1998 to 2012 as the above table and graph further shows that 46% of the women already had a first child before 2½ years after cohabitation between 1998 and 2002. Meanwhile, the proportion of women who had progressed to have a first child before 2½ years after first cohabitation between 2003 & 2007 was almost half (48%), while more than

half (55%) had achieved their first birth within the same period from first cohabitation between 2008 and 2012.

Eight years after first cohabitation, exactly four of every five women (80%) had proceeded to have a first birth during the period 1998 – 2002. For the period 2003 – 2007 and period 2008 – 2012, 83% and 85% of the women respectively had progressed to having a first child after eight years from first cohabitation. However, virtually all the women that cohabited progressed to have a child and the proportion (99%) was equal for the three periods.

Table 3: Trend of progression to first birth by duration since first cohabitation from 1998 – 2012

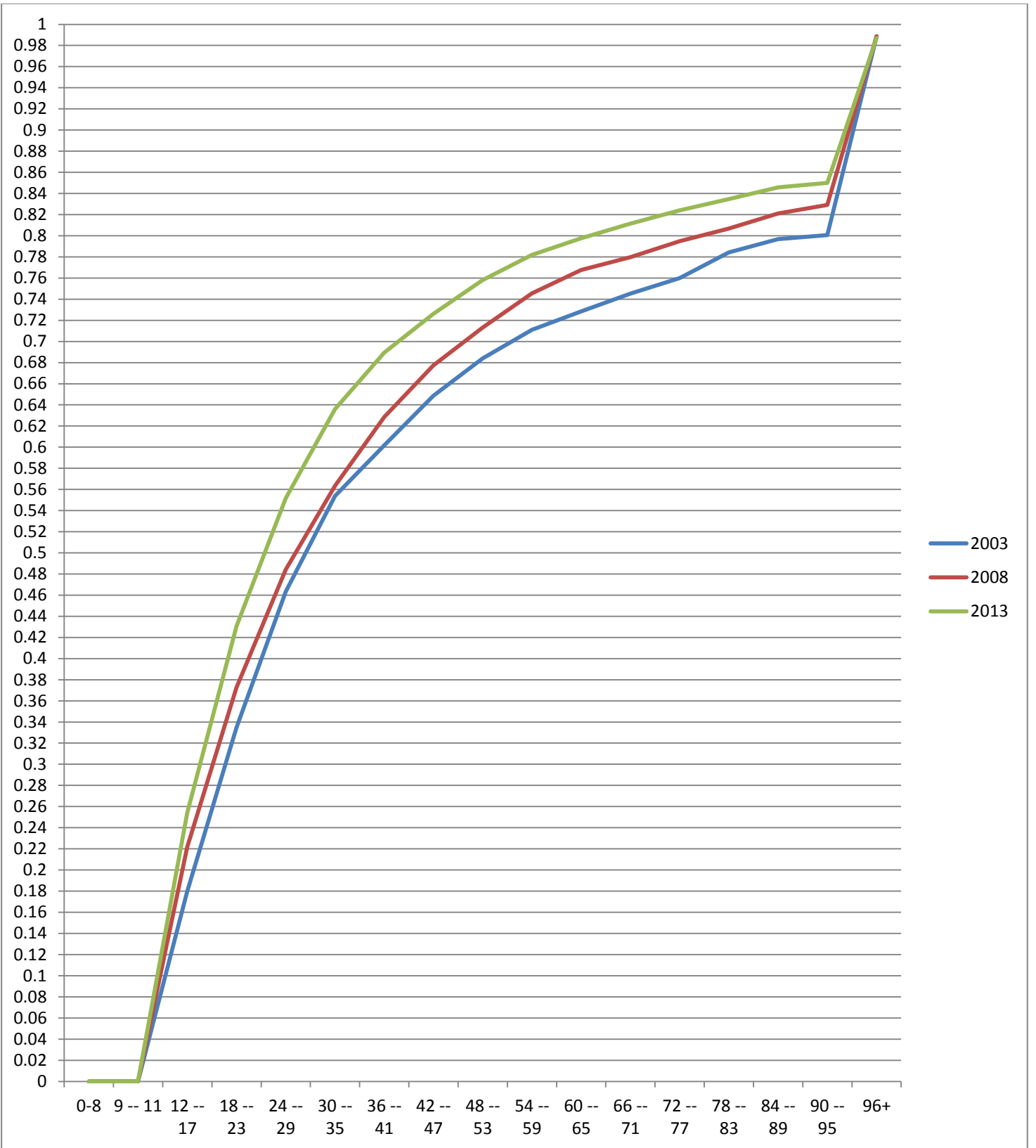| Duration (months) since last parity	PPR a_0t 1998-2002	PPR a_0t 2003-2007	PPR a_0t 2008-2012
0-8	0.0000	0.0000	0.0000
9-11	0.0000	0.0000	0.0000
12-17	0.1798	0.2217	0.2541
18-23	0.3347	0.3728	0.4306
24-29	0.4634	0.4842	0.5517
30-35	0.5539	0.5634	0.6361
36-41	0.6017	0.6285	0.6896
42 – 47	0.6486	0.6773	0.7261
48 – 53	0.6839	0.7132	0.7580
54 – 59	0.7110	0.7455	0.7820
60 – 65	0.7284	0.7677	0.7977
66 – 71	0.7452	0.7798	0.8114
72 – 77	0.7600	0.7949	0.8241
78 – 83	0.7843	0.8067	0.8346
84 – 89	0.7967	0.8211	0.8457
90-95	0.8005	0.8292	0.8499
96+	0.9883	0.9888	0.9872

Table 4: Trend of progression to 2nd parity by duration since first birth from 1998 – 2012

Duration (months) since last parity	PPR $a_i t$ 1998-2002	PPR $a_i t$ 2003-2007	PPR $a_i t$ 2008-2012
0-8	0.0000	0.0000	0.0000
9-11	0.0000	0.0000	0.0000
12-17	0.0176	0.0160	0.0093
18-23	0.0750	0.0645	0.0521
24-29	0.1859	0.1940	0.1786
30-35	0.3464	0.3846	0.3540
36-41	0.4947	0.5105	0.4991
42 – 47	0.5827	0.6210	0.5980
48 – 53	0.6381	0.6833	0.6589
54 – 59	0.6802	0.7270	0.7017
60 – 65	0.7104	0.7545	0.7327
66 – 71	0.7329	0.7784	0.7586
72 – 77	0.7446	0.7952	0.7754
78 – 83	0.7614	0.8085	0.7899
84 – 89	0.7769	0.8195	0.7992
90-95	0.7876	0.8288	0.8100
96+	0.9629	0.9641	0.9599
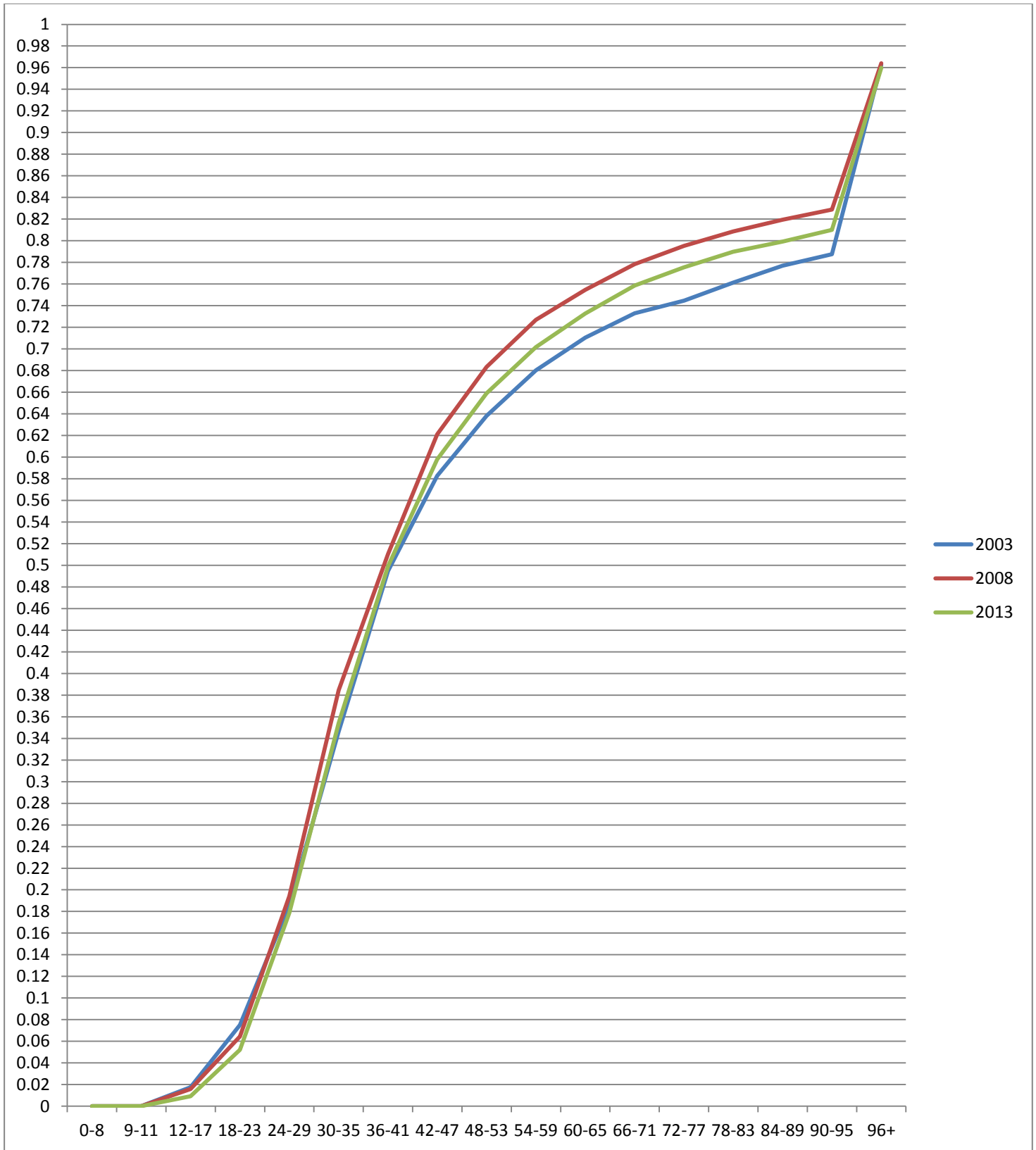
In table 4, the proportion of women that had had a second birth before their first child clocked the age of 3 was 35% between 1998 and 2002. The proportion moved upward by four percent to become 39% between 2003 and 2007 then decreased back to 35% between 2008 and 2012. About half of the women already progressed to the 2nd parity three-and-half years after first birth for the periods 1998 – 2002, 2003 – 2007 and 2008 – 2012.

Amazingly, although close but not up to four of every five women (79%) had progressed to 2nd parity 8 years after their first birth during the period 1998 – 2002. Meanwhile a little more than four of every five women have had their second birth during the period 2003 – 2007 (83%) and 2008 – 2012 (81%). In addition, the proportion of women who eventually proceeded to their 2nd parity after having their first child was for all periods from 1998 – 2012.

Table 5: Trend of progression to 3rd parity by duration since second birth from 1998 – 2012

| Duration (months) since last parity	PPR a_2t 1998-2002	PPR a_2t 2003-2007	PPR a_2t 2008-2012
0-8	0.0000	0.0000	0.0000
9-11	0.0000	0.0000	0.0000
12-17	0.0197	0.0196	0.0096
18-23	0.0691	0.0687	0.0530
24-29	0.1713	0.1914	0.1612
30-35	0.3552	0.3667	0.3385
36-41	0.4995	0.4901	0.4756
42 – 47	0.5996	0.6013	0.5736
48 – 53	0.6695	0.6643	0.6455
54 – 59	0.7147	0.7107	0.6970
60 – 65	0.7289	0.7418	0.7252
66 – 71	0.7562	0.7620	0.7519
72 – 77	0.7760	0.7793	0.7752
78 – 83	0.7960	0.7889	0.7861
84 – 89	0.7975	0.8001	0.7993
90-95	0.8039	0.8057	0.8096
96+	0.9191	0.9213	0.9139
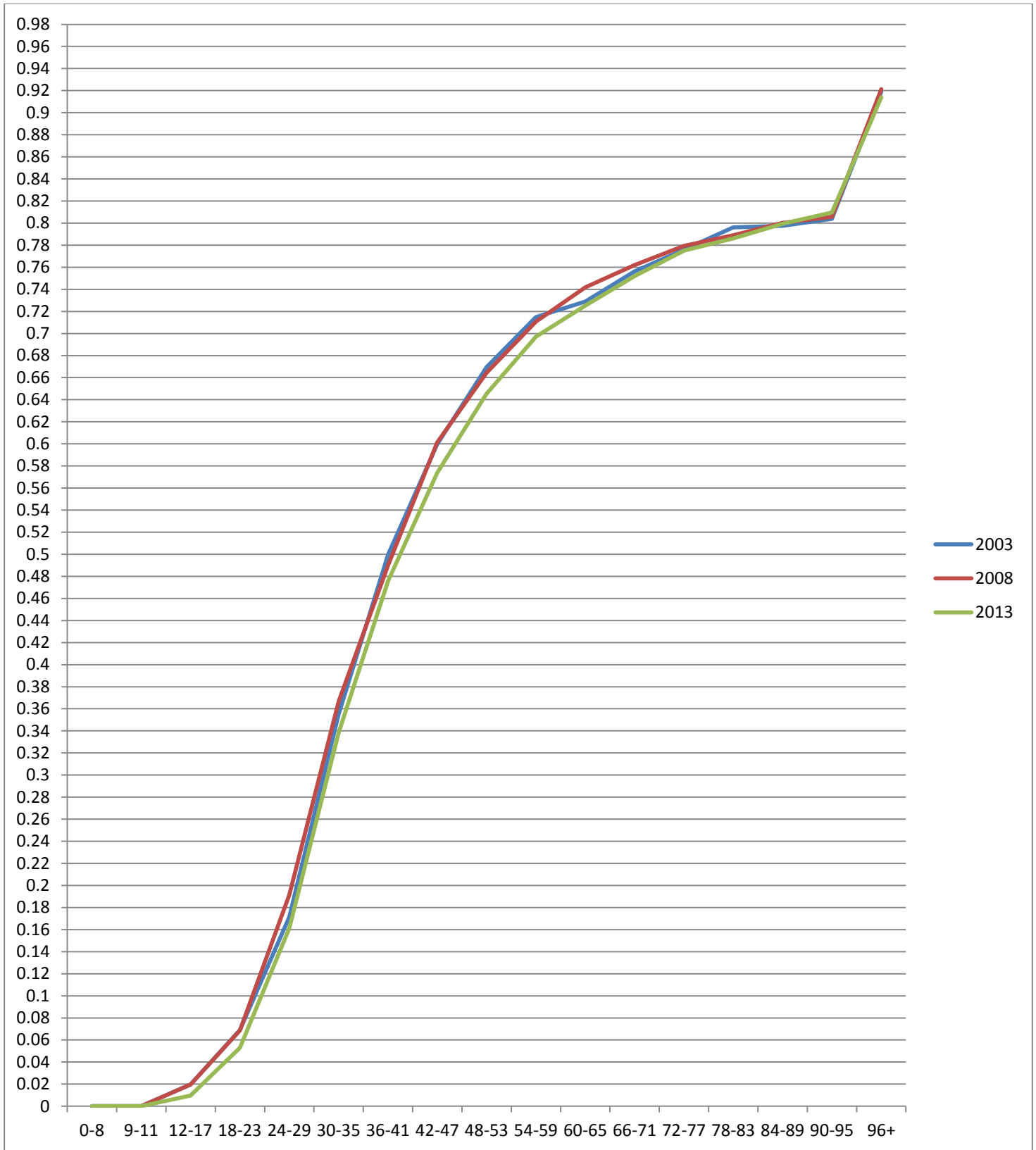
Table 5 shows that; seven percent of Nigerian women already had a third child before the second child was two years of age for the period 1998 – 2002 and the period 2003 – 2007. The proportion of Nigerian women who had progressed to the third parity before the second child clocked age two reduced to 5% in 2008 – 2012. Also, it appears that there is an agreement in the proportion of women that progressed to the 3rd birth 3½ years after the

second birth for the periods 1998 – 2002 and 2003 – 2007 as approximately 50% of the women had experienced their third birth before the second child became 3½ years old for both periods.

Furthermore, it was discovered that for the periods 1998 – 2002, exactly 80% of the women have given birth to a third child 8 years after their 2nd birth. The proportion was not much different for

periods 2003 – 2007 and 2008 – 2012 as the women progressed to the third parity before their 2nd child clocked 8 years in both periods. Equally, there was a negligible difference in the proportion of women who progressed to 3rd parity approximately 81% of during the period 1998 -2002 (92%) and 2003 – 2007(92%) compared to those for period 2008 – 2012 (91%).

Table 6: Trend of progression to 4th parity by duration since third birth from 1998 – 2012

Duration (months) since last parity	PPR a_3t 1998-2002	PPR a_3t 2003-2007	PPR a_3t 2008-2012
0-8	0.0000	0.0000	0.0000
9-11	0.0000	0.0000	0.0000
12-17	0.0315	0.0168	0.0097
18-23	0.0696	0.0612	0.0489
24-29	0.2065	0.1626	0.1515
30-35	0.3689	0.3255	0.3064
36-41	0.5057	0.4474	0.4280
42 – 47	0.6052	0.5412	0.5309
48 – 53	0.6600	0.6107	0.5910
54 – 59	0.7014	0.6604	0.6417
60 – 65	0.7298	0.6925	0.6802
66 – 71	0.7497	0.7222	0.7091
72 – 77	0.7699	0.7397	0.7292
78 – 83	0.7992	0.7547	0.7491
84 – 89	0.8098	0.7622	0.7605
90-95	0.8186	0.7704	0.7662
96+	0.8616	0.8645	0.8545
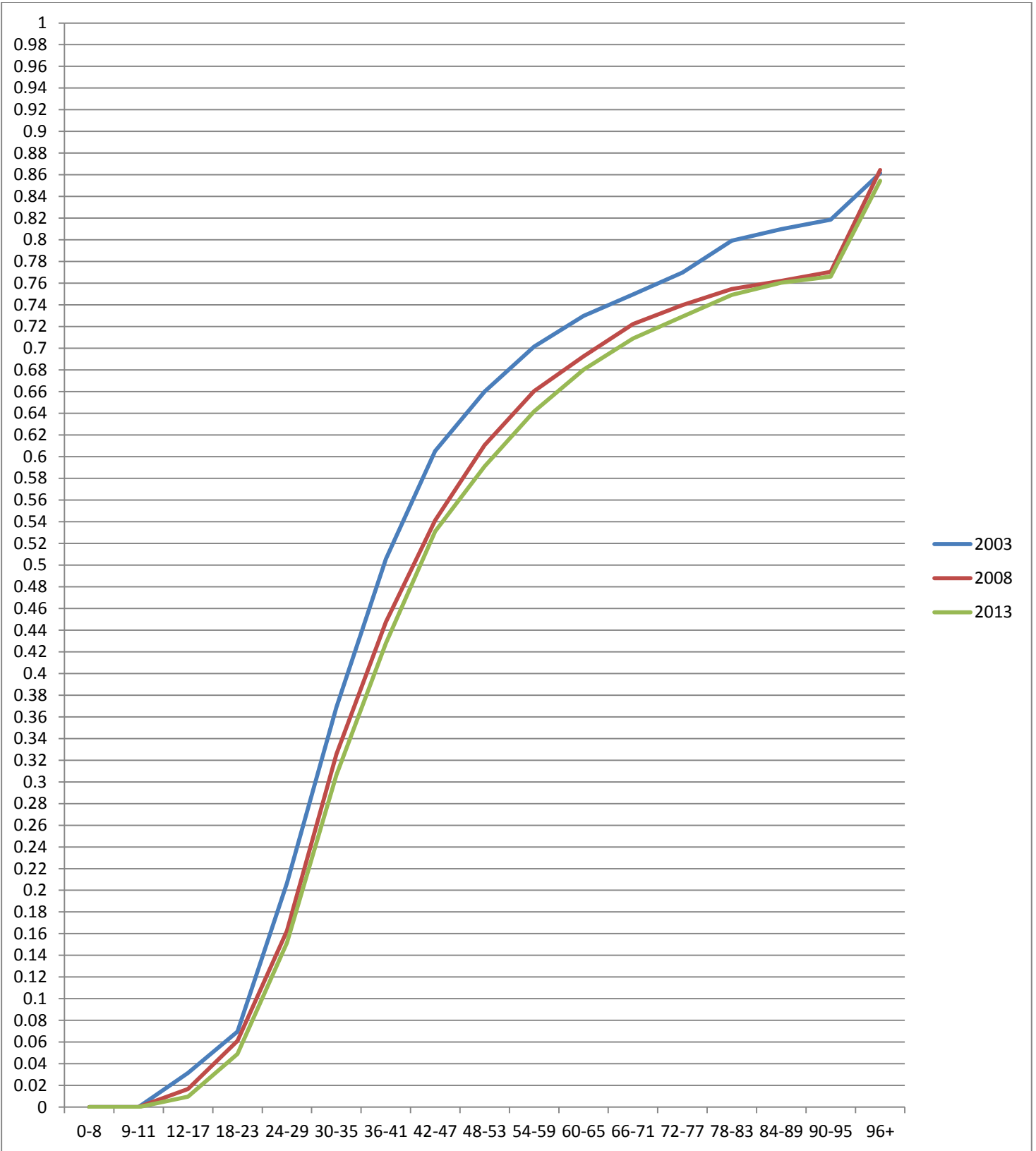
Between 1998 – 2002, Thirty-seven percent of the women had progressed to the fourth parity before 3 years after they had their third birth. This proportion reduced to 33% (a four percent decrease) for the period 2003 – 2007 and further reduced to 31% for the period 2008 – 2012. In addition, the proportion of women moving quickly to the fourth parity tends to be reducing gradually from year 1998 – 2012 as more than half (51%) of the women for the period

1998 – 2002 had experienced their fourth birth before 3½ years after having their third child whereas only 45% and 42% of the women have progressed to the fourth parity 3½ years after the third parity for the periods 2003 – 2007 and 2008 – 2012 respectively.

Furthermore, more than four-of-five women (82%) already had a fourth child before eight years after their 3rd birth, while a little above three-quarter

(77%) had also progressed to fourth parity eight years after third birth for the periods 2003 – 2007 and 2008 – 2012. Similarly to what was observed for parity three, the proportion of women progressing to their fourth birth remained relatively equal for all periods from 1998 to 2012. Although the proportion was slightly higher in 2003 – 2007 (87%) compared to 1998 – 2002 (86%) or 2008 – 2012 (86%).

Table 7: Trend of progression to 5th parity by duration since fourth birth from 1998 - 2012

Duration (months) since last parity	PPR a_4t 1998-2002	PPR a_4t 2003-2007	PPR a_4t 2008-2012
0-8	0.0000	0.0000	0.0000
9-11	0.0000	0.0000	0.0000
12-17	0.0095	0.0147	0.0076
18-23	0.0479	0.0567	0.0415
24-29	0.1313	0.1507	0.1323
30-35	0.2835	0.2894	0.2774
36-41	0.4421	0.3995	0.3872
42 - 47	0.5184	0.5044	0.4799
48 – 53	0.5871	0.5628	0.5475
54 – 59	0.6224	0.6148	0.5912
60 – 65	0.6650	0.6485	0.6255
66 – 71	0.6866	0.6769	0.6471
72 – 77	0.7005	0.6915	0.6655
78 – 83	0.7170	0.7042	0.6774
84 – 89	0.7260	0.7147	0.6906
90-95	0.7360	0.7247	0.7010
96+	0.7978	0.8013	0.7895
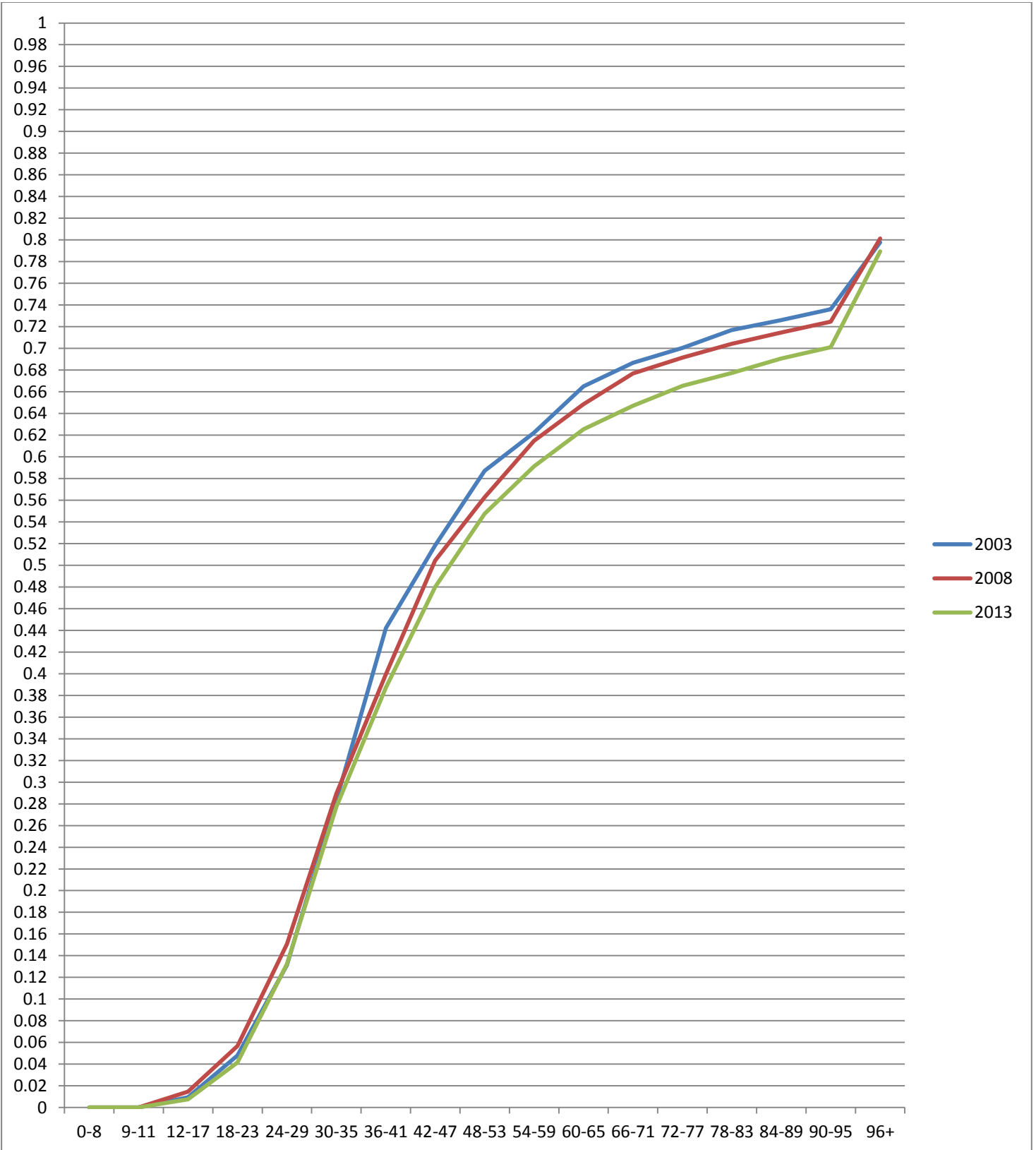
The proportion of women that already had a fifth birth within an interval of 3 years after their fourth birth was approximately 28% for the period of 1998 – 2002 and it remained fairly constant through to 2012. However a slight difference was noticed before the fourth year after the 4th parity. As at that point, more than half (52%) of the women during the period 1998 – 2002 had progressed to their fifth birth

four years after their 4th birth was observed for the periods 2003 – 2007 (50%) and 2008 2012 (42%).

It was also observed from the table above that there was a consistent decrease of 2% for the three periods starting from 1998 – 2002 and ending at 2008 – 2012. Seventy-four percent of the women in the period 1998 – 2002 had progressed to the fifth birth 8 years after their 4th birth. The proportion moved down to 72% for the period 2003 – 2007 and further

down to 70% for the period 2008 – 2012. Eventually, four-fifth (80%) of the women for periods 1998 - 2002 and 2003 – 2007 who have experienced the fourth birth gave birth to a fifth child while, 79 percent progressed to the fifth birth during period 2008 – 2012.

Table 8: Trend of progression to 6th parity by duration since fifth birth from 1998 – 2012

Duration (months) since last parity	PPR a_5t 1998-2002	PPR a_5t 2003-2007	PPR a_5t 2008-2012
0-8	0.0000	0.0000	0.0000
9-11	0.0000	0.0000	0.0000
12-17	0.0352	0.0174	0.0180
18-23	0.0870	0.0508	0.0483
24-29	0.1772	0.1429	0.1319
30-35	0.3071	0.2764	0.2645
36-41	0.4037	0.3724	0.3715
42 - 47	0.4904	0.4563	0.4578
48 – 53	0.5566	0.5111	0.5104
54 – 59	0.5971	0.5532	0.5536
60 – 65	0.6222	0.5808	0.5840
66 – 71	0.6441	0.6022	0.6084
72 – 77	0.6674	0.6229	0.6234
78 – 83	0.6855	0.6383	0.6386
84 – 89	0.6940	0.6455	0.6466
90-95	0.6940	0.6577	0.6592
96+	0.7342	0.7380	0.7253
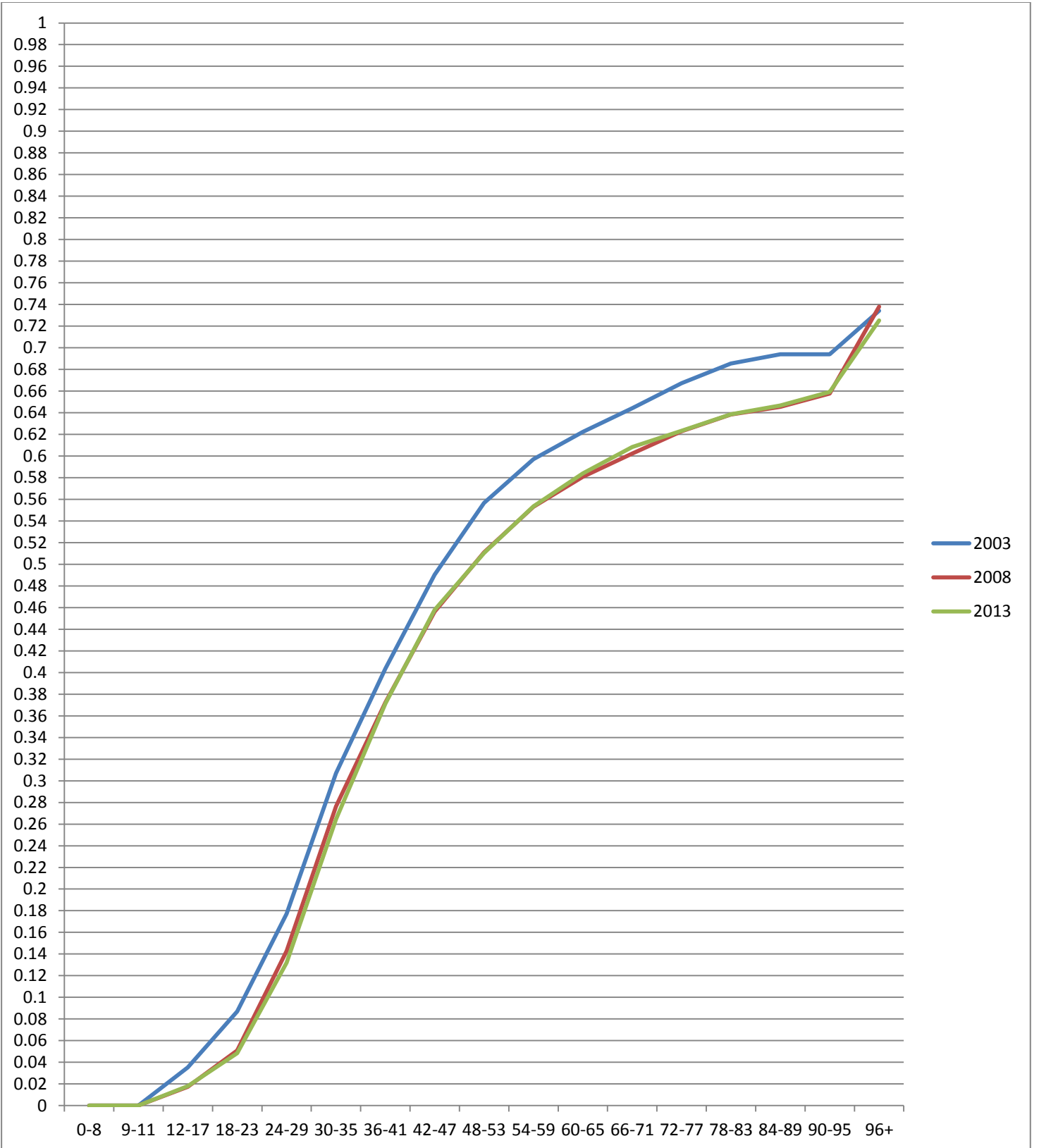
Thirty-one percent of the women for period 1998 – 2002 had a fifth had a fifth birth to sixth birth interval that was less than 3 years. The proportion of women that has such birth interval decreased to 28% for the period 2003 – 2007 and further declined to 26% between year 2008 – 2012. Furthermore, almost half (49%) of Nigerian women during year 1998 – 2002 already progressed to the sixth birth 4 years after their fifth birth, while the proportion who went on to

have a sixth child before their fifth child clocked four years went down to 47% and then 46% for the periods 2003 -2007 and 2008 – 2012 respectively.

Eight years after the previous birth, just about 70% progressed to the sixth parity for period 1998 – 2002, while two-third (66%) of the women in the periods 2003 – 2007 and 2008 – 2012 who had a fifth birth equally progressed to the sixth birth eight years later. In addition, 73%, 74% and 73% of

women for periods 1998 – 2003, 2003 – 2007 and 2008 – 2012 respectively progressed to their sixth parity after having a fifth birth.

Table 9: Trend of progression to 7th parity by duration since sixth birth from 1998 – 2012

Duration (months) since last parity	PPR a_6t 1998-2002	PPR a_6t 2003-2007	PPR a_6t 2008-2012
0-8	0.0000	0.0000	0.0000
9-11	0.0000	0.0000	0.0000
12-17	0.0161	0.0178	0.0151
18-23	0.0642	0.0644	0.0460
24-29	0.1517	0.1536	0.1287
30-35	0.2858	0.2772	0.2523
36-41	0.3615	0.3664	0.3594
42 – 47	0.4437	0.4485	0.4478
48 – 53	0.5024	0.4957	0.5065
54 – 59	0.5422	0.5401	0.5468
60 – 65	0.5631	0.5692	0.5720
66 – 71	0.6027	0.5942	0.5890
72 – 77	0.6183	0.6103	0.5976
78 – 83	0.6426	0.6237	0.6148
84 – 89	0.6701	0.6312	0.6245
90-95	0.6731	0.6435	0.6350
96+	0.6745	0.6784	0.6655
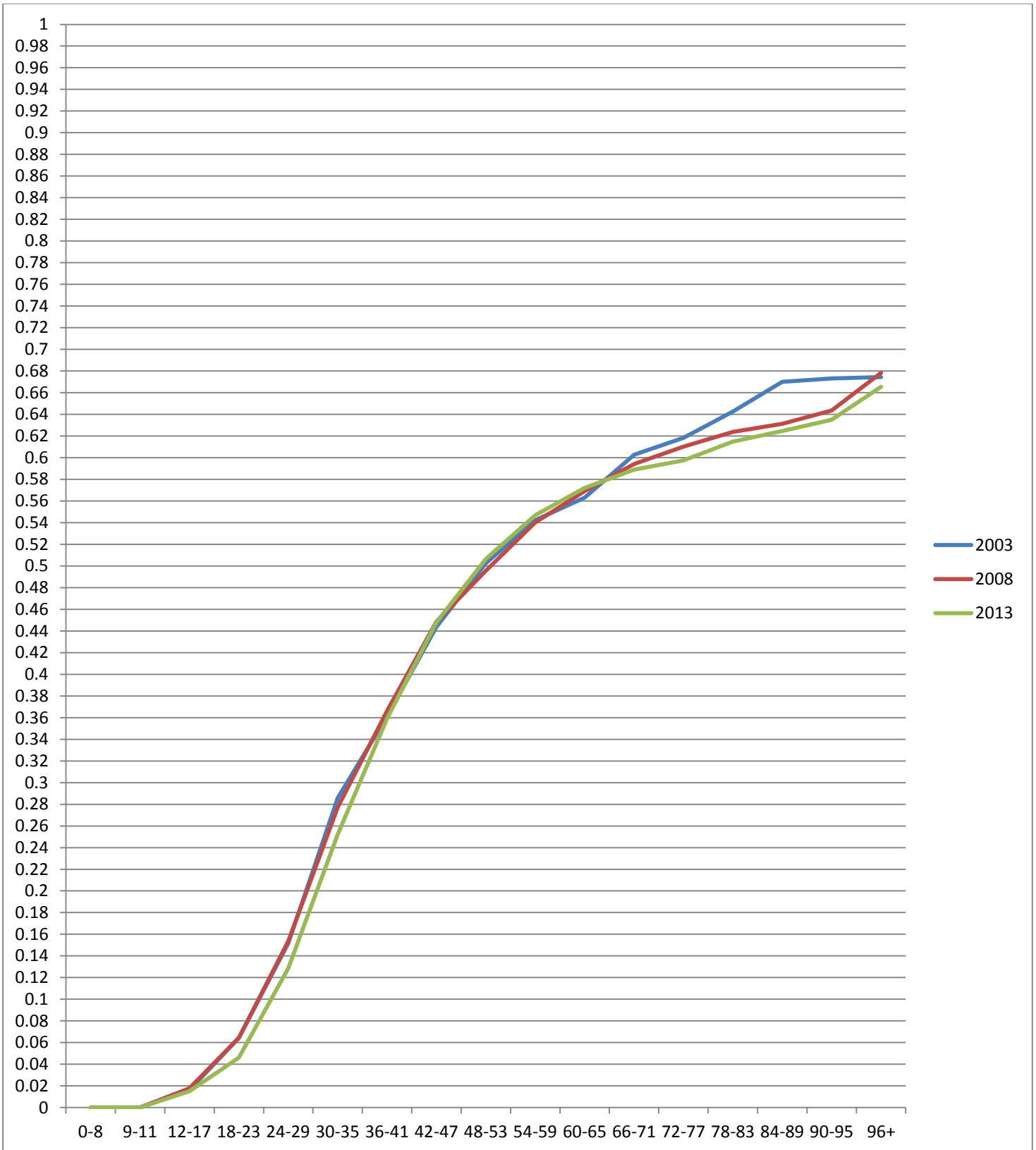
The proportion of women that already had their 7th birth before 3 years after their previous birth was not much different for periods 1998 – 2002 and 2003 – 2007 as 29% of the women during 1998 – 2002 and 28% of the women during 2003 – 2007 already progressed to the seventh parity before their sixth child became 3 years old. The proportion of women that had experienced a seventh birth for the same interval was one-quarter (25%). It took four-and-half

years before half of the women who had a sixth child could move on to having a sixth child for all the periods from 1998 – 2012.

In addition, just a little over two-third (67%) of the women with six children during the period 1998 – 2002 could experience a seventh birth before 8 years after the sixth birth. Sixty-four percent of the women during the period 2003 – 2007 and period 2008 – 2012 equally had their seventh birth

experience before their sixth child became 8 years old. Overall, sixty-eight percent of women with six children progressed to parity seven between 1998 and 2002, while another 68 percent of mothers of six children between 2003 and 2007 progressed to seventh birth within that period. About two-third (67%) of women in progressed from sixth to seventh parity between 2008 and 2012.

Discussion

This study has examined speed of progression to next parity and its trend from 1998 - 2012 among women of reproductive ages in Nigeria.

Over the years from 1998 – 2012 the duration it takes before women could progress from first cohabitation to first birth kept decreasing. For instance, between 1998 and 2002, it took two-and-half years before 46% of the women could commence childbirth after cohabitation, meanwhile more than half (55%) of the women had progressed to first birth after cohabitation during 2007 – 2012. This indicates that some factors are playing in to increase the eagerness of women to commence childbirth early after cohabitation. One of such factors could be increasing female education which acts to increase female age at marriage (Yoo 2014).

A comparison of the three waves of Nigeria Demographic and Health Survey (National Population Commission(NPC)[Nigeria] and ORC Macro 2004; National Population Commision (NPC) [Nigeria] & ICF Macro 2009; NPC & ICF 2014) shows that female education is on the increase (however, at a very slow rate) and the increase automatically gives rise to age at marriage. Meanwhile it is logical to think that women who begin cohabitation at a later age becomes more concerned about menopause and are more likely to quickly commence childbirth after cohabitation than those who began cohabitation at an early age.

According to WHO (2004) there should be about 3 years interval between a birth and the next one. Although, it was expected that as a result of increasing modern contraceptive awareness, less women should experience short birth interval as the years go by. However, this was not the case for Nigerian women progressing to second parity. This study shows that 35% of the Nigerian women had a birth interval that was not up to 3 years between 1998 and 2002. The period 2003 – 2007 was expected to have lesser proportion of women having this short birth interval, on the hand, it increased by 4% to become 39% of the women. However, the proportion of women with a first to second birth interval less than 3 years decreased back to 35% between 2008 and 2012.

When the trend in progression to next parity from 1998 – 2012 was considered among women of reproductive ages in Nigeria, it was discovered that; there was not much variation in the parity progression probabilities (PPP) from 1998 to 2012 for all parities. The proportion of women progressing to next parity was observed to be fairly equal for both periods 1998-2002 and 2003-2007. However, there was a slight decrease of approximately one percent for the period 2008-2012.

The observation in this study then suggests that fertility levels remained constant from 1998 through 2007 with a very little decrease between 2008 and 2012. The result is therefore consistent with the fertility trend from 2003 – 2013 that was indicated in the 2013 Nigeria Demographic and Health Survey (NDHS) report (NPC and ICF, 2014). Although the findings of this study is similar to the NDHS 2014 report with respect to fertility trend, fertility levels observed in this study appears to be higher than what was reported in the 2014 NDHS report. Another study (Adebowale and Palamuleni, 2014) also found fertility levels to be higher than what was reported in the 2014 NDHS report.

With respect to speed of progression to next parity, this study shows that there is a considerable difference in the pace of progression to first parity for the three periods (1998-2002, 2003-2007, and 2008-2012). The speed of progression to the first parity was slowest in 1998-2002 and fastest in 2008-2012. The difference that was observed in the pace at which women were progressing to the next parity for the three periods began to reduce from the second parity and eventually converged in the third parity. Interestingly, a noticeable difference in the pace of progression to next parity for the three periods was again detected from the fourth to sixth parity with period 1998-2002 having the quickest progression rate followed by period 2003-2007. Nevertheless, there was not much difference in the pace of progression to the sixth parity for periods 2003-2007 and 2008-2012.

The findings in this study therefore suggest that; the speed at which women are progressing to early parities (parities one and two) has been increasing from 1998 – 2012. However, over the same period of time (1998 – 2012), there have been relatively consistent reductions in the speed at which women are progressing to high order parities. The increasing birth interval length at high order parities found in this study is consistent with Moultrie et al (2012) work when they investigated the birth interval dynamics in 24 African countries using data from 76 Demographic and Health Surveys carried out between 1986 and 2010. This observed reduction in speed indicates that women are beginning to take

more time before progressing to high order parities. This suggest that the increase in modern contraceptive awareness tends to be more effective for higher parities (parity four and above) than lower parities (parities three and two). Therefore, it can be speculated that majority of the Nigerian women who will use a modern contraceptive will not begin usage until after their third birth. More studies needs to be carried out to ascertain the reliability of the speculation. If the speculation is true, then family planning targeted programs need to emphasize the need for early uptake of a family planning method since contraceptive is not only meant for limiting but also for spacing birth. This is a necessary action that must be taken if policy makers are interested in the reduction of infant and maternal mortality.

With a reducing pace of progression to high order parities, there are two positive implications. The first implication is; with a continuous increase in birth interval, there is a high possibility that maternal and infant mortality resulting from short birth spacing will continually reduce over time. Secondly, a reduction in the pace at which women are progressing to high order parities will eventually lead to a reduction in total fertility. However, the observed increasing speed of progression to early parities might reduce the effect that a slower pace of progression to high order parities might have on total fertility. Therefore, speed of progression to early parities needs to reduce in order to achieve a quicker reduction in total fertility.

Conclusion
Not much progress has been made with respect to fertility reduction in the country as parity progression probabilities remained fairly constant for all periods between 1998 and 2012. On the other hand, the interval between first cohabitation and first birth continuously reduced throughout the study period (1998 – 2012) while higher order births (from parity four and above) showed a consistent but slow increase in the proportion of women experiencing longer birth intervals between 1998 and 2012. A reduction in the pace of progression to high order parities suggests Nigeria is experiencing a consistent but slow total fertility decline.

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