INTRODUCTION

Conventional theories of fertility decline revolve around the idea that once the fertility transition begins it will continue to progress until replacement fertility is attained (Kirk 1996, Bongaarts 2008). The fertility transitions in Europe, which underlie classic demographic transition theories, may have varied in pace of transition depending on a number of external factors, but they systematically follow this pattern of consistent decline. Recently, however, demographers have noted that contemporary transitional societies are not following the classic models of continuously decreasing fertility (Gendell 1985, Bongaarts 2006, Bongaarts 2008). Rather, some populations appear to reach a fertility plateau where they maintain a consistently high level of fertility for a relatively extended period of time. Because these patterns do not reflect the historical patterns observed in Europe, the mechanisms underlying the plateau and the reinstatement of a decline have not been fully explored and are not fully understood.

In this paper we analyze some of the components of stalled fertility as they pertain to Guatemala, the only Central American country to have experienced a stalled fertility decline (Bongaarts 2008). After a period of declining fertility, during the 1990s the change in Guatemala's total fertility rate (TFR) began to decelerate to the degree that the transition appeared to stall at around 5 lifetime births per woman. In the early 2000s the TFR of 4.4 lifetime births provided encouraging evidence that the country may have again started down the path towards lower fertility. However, not until data from the most recent reproductive health survey revealed a dramatically reduced TFR of about 3.5 lifetime births, was there strong evidence that the fertility transition was in effect. Therefore, with clear evidence that a significant decrease in fertility is underway, we can now analyze the components of Guatemala's fertility transition from the period of initial decline, to the stall, and to the period of re-acceleration of decline.

Using the fertility histories of nearly 25,000 women, from five different country-wide surveys (1987-2008), we deconstruct the fertility transition in Guatemala through an examination of both parity and population composition. First, using period parity progression ratios (PPPRs), we compare parity transitions over time, at the country-level, to evaluate parity specific behavior before, during and after the stall. Through an examination of transitions from one birth order to the next we can expand our understanding of the fertility behavior that leads to a stall and the reinstatement of a decline by isolating the changes in parity transition rates for each birth order over time. Typically, as a society moves from pre-transitional rates of fertility[1] (to replacement level fertility reductions in higher order births first occur later followed by changes in the timing of lower order births (eg; women delay age at first birth) (Bongaarts 1999, Spoorenberg 2010). These changes lower the TFR and signal an overall shift in family size goals. Little is known, about parity transitions in the event that fertility decline stalls mid-transition. It is therefore not known if certain parities stalled more than others or if

[1] Bongaarts (2008) used work by Ross and colleagues (2006) to define pre-transitional societies as those with contraceptive prevalence rates lower than 10 percent among women in union.

the transition from each birth order to the next evidenced the same type of stagnating behavior.

Further because it is also not known if certain subgroups resisted or embraced changing fertility norms more than others we construct an individual-level analysis of parity transitions. Using event-history analysis, we examine population characteristics that may have created independent fertility trajectories within the population. Grouping a diverse population may have muddled analyses to the point that it was impossible to disentangle the different transitional pathways from each other. No study has evaluated parity specific behavior in Guatemala throughout the history of Guatemala's fertility transition at either the macro- or the micro-level. This study therefore seeks to expand the discussion of stalled fertility transitions and to fill an important gap in the literature regarding Guatemala's journey towards replacement fertility.

In the following section we provide more details regarding Guatemala's reproductive health history with special attention to contextual and compositional factors linked to fertility variation. After this introduction to Guatemala we provide information on the data and limitations of the data used in this analysis, followed by details of the parity-specific methods used here to evaluate observed fertility patterns. The results of the analysis are then highlighted allowing for within-country comparisons over time, and finally, we discuss the results in terms of variation due to context versus composition.

ANALYTIC FRAMEWORK

Guatemala's continuously high fertility during the 1990s spurred a sizeable amount of academic and gray literature examining underlying causes of high fertility and corresponding low contraceptive use rates (Bertrand et al. 2001, Santiso-Galvez and Bertrand 2004, De Broe and Hinde 2006, Grace 2010). In many ways these studies, and the resulting conclusions that were drawn, were limited by the short-term perspective of the Guatemalan fertility trajectory. In most of the prior studies, before Guatemala experienced a significant decline in TFR, the goal of the research projects was to determine the necessary mechanisms to motivate a legitimate decline in fertility as it was not fully apparent that an actual transition was underway (De Broe and Hinde (2006) and Bertrand and Santiso-Galvez (2004) do address a "delayed" or stalled transition). Now that we have identified a real decrease in TFR we consider the period of stall from a different perspective – namely that some subgroups may have paced their decline differently than other subgroups. Given the release of new survey data that highlight the largest drop in TFR ever observed in Guatemala, we are in a unique position to analyze the fertility transition with the knowledge that the country is rapidly headed towards replacement level fertility. While we build our analytic framework on the results of related projects, an important consideration in applying results from these prior analyses is that the goals of the studies differ. In this analysis we build on the new information gained from the previous related research that revealed aberrant family planning and

fertility behavior, however we construct our analysis with the intention of identifying the differing impacts of segments of the population on the timing and pace of the fertility decline. In this way we can determine if indeed certain subgroups were transitioning at different paces.

Through their identification of consistently high or low fertility sub-populations, these previous studies produced a selection of variables likely to account for different observed fertility transition trajectories. Both qualitative and quantitative studies of contraceptive use (and some additional studies related to other aspects of reproductive health) have highlighted the significant impact of a variety of factors relating to economic and sociodemographic characteristics (Goldman and Glei, 2003; Carter, 2002; Bertrand et al., 2001; Grace, 2010; Becket and Pebley, 2003, and many others). Common to nearly all of these studies, is the dominant role of women's education, living in an urban area, religion and ethnicity. In general these studies find that as women's education increases, fertility decreases and that Indigenous women (mostly non-Spanish speaking Mayans) have more children than their Ladino (Spanish speaking individuals of mixed-ancestry) counterparts. Urban women are also characterized as having fewer children. The explanations for these findings are somewhat varied depending on the analysis but generally suggest that limited education, rural residence and the unique cultural and linguistic characteristics of Guatemala's Indigenous population lead to nearly insurmountable barriers to family planning services which result in very little contraceptive use and very large families. Building on these results, it is therefore possible that different segments of the population may have been proceeding through the fertility transition in such different ways (eg., different pacing and timing).

In addition to isolating the variation in behavior according to educational attainment and ethnicity, most studies peripherally address the impacts of the 36-year civil war hypothesized to have impacted nearly every aspect of human health and development in the country (particularly see Santiso-Galvez and Bertrand, 2004 and De Broe and Hinde, 2006). The war began in the early 1960s when a small segment of the military attempted a coup ultimately resulting in a violent and drawn-out conflict that impacted nearly every aspect of human health and development. The development and expansion of roads, health clinics and schools was stalled and a fear and distrust of the government developed, particularly among the rural and Indigenous population. The Commission for Historical Clarification (CEH) and the Recovery of Historical Memory Project (REMHI) estimate that nearly 1 million individuals were killed, went missing or were displaced during the civil war. The Indigenous population experienced the greatest percentage of these losses (Chamarbagwala and Moran, 2010).

Research highlights the impact of the war on proximate and distal determinants of fertility – namely education, contraceptive use/availability and cultural differences (Santiso-Galvez and Bertrand, 2004; Chamarbagwala and Moran, 2010). In terms of fertility, researchers theorize that the war created a general fear of the government, particularly among the indigenous and with particular regard to family planning and education programs, and in addition, that these effects were felt more strongly in areas of the country where the most violence occurred – the mountainous areas in the mid-North

of the country – largely populated by Indigenous Guatemalans (Santiso-Galvez and Bertraind, 2004; De Broe and Hinde, 2006; Chamarbagwala and Moran, 2010). Because of the frequency of torture, rape, abductions and murder and because women and children were often targets, school attendance and educational expansion declined, especially in the most violent departments (Chamarbagwala and Moran, 2010). Additionally, any expansion of reproductive health services was severely limited by access issues (road construction was stalled) and further limited by the general distrust of any governmental health programs (the Indigenous were particularly fearful that the government was instituting population control policies) (Santiso-Galvez and Bertrand, 2004; De Broe and Hinde, 2006). Combining this distrust of government sponsored health programs with decreased school attendance and increased separation of indigenous couples may have laid the foundation for a fertility boom in the years following the war among the indigenous. This is particularly noteworthy in terms of examining the fertility decline, as the effects of the war – reluctance to adopt family planning strategies, family separation and reduce educational opportunities – reflect the experiences of the rural indigenous more than any other population subgroup. Therefore it is highly likely that the war further exacerbated the divergence in fertility transition paths.

We assert that each of these factors – education, ethnicity, urbanization and conflict, dramatically impacted Guatemala's fertility transition. Specifically we hypothesize that once these factors are accounted for, there will be no evidence of a stall during the transition. Rather, the stall reflects the heterogeneity within the population - a population which consists of several distinct groups of individuals who are so dissimilar that they cannot be expected to proceed down the same path towards replacement fertility. In our analysis we first produce PPPRs covering the period of analysis to provide initial perspective on the way in which parity transitions reflect the decline, stall, then decline again of Guatemala's transition. Second we produce parity-specific transition curves adjusting for differences in the four factors listed above.

DATA

We rely on household survey data collected in 1987, 1995, 1998/99, 2002 and 2008. The data from the three earliest time periods are Demographic and Health Survey (DHS) data and the two most recent surveys are Reproductive Health Surveys (RHS). The DHS and RHS data are virtually identical in their construction for our purposes. Each woman in a household between the ages of 15-49 (44 for the 1987 data) is asked a series of detailed questions about her reproductive experiences. From these retrospective reports of childbirths we can construct a timeline of childbearing for each woman. Because childbearing has historically occurred at very young ages in Guatemala we begin each woman's timeline at age 10 and keep track of the births as they occur. Additionally, because union formation is complex in Guatemala – both formal and informal unions are very common – and the survey questions are not consistent in their treatment of union-type we refrain from categorizing women by union-status.

METHODS

Period Parity Progression Ratios

Period parity progressions ratios reflect the transition from one parity to the next and therefore reflect the incremental family building process. Because PPPRs are constructed to evaluate the way women transition from one birth order to the next, they provide a more nuanced perspective on fertility change than related aggregate measures (e.g. TFR, ASFR). Including this type of perspective in analyses of the Guatemalan fertility transition is vital to developing a complete understanding of the mechanisms underlying stalled fertility transitions.

Explained in detail by Ni Brolchain (1987), Feeney & Yu (1987), Hinde (1998) and Spoorenberg (2010), period parity progression ratios allow us to compare the rate of transition to specific parities over time. Researchers argue that fertility analyses of parity specific behavior allow for a more realistic analysis of fertility because a subsequent birth likely depends, in part, on the number of a births a woman has had up to a given point in time. We use a combination of synthetic and true parity progression ratios to produce parity transitions for each year starting 10 years prior to the earliest of our surveys (see Hinde (1998) for details). Combining the periods of data allows us to model country-level patterns in transitions from 1977 until 2008 – more than 30 years of Guatemala's fertility history. The PPPRs are used to establish the parity-specific pattern of Guatemala's fertility transition – including the transition trends during the stall. Identifying patterns in parity specific transitions reveals the parity (or parities) that drove the stall in TFR and facilitates a more focused parity-specific analysis at the individual-level in the next step of the analysis.

Cox Proportional Hazard Models

Analyzing fertility from an individual perspective is necessary to fully understand the mechanism underlying fertility change because individuals are the "decision makers" who drive macro-level changes (Smith 1989, Bulatao and Lee 1983). Given the significant role that ethnicity, women's education, place of residence (urban versus rural) and the war have played in related research, we focus on the changing impact of these factors on individual fertility behavior over time. To best model these transitions and to examine our hypothesis that different population subgroups began reducing their fertility behavior at different times, we construct models using event-history methods, specifically Cox proportional hazard models (Therneau and Grambsch, 2000**)**. We construct separate models for each of the transitions from the 1^{st} to 2^{nd} births, the 2^{nd} to 3^{rd} births, 3^{rd} to 4^{th} births, 4^{th} to 5^{th} births and 5^{th} to 6^{th} births. Examining these transitions over time and with attention to the impact of each of the independent variables, provides insight into how changes in the population composition resulted in changes in the pacing and timing of the fertility transition. In this way we can ascertain if, for example, certain groups had been maintaining high fertility (increased likelihood of transition to a higher order birth) throughout the late 1980s and into the period where we see a stall, or if there was a resurgence in transitions in higher order births among certain groups of women following the war. These results will help identify the sub-groups of women who have been

transitioning at different rates and disentangles the compositional changes that may have muddled the straight-forward interpretation of Guatemala's fertility transition.

ANTICIPATED RESULTS

We anticipate that our results will indicate that indigenous and Ladino Guatemalans behave in very different ways in terms of their fertility behavior. Our preliminary results reveal plateaus in the PPPRs among the higher birth orders (transitions to 4^{th} births and beyond) and very little change in lower birth orders. Because of the significance of ethnicity, education, urban residence and the war in related research, we anticipate that through the event history analysis we will be able to decompose the population to identify distinct groups.

While our project uses data from Guatemalan DHS and RHS it is designed to contribute to the larger literature of stalled fertility transitions and transitions of contemporary emerging societies.

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