The Decline in Non-Numeric Ideal Family Size: A Cross-Regional Analysis

Lauren Bachan
The Pennsylvania State University
Margaret Frye
Harvard University

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Abstract

This paper examines women's non-numeric responses to questions about ideal family size (IFS). Such responses have often been interpreted through the lens of classical demographic transition theory, as an indication that reproduction has not yet entered the"calculus of conscious choice" (Coale 1973:65). Yet non-numeric IFS responses have rarely been investigated in a cross-national framework, and never across time. Thus we know little about the processes underlying changes in these responses. This study uses over 15 years of DHS data from 33 countries representing three world regions. Taking a multi-level modeling approach, we use country- and individual-level indicators to examine the factors associated with non-numeric IFS. We then examine how the relationship between non-numeric IFS and individual- and country-level predictors changes over time. Results suggest that education and knowledge of contraception have the most salient associations with non-numeric IFS; with both being negatively associated with this type of response. While the overall effect of education remains consistently strong over time, we find evidence to suggest the the association between non-numeric responses and knowledge of modern contraception decreases over time.

Keywords Fertility transitions, Fertility preferences, Non-numeric responses

Introduction

Non-numeric responses to survey questions on fertility intentions—such as "up to god" or "such things can't be known"—have long captivated researchers studying the cultural and developmental processes underlying fertility change (e.g., Caldwell 1976; Morgan 1982; Olaleye 1993). Within high-fertility contexts, demographers have considered non-numeric fertility intentions as a key piece to the fertility transition puzzle because they seem to represent a "natural fertility" ethos among women (van de Walle 1992). This idea has gained particular traction when conceptualized within the framework of Coale's theory of the fertility transition, which posits that fertility declines when decisions about childbearing exist within individuals' "calculus of conscious choice" (Coale 1973:65). Non-numeric responses to questions of ideal family size (IFS) may thus represent a woman's inability to control, conceptualize, or assign numeric values to her future fertility (Caldwell 1976; Castle 2001; Morgan 1982), and be indicative of a "pre-transition" mindset.

Despite general consensus among demographers that non-numeric responses to IFS questions are meaningful, our understanding of what such answers actually represent and how they cohere with broader fertility paradigms remains limited. While scholars have noted the general decline in non-numeric IFS across countries in recent decades (Bongaarts and Casterline 2013; Castle 2001), no studies have attempted to explain the change in the prevalence of non-numeric IFS or examine how this general decline may relate to the wider scope of fertility transitions. And to the best of our knowledge, there has been no research investigating non-numeric IFS on large or cross-regional scales. The small body of research that *does* explore the processes underlying non-numeric IFS suggests that such responses are associated with lower levels of education (McCarthy and Oni 1987; Riley et al. 1993) and, particularly in sub-Saharan Africa, with uncertainty due to high child mortality and the HIV/AIDS epidemic (Hayford and Agadjanian 2011; LeGrand et al. 2003).

These extant empirical examinations of non-numeric IFS have a narrow geographical focus and are limited to point-in-time analyses. But trends in non-numeric IFS are dynamic

and follow similar patterns across world regions. Over the past 16 years, the proportion of women who provide non-numeric responses to IFS questions in the Demographic and Health Surveys (DHS) has declined in the majority of the world's developing countries (Bongaarts and Casterline 2013; Castle 2001).[1] Given that fertility transitions necessarily unfold chronologically, non-numeric IFS must also be assessed longitudinally in order to determine how they contribute to wider patterns of fertility change.

This study aims to identify the demographic and sociological trends that have contributed to changes in women's non-numeric IFS and to compare those factors across countries. We use a multilevel modeling strategy and data from 33 countries to answer the following questions:

1. What individual and contextual factors are associated with women providing non-numeric responses to IFS questions?

2. Have those relationships changed over time?

What Survey Respondents Tell Us When They Don't Respond

The tendency for respondents to opt out of answering questions through responses such as"I don't know" or "no opinion" is not limited to surveys about fertility intentions or demographic outcomes. Typically investigated in public opinion or political surveys, methodologists generally agree that such non-responses are not random but instead are related to respondent's characteristics, such as education, income, and gender (Francis and Busch 1975; Laurison 2008; Stinchcombe 1964). In addition to telling us about the respondents themselves, respondents' refusal to answer questions using the scale provided in the survey also provide insight into their social positioning; for example, Bourdieu (1984) posits that "don't know" responses to political questions are more prevalent among those lacking access to power and social capital (see also Bryson 1996).

[1]In the 33 countries we analyzed for this study, 76% experience a net decline in NNR.

Within demography, survey questions do not typically ask about people's opinions about political events or their views on social issues, but instead involve more personal issues, such as their first sexual experiences or their expectations and aspirations for their future family life. Demographers are particularly interested in non-responses to questions about fertility preferences. Within this realm, questions are often open-ended and use a numeric or calendar scale, such as how many children a woman would like to have and when she will ideally become pregnant. Refusing to provide a numeric response to such questions is likely not an indication of lack of knowledge about the issue at hand, but instead may indicate a unique cognitive orientation to demographic processes or individual experiences.

Non-numeric IFS and the Fertility Transition

Fertility preferences, such as IFS, play a large role in demographers' efforts to understand the transition from high to low fertility. One of the core tenets of demography is that a population-level decline in fertility can only be achieved once reproduction enters an individuals calculus of conscious choice (Coale 1973). Since non-numeric IFS has been interpreted as women's perceived lack of control over their own fertility (Caldwell 1976; Castle 2001), it follows that fertility transitions should be accompanied by a decline in the prevalence of non-numeric IFS.

In his "restatement" of the demographic transition theory, Caldwell (1976) explicitly acknowledges that in high-fertility countries, "up to God" and "don't know" responses to IFS questions are likely more truthful than numeric responses, as fertility decisions in these contexts are often made outside of the nuclear family and are influenced by cultural norms regarding the timing and frequency of reproduction. Further, evidence suggests that treating these responses as missing data and dropping them from analyses will bias results (Jensen 1985; Olaleye 1993).

In Figure 1, we examine the relationship between fertility and non-numeric IFS responses at the national level by plotting the proportion of women who provide a non-numeric response

for each of the Demographic and Health Surveys (DHS)[2] included in our analysis against the total fertility rate (TFR) for the corresponding year (estimates obtained from the 2012 World Development Indicator Databank) (ICF International 1993-2011; World Bank 2012). This graph shows a clear positive trend; as the total fertility rate increases, so does the proportion of women providing a non-numeric response.[3] These results offer preliminary support for interpreting non-numeric responses to IFS through the lens of the fertility transition theory. We examine the relationship between fertility rates and non-numeric responses in more detail below.

—FIGURE 1 ABOUT HERE—

Theoretical Framework

Drawing on previous research on non-numeric IFS as well as broader family planning and demographic literature, we center our analysis around four perspectives about what might prompt women in developing countries to provide non-numeric responses to questions IFS.

Mortality-related uncertainty is positively associated with non-numeric IFS.

There is a growing body of literature, particularly focused on sub-Saharan Africa, that documents how uncertainty shapes actions and decision-making (Johnson-Hanks 2004, 2006; Trinitapoli and Yeatman 2011). One source of uncertainty in developing countries is mortality. Frequent encounters with mortality may lead women to be uncertain whether they will live to parent their children as well as whether their children will survive to adulthood, making the task of choosing an "ideal" number of children considerably more complex. Likewise, the HIV/AIDS epidemic in the region has also been shown to influence both men's and women's fertility preferences through perceptions of one's status (Yeatman 2009a,b).Furthermore, localized, cross-sectional studies have demonstrated a positive asso-

[2]These data points represent the first and last survey within this study's observed interval for the 33 countries in our sample.

[3]The two outlying data points in Asia are from Indonesia's 1997 and 2007 DHS (see also see Figure 3).

ciation between child mortality and the likelihood of providing a non-numeric response to IFS questions (Hayford and Agadjanian 2011; LeGrand et al. 2003; Sandberg 2005).

High levels of education and literacy among women are positively associated with the likelihood of providing a non-numeric response when asked about IFS.

Since the 1994 International Conference on Population and Development in Cairo, the empowerment of women—particularly through education—has featured prominently in research on fertility decline and efforts to promote family planning (Ashford 1995; Cleland et al. 2006; Knodel and Jones 1996). While the mechanisms through which education decreases fertility have been contended (Martin 1995), women's education is likely associated with decreases in non-numeric responses to IFS through improvements in numeracy (van de Walle 1992). In fact, studies have shown strong positive associations between education and providing numeric responses to IFS questions (Hayford and Agadjanian 2011; McCarthy and Oni 1987; Riley et al. 1993).

Knowledge of modern contraception and lower contextual-level fertility rates are negatively associated with the likelihood of providing a non-numeric response when asked about IFS.

Extending Coale's (1973) line of reasoning, it follows that knowledge of family planning brings fertility within the "calculus of conscious choice" by allowing women to imagine controlling their fertility. Empirical evidence indeed suggests that the *use* of modern contraception is negatively correlated with IFS and positively correlated with the desire to stop childbearing (Bhargava 2007).

The idea that people may not know they want to limit their family size until they see other people doing so is also relevant and has been championed by diffusion theorists who believe that fertility decline is a process of change begetting change. Research on Taiwan's rapid fertility transition shows clear support for diffusion within local townships (Montgomery and Casterline 1993). Likewise, knowledge of family planning methods is positively

associated with exposure to family planning outreach efforts, suggesting that interpersonal networks support emerging preferences to limit childbearing (Debpuur et al. 2003).

Wealth is negatively associated with the likelihood of having non-numeric IFS.
Economic theories of fertility decline hold that as wealth increases, children become more expensive, leading people to desire smaller families (Macunovich 1996; Lee 2003). The idea that economic modernization changes the way that people plan for and think about childbearing can be traced back to Notestein (1953), who describes how the "urban industrial society" brings about "the development of a rational and secular worldview" and the emergence of "a new ideal of the small family" (Notestein 1953: 16). In his 1976 reformulation of Notestein's demographic transition theory, Caldwell describes two separate regimes of fertility, both of which can be considered economically rational: one where there it is economically rational to have an unlimited number of children and the other where it is economically rational to restrict one's fertility; he describes how societies transition to the latter regime through economic modernization leading to changes in social norms and family structure (Caldwell 1976).

Empirical analyses of fertility decline support these early theories that economic development and wealth increases are associated with the desire to limit one's fertility. Economic development and wage increases were found to explain 45 to 65 percent of the rapid fertility decline in Bangladesh in the 1980s; contraceptive programs, on the other hand, appear to have little effect (Gertler and Molyneaux 1994). Likewise, the decrease in Iran's marital fertility between the 1950s and 1970s closely followed a demand-specific model, with fertility behavior being determined largely by costs of children (Raftery et al. 1995). Household wealth and community-level socio-economic status have also been found to be negatively associated with the likelihood of providing a non-numeric response in both Mozambique and Nigeria (Hayford and Agadjanian 2011; McCarthy and Oni 1987).

These four perspectives guide our investigation into the factors that contribute to a

women's refusal to assign a numeric value to her fertility preferences. Each of these four perspectives highlights a different aspect of the fertility transition and thus, by definition, emphasize changes over time. The fact that they all represent dynamic processes prompts us to also investigate whether and how the relationships between a given predictor and non-numeric IFS have become stronger or weaker over time.

Data and Methods

Data

This study uses data from the Demographic and Health Surveys (DHS) from 33 developing countries representing three world regions: South and Southeast Asia, Latin America, and sub-Saharan Africa. The DHS are standardized and nationally representative household-based surveys that are primarily used to gather information on sexual and reproductive health, child health, and fertility.

DHS surveys have been repeatedly administered in many countries, allowing for comparisons over time. We use two surveys for each country: the first available Phase III or Phase IV survey and the most recently available survey.[4] The data span 16 years from 1993 through 2011. Table 1 contains the countries included in our analysis, the year of data collection, and the sample size for each survey.[5]

—TABLE 1 ABOUT HERE—

The DHS collect data at the individual and household levels. Thus, in order to tap into country-level information not measured consistently within the DHS, we also supplement data from the World Development Indicator Database (World Bank 2012).

[4]The Phase III and Phase IV surveys were administered between 1993 and 2001. We use the most recent survey available for each country with the exception of Bangladesh and Haiti. The 2011 DHS for Bangladesh does not contain all relevant variables. Specifically it is missing data on contraceptive knowledge; thus we use the 2007 survey. We chose not to use Haiti's 2012 DHS because it was administered 2 years after the earthquake and since it was so recently released, it remains unclear how anomalous the data are.

[5]In instances where data collection took place over multiple years, we report the year that the majority of respondents were interviewed.

A country was chosen to be included in the study if it had two standard DHS surveys administered during or after the Phase III period (roughly around 1993), when interviewers began probing for numeric responses to the question of IFS. These selection criteria were implemented in order to allow us to examine change between surveys and to minimize methodological and measurement variance on our outcome measure. Additionally, we restrict our analyses to women who have complete information available on all key measures used in our analyses. Overall, 0.7 percent of respondents had missing data on at least one variable of interest, and the percent missing ranged from 0.01 for Bangladesh in year 1994 to 5.9 for Vietnam in year 1997. Our final analytic sample includes 787,139 women.

Dependent variable

Our outcome measure is a binary indicator of whether a woman has provided a non-numeric response to the question of IFS (1=non-numeric, 0=numeric). The DHS measures a woman's IFS through the following question: *"If you could chose exactly the number of children to have in your whole life, how many would that be?"*.[6] The wording and placement of this question has remained consistent throughout the observation period. Interviewers are instructed to probe for numeric responses before recording a non-numeric response to the IFS question. These instructions allow us to treat non-numeric IFS as valid responses to the question, rather than missing data or errors.

Previous scholars have often assumed that providing a non-numeric response to questions about IFS indicates that women approach their fertility decisions with a "pre-transition" mindset and do not conceive of their own family size as something to be planned in advance or conceptualized in a quantitative manner. Yet non-numeric responses could indicate a number of different perspectives on IFS and fertility more generally, only some of which cleave to fertility transition theory. One woman might respond non-numerically because she

[6]To avoid answers that may be biased by a woman's current number of children, the question is prefaced with, *"If you could go back to the time when you did not have any children..."* for women who already have children.

is still in school and does not yet have a clear picture of what her career responsibilities will look like, another might refuse to provide a number because she believes that only God can decide how many children a family will be blessed with, while another might simply wish for as many children as she and her husband can create. Unfortunately the DHS do not consistently provide insight into these different motivations underlying non-numeric IFS. Across all three regions, the majority of surveys include only one "non-numeric response" category for the question about IFS.[7]

However, some DHS do provide specific sub-categories of non-numeric responses; we examine these data in Table 2. The most common sub-category is "Its up to God/Allah." This option was included in more than a third of the surveys in Africa and Asia and about a quarter of the surveys in Latin America. In surveys that include "up to God/Allah" as a response option, this category represents the modal type of non-numeric IFS response. A smaller number of surveys included "I don't know" as a specific type of non-numeric response; this option was most commonly found in surveys conducted in Latin America (39 percent of surveys) and were less common in surveys conducted in Africa (13 percent of surveys). Nine surveys in Africa also included additional specific sub-categories, including "can't decide/never thought about it before," "depends on husband," "any number," and "as many as possible." These additional sub-categories represent less than a quarter of all non-numeric responses in each survey, a minority of respondents in each survey.[8]

—TABLE 2 ABOUT HERE—

As these sub-categories were included in a small number of surveys and their inclusion or exclusion is not clearly attributable to variation in context or time period, we interpret these patterns with caution, and proceed by examining non-numeric responses to IFS as one general category, while acknowledging the limitations of this approach.

[7]Specifically, out of all DHS administered in countries included in our analysis and conducted after the Phase 3 revision, 70 percent include only one non-numeric response category for IFS; this figure is 67 percent for Africa, 65 percent for Asia, and 80 percent for Latin America.

[8]With the exception of Benin 2006, in which 56 percent of non-numeric responses were coded "as many as possible."

Individual-level independent variables

We use individual-level predictor variables to examine each of our four theoretical perspectives. To explore whether mortality-related uncertainty is associated with non-numeric IFS, we include a variable indicating whether a woman has experienced the death of a child. To evaluate the role that education plays in predicting non-numeric IFS, we use two measures: whether or not a woman can read (1= literate, 0=illiterate)[9] and a categorical variable specifying the highest educational level she completed—primary school or higher, some primary school, or no school at all (reference group).

To assess the extent to which exposure to messages about family planning is associated with women's likelihood to express numeric fertility preferences, we include a measure of whether a woman knows any modern method of contraception (1=yes, 0=no). In considering whether economic conditions are associated with non-numeric IFS, we use a categorical variable that represents household socioeconomic status (SES), as measured by the DHS wealth index quintiles (with the middle quintile as the reference group). While evidence suggests that wealth indices are good proxies for SES (Bollen et al. 2002), the DHS wealth index is constructed on a per-country basis and therefore is a measure of *relative* wealth within a country. We also include a measure for the woman's residence in an urban versus rural area (1=urban, 0=rural).

All models also control for the following individual-level sociodemographic variables that are known to be associated with IFS and/or completed fertility: age, marital status, number of living children, and whether the respondent is Muslim. Aside from dummy variables, all variables are standardized (mean=0) to allow a direct comparison of effect size.

[9]Due to changes in the literacy question over time, we are unable to drill down to a more nuanced measure of literacy. In this measure, we consider women who "read easily", "read with difficulty", are "able to read a whole sentence" and are "able to read part of a sentence" as literate. Supplementary analyses confirm that literacy increases over time in the vast majority of the countries in our sample. It should also be noted that the DHS assumes that women who completed secondary school are literate, and they are not asked the literacy question. Thus, we make the same assumption in our analysis.

Country-level independent variables

To examine whether contextual-level characteristics may play a role in predicting non-numeric IFS independent of a woman's individual attributes, we also include several macro-demographic and socioeconomic indicators obtained from the World Development Indicator Databank (World Bank 2012), which give national-level estimates for each survey included in our models. These include the under-five child mortality rate, HIV prevalence (percent of population ages 15-49 estimated to be HIV positive), the total fertility rate (TFR), the percent of the population living in an urban area, and GDP per capita.[10] The latter represents GDP converted into international dollars using purchasing power parity rates. In addition, we include a country-level education measure representing the proportion of women in the country that have ever attended school (any level). This variable was aggregated from the data collected by the DHS. All country-level variables reflect the year the DHS data were collected for each survey. A summary of all predictor variables, organized according to their corresponding theoretical perspectives, can be found in Table 3.

—TABLE 3 ABOUT HERE—

Analytic Approach

We begin by comparing recent trends in non-numeric fertility preferences across different countries and regions. To examine the extent to which each of the four theoretical perspectives described above might help us to interpret these patterns, we use a series of multilevel logistic regression models, which allow us to investigate both individual- and country-level effects on non-numeric responses while accounting for the non-independence of observations (Raudenbush and Bryk 2001)—that is, women in our data being nested within countries. We estimate separate models predicting non-numeric IFS for each theoretical perspective,

[10] Previous versions also included the maternal mortality rate for each country, but this measure was found to be highly correlated with infant mortality (correlation coefficient 0.9). Because infant mortality is more directly related to fertility preferences than is maternal mortality, we chose to exclude this measure from our analyses. Maternal mortality was not a significant predictor of non-numeric responses, and removing it did not change our results.

along with a combined model with all covariates included.

We assess change in non-numeric IFS over time by including a binary measure distinguishing between the first and second survey administered in each country. We estimate all models by defining this "second survey" variable as a random coefficient, which estimates different slopes for each country. The coefficient for "second survey" should, therefore, be interpreted as the average estimate across all countries. This approach may provide overly conservative estimates, but allows us to more accurately account for the variation in dates of the first and last survey for the countries in our sample (across countries in our sample, time intervals range from 3 to 16 years, with a mean interval length of 9.97 years). Theoretically, this approach also acknowledges the heterogeneity across countries in what individuals are likely to experience over a given time period. And finally, results from likelihood ratio tests confirm that the random coefficient model fits our data better than a traditional random intercept model, which estimates the same coefficient for all countries.

We test for change over time in the *associations* between each predictor and the outcome by including interaction terms between the second survey variable and the significant predictors of non-numeric IFS.[11] Statistically significant interactions suggest that the effect of a given predictor changes over time. This procedure is common in analyzing repeated survey data (Haynie 1998; Omariba and Boyle 2007) and is formally known as a changing parameter model (Firebaugh 1997).

[11] Despite the challenges of interpreting interaction terms in nonlinear models (Ai and Norton 2003), the multilevel nature of our data preclude the calculation of marginal effects of interaction terms (as in Karaca-Mandic, Norton, and Dowd 2011). Therefore, we interpret all interaction terms using odds ratios, which allow one to assess the multiplicative effects of the interaction on the baseline odds for each group (Buis 2010).

Results

Trends in non-numeric IFS

We begin by examining trends over time in non-numeric IFS for the countries analyzed in this study. Figure 2 shows the weighted proportion of women who provided a non-numeric response to the question about IFS in both the first and last survey administered in each country in our sample, with sub-Saharan Africa displayed on the left and Asia and Latin America on the right. On average, women in Africa are more likely to respond non-numerically when asked about their IFS, relative to Asia and Latin America.

—FIGURE 2 ABOUT HERE—

In all three regions, the linear trend lines plotted in Figure 2 show a decline in this type of response over time; this decline is steeper in Latin America and Asia relative to Africa. The proportion responding non-numerically to the question about IFS also declines over time within the majority of countries included in this analysis: in all Asian countries analyzed, in 15 out of 21 countries included in sub-Saharan Africa (exceptions include Nigeria, Benin, Zambia, Mali, Guinea, and Zimbabwe), and in 4 out of 6 countries in Latin America (exceptions: Guatemala and Nicaragua).

Mozambique experienced the most substantial decline in non-numeric responses between the two surveys, with 17 percent of women responding non-numerically in 1997 and less than 1 percent doing so in 2011. Other countries that experienced notable declines include Burkina Faso (which went from 21 percent in 1999 to 4 percent in 2010), Bangladesh (from 11 percent in 1994 to less than 1 percent in 2011), Indonesia (from 22 percent in 1994 to 11 percent in 2007), and Bolivia (from 9 percent in 1994 from 2 percent in 2008).

Figure 2 also displays the substantial range in the prevalence of non-numeric responses to IFS throughout the time period analyzed in this study. In the later years, from 2005-2011, the proportion of women giving a non-numeric response remains above ten percent in five countries (Mali, Niger, Nigeria, Ethiopia, and Indonesia). On the other hand, at the

beginning of the period, between 1993 and 1999, the proportion of respondents who offer a non-numeric response to the IFS question is below 2.5 percent in seven countries (Zimbabwe, the Ivory Coast, Vietnam, the Philippines, the Dominican Republic, and Haiti).

In Table 4, we examine how this overall decline in non-numeric responses to questions about IFS unfolds across age groups, cohorts, and periods for each of the three world regions. In Asia we see non-numeric IFS decline across all cohorts and age groups. When we look at how non-numeric responses are distributed by age during each time period (by moving down each column) we can see that older women in Asia are more likely to provide a non-numeric response in the 1990s and 200s, but this age pattern disappears in the most recent surveys analyzed. Following age groups across time (diagonally from left to right), the most dramatic decline in Asia happens among women in their late 40s. In the 1990s, a quarter of this age group provided a non-numeric response to the IFS question and, by the 2010 decade, only 1 per cent of women in this age group failed to assign a numeric value to their ideal family size. And finally, when we examine cohorts as they age forward in time (by looking across each row), we can see that all cohorts become less likely to respond non-numerically as they grow older; this trend is more marked in the earlier cohorts, those born in the 1950s and 1960s, than in the younger cohorts, born in the 1980s and 1990s.

—TABLE 4 ABOUT HERE—

There is a less steady pattern of decline in non-numeric IFS in Africa—both within birth cohorts and age groups. Following age groups across time (diagonally from left to right), we see that most age groups experienced an increase in the proportion of non-numeric IFS in the middle decade before making a substantial decline in the last decade for which we have data. This pattern is observed for the 1950, 1960, and 1970 cohorts, suggesting the presence of a period effect during the 2000 decade. At such an aggregated level, it is difficult to determine what is responsible for this period effect. We speculate that it may be linked to the HIV/AIDS epidemic. The pattern of older respondents being more likely to respond non-numerically persists in the most recent time period in Africa, unlike in Asia (see the

columns corresponding to 2010-2011).

Unfortunately, there are no data available from Latin America during or after 2010. What is clear from Table 4 is that there was a decline in non-numeric IFS across all cohorts and age groups between the decades of 1990 and 2000. Unlike in Asia and Africa, however, the proportion of non-numeric IFS in Latin America was relatively similar across women of all ages in the 1990s.

Figure 3 shows the relationship between non-numeric responses to IFS and the total fertility rate across time. Every country in our sample experiences a decline in TFR between the first and last survey, and TFR and non-numeric IFS are positively correlated in 76 percent of the countries analyzed. The eight countries that do not show a positive correlation between non-numeric IFS and TFR are the same countries that do not experience a decline in non-numeric IFS over the observed interval.

While non-numeric IFS tends to decline as the total fertility rate declines in each country, the countries experiencing the most dramatic declines in fertility during the observation period do not necessarily show correspondingly large declines in the proportion of respondents who give a non-numeric response to the IFS question. For example, in Nepal, the total fertility rate declined by about two births per woman between 1995 and 2011, but the proportion of women who gave non-numeric responses to the IFS question changed by only about two percent between the two surveys. Similarly, the total fertility rate in Haiti decreased from 5 to 3.6 between 1994 and 2006, while the percent of survey respondents who provided non-numeric IFS responses declined by only 1 percent. On the other hand, Chad and Burkina Faso, two countries characterized by dramatic declines in non-numeric response, experience only modest changes in total fertility rate between the two surveys. The overall positive correlation between TFR and non-numeric IFS support the idea that as countries move through the fertility transition, women are more able to assign numeric values to their ideal family size. However, the heterogeneity in the magnitude of this association indicates that TFR is likely not the only factor associated with the decline in NNR.

Predictors of non-numeric IFS

Descriptive statistics for all variables used in the multilevel models are provided in Table 5. Estimates are weighted to adjust for regional variation in sampling within countries (individual-level variables only) and for differences in population size across countries (all variables).[12]

—TABLE 5 ABOUT HERE—

On average, child mortality becomes a rarer event across the survey years: both the proportion of respondents who report experiencing a child death as well as the national-level child mortality rates decrease by more than 20 percent, on average. We also see a striking increase in literacy and educational attainment across the survey years, with the proportion of the sample who never attended school decreasing by 28 percent and the proportion who completed primary school increasing by 23 percent.

We also see a noticeable increase in literacy and educational attainment across the survey years, with the proportion of the sample who never attended school decreasing by nine percent and the proportion who completed primary school *increasing* by nine percent.

The countries included in this study experience modest fertility decline, on average, between the two periods of observation. Women in the second survey year have 0.2 fewer children and the proportion of women that know of at least one modern method of contraception increases by four percent in later surveys. These changes are also evident in the decline in average TFR from 5.2 to 4.5. The time periods between the two surveys in each country are also characterized by increasing development: GDP per capita increases over time, and more women live in urban areas in the later survey years, though this change is not statistically significant at the country level.[13]

Figure 4 shows the logged odds from our first set of multilevel logistic models estimating

[12]Population estimates or adults aged 15-45 were obtained from the United Nations Population Division (United Nations, Department of Economic and Social Affairs 2010).

[13]Table 5 does not include descriptive measures of the wealth index, as wealth quintiles calculated by the DHS—by definition—represent one-fifth of the population at both time periods.

the effect of given predictors on non-numeric IFS. We present the results graphically in order to facilitate comparison of the strength of the associations between non-numeric responses and each measure; the coefficients have been standardized and thus the magnitudes can be compared to one another. The left panel plots logged odds from the baseline model and four separate models estimated according to each of the theoretical perspectives; while the right panel presents logged odds of all predictor variables when included in the same model. Estimates that are statistically significant at the 0.05 level are indicated by solid circles; insignificant estimates are indicated by hollow circles. The 95 percent confidence intervals for each estimate are also plotted (some intervals are too narrow to make out in the figure). All models include the aforementioned individual-level control variables, but for the sake of space their coefficients are not presented in Figure 4. Estimated odds ratios for all variables can be found in Table A.1 in the Appendix, along with random effects parameters and fit statistics for all models.

—FIGURE 4 ABOUT HERE—

Model 1 in Figure 4 indicates that, accounting for basic individual-level controls, being interviewed in the later survey is negatively associated with the likelihood of providing a non-numeric response to the question of IFS. Specifically, women across all countries have, on average, 52 percent lower odds of providing a non-numeric response in the second survey relative to women interview in the first survey. As described above, we define second survey as a random coefficient, with different slopes estimated for each country. Variance on this estimated slope is substantial, with a standard deviation of 0.9 across all countries (see random effects parameters in Table A.1 of Appendix).

Model 2 includes variables consistent with the first theoretical perspective described above—that mortality-related uncertainty is positively associated with non-numeric IFS. Here we find that having had a child die is positively associated with non-numeric IFS. Women who have experienced the death of a child have 43 percent greater odds of providing a non-numeric response to the question on IFS. Likewise, we find that the contextual

effect of country-level child mortality rates influences the numeracy of individual's fertility preferences. Child mortality rates operate in the expected direction, with a one standard deviation increase in child mortality rates leading to a 56 percent increase in the odds that a woman will respond non-numerically to the question of ideal family size. These findings are echo what other researchers have found in localized settings (Hayford and Agadjanian 2011).

We also see from Model 2 that a country's HIV prevalence rate is significantly associated with non-numeric IFS. However, contrary to our hypothesis, this relationship is *negative*, with women living in higher-prevalence areas being less likely to provide non-numeric IFS responses. We interpret this relationship as perhaps being an indicator of greater exposure to HIV prevention programming—much of which overlaps with family planning rhetoric. More broadly, higher HIV prevalence at a national level might suggest a context in which sex is more frequently discussed as something requiring caution and planning (Cleland and Watkins 2006; Robinson 2011). Supplementary analyses focusing only on sub-Saharan Africa suggest that this result is primarily driven by that region (models not shown, but available on request).

Model 3 contains evidence supporting the second theoretical perspective. Estimates from this model indicate that being literate reduces the odds that a woman will provide a non-numeric response for IFS by 34 percent. Likewise, relative to women who have never attended school, those who have attended primary school and those who have completed primary education are less likely to provide a non-numeric response to this question; this association is larger for the latter group.

The variables included in Model 4 reflect the third theoretical perspective. [14] As expected, women who have knowledge of modern family planning methods are significantly less likely to give a non-numeric responses than women who do not. This model also in-

[14]Based on the results of Model 2 and our positive association between non-numeric fertility responses and HIV prevalence being be related to the role of family planning, we estimated supplementary models that include HIV prevalence in this model. The addition of HIV prevalent as a covariate did not alter the results of Model 4 as it is presented here.

dicates that the contextual effect of fertility rates is also significantly associated with a woman's likelihood of having a non-numeric IFS. Specifically, a one standard deviation increase in TFR changes a woman's odds of providing a non-numeric response by 58 percent. Note that despite the wide confidence interval, the association between non-numeric IFS and national-level TFR is stronger than that of a woman's age and current number of children (see Table A.1 in Appendix A).

The fourth theoretical perspective is represented in Model 5, which includes the wealth-related variables. While the contextual effects of GDP per capita and percent of population living in an urban area are not significant predictors of non-numeric IFS, Model 5 does indicate that individual-level measures of wealth are significantly associated with non-numeric IFS. Living in an urban area reduces the odds of a woman providing a non-numeric response to the question of desired family size by 19 percent. Additionally, a woman's household wealth is significantly associated with her odds of providing a non-numeric response to the question of IFS. Compared to women who reside in households in the middle quintile of wealth, women in the lowest quintile have 41 percent greater odds of having non-numeric IFS. Conversely, women in the highest quartile of household wealth have 27 percent lower odds of providing a non-numeric response compared to those in the middle-quartile of wealth. Taken together, this suggest that non-numeric IFS is more strongly associated with being relatively poor than being relatively wealthy.

To identify the most important predictors of non-numeric IFS, we estimate a model that includes all controls and all hypothesis-specific variables. Model 6 indicates that experiencing a child death, education (particularly completing primary school) and knowledge of modern methods of contraception remain statistically significant individual-level predictors of non-numeric IFS. {However, support for the wealth perspective is somewhat reduced. While living in an urban area remains negatively associated with non-numeric IFS, being in the highest household wealth quintile is no longer significantly associated with the odds of providing a non-numeric response. Although the effects of the other wealth quintiles re-

main statistically significant, only the relatively poorest women are substantially impacted by their wealth status. In the full model with all variables included, these women have 15 percent greater odds of providing a non-numeric response to the question of ideal family size compared to women in the middle wealth quintile. Finally, Model 6 also indicates that the association between HIV prevalence and non-numeric IFS remains robust to a host of other factors, although the magnitude of this association is moderately reduced. Unlike HIV prevalence, the contextual measures of TFR and child mortality are no longer statistically significant predictors of non-numeric IFS.

Comparing model fit, among the perspective-specific models (Models 2 through 5), the education model fits the data best. Taken together with the strong and robust negative association between education and non-numeric IFS, this suggests that the education perspective is the primary lens through which to view the phenomenon of non-numeric IFS among women. The results in Table 4 also show that there is substantial and significant variation between countries in the likelihood of a woman providing a non-numeric response to the question of desired family size (as is evident in the variance parameter of 0.77, presented in Table A.1 in the Appendix). This is unsurprising given that the sample represents 33 countries from three different regions of the world. Finally, none of the models in Table 4 entirely account for the significant association between time and non-numeric desired family size. That is, the average slope of last survey remains statistically significant (albeit less so) throughout all estimated models.

Changing effects of predictors across time

We turn to our second research question by specifying interactions between the significant predictors of non-numeric IFS and the second survey to evaluate whether the effects of these predictors have changed over time (Table 6). We first approached this by estimating individual models for each interaction. For the sake of space, Table 6 presents only the interactions that were found to be statistically significant (all models available on request).

—TABLE 6 ABOUT HERE—

Model 1 in Table 6 indicates that the association between non-numeric IFS and experiencing a child's death becomes stronger over time. The odds ratio 1.12 for this interaction term, together with the positive association between experiencing a child's death and non-numeric IFS tells us that individual experience with child mortality is a stronger predictor of the outcome in later surveys than it is in earlier surveys. Considering that, on average, fewer women experience the death of a child in later surveys, one explanation for this may be that the event of a child's death is more of a shock to mothers in terms of how they think about their future childbearing in contexts of relatively lower child mortality.

We also find a significant change in the association between knowing a modern method of contraception and non-numeric IFS across the two survey periods (see Model 2 in Table 6). While knowledge of contraception continues to be negatively associated with non-numeric IFS, this relationship becomes weaker in later surveys. This is unsurprising given that the proportion of women who know a modern method of contraception is nearly universal in the second survey period (94 percent), making this attribute less discerning when it comes to predicting non-numeric IFS. Likewise, the negative effect of living in an urban area weakens over time, although the magnitude of this change is relatively small (Model 3, Table 6). As with knowledge of contraception, as more people move to urban areas, living in one is a less distinguishing factor.

We found no evidence to suggest that the negative associations between the education variables and non-numeric IFS changes between the first and last surveys of the countries in our sample. In other words, literacy and educational attainment continue to reduce the odds of a woman providing a non-numeric response to the question of ideal family size in later survey periods. Additionally there were no significant interactions between the wealth quintiles and the second survey variable. This suggests that there has been little variation in the impact of relative poverty on a woman's ability to assign a numeric value to her fertility preferences.

We estimate a full model with all significant interaction (Model 4 in Table 6). Here we see that these cross-time relationships remain robust when accounting for all other covariates. As we would expect, this is also the relatively best-fitting model.

Discussion

This article examines a key element of canonical theories of fertility change: the idea that high fertility is partially attributable to women not conceiving of their own family size as the target of intentions or aspirations (Caldlwell 1976; Castle 2001; Morgan 1982). We show that over the past two decades, the proportion of women offering non-numeric responses to the question of IFS has declined in the majority of countries in our sample. We also show considerable heterogeneity in these changes over time, with some countries maintaining a high proportion of non-numeric responses to this question well into the first decade of the 21st century and non-numeric IFS increasing in about a quarter of the countries in our sample. When we examine the associations between the proportion responding non-numerically and each country's total fertility rate, we find support for interpreting these types of responses through the lens of fertility transition theory, while also documenting considerable variation across countries in the correlation between these two measures.

Based on previous research on non-numeric IFS and literature on fertility transitions more broadly, we examined the predictors of non-numeric IFS using four theoretical perspectives that prior literature suggests might relate to non-numeric fertility intentions. To understand these processes longitudinally, we also explored whether and how the effects of these predictors change across time. We find that experiencing a child death is positively associated with the odds of having non-numeric IFS. This finding replicates previous findings from Mozambique (Hayford and Agadjanian 2011). Additionally, we find that this relationship is stronger in later surveys, despite the average decline in women experiencing such events and a reduction in child mortality rates across all countries in our analysis. Literacy and

educational attainment reduce the odds that a woman will provide a non-numeric response for IFS, in particular completion of primary school. Likewise, women who know a modern method of contraception are less likely to respond non-numerically to questions about IFS than those who do not. There is also limited evidence to support the hypothesis that relative wealth is negatively associated with non-numeric IFS, although these relationships are weaker in models that include all covariates.

While we find varying levels of support for each of the four perspectives, education and family planning seem to be the most robust predictors of non-numeric IFS. The two models testing the effects of education and family planning fit the data better than those testing the uncertainty and wealth hypotheses. This suggests that non-numeric IFS is tied less to access to resources and situational uncertainty and more to knowledge (both general and fertility-specific).

How the effects of education and knowledge of contraception change (and do not change) across survey periods also provides insight into the longitudinal processes that underly non-numeric IFS. The negative association between education and non-numeric IFS remains strong from the first to second survey period. Knowledge, as it applies to family planning, reveals a different pattern across time. Unlike the implications of exposure to primary education, our analyses suggest that the positive association between this knowledge and non-numeric IFS weakens over time. This is in line with what we would expect from a diffusion theories of fertility decline. That is, knowledge of modern contraception is consistently high (above 90 percent of women) across both survey years, indicating that this type of knowledge is well diffused throughout the population of women. In turn, such knowledge becomes less of a distinguishing factor over time. We also find evidence that the association between living in an urban area and responding non-numerically is weaker in the later surveys, relative to the earlier surveys for each country. On the other hand, experiencing a child death is a stronger predictor of responding non-numerically in the later surveys.

Our analysis presents results that are empirically robust and theoretically coherent. Yet

there are four primary limitations are worthy of note. First is that our contextual variables are measured at the country level. Given the geographic diversity within countries included in our analysis, this aggregation likely does not accurately capture the contexts of many women. While defining contexts with smaller geographical areas would have been preferable, certain measures—such as HIV prevalence and GDP per capita—are unattainable for sub-country units.

Second, in testing for changes in the effect of predictor variables on non-numeric IFS between surveys, we use a measure for time that differentiates the first from second survey administered in each country. The time interval captured by this measure varies by country and thus is sub-optimal. While this is a result of data availability, we attempt to adjust for it by allowing the effect of time to vary across countries in our models. This approach also acknowledges the heterogeneity in the ways that of individual experiences across countries. However, Nonetheless our ability to measure general trends over time is still limited by the fact that the surveys represent time intervals of varying lengths and starting points.

Third, although we have quite a few countries that span different developmental epochs, there are likely other types of experiences in non-numeric IFS that are not represented in our sample. A similar study using more developed countries or focused on other world regions may yield different results. In particular, examining trends in non-numeric responses to IFS in regions that have experienced rapid fertility decline in recent decades, such as East Asia and the Middle East, would help to illuminate the extent to which non-numeric responses can be understood as indicative of a "pre-transition mindset." A related concern is that, because of the small number of countries in Latin America and Asia that fit our sampling criteria, we were unable to parse out regional trends for these areas.

Finally, for conceptual reasons, we examined each of the four perspectives individually. However, we recognize that they are highly inter-related. For instance, women's knowledge of family planning methods does not exist within a vacuum, but is intertwined with her education and even the wealth of a country. How these interdependencies act to influence

non-numeric IFS is something not explored in this study, but would be a productive avenue for future research.[15]

This article examines a topic about which demographers have long theorized: the extent to which individuals approach their ideal family size as a quantifiable phenomenon. We show non-numeric responses to IFS cleave with broader processes of development unfolding around the world, including increasing education and access to information about family planning and decreasing child mortality. Through examining trends and predictors of non-numeric IFS across countries and over time, our analysis reveals new insights into the subjective underpinnings of global fertility change.

[15]A correlation matrix for all variables can be found in Appendix A.

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Tables

Table 1: List of Sampled Countries, Years of Survey, and Sample Size

Country	First Survey Year	*n*	Last Survey Year	*n*
Sub-Saharan Africa				
Benin	1996	5,491	2006	17,794
Burkina Faso	1999	6,445	2010	17,087
Cameroon	1998	5,501	2011	15,426
Chad	1997	7,454	2004	6,085
Ivory Coast	1994	8,099	1998	3,040
Ethiopia	2000	15,367	2011	16,515
Ghana	1993	4,562	2008	4,916
Guinea	1999	6,753	2005	7,954
Kenya	1993	7,540	2009	8,444
Madagascar	1997	7,060	2009	17,375
Malawi	2000	13,220	2010	23,020
Mali	1996	9,704	2006	14,583
Mozambique	1997	8,779	2011	13,745
Namibia	2000	6,755	2007	9,804
Niger	1998	7,577	2006	9,223
Nigeria	2003	7,620	2008	33,385
Rwanda	2005	11,321	2010	13,671
Tanzania	1996	8,120	2004	10,329
Uganda	1995	7,070	2011	8,674
Zambia	1996	8,021	2007	7,146
Zimbabwe	1994	6,128	2010	9,171
Asia				
Bangladesh	1994	9,640	2007	10,996
Cambodia	2000	15,351	2010	18,754
Indonesia	1994	28,168	2007	32,895
Nepal	1995	8,429	2011	12,674
Philippines	1993	15,029	2008	13,594
Vietnam	1997	5,664	2002	5,665
Latin America				
Bolivia	1994	8,603	2008	16,939
Dominican Republic	1996	8,422	2007	27,195
Guatemala	1995	12,403	1999	6,021
Haiti	1994	5,356	2006	10,757
Nicaragua	1998	13,634	2001	13,060
Peru	1996	28,951	2000	27,843

Table 2: Sub-Categories of Non-Numeric Responses to Ideal Family Size

	Up to God	Don't Know	Other Specific Category[1]	Total
AFRICA				
Number of Surveys with Response Category	24	8	9	60
Proportion of Surveys with Response Category	0.40	0.13	0.15	
Proportion of NNR Responses[2]	0.67	0.13	0.21	
ASIA				
Number of Surveys with Response Category	8	2	0	23
Proportion of Surveys with Response Category	0.35	0.09	--	
Proportion of NNR Responses[2]	0.73	0.18	--	
LATIN AMERICA				
Number of Surveys with Response Category	4	6	0	17
Proportion of Surveys with Response Category	0.24	0.35	--	
Proportion of NNR Responses[2]	0.87	0.39	--	
ALL COUNTRIES				
Number of Surveys with Response Category	36	16	9	100
Proportion of Surveys with Response Category	0.36	0.16	0.09	
Proportion of NNR Responses[2]	0.72	0.16	0.21	

[1] Responses include: “any number,” “as many as possible,” “depends on husband,” and “can’t decide/never thought of it before.”
[2] Denominator is restricted to surveys in which the response category was included as an option for IFS. Estimates of proportions are weighted.

Table 3: Independent Variables Grouped by Theoretical Perspective

Theoretical Perspectives	**Country-level Indicators**	**Individual-level Indicators**
Mortality-related uncertainty	Child mortality rate; AIDS prevalence	Experienced a child death
Education	Proportion of adult women who ever attended school	Educational attainment; Literacy
Family Planning and Fertility Reduction	Total fertility rate	Knowledge of modern contraception methods
Wealth	GDP per capita; proportion of population living in a rural area	Household wealth index; Urban residence

Table 4: Percentage of women providing a non-numeric response by period and cohort within each region

	Decade of interview								
Decade of birth	1990	2000	2010	1990	2000	2010	1990	2000	2010
	Asia			Africa			Latin America		
1940	25.9%	---	---	13.2%	---	---	8.3%	---	---
1950	17.7%	12.7%	---	11.4%	15.9%	---	8.3%	3.6%	---
1960	11.1%	8.6%	1.1%	7.8%	12.5%	10.8%	6.0%	2.0%	---
1970	7.6%	4.9%	0.6%	5.7%	8.6%	8.4%	5.4%	1.2%	---
1980	4.8%	3.2%	0.6%	8.4%	7.4%	5.0%	6.1%	1.2%	---
1990	---	2.0%	1.1%	---	7.8%	3.1%	---	0.8%	---

Table 5: Descriptive Statistics

	First Survey		Last Survey		T-Statistic
	Mean/Percent	SD	Mean/Percent	SD	
Non-Numeric Response to Ideal Family Size	11.1%	0.3	6.3%	0.2	36.1***
Control Variables					
Age	29.9	9.3	30.5	9.6	-14.1***
Number of Living Children	2.5	2.2	2.3	2.1	18.5***
Currently Pregnant	8.3%	0.3	7.2%	0.3	9.6***
Muslim	44.5%	0.5	43.4%	0.5	4.8***
Married	77.9%	0.4	75.1%	0.4	17.0***
Individual-level Independent Variables					
Experienced Child Death	26.2%	0.4	19.9%	0.4	33.6***
Literate	51.6%	0.5	61.4%	0.5	-44.3***
Educational Attainment					
No Schooling	32.0%	0.5	22.9%	0.4	46.2***
Attended Some Primary School	21.6%	0.4	19.9%	0.4	9.7***
Completed Primary School	46.4%	0.5	57.2%	0.5	-47.7***
Knows Modern Method of Contraception	89.8%	0.3	93.8%	0.2	-35.6***
Urban Residence	28.8%	0.5	34.5%	0.5	-28.1***
Country-Level Independent Variables					
Child Mortality Rate	128.0	54.1	92.3	48.6	2.8**
Maternal Mortality Rate	554.1	263.7	389.1	245.2	2.5**
% in School	63.1%	0.3	70.7%	0.0	-1.2
Total Fertility Rate	5.2	1.3	4.5	1.5	2.0*
HIV Prevalence	4.3	5.6	3.7	4.6	0.5
GDP Per Capita	589.9	593.4	1008.8	975.9	-2.1*
% of Population Living in Urban Area	68.1%	0.2	63.5%	0.2	1.17

Table 6. Odds Ratios from Multilevel Logistic Regression of Non-Numeric Ideal Family Size, Including Select Interaction Terms

Level-1 Variables (787,139 women)	Model 1	Model 2	Model 3	Model 4
Age	1.068***	1.131***	1.172***	1.075***
	(0.007)	(0.007)	(0.008)	(0.007)
Parity	1.277***	1.308***	1.226***	1.205***
	(0.008)	(0.008)	(0.008)	(0.008)
Currently pregnant	1.142***	1.169***	1.121***	1.105***
	(0.019)	(0.019)	(0.018)	(0.018)
Muslim	1.789***	1.696***	1.820***	1.546***
	(0.024)	(0.023)	(0.025)	(0.021)
Married	0.796***	0.828***	0.773***	0.747***
	(0.010)	(0.010)	(0.009)	(0.009)
Second Survey	0.619**	0.555***	0.503***	0.533***
	(0.103)	(0.092)	(0.088)	(0.095)
Experienced a child's death	1.355***			1.186***
	(0.020)			(0.018)
Literate				0.711***
				(0.012)
Education Level (ref. = no education)				
Incomplete Primary				0.859***
				(0.012)
Complete primary				0.571***
				(0.012)
Knows modern contraception		0.387***		0.517***
		(0.006)		(0.009)
Socio-economic Status (ref. = middle quintile)				
Lowest quintile			1.410***	1.150***
			(0.020)	(0.017)
Second quintile			1.128***	1.033*
			(0.017)	(0.015)
Fourth quintile			0.865***	0.968*
			(0.014)	(0.016)
Highest quintile			0.734***	0.992
			(0.013)	(0.018)
Urban residence			0.760***	0.865***
			(0.013)	(0.015)
Level-2 Variables (33 countries)				
Child mortality rate	1.576***			1.231
	(0.215)			(0.317)
HIV Prevalence	0.743**			0.718*
	(0.085)			(0.096)
% Ever attended school				1.247
				(0.257)
TFR		1.572**		1.51
		(0.237)		(0.405)
% Urban			0.963	1.019
			(0.222)	(0.224)
GDP per capita			0.834	1.122
			(0.195)	(0.248)
Interactions				
Child's death X Second survey	1.124***			1.124***
	(0.022)			(0.023)
Knows mod. contraception X Second survey		1.192***		1.176***
		(0.030)		(0.030)
Urban residence X Second survey			1.148***	1.097***
			(0.025)	(0.024)

Table 6, Ctd. Odds Ratios from Multilevel Logistic Regression of Non-Numeric Ideal Family Size, Including Select Interaction Terms

Random Effects Parameters				
Intercept	0.044***	0.101***	0.035***	0.133***
	(0.007)	(0.016)	(0.009)	(0.021)
SD of intercept	0.813***	0.827***	0.941***	0.769***
	(0.103)	(0.104)	(0.118)	(0.185)
SD of second survey	0.791***	0.842***	0.870***	0.808***
	(0.101)	(0.107)	(0.110)	(0.107)
Model Fit statistics				
AIC	*341,616*	*337,947*	*338,923*	*332,020*

Figures

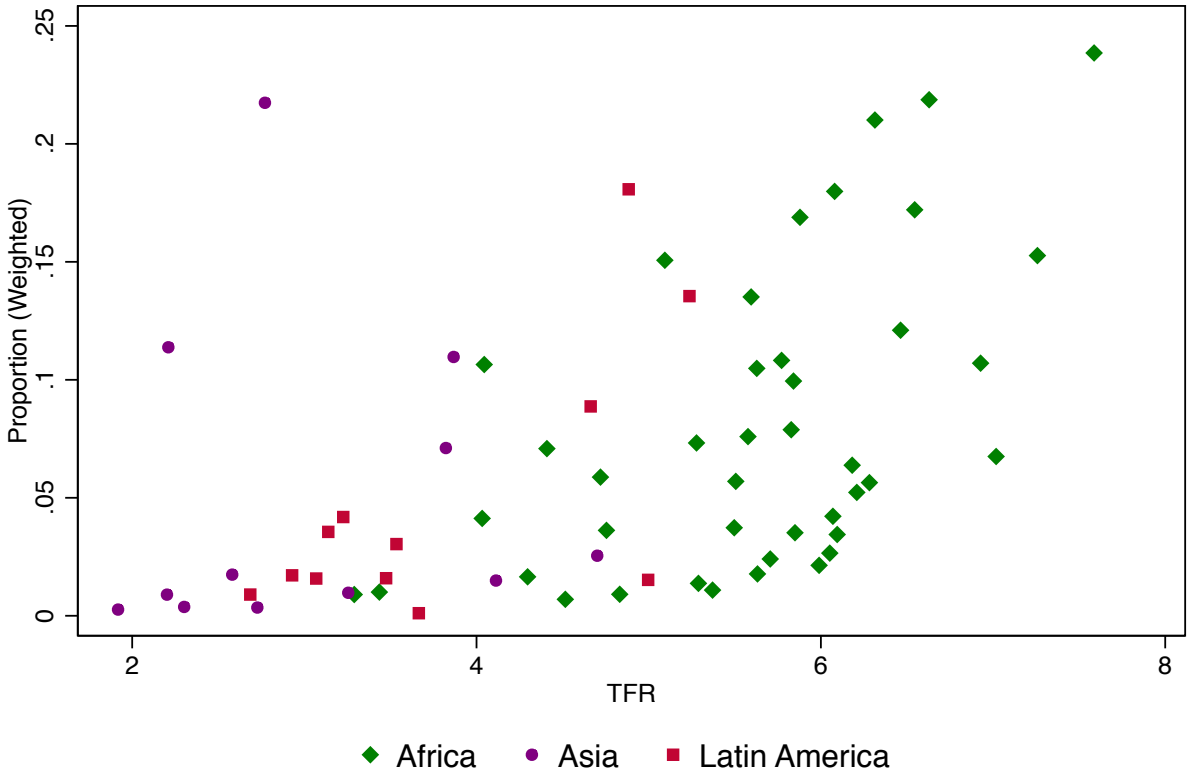


Figure 1 Non-Numeric Fertility Intentions and Total Fertility Rate

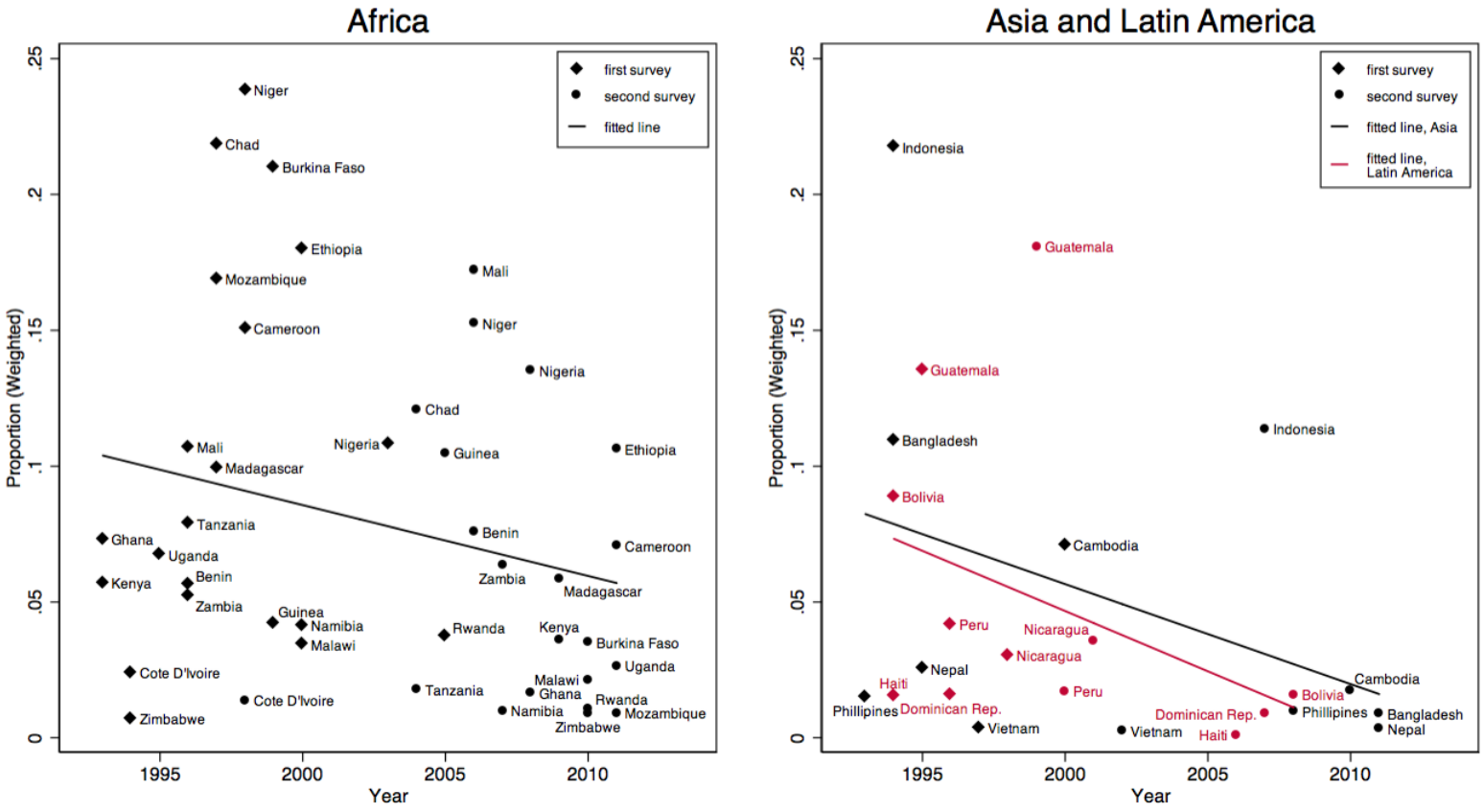


Figure 2 Proportion Providing a Non-Numeric Response to Question About Ideal Family Size

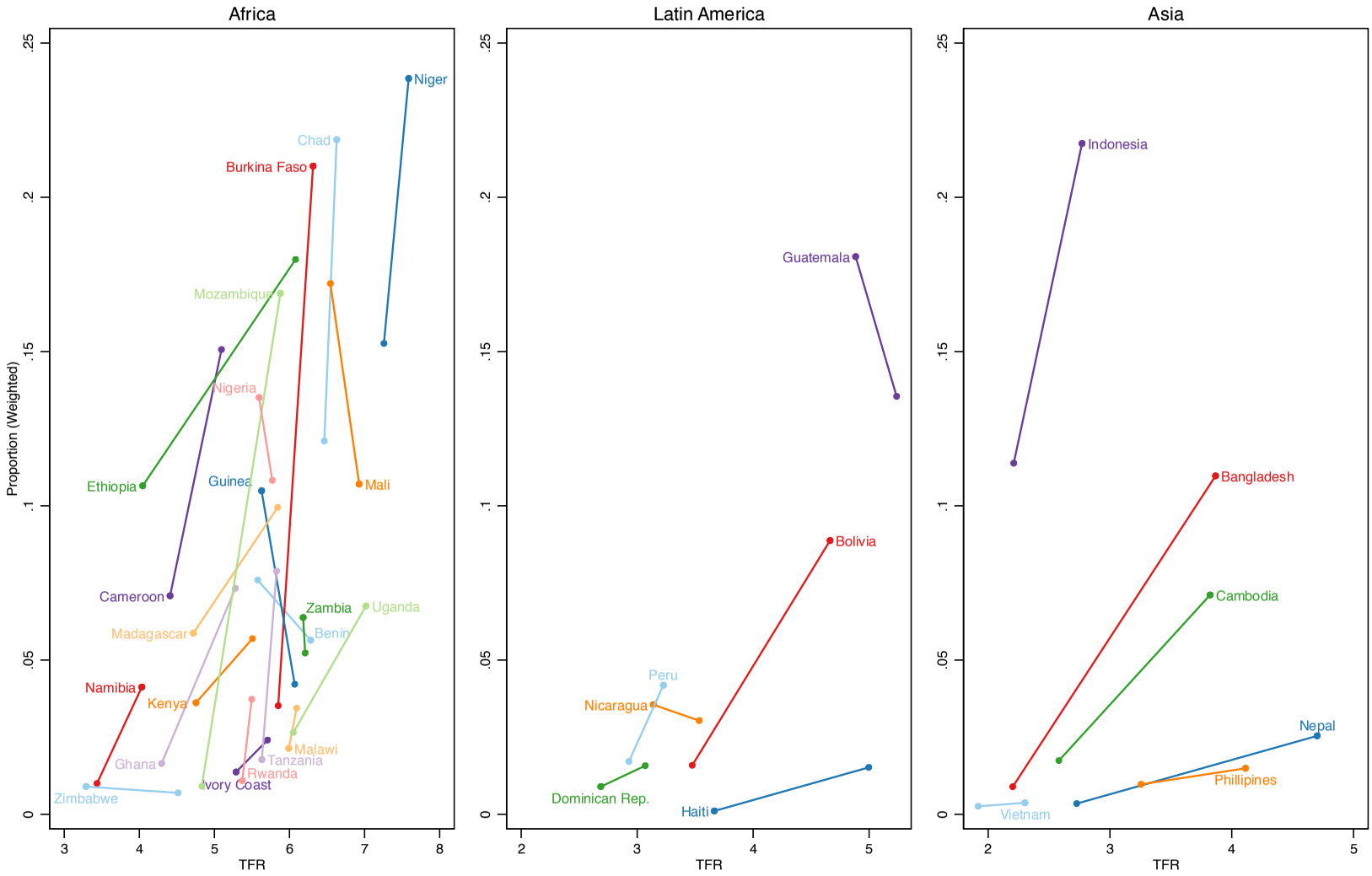
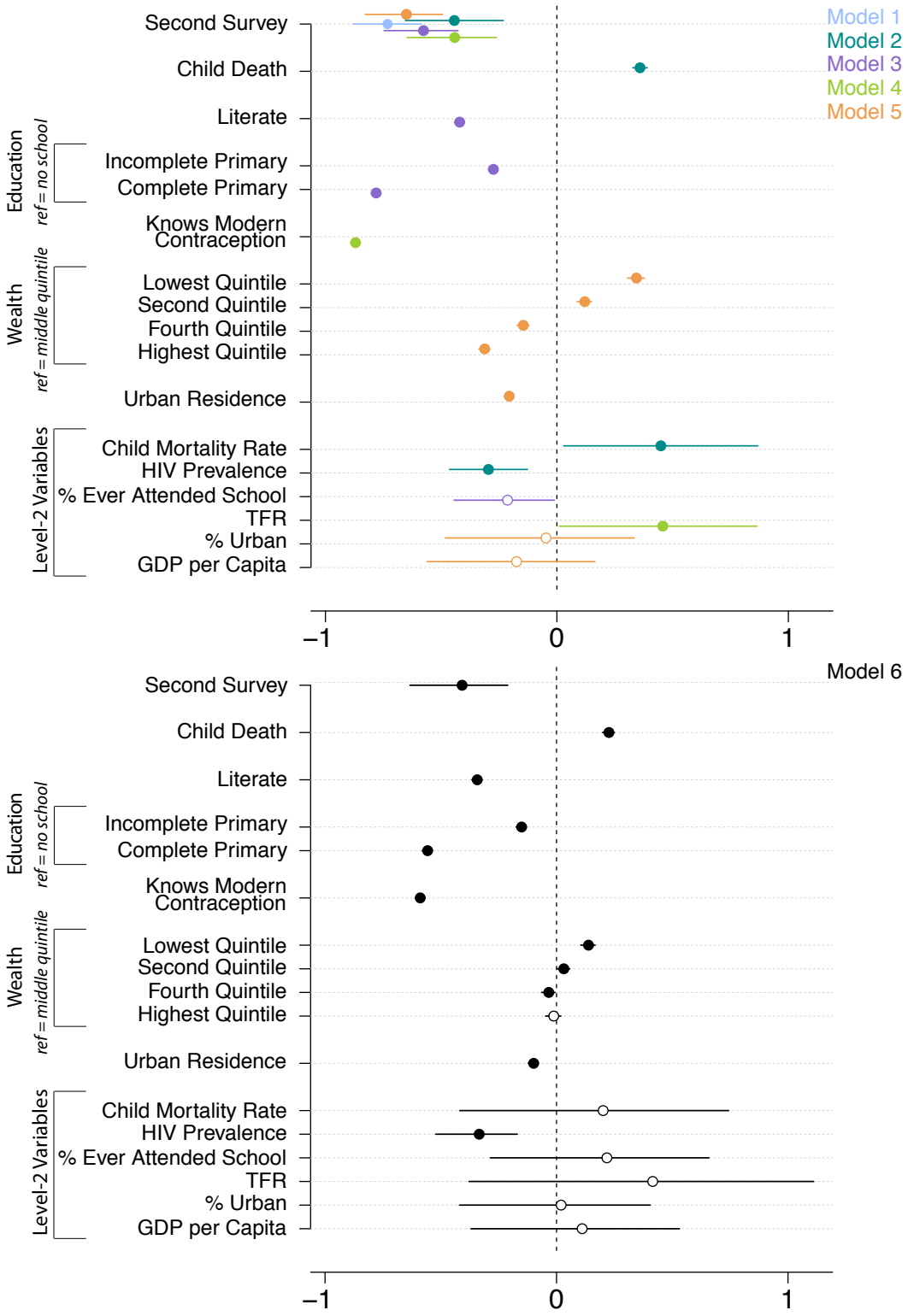


Figure 3 Changes in Non-Numeric Fertility Intentions and Total Fertility Rate Between Surveys



Closed circles denote statistically significant estimates. Open circles denote estimates that are not statistically distinguishable from zero. All models control for woman's age, marital status, number of living children, current pregnancy status, and whether she is Muslim. Number of observations: 787,139; number of countries: 33

Figure 4 Logged Odds from Multilevel Logistic Regression of Non-Numeric Ideal Family Size

Appendix

Table A.1 Odds Ratios from Multilevel Logistic Regression of Non-Numeric Ideal Family Size

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Level-1 Variables (787,139 women)						
Age	1.128***	1.067***	1.090***	1.132***	1.172***	1.075***
	-0.007	-0.007	-0.007	-0.007	-0.008	-0.007
Parity	1.299***	1.277***	1.205***	1.307***	1.225***	1.204***
	(0.008)	(0.008)	(0.007)	(0.008)	(0.008)	(0.008)
Currently Pregnant	1.164***	1.141***	1.112***	1.170***	1.121***	1.106***
	(0.019)	(0.019)	(0.018)	(0.019)	(0.018)	(0.018)
Muslim	1.824***	1.791***	1.558***	1.687***	1.818***	1.539***
	(0.025)	(0.024)	(0.021)	(0.023)	(0.024)	(0.021)
Married	0.818***	0.796***	0.748***	0.827***	0.773***	0.746***
	(0.010)	(0.010)	(0.009)	(0.010)	(0.009)	(0.009)
Second Survey	0.481***	0.642**	0.562***	0.643**	0.522***	0.655*
	(0.075)	(0.108)	(0.087)	(0.105)	(0.091)	(0.115)
Experienced a child death		1.432***				1.254***
		(0.016)				(0.014)
Literate			0.657***			0.710***
			(0.011)			(0.012)
Education Level (ref. = no education)						
Incomplete Primary			0.760***			0.860***
			(0.011)			(0.012)
Complete primary			0.458***			0.573***
			(0.009)			(0.012)
Knows Modern Contraception				0.419***		0.555***
				(0.005)		(0.007)
Socio-economic Status (ref. = middle quintile)						
Lowest quintile					1.410***	1.148***
					(0.020)	(0.017)
Second quintile					1.128***	1.032*
					(0.017)	(0.015)
Fourth quintile					0.865***	0.967*
					(0.014)	(0.016)
Highest quintile					0.732***	0.988
					(0.013)	(0.018)
Urban residence					0.814***	0.906***
					(0.011)	(0.012)
Level-2 Variables (33 Countries)						
Child Mortality Rate		1.567**				1.233
		(0.214)				(0.316)
HIV Prevalence		0.744*				0.716*
		(0.086)				(0.096)
% Ever attended school			0.808			1.243
			(0.118)			(0.257)
TFR				1.580**		1.515
				(0.237)		(0.405)
% Urban					0.954	1.02
					(0.220)	(0.224)
GDP per capita					0.840	1.117
					(0.197)	(0.245)
Random Effects Parameters						
Intercept	0.057***	0.043***	0.095***	0.095***	0.057***	0.121***
	(0.009)	(0.007)	(0.015)	(0.015)	(0.011)	(0.020)
SD of intercept	0.929***	0.813***	0.890***	0.829***	0.940***	0.772***
	(0.929)	(0.103)	(0.890)	(0.829)	(0.940)	(0.101)
SD of second survey	0.884***	0.795***	0.836***	0.833***	0.870***	0.798***
	(0.884)	(0.102)	(0.836)	(0.833)	(0.870)	(0.106)
Model Fit Statistics						
AIC	342,704	341,649	335,204	337,996	338,963	332,114

Table A.2 Correlation Matrix for All Variables

	Non-Numeric Response	Age	Parity	Currently Pregnant	Muslim	Married	Second Survey	Child's Death	Child Mortality Rate	Literate	Incomplete Primary	Complete Primary
Non-Numeric Response	1											
Age	0.07	1										
Parity	0.10	0.69	1									
Currently Pregnant	0.01	-0.08	-0.03	1								
Muslim	0.15	0.04	0.07	0.04	1							
Married	0.06	0.30	0.39	0.17	0.21	1						
Second Survey	-0.07	0.01	-0.03	-0.01	0.01	-0.05	1					
Child's Death	0.09	0.37	0.38	0.03	0.11	0.21	-0.06	1				
Child Mortality Rate	0.09	-0.08	0.07	0.08	0.33	0.10	-0.27	0.20	1			
Literate	-0.14	-0.14	-0.27	-0.07	-0.23	-0.21	0.09	-0.28	-0.40	1		
Incomplete Primary	-0.01	-0.01	0.05	0.01	-0.13	-0.02	-0.02	0.03	-0.06	-0.11	1	
Complete Primary	-0.12	-0.14	-0.27	-0.06	-0.16	-0.17	0.08	-0.27	-0.33	0.72	-0.53	1
% Attended School	-0.10	0.04	-0.07	-0.06	-0.41	-0.14	0.13	-0.18	-0.76	0.46	0.13	0.38
Knows Mod. Contraception	-0.15	0.05	0.00	-0.02	-0.16	-0.01	0.08	-0.06	-0.25	0.26	0.04	0.22
TFR	0.06	-0.10	0.07	0.08	0.16	0.03	-0.19	0.19	0.87	-0.36	0.01	-0.33
HIV Prevalence	-0.06	-0.07	0.00	0.03	-0.15	-0.08	-0.05	0.03	0.27	0.00	0.09	-0.02
Lowest quintile	0.06	0.03	0.12	0.03	0.01	0.08	0.00	0.10	-0.04	-0.22	0.08	-0.23
2nd quintile	0.02	0.01	0.06	0.02	0.01	0.04	0.00	0.06	-0.01	-0.11	0.05	-0.12
4th quintile	-0.03	-0.01	-0.04	-0.01	-0.01	-0.02	0.01	-0.03	0.00	0.08	-0.03	0.08
Highest quintile	-0.05	-0.03	-0.15	-0.05	0.00	-0.11	0.00	-0.13	0.05	0.24	-0.11	0.27
% Urban	-0.04	0.03	-0.05	-0.05	-0.19	-0.10	0.14	-0.13	-0.50	0.29	-0.08	0.33
GDP per capita	-0.04	0.04	-0.06	-0.05	-0.17	-0.15	0.24	-0.14	-0.56	0.29	-0.04	0.28
Urban resident	-0.07	-0.03	-0.15	-0.05	-0.05	-0.15	0.03	-0.15	-0.11	0.30	-0.12	0.33

	% Attended School	Knows Mod. Contraception	TFR	HIV Prevalence	Lowest quintile	2nd quintile	4th quintile	Highest quintile	% Urban	GDP per capita	Urban resident
% Attended School	1										
Knows Mod. Contraception	0.23	1									
TFR	-0.65	-0.23	1								
HIV Prevalence	0.12	0.03	0.35	1							
Lowest quintile	0.03	-0.14	-0.04	-0.03	1						
2nd quintile	0.01	-0.05	-0.01	-0.02	-0.24	1					
4th quintile	0.00	0.06	0.00	0.02	-0.25	-0.24	1				
Highest quintile	-0.05	0.13	0.05	0.02	-0.27	-0.26	-0.27	1			
% Urban	0.52	0.05	-0.52	-0.31	0.03	0.02	0.01	-0.08	1		
GDP per capita	0.50	0.09	-0.55	-0.15	0.03	0.02	0.00	-0.07	0.73	1	
Urban resident	0.11	0.15	-0.12	-0.07	-0.32	-0.23	0.11	0.48	0.25	0.18	1.00