Fertility Decline in Paraguay

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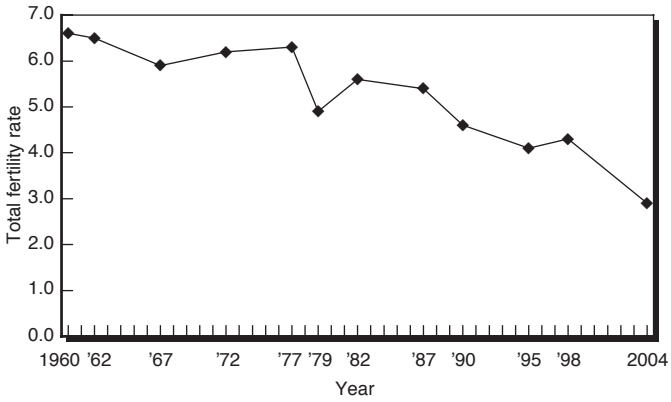
Recent reproductive health surveys show that the fertility rate in Paraguay decreased precipitously from 4.3 lifetime births per woman in 1995–98 to 2.9 births in 2001–04. In this study, we establish data consistency between the 1998 and 2004 surveys by comparing a series of cohort-specific period rates and use the Bongaarts framework of proximate determinants of fertility to demonstrate that an increase in the contraceptive prevalence rate (CPR) between 1998 and 2004 fully accounts for the fertility decline. Decomposition of rates shows that changes in group-specific CPRs explain a greater proportion of the change in the overall CPR than do changes in population composition by educational attainment, urban residence, region, and language spoken at home. Finally, we show that younger cohorts of women in 2004 reported ideal completed fertility desires of less than 2.9 births, suggesting that the fertility rate is likely to continue to decrease. (Studies in Family Planning 2009; 40[3]: 227–234)

Throughout the latter half of the twentieth century, Paraguay's total fertility rate (TFR)—the number of lifetime births per woman—has been higher than those in most other Latin American and Caribbean countries and higher than would be expected given its moderate socioeconomic development (Bryant 2007). Nonetheless, the estimated TFR in Paraguay steadily declined from 6.6 births in 1960 to 4.6 births in 1990 (see Figure 1). The pace of fertility decline seems to have slowed in 1990s, and this stagnation in the TFR was attributed to a lack of increase in contraceptive use (Monteith et al. 1988). Recently, however, the estimated TFR in Paraguay decreased from 4.3 births during 1995–98 to 2.9 births during 2001–04,[1] substantially reducing the gap in TFRs between Paraguay and other South American countries.

This impressive decrease is particularly surprising given the lack of substantial changes in Paraguay during the past decade in other development indicators, such as child mortality, socioeconomic levels, or the political agenda for family planning programs that may have involved improvement in access to or reduced fees for contraceptives or new method introduction. A low child-mortality rate is often regarded as a prerequisite for a sustained decrease in fertility rates; survey results show, however, that Paraguay's child-mortality rate of 33 deaths per 1,000 live births during 2001–04 was the same as it was during 1992–95 (CEPEP 1997 and 2005). Paraguay remains one of the poorest countries in South America, with an average annual income per capita of US$1,558, and it is a predominantly agrarian society: approximately half of the population lives in rural areas (Gacitúa Marió et al. 2004). Consequently, the validity

Figure 1 Total fertility rates, 1960–2004, Paraguay



Note: These estimates are derived from different calculation methods and data sources; therefore, they may not be strictly comparable. In particular, a large decline and subsequent increase are observed at around 1979. The 1977 estimate of 6.3 births is based on the birthday of the last birth, the total number of births, and the number of surviving children and used a substantially smaller sample (1,871 women), whereas the 1979 estimate of 4.9 births is based on complete birth records and a larger sample (4,240 women), suggesting that the decline between these two years might not be as precipitous as observed in the graph (CEPEP 1989). The subsequent increase was attributed to the lagged effect of the Paraguayan Ministry of Health's discontinuation of the modern contraceptive supply between 1979 and 1988 (CEPEP 1991).
Sources: 1960–72: Census 1972. 1977: Encuesta de Prevalencia de Anticonceptivos (1977). 1979: Encuesta Nacional de Fecundidad (1979). 1982: Census 1982. 1987: Encuesta Nacional de Planificación Familiar (1987). 1990: Encuesta Nacional de Demografía y Salud (1990). 1995: Encuesta Nacional de Demografía y Salud Reproductiva (1995–96). 1998: Encuesta Nacional de Salud Materno Infantil (1998). 2004: Encuesta Demográfica y de Salud Materna Infantil (2004).

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of the apparent precipitous decrease in Paraguay's TFR between 1998 and 2004 has been questioned by both international and domestic policymakers.

In this study, we explore the possible determinants of Paraguay's recent TFR decrease, most importantly contraceptive use, but also several important socioeconomic characteristics, including educational attainment, urban/rural residence, region of residence, and language spoken at home. We also assess the quality of data collected during the two most recent Paraguayan reproductive health surveys, conducted in 1998 and 2004, and the likelihood that the fertility rate may continue to decline.

Data and Methods

For our analysis, we employ data from three of Paraguay's recent national reproductive health surveys (RHSs): the 1995–96 National Survey of Demography and Reproductive Health (ENDSR), the 1998 National Survey of Maternal and Infant Health (ENSMI), and the 2004 National Survey of Demography and Sexual and Reproductive Health (ENDSSR). All three surveys were conducted by the Paraguayan Center of Population Studies (Centro Paraguayo de Estudios de Población/CEPEP) with technical assistance provided by the United States Centers for Disease Control and Prevention (CDC). Survey samples were designed to be representative of the population of Paraguay except for residents of the occidental region of El Chaco, who were omitted from the sampling frame because of their region's extremely low population density (the El Chaco region accounts for about 60 percent of Paraguay's territory but contains only about 2 percent of its total population). The rest of the country was divided into four regions: the Gran Asunción region, which includes the city of Asunción, the national capital; the North region; the Central South region; and the East region. The response rates for the 1995–96, 1998, and 2004 RHSs were, respectively, 96 percent, 98 percent, and 97 percent, and the final samples consisted of 6,465, 3,598, and 7,321 women of reproductive age. Reproductive age was defined as 15–49 years in the ENDSR and as 15–44 years in the ENSMI and the ENDSSR. To achieve comparability across surveys, we exclude women aged 45 and older from our analyses. Because each survey used stratified multistage cluster sampling, we apply sampling weights throughout our analyses to correct for the unequal probabilities of selection for census tracts, households, and individual women.

In this study, we have four analytic objectives. First, using the complete birth-history data for all children of the women interviewed, we endeavor to assess the quality of data gathered for the 1998 and 2004 surveys by examining the consistency of cohort-specific period fertility rates for the two surveys. These rates are based on the number of births that occurred during a given period to cohorts of women within a specified age range at the end of that period. We define these cohorts according to women's ages in August 2003. The cohort of women aged 20–24 in August 1998 according to the 1998 RHS, for example, corresponds to the cohort of women aged 25–29 in August 2003 according to the 2004 RHS, for whom information is available to estimate two sets of fertility rates for periods preceding August 2008. If the quality of data from the two surveys is high, the two surveys should yield substantially similar results for the same periods of time. Although cohort-specific period rates are not calculated as frequently as age-specific period rates, they are useful for comparing rate estimates for the same time periods based on the results from different surveys.

Our second objective is to apply the Bongaarts framework (Bongaarts 1978 and 1982; Bongaarts and Potter 1983) to assess the relative importance of various proximate determinants of fertility to the fertility decline. Proximate determinants of fertility are the biological and behavioral factors directly associated with fertility rates. Bongaarts identified four such factors: proportion of women in union, contraceptive prevalence, proportion of women who experienced postpartum infecundability due to breastfeeding, and proportion who underwent induced abortion. We do not consider induced abortion here because it is illegal in Paraguay, and a reliable estimate of the national abortion rate is not available; however, abortion is likely to have had little effect on the fertility rate.[2]

Because, as is shown below, an increase in the national contraceptive prevalence rate (CPR) is the factor most closely associated with the fertility decline in Paraguay between 1995–98 and 2001–04, we decompose the change in this rate into a component attributable to changes in the composition of the population and a component attributable to changes in group-specific CPRs (Kitagawa 1955; Preston et al. 2001). We use the following equation:

$$\Delta(\text{difference in CPRs}) = \sum(C_i^{1998} - C_i^{2004}) * (CPR_i^{1998} + CPR_i^{2004}) / 2 + \sum (CPR_i^{1998} - CPR_i^{2004}) * (C_i^{1998} + C_i^{2004}) / 2$$

where C_i^{1998} represents the proportion of women with a given characteristic (education, language, region, or urban/rural residence in 1998) and CPR_i^{1998} represents the CPR for these women in 1998. The first part of the equation represents the difference in CPRs attributable to changes in the proportion of women with the characteristic between 1998 and 2004, and the second part represents the difference in CPRs attributable to changes in the characteristic-specific CPRs in the same period. By assessing the relative importance of these two factors, we are able to determine whether the increase in Paraguay's overall

CPR is attributable to an increase in CPRs throughout sectors of the Paraguayan population or to socioeconomic changes such as urbanization and improved access to education that are generally associated with higher rates of contraceptive use.

Finally, in order to forecast the future fertility trend in Paraguay, we examine the planning status of births and the number of children that Paraguayan women, particularly younger cohorts of women, considered to be ideal.

Results

Table 1 presents TFRs and their 95 percent confidence intervals, which are calculated for a three-year period prior to the start of data collection for each of the three surveys. The estimated TFR in Paraguay during 2001–04 (2.9 births) was significantly lower than it was during either 1992–95 (4.1 births) or 1995–98 (4.3 births). The recent drop in fertility is evidenced not only across surveys but also in age-specific rates by periods based on the 2004 RHS alone. Figure 2 shows a clear disjuncture between the fertility rates during 1999–2004 and those during previous five-year periods among women in every five-year age interval except those aged 15–19, among whom rates were slightly lower during 1974–79. In particular, the most reproductively active women, those aged 20–29, exhibit substantially lower fertility estimates, contributing to the overall low TFR in this most recent period.

Comparisons of Cohort-specific Period Rates Between 1998 and 2004

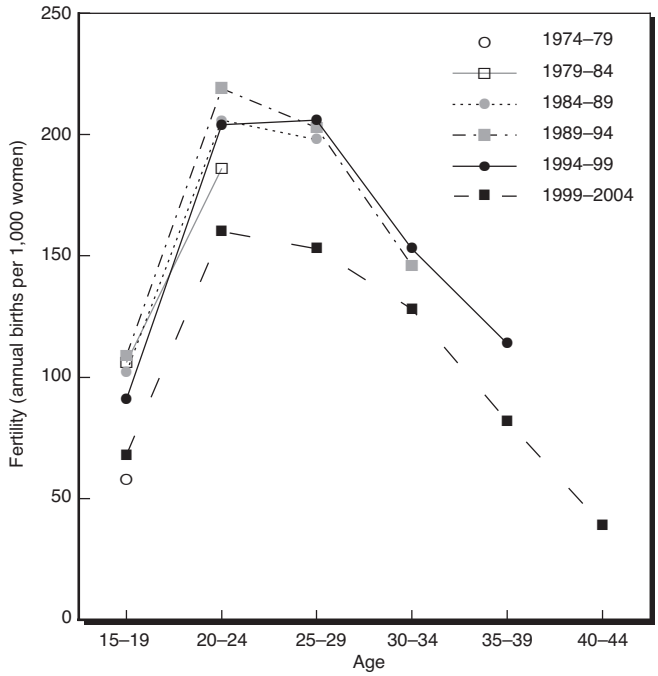
To evaluate the consistency of the fertility rates produced by the 1998 and 2004 surveys, Figure 3 shows in each graph a set of period-specific birth rates for women in the cohorts aged 20–24, 25–29, 30–34, 35–39, and 40–44 in August 2003. Although the same cohorts of women were five years younger in August 1998, they have been labeled with their ages in August 2003. Each graph contains two sets of fertility estimates for each of six periods from September 1973–August 1978 to September 1998–August 2003 for a specific birth cohort. For example, the first graph in the figure shows the estimated fertility rate during 1998–2003 to be 116 births per 1,000 women aged 20–24 in August 2003. Logically, no data are available for the 1998–2003 period

Table 1 Total fertility rates for Paraguay, by time period, according to source

Period	TFR	95% CI	Source
September 1992–September 1995	4.13	(3.88–4.39)	ENDSR 1995–96
August 1995–August 1998	4.26	(3.78–4.75)	ENSMI 1998
February 2001– February 2004	2.92	(2.76–3.07)	ENDSSR 2004

Note: TFRs and confidence intervals are weighted.

Figure 2 Age-specific fertility rates, by five-year period, Paraguay



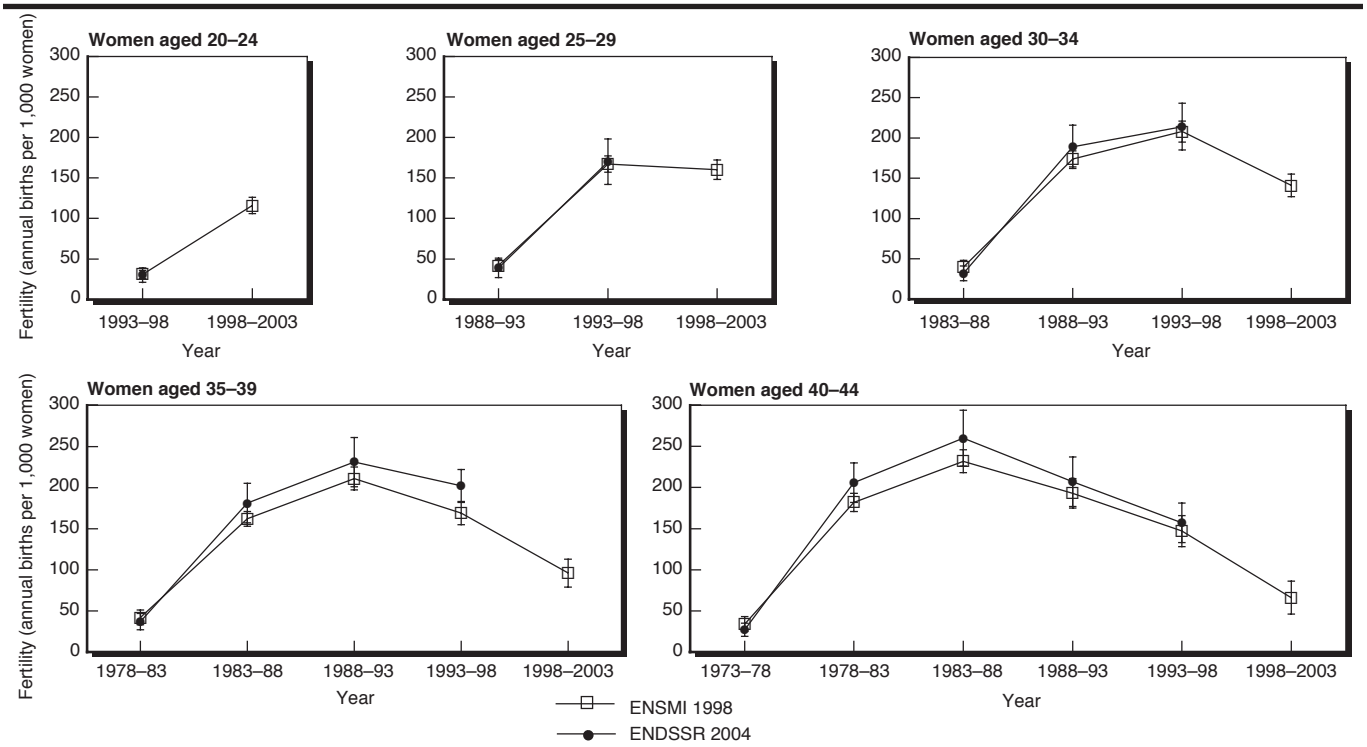
Source: ENDSSR (2004).

based on the 1998 RHS. These women were aged 15–19, five years younger at the end of the penultimate period (1993–98), thus we can estimate two fertility rates for the 1993–98 period using both the 1998 and 2004 RHSs. The fertility rate for the same cohort of women was 30 based on 2004 survey data, and 31 based on 1998 survey data. We also found remarkable similarity in fertility estimates produced from the two sources of data for the two next older cohorts and only small (nonsignificant) differences for the two oldest cohorts. The cumulative fertility rate for the period between August 1993 and August 1998 based on these five cohorts (aged 15–39 in August 1998) is slightly higher based on the 2004 survey (4.2 births) than that based on the 1998 survey (3.9 births); however, the difference is not statistically significant. In sum, these results indicate a high level of data consistency between the two RHS surveys and robustness of the fertility estimates.

Proximate Determinants of Fertility

To explore the factors that influenced the observed fertility decline, we use the Bongaarts model to assess the relative importance of proximate determinants based on data from the 1995–96, 1998, and 2004 RHSs. The index of marriage, C_m, is intended to capture the reduction in fertility attributable to the proportion of women who are not in union and who are, therefore, assumed to be sexually inactive. "In union" refers to being married or in a consensual union

Figure 3 Five-year-period fertility rates with 95% confidence intervals, by cohorts, based on women's age in August 2003, ENSMI 1998 and ENDSSR 2004



of unmarried partners. Consensual union is a common alternative to marriage in Latin America, and women in this type of union have been shown to have reproductive behaviors similar to those in marital unions (De Vos 1987; Martín 2002). The index of contraception, C_c, captures the reduction associated with contraceptive use among women in union and is calculated on the basis of contraceptive prevalence (the proportion of women in union who use contraceptives) and the efficacy of the methods used. To calculate the average effectiveness of a contraceptive, we adapt the contraceptive failure rates of methods for Paraguay that were estimated by Cleland and Ali (2004) on the basis of 1990 Paraguay RHS data. The index of postpartum infecundability, C_i, represents the reduction in fertility attributable to postpartum amenorrhea.

Table 2 provides descriptive statistics from the three surveys on the three proximate determinants considered for this study. Changes in all these factors seem to have favored fertility reduction in 2004. The proportion of reproductive-aged women in union decreased by approximately 17 percentage points between the 1995–96 and 2004 surveys, largely because the median age of women at the time of their first union increased from 19.6 years to 21.3 years. Contraceptive prevalence increased substantially throughout the decade, from 54 percent reported in the 1995–96 survey to 57 percent in the 1998 survey and to 73 percent in the 2004 survey. Importantly, the use of modern methods, particularly the male condom, female sterilization, and injectable hormones, increased rapidly. Finally, the mean duration of postpartum amenorrhea increased only slightly, from 5.5 months in the 1995–96 survey to 5.9 months in the 2004 survey.

Table 3 shows the three indexes of proximate determinants considered here, and also shows observed and predicted TFRs. The predicted TFRs are the products of all three indexes multiplied by the maximum potential fertility, 15.3 births. This is the average number of births per woman in a hypothetical population of women who are

Table 2 Proportion of women surveyed, by proximate determinants of fertility, according to survey date, Paraguay

Variable	1995–96	1998	2004
In union	70.3	61.3	53.7
Median age at first union (years)	19.6	20.8	21.3
Contraceptive use (among women in union)			
Pill	14.6	13.1	15.0
Male condom	7.0	7.3	11.9
IUD	8.4	11.1	11.5
Female sterilization	6.4	8.0	11.5
Male sterilization	0.0	0.0	0.1
Injectable	6.8	7.5	10.4
Vaginal methods	0.7	0.5	0.2
Total (modern methods)	43.9	47.5	60.5
Periodic abstinence	6.2	4.3	7.7
Withdrawal	3.5	5.4	3.0
Total (traditional methods)	9.7	9.7	12.3
Total (both types of methods)	53.6	57.2	72.8
Mean postpartum amenorrhea (months)	5.5	5.6	5.9

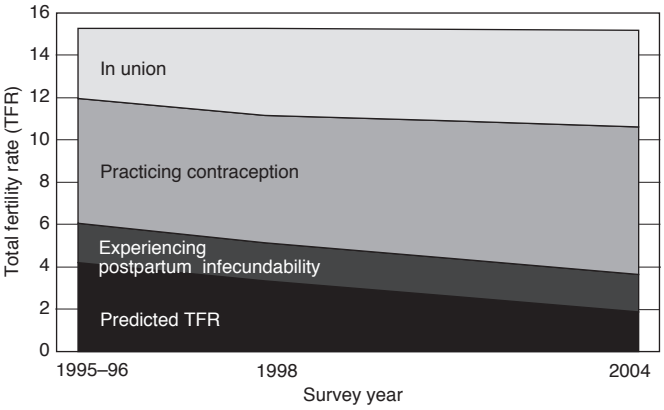
Note: All figures are weighted.
Sources: ENDSR 1995–96, ENSMI 1998, and ENDSR 2004.

Table 3 Indexes of proximate determinants of fertility, by survey date, Paraguay

Index	1995–96	1998	2004	Ratio 1998: 1995–96	Ratio 2004: 1998
Union (C_m)	0.703	0.613	0.537	0.872	0.876
Contraception (C_c)	0.470	0.431	0.293	0.916	0.679
Proportion using contraceptives (u)	0.536	0.572	0.730	1.031	0.695
Average use-effectiveness (e)	0.914	0.921	0.919	—	—
Postpartum infecundability (C_i)	0.833	0.830	0.820	0.996	0.988
Maximum potential fertility	15.3	15.3	15.3	1.000	1.000
Predicted TFR	4.22	3.35	1.97	0.796	0.587
Observed TFR	4.13	4.26	2.92	—	—
Difference (predicted – observed TFRs)	0.09	–0.91	–0.95	—	—

— = Not applicable.
$C_c = 1–1.08 * e * u$.
$C_i = 20/(18.5 + i)$, where i is the length in months of postpartum infecundability.
Predicted TFR = $C_m * C_c * C_i * 15.3$.

Figure 4 Reductions in maximum potential fertility attributed to proximate determinants of fertility, Paraguay



sexually active throughout their reproductive years and who are not practicing contraception, undergoing abortion, or breastfeeding. The values of the indexes range from 0 to 1, where 1 indicates no reduction in fertility attributable to the factor being assessed. The table shows that values for all three indexes decrease monotonically over time, suggesting that the pregnancy-preventive effects of all the proximate determinants increased nearly continuously throughout the decade. During all periods, however, the index for practicing contraception had the smallest value—that is, the largest fertility-depressing effect—followed by the index for being in union. The last two columns of the table show the ratios of the value of each index from one survey to the prior survey. These ratios depict the relative importance of changes in the indexes in relation to changes in the predicted fertility rate. The largest contributor to the decrease in predicted TFRs between the 1995–96 and 1998 surveys was the reduction in the proportion of women in union, whereas the largest contributor to the decrease between the 1995–96 and 2004 surveys is the increase in the proportion of women who use contraceptives.

Figure 4 illustrates the large depressive effect of contraception on fertility. The high level of contraceptive prevalence in 2004 and, less importantly, the lower proportion of women in union (as shown in Table 2) are more than sufficient to decrease the fertility rate to below the replacement level, according to the Bongaarts model. It also demonstrates that the fertility decline between 1995–98 and 2001–04 is in accordance with the general pattern of changes in behavioral factors throughout the decade.

Decomposition of Contraceptive Prevalence Rates

Table 4 shows that, consistent with the previous finding that contraceptive use is the most important factor in the fertility decline, TFRs and CPRs are closely and inversely correlated across groups of women categorized by their educational level, the language spoken at home,[3] region, and urban/rural area of residence. In other words, a low TFR is consistently accompanied by a high CPR. Furthermore, the size of the decrease in TFRs over time is positively associated with the size of the increase in contraceptive prevalence, indicating the major role of contraceptives in lowering fertility levels. We posit two possible explanations for the increase in CPRs: (1) the proportions of the population with socioeconomic characteristics associated with high rates of contraceptive use increased, and (2) the rate of contraceptive use increased among all segments of the population and is relatively independent of underlying social and economic changes.

Examination of Table 4 suggests that both mechanisms are operative. Higher educational attainment, Spanish-speaking, and residence in the national capital and in other urban areas are strongly associated with a higher prevalence of contraceptive use, according to all three surveys, and the proportion of women with these characteristics generally increased in the population between the 1995–96 and 2004 surveys. For example, the proportion of women with five or fewer years of schooling decreased from 40 percent in the 1995–96 survey to 24 percent in the 2004 survey, while the proportion of those with 12 or more years of schooling increased from 15 percent to 28 percent in the same period.

The evidence also shows that for all subgroups defined by these characteristics, the use of contraceptives has become more common with the passage of time. For example, 44 percent of women with some primary education reported using contraceptives in the 1995–96 survey, whereas 66 percent of women with the same level of schooling reported in 2004 that they were using contraceptives. Likewise, their better-educated counterparts with at least 12 years of schooling increased their CPR

Table 4 Total fertility rates, contraceptive prevalence rates, and percentage distribution of women surveyed, by selected socioeconomic characteristics, according to survey date, Paraguay

	1995–96			1998			2004		
Variable	TFR	CPR	Women surveyed (percent)	TFR	CPR	Women surveyed (percent)	TFR	CPR	Women surveyed (percent)
Education									
Primary incomplete	5.52	43.6	39.8	5.93	48.5	36.7	4.20	65.5	23.6
Primary complete	4.45	53.5	28.7	4.96	53.7	27.8	3.81	70.8	28.0
Secondary incomplete	3.19	61.8	16.7	3.58	66.3	16.3	2.90	74.1	20.4
Secondary+	2.18	70.6	14.9	2.26	72.0	19.2	2.10	80.1	28.1
Language spoken at home									
Guarani	5.38	42.1	44.6	6.03	46.3	43.5	3.92	64.8	34.2
Guarani and Spanish	3.56	60.3	29.8	3.43	61.4	37.5	2.62	72.9	36.0
Spanish	2.68	64.1	20.9	2.73	75.5	15.3	2.29	81.5	26.1
Other	na	70.3	4.7	na	72.1	3.7	na	84.9	3.7
Region[a]									
Gran Asunción	2.72	61.9	27.2	2.87	66.0	25.4	2.35	74.5	27.0
North	5.40	44.2	13.4	na	na	na	3.88	61.3	12.5
Central South	4.52	50.4	26.7	4.83[a]	54.4[a]	74.6[a]	3.08	76.2	28.6
East	4.65	52.7	32.6	na	na	na	2.99	72.8	31.9
Residence									
Urban	3.13	58.9	50.8	3.21	65.4	50.6	2.51	76.5	59.3
Rural	5.34	47.9	49.2	5.59	49.3	49.4	3.70	67.4	40.7
Total	4.13	53.5	100.0	4.26	57.4	100.0	2.92	72.8	100.0
(N)			(4,194)			(2,386)			(4,564)

na = Not available.
[a]In ENSMI 1998, the region was categorized into two groups: Gran Asunción and the rest of the country; therefore, only two estimates are available.
Notes: TFRs are based on responses from all women; CPRs and proportions of women are based on responses from women currently in union. All figures, except numbers of women in union (Ns in parentheses), are weighted.
Sources: ENDSR 1995–96, ENSMI 1998, and ENDSR 2004.

from 71 percent to 80 percent in the same period. Similarly, the CPR for women in a Guarani-speaking home increased by 23 percentage points between the 1995–96 and 2004 surveys, whereas the CPR for women living in a Spanish-speaking home increased by 17 percentage points. Women characterized by a high level of educational attainment and residence in a Spanish-speaking home experienced a smaller increase in CPR than did women with less education and those residing in a Guarani-speaking household, suggesting that the positive effects of these socioeconomic attributes on contraceptive use may have come close to the ceiling and diminished in importance during this period.

Table 5 presents the results of the decomposition. The compositional shift of the population played a substantially smaller role in the overall CPR increase than did the increase in contraceptive use within population subgroups classified by all four socioeconomic characteristics. For example, we estimated that only 14.6 percent (2.3 ÷ 15.4) of the total increase in the CPR between 1998 and 2004 was attributable to the increased educational level of Paraguayan women and that the remaining 85.1 percent was accounted for by an increase in CPR among women at each educational level. An even smaller proportion (7.2 percent) of the increase was attributable to urbanization, or to concentration of the population in the Gran Asunción region. Contraceptive use has become prevalent across Paraguay.

Reproductive Preference and Projection into the Future

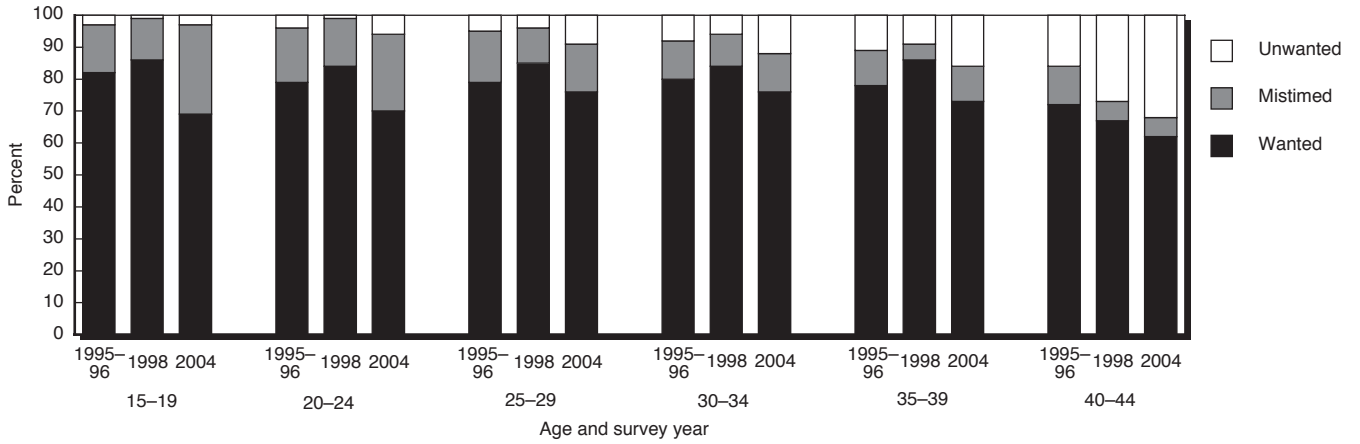
To evaluate women's success in achieving their fertility desires and to predict the future trend in fertility, we consider the proportions of births that were reported as wanted, mistimed, or unwanted, by mothers' age and survey year. All live births that occurred within three years prior to the beginning of each survey are considered. As shown in Figure 5, despite the rapid increase in contraceptive prevalence throughout the decade, the proportions of both mistimed and unwanted births increased slightly between 1995–98 and 2004 for nearly all the age groups of women. This finding suggests that the increase in contraceptive use has not kept pace with the increase in women's desire to control the timing and reduce the total number of births. The demand for and use

Table 5 Decomposition of change in contraceptive prevalence rates between 1998 and 2004, Paraguay

Variable	Compositional difference	Group-specific difference	Total difference[b]
Education	2.3 (14.6)	13.1 (85.4)	15.4 (100.0)
Language	2.3 (14.9)	13.2 (85.1)	15.5 (100.0)
Region[a]	0.1 (0.7)	15.3 (99.3)	15.5 (100.0)
Urban/rural residence	1.1 (7.2)	14.3 (92.8)	15.4 (100.0)

[a]The region was based on two categories: Gran Asunción and the rest of the country.
[b]The variation among figures under "total difference" are the result of rounding.
Note: Percents of the total difference are shown in parentheses.

Figure 5 Percentage distribution of births, by planning status, according to women's age and survey date, Paraguay



Note: The differences in planning status between 1998 and 2004 are statistically significant at $p < 0.05$ for all age groups.

of contraceptives may continue to increase, potentially reducing future fertility.

The mean ideal number of children by respondents' age and socioeconomic characteristics based on the 2004 RHS is presented in Table 6. This table shows the trend in fertility desires across the age cohorts of the women surveyed. Consistent with fertility decline in Paraguay, the two youngest cohorts of women report lower desired family size than the older cohorts. Their average ideals of completed fertility, 2.5 and 2.7 births, are smaller than the observed TFR estimate of 2.9 births for the period between 2001 and 2004. This finding suggests a potential for continued fertility decline. The differentials in the mean ideal number of births by educational level become increasingly smaller for younger cohorts, whereas differences by language spoken and area of residence do not.

Table 6 Mean ideal number of children, by respondents' age and socioeconomic characteristics, Paraguay, 2004

	Age (years)						
Variable	**15–19**	**20–24**	**25–29**	**30–34**	**35–39**	**40–44**	**Total**
Education (years)							
Primary incomplete	2.43	3.12	3.51	4.05	4.57	4.72	3.82
Primary complete	2.62	2.80	3.11	3.49	3.83	3.91	3.24
Secondary incomplete	2.52	2.63	2.73	3.09	3.27	3.56	2.70
Secondary+	2.60	2.57	2.63	2.82	3.06	3.24	2.73
Language spoken at home							
Guarani	2.73	2.95	3.38	3.38	4.52	4.63	3.45
Guarani and Spanish	2.55	2.53	2.62	2.62	3.10	3.36	2.71
Spanish	2.39	2.64	2.81	2.81	3.47	3.72	2.90
Other	2.19	2.47	2.88	2.88	3.29	3.42	2.69
Region							
Gran Asunción	2.46	2.53	2.64	2.90	3.22	3.68	2.77
North	2.83	2.88	3.48	4.13	4.16	4.44	3.41
Central South	2.58	2.80	2.89	3.44	3.84	4.02	3.11
East	2.49	2.68	3.00	3.23	3.88	3.72	2.96
Residence							
Urban	2.49	2.68	3.00	3.23	3.88	3.72	2.81
Rural	2.70	2.88	3.27	3.73	4.35	4.44	3.34
Total	2.54	2.67	2.91	3.28	3.69	3.88	2.99

Note: All figures are weighted.

Conclusion

Our first objective was to assess the validity of data from which the most recent Paraguayan fertility estimate was drawn. We found remarkable similarity in cohort-specific period rates derived from 1998 and 2004 survey data, particularly among younger cohorts of women, indicating consistency in birth-history reports collected at the two different times. By applying the Bongaarts model of proximate determinants, we found that the high level of contraceptive prevalence in 2004 was most important in, and more than sufficient to account for, the decrease in the TFR and that the fertility decline was in accordance with the steady increase in contraceptive use throughout the decade. The results of decomposition of changes in the contraceptive prevalence rates between 1998 and 2004 suggest that contraceptive use became widely accepted by the various sectors of the Paraguayan population. Despite the large proportion of women who were practicing contraception in 2004, however, unwanted and mistimed births increased across all cohorts of women, suggesting that the demand for contraception is likely to increase and that the fertility rate is likely to continue its decline. The likelihood of a further decrease in the TFR is also suggested by the mean ideal number of children that young women reported, which is fewer than the TFR of 2.9 children that was estimated in the 2004 survey.

In addition to providing solid empirical evidence that Paraguay is undergoing a rapid fertility transition, our results also suggest several avenues for future research. Although the Bongaarts model is useful for determining

the relative contribution of the proximate determinants for fertility decline observed in Paraguay, it also demonstrates a large disjuncture between the predicted and observed TFRs, particularly for the most recent estimates. We suggest two explanations for this disjuncture. First, such a large difference is likely when fertility is changing rapidly, as is the case in Paraguay. The Bongaarts model, which uses contraceptive prevalence at the time of the survey, predicts fertility nine months after the survey, whereas the observed TFR is calculated from the number of births that occurred three years prior to the survey. The disjuncture may also suggest that some of the underlying assumptions in the Bongaarts model may not hold true for Paraguay, particularly the assumption that women who are not in union are not sexually active (Stover 1998). In an auxiliary analysis, we found that childbearing before entering into union is common in Paraguay: the proportions of first births that occurred prior to the mothers' entry into their first union were 23, 24, and 21 percent, based on 2004, 1998, and 1995–96 data, respectively.[4] Further exploration of the patterns and prevalence of out-of-union births is warranted for its significance in fertility in Paraguay.

We also found that the language spoken at home was strongly associated with both fertility and contraceptive use. Women in Guarani-speaking homes reported a higher mean number of children, a higher mean ideal number of children, and a lower rate of contraceptive use than did women in Spanish-speaking homes. Cultural elements that may foster a preference for a higher fertility level have not been well investigated in Paraguay. Future research should be undertaken to better identify the mechanisms by which language affects fertility in Paraguay.

Notes

1 In this study, we calculate the TFR for 1995–98 using data from the 1998 survey and for 2001–04 using data from the 2004 survey.

2 Sedgh and her colleagues (2007) estimate the general abortion rate for South America to be 33 abortions per 1,000 women.

3 Language spoken at home is determined by the question "What language is usually spoken by the majority of the members of the household?" The official languages in Paraguay are Spanish and Guarani. Guarani is an indigenous language not necessarily associated with a particular ethnic group in Paraguay (unlike the situation in other Latin American countries), and the majority of the population (87 percent), including both mestizos and indigenous people, is able to speak and understand the language (Gacitúa Marió et al. 2004). Guarani is generally spoken in informal settings, however, and those who speak it as their principal language usually reside in rural areas and in lower socioeconomic circumstances.

4 These figures are based on the age at which first birth and beginning of first union occurred. When they occurred at the same age, the beginning of the union is assumed to have preceded childbirth.

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