J.biosoc.Sci, (2008) **40**, 725–742, © 2008 Cambridge University Press
doi:10.1017/S0021932007002702 First published online 22 Jan 2008

CHILDBEARING IN CRISIS: WAR, MIGRATION AND FERTILITY IN ANGOLA

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Summary. This study examines the short- and long-term effects of war-induced and war-unrelated migration on fertility outcomes using data from two peri-urban municipalities of Greater Luanda in Angola. In the short term, results from multi-level discrete-time logistic regression models indicate that net of other factors, war-unrelated migration is associated with a lower probability of birth than war-induced migration in a given year. Similar results are obtained when the effects of migration are lagged by a year. At the same time, the effects of war-triggered migration do not differ significantly from those of not migrating in a given year but are statistically significant when the effects of migration are lagged by a year. In the long term, the effects of migration experience on cumulative fertility are negligible and not statistically significant net of demographic and socioeconomic variables. Interpretations of the results are offered in the context of Angola and their broader implications are reflected on.

Introduction

In recent years, researchers have become increasingly interested in how fertility responds to military conflicts in developing settings (e.g. Khlat *et al.*, 1997; Lindstrom & Berhanu, 1999; Agadjanian & Prata, 2002; Randall, 2005). Inspired at least in part by the 1994 International Conference on Population and Development focus on the reproductive health needs of refugees and internally displaced persons, numerous studies not only document the deleterious effects of military conflicts and population displacement on public health systems, but also highlight fertility and reproductive health outcomes of displaced populations (Goodyear & McGinn, 1998; Busza & Lush, 1999; McGinn, 2000; Al-Qudsi, 2000; Hynes *et al.*, 2002; Guha-Sapir & Gijsbert, 2004; Singh *et al.*, 2005; Verwimp & Bavel, 2005).

Historical studies, mainly in Western Europe, have typically found a decline in fertility during war. For instance, an analysis of the impact of the First World War on French fertility showed a massive drop in fertility largely as a result of a decline in marriage rates and a rise in marital disruptions (Festy, 1984). Winter (1992) attributed changes in fertility tempo during and after the Second World War to the historical effects of war on women's social and economic roles. Mass mobilization of men expanded the roles of women, which acted to inhibit fertility, but demobilization after the war saw women return to their family roles and responsibilities, thereby bringing a post-war rise in fertility. Similarly, Caldwell (2004), using data from thirteen wars and social upheavals in Europe, found marked falls in fertility arising from deferred female marriage, declining marital fertility, or both. Other studies in some non-Western settings had largely similar findings (e.g. Kong *et al*., 1988; Barbieri *et al*., 1995).

Yet in developing countries, the relationship between war and fertility is less certain as war-induced conditions can also lead to a rise in fertility levels due to parents' desire to replace lost children as a risk-insurance strategy. A perusal of the limited literature that deals with the effects of war on fertility in general (not focusing specifically on forced migration) shows mixed evidence. According to a study of Lebanese fertility, Lebanon's civil war and the economic crisis that followed showed little effect on fertility, mainly due to the low fertility levels already reached prior to the war (Khlat *et al*., 1997). In Ethiopia, birth intervals and conceptions were found to be reduced by the effects of famine and military attacks during the recurrent civil conflicts and crop failures (Lindstrom & Berhanu, 1999). Results from another study in Eritrea indicate that military mobilization and displacement associated with the 1998–2000 border conflict with Ethiopia resulted in a large fertility decline in the late 1990s and the early part of the new century (Blanc, 2004). Agadjanian & Prata (2002), in their study of fertility dynamics in Angola, detected evidence of a war-time drop and post-war rebound in fertility, which were shaped by the type and degree of exposure to the war and women's socioeconomic characteristics. In Palestine, long periods of conflict between Palestinians and Israelis have probably contributed to higher than normal fertility levels among the Palestinians (Fargues, 2000). And in Bangladesh, birth rates, which had been declining slightly in the period before the war, may have increased modestly during the war and fell substantially in all age groups in the year following the war (Curlin *et al*., 1976).

In a recent review of the limited literature on the fertility implications of war-induced migration, Hill (2004) points to inconsistent findings. For instance, in Sarajevo before and during the Bosnian war in 1992–1994, fertility fell mainly as a result of temporary separation of marital partners, abortion and reduced fecundability due to undernutrition. In a study of two Cambodian refugee camps in Thailand, one of rural and lower socioeconomic background and the other of urban and higher socioeconomic status, fertility levels were found to be substantially higher in the urban-origin than the rural-origin refugee camp during a six-month period. The difference in fertility, however, reflected lower conception rates among the rural-origin refugees prior to arriving in the camps compared with the urban-origin group. In a recent study in Rwanda, refugee women had higher fertility but lower survival chances for their children than non-refugee women (Verwimp & Bavel, 2005). Lastly, a study of the Malian Tuareg suggested stability in both fertility and marriage rates during periods of conflict, exile and repatriation (Randall, 2005).

The literature on the relationship between voluntary (economic) migration and fertility is much better established. Much of this literature has concentrated on explaining childbearing preferences and behaviour of rural migrants in places of destination (Goldstein, 1973; Green, 1978; Bach, 1981; Farber & Lee, 1984; Lee, 1992;

Brockerhoff & Yang, 1994; Goldstein *et al*., 1997). Several competing perspectives have been identified and tested on how geographical mobility could impact on childbearing patterns. The most prominent among them are those emphasizing selection, disruption and adaptation mechanisms. The selection perspective argues that migrants are self-selected by individual characteristics (such as sex, age, occupation and marital status) and have fertility preferences similar to those in destination areas than in origin areas. Migrants, for example, may be selected for higher levels of education and socioeconomic characteristics and may have fewer children than less educated women, not only in rural settings, but in urban areas as well (Macisco *et al*., 1970; Zarate & de Zarate, 1975; Farber & Lee, 1984; Kahn, 1988; Courgeau, 1989; Chattopadhyay *et al*., 2006). Selection may also be a result of unobserved characteristics such as the tendency to postpone the onset of childbearing, openness to change, altered fertility aspirations and access to information about destination areas (Ribe & Schultz, 1980).

Disruption, on the other hand, assumes disruptive factors such as spousal separation and the desire to delay childbirth immediately after migration. Thus fertility of migrants is expected to be lower than that of non-migrants but for a short duration of time (Goldstein, 1973; Goldstein & Goldstein, 1981; Hervitz, 1985; Sharma, 1992; Brockerhoff, 1995; Lindstrom & Saucedo, 2002; Jensen & Ahlburg, 2004; Kulu, 2005). The third mechanism through which migrants' fertility may change is adaptation to the fertility regimes in destination areas. This mechanism assumes that fertility is determined by the social and cultural norms dominant in the new place of residence (Caldwell, 1982). The new environment presents incentives such as education and women's labour market participation, which increases the opportunity costs attached to childbearing and childrearing. These incentives and changes induce people to reduce fertility from what it would have been had they not migrated (Lee & Pol, 1993). Adaptation can thus be detected in the cumulative fertility of migrants relative to non-migrants if selection and short-term disruption effects are controlled for.

The foregoing overview of the two separate blocks of research – that on the impact of war on fertility and that on migration–fertility interrelationships – reveals two important gaps in the literature. First, the literature on the effects of war on fertility focuses almost exclusively on forced migration (refugees and internally displaced persons) and fails to make an important distinction between war-induced and war-unrelated (economic) migration. Yet, in situations of prolonged conflict not all groups of those migrating may be uniformly impacted by hostilities or exhibit the same demographic response. Second, the two bodies of literature are largely separate and rarely intersect. However, war typically creates massive economic hardships that may galvanize migratory movements, even in situations where no direct threat to the lives of individuals exists. Thus migration that is triggered directly by hostilities and migration that is caused mainly by economic deprivation could occur in parallel.

In this paper, these gaps are addressed by exploring how war-induced and economic (non-war) migration by both women and men affect their fertility in Angola, a country of 16 million people in south-western Africa that saw one of the longest and bloodiest internal conflicts in modern African history. Specifically, short-term effects of war-induced migration and war-unrelated migration are examined and compared. The analysis of the short-term effects of migration on fertility is complemented with analysis of the long-term fertility differences among war migrants, non-war migrants and non-migrants.

Conceptual and analytical approach

This study's approach rests on the presumption that although the antecedents and processes of forced and voluntary migration are rather different, both types of migration may occur in the same context, especially in settings of prolonged and varying intensity guerilla warfare that have characterized civil military conflicts in many parts of the developing world, especially in sub-Saharan Africa. In such settings, some migration moves may occur primarily or entirely because of a worsening security situation and direct threats to individuals' lives and well-being, while others may primarily be triggered by economic or family considerations. Although war may indirectly affect these considerations by causing general economic decline and reducing livelihood opportunities, the moves that take place when a direct threat is absent would be generally better thought of and prepared than the flights from areas of all-out hostility. These moves, therefore, would be more akin to voluntary migration and their association with fertility would be shaped by the mechanisms described in the previous section.

This study brings together the analysis of war-induced and economically driven migration (which hereafter will be referred to as war migration and non-war migration, respectively) and compares the effects of these two types of migration on fertility outcomes in Angola, a country that lived through one of the most protracted and destructive civil wars in sub-Saharan Africa. Although hostilities precluded data collection in places where war migration originates, the next best thing was possible, i.e. the study of war migrants and non-war migrants in a place of migration destination, and matching of their fertility and migration histories. Importantly, the study is set in Luanda, Angola's capital and largest metropolis, which has been the country's main recipient of both war and non-war migrants. Luanda's pre-eminence as the favourite destination of both war and non-war migrants not only allows for a comparison of these two types of migration, but also minimizes migrants' selectivity on destination.

To compare the short-term effects of war and non-war migration on fertility, a dynamic approach is chosen. Whether the probability of having a birth in any given year is affected by a person's migration experience in that year is examined. Non-war migrants may be selected on certain unobserved characteristics such as a tendency to regulate childbearing, openness to behavioural change, and flexible fertility aspirations. In addition, non-war migration typically allows for greater planning, including planning of pregnancy and birth, to accommodate the inevitable disruption of the normal course of life. In contrast, war migration is usually unexpected and abrupt and is much less selective on individual characteristics. It is, therefore, hypothesized that, *ceteris paribus*, non-war migration in any given year is associated with a lower probability of birth in that year than is war migration. Similarly, given the nature of the sample drawn from the urban population, migrating for war reasons is expected to increase the probability of birth relative to non-migration. And finally, if the selection mechanisms guide reproductive behaviour of non-war migrants, non-war migration should not have any effect on the probability of birth compared with non-migration. Alternatively, if the disruption mechanisms prevail, non-war migration should result in a much lower probability of birth than non-migration. The effects of migration, voluntary or not, on fertility, however, may not manifest themselves in the year of migration, especially if migration happens towards the end of the year. The effects of migration may therefore be more pronounced in the year following the move.

To assess long-term fertility differences associated with the two types of migration, lifetime fertility is analysed by comparing individuals in three categories: those who have experienced war migration, those who have experienced non-war migration, and those without any migration experience. This part of the analysis explores whether any short-term differentials in fertility, effected through the selection or disruption mechanisms, are reduced in the long run. If convergence of fertility levels across the three groups is indeed evident, the workings of adaptation mechanisms would be assumed.

Context: The War in Angola

Angola was once described as 'the land of frustrated potential' to stress its enormous mineral resources (mainly oil and diamonds) amidst the misery of war (Cramer, 1996). Yet Angola also offers an appropriate example for this analysis due to the recurrent episodes of war over prolonged but intermittent periods before and after its independence from Portugal in 1975. The country lived through one of the bloodiest and bitter conflicts in modern African history – a product of cold war era geopolitics, local interregional rivalries, and the inordinate individual ambitions of its political leaders. The war was mainly fought between the government of the Popular Movement for the Liberation of Angola (MPLA) party and its bitter political enemy, the National Union for the Total Independence of Angola (UNITA). It started in the 1960s, long before Angola's independence, and dragged on until the signing of a ceasefire between the two sides in 1991. Hostilities, however, resumed a year later, after the UNITA opposition refused to accept the results of the presidential elections and continued until another peace agreement was signed in Lusaka, Zambia, in 1994. Yet, the ensuing period of peacefulness was also short-lived as fresh waves of fighting erupted at the end of 1998. That last round continued until the death of UNITA's charismatic leader and the military defeat of UNITA in 2002. Since then, Angola has lived in peace.

One important feature of Angola's decades-long war is that it did not affect the entire country equally. Thus Luanda, the capital city, remained one of the havens of safety, attracting displaced persons from both urban and rural parts of the country affected by intense fighting. However, even during the war many migrants came to Luanda for reasons directly unrelated to war – to join relatives and to look for better educational and economic opportunities. This combination of war-related and economic migration led to a rapid population growth, with the population of Greater Luanda reaching up to four million, or about a third of the nation's total population, towards the end of the civil war (Jenkins, 2002). No official data on the size and distribution of war-related and economic migrant populations in Luanda are available. While some migrants continued to reside in camp-like conditions on the distant outskirts of the capital, others succeeded in making their way into the more organized and centrally located neighbourhoods, either by staying with family or relatives or building their own makeshift dwellings, often illegally, in crowded city slums.

Similarly, due to the turmoil and political unrest, there is hardly any available literature on Angola's maternal and child health situation. Available sources, however, paint a dire picture. Thus, around the time when the civil war ended, maternal mortality was estimated at 1·7 deaths per 100 live births and 1 in 4 children died before reaching age five (UNICEF, 2000; Population Reference Bureau, 2005). Angola's fertility remains high and is estimated at 6·8 children per woman – higher than in most countries of sub-Saharan Africa. Contraceptive use of any form is estimated at 6% among women aged 15–49 (Population Reference Bureau, 2007).

Data and Methods

Data

Data are from a survey conducted in 2004 in two peri-urban municipalities (*municípios*) of Greater Luanda. One of the municipalities, Samba, is located closer to the city core and was known to contain a relatively small share of forced, i.e. war, migrants. The other municipality, Viana, is a more distant and less-urbanized suburb of the city and was known to have a larger share of war migrants. Both municipalities, like other parts of Luanda, also contain a sizeable population of voluntary, i.e. non-war, migrants. The survey sample of 1081, made up of men aged 15–59 and women aged 15–49, was almost evenly split between Samba and Viana. In each municipality, the sample was drawn separately in each *bairro* (an administrative sub-division of *município*) with a *bairro* sample size proportional to each *bairro's* estimated population size. Households within each *bairro* were chosen using a random walk algorithm. In each chosen household, one resident of eligible age, alternately a man or a woman, was randomly selected for interview. The survey had a less than 5% non-response rate, most of which was due to unavailability of selected individuals rather than their refusal to be interviewed.

The survey was administered in Portuguese by an interviewer of corresponding gender. Portuguese, the official language of Angola, is the dominant linguistic medium in Luanda, even among residents for whom it is not a mother tongue. Most survey respondents had no difficulties answering the survey questions in that language. In the few instances when respondents were not sufficiently proficient in Portuguese, the interviewers with appropriate language skills or interpreters were used. The survey collected information on complete birth histories (month and year of each birth), current socioeconomic characteristics, and marital and sexual partnerships. Detailed migration history was also collected: respondents who had migrated to Luanda were asked about up to two localities of previous residence and the timing of migration from those localities. Notably, almost all respondents who ever migrated did so only once. Migrant respondents were also asked to name reasons why they had left localities of previous residence: their responses were then classified by the interviewers into one or several of six possible categories (war-related, economic, family, education, health, or other).

Statistical model

Probability of birth in a given year. To examine the impact of war or non-war migration on the probability of birth in a given year, with the retrospective data at hand, an event history approach is used. The dependent variable in this analysis is the probability of giving birth (having birth by a marital partner, for men) in a year since age fifteen. Age fifteen was selected due to the prevalence of early childbearing in Angolan society. Very few respondents had births before age fifteen, and these respondents were excluded from the analysis. Respondents were thus at risk from their fifteenth birthdays until they were censored at the time of interview (this implies that a respondent is *not* censored after experiencing the first birth but continues to contribute observations to the dataset until the year of interview).

The main predictor of interest in the analysis is whether or not migration occurred in a given year after the respondent's fifteenth birthday. This predictor is operationalized as a set of dummy variables capturing both the fact of and the reason for migration: (1) Did not migrate in a given year (1 if did not migrate, 0 if migrated for any reason); (2) migrated in a given year because of war (1 if yes, 0 if not); and (3) migrated in a given year for war-unrelated reasons (1 if yes, 0 if not). A respondent is classified as migrating because of war if she/he stated war as a reason for migration (regardless of other reasons also stated). If war was not mentioned in response to the question on reasons for migration, then migration is considered war-unrelated. In all, 125 respondents came to Luanda for war-unrelated reasons, such as employment, education and family reunification, while 176 respondents named war as a reason for their migration. In the person-year file that was created, each of these 301 respondents has as many observations as there are years between the year she/he turned fifteen and the survey year.

The statistical models control for age, which is parameterized as quadratic, to account for the age pattern of fertility varying from low to high and then to low again, as individuals progress through their reproductive span (this pattern is most typical of women but is largely applicable to men as well). The models control for gender as a time-invariant covariate. Marital status is also controlled for as a time-varying dichotomous indicator of whether or not a respondent was married or living together with a (wo)man in any given year. Another time-varying control is cumulative fertility, which is operationalized as the number of children ever born to the respondent by the beginning of a given year. Whether a respondent had a birth in the previous year is also controlled for. Education is coded into three categories: (1) up to four years of schooling; (2) between five and eight years of schooling; and (3) more than eight years of schooling. Education is assumed to be time-invariant: the respondents are assigned to an educational category based on their schooling level reported at the time of the survey. Due to concerns of causal ordering, other current socioeconomic variables are not included as controls. Finally, the intensity of civil war is controlled for. This is a dichotomous indicator that takes the value of 1 in years that saw particularly intense hostilities (1993, 1994, 1999, 2000 and 2001) and 0 in years when the intensity of fighting declined.

Discrete-time hazard models are estimated using logistic regression. Although there is information on year and month of birth, the migration data are only available for years; the unit of analysis is therefore person-year. To control for within-person clustering of births and to protect against deflated standard errors and potentially biased hypotheses test, random effects models are fitted, which allow the intercept to vary randomly by individual (Barber *et al.*, 2000). These models are fitted using the XTLOGIT procedure in STATA. The resulting discrete-time logistic model can thus be specified in the following form:

$$\text{In } (P_{jt}/1-P_{jt})=\beta_{0j}+\beta_1 X_{jt}+\beta_2 z_j+\beta_3 T_{jt}\,, \qquad (1)$$

where P_{jt} is the probability of having a birth for individual j in year t, β_{0j} is the intercept that varies randomly across individuals, β_1, β_2, β_3 are vectors of coefficients, X_{jt} is a vector of time-varying covariates, z_j is a vector of time-invariant covariates and T_{jt} is a specification for the baseline hazard of birth.

First, a baseline model of the probability of a birth in a given year is examined, which includes migration as the sole predictor (besides the baseline hazard parameterized as both linear and quadratic). Then a full model is fitted that includes all the other covariates described above. The same exercise is repeated by lagging the effects of migration by one year.

Lifetime fertility. The models on lifetime fertility use data on the number of children ever born to each respondent. Since this is a count variable with a non-normal distribution, it is preferable to use a count data model rather than ordinary least squares. The Poisson estimation would be a typical candidate for such a model. However, because of evidence of overdispersion in the data (i.e. the conditional variance exceeds the conditional mean), which violates a key assumption of Poisson distribution, a negative binomial regression model is fitted. The negative binomial regression model is a generalized form of the Poisson model and includes a disturbance term, which accounts for overdispersion (Allison, 1999). The model can thus be specified in the following form:

$$\text{Log } (\lambda_i)=\beta_0+\beta_i X_i+\sigma\varepsilon_i\,, \qquad (2)$$

where log (λ_i) is the log of the expected value of the number of children ever born, with a Poisson distribution, for individual i, conditional on a standard gamma distribution ε_i. X_i is a vector of predictors, β_0 is the intercept, β_i is a vector of regression coefficients, and $\sigma\varepsilon_i$ is the error term.

As in the test of the probability of birth, two models are fitted using the GENMOD procedure in SAS: a baseline model that includes lifetime migration status as the only predictor and a full model that controls for individual and socioeconomic status indicators derived from current characteristics reported in the survey. Migration status is operationalized as three dummy variables: (1) non-migrants, i.e. those who were born in Luanda, those who came to the city before 1992 (i.e. before post-election hostilities flared up) and those who moved to the city before age six, regardless of year of the move; (2) war migrants, i.e. those respondents who moved

https://doi.org/10.1017/S0021932007002702 Published online by Cambridge University Press

to Luanda since 1992 and at age six or older for reasons directly linked to war; and (3) non-war migrants, i.e. those who came to Luanda since 1992 and at age six or older for reasons directly unrelated to war. The controls include: age (linear and squared), gender, education, marital status (currently married or not), current employment status (whether or not respondent works outside the home), and electricity (household has electricity from grid or generator). Municipality of residence is also controlled for, i.e. Samba vs Viana. Table 1 summarizes the distributions of these variables by migration status and gender.

By the study design, the sample is evenly distributed between Samba, the more urbanized municipality of Luanda, and Viana, the less urbanized one. Due to already noted differences between the two municipalities, Viana had a larger share of war migrants, but even in Samba the size of that group was substantial. The distribution of non-war migrants between the two municipalities was the opposite: a much larger share of non-war migrants lived in Samba than in Viana. Both municipalities had a large number of non-migrants, even though slightly more of them resided in Samba. The mean age of the total sample was about 28 years. War migrants were the oldest on average (29·7 years) and non-war migrants were the youngest (25·3 years). Similarly, war migrants had the largest average number of children ever born (2·8) and non-war migrants the smallest average number of children ever born (1·7). Also paralleling age differences, war migrants had the largest share of those who were married or living with a marital partner at the time of the survey, while non-war migrants had the smallest share. Electricity (from a grid, generator or both) is used here as a proxy for household material well-being; war migrants had the smallest share of those who had electricity in their residences, whereas non-migrants had the largest share of those with electricity at home. Not surprisingly, war migrants, both men and women, were the least educated and non-migrants were the best educated. Yet interestingly, war-migrant men and women were much more likely to work outside the home than were their counterparts from the other two groups.

Results

Migration and probability of birth

Section A of Table 2 summarizes the results of the model predicting the effects of migrating for war-related reasons, migrating for war-unrelated reasons, and not migrating in any given year on the odds of birth in that year. The results are presented as odds ratios, exponentiated from the log-odds of the logistic regression model. An odds ratio greater than unity represents a positive effect on the probability of birth, relative to the reference category (not migrating, in the case of the main predictor), whilst an odds ratio of less than unity indicates a negative effect on the probability of birth.

Model 1 (the baseline model) displays the main effects of the variables of interest – whether or not war or non-war migration occurred in a given year and the baseline hazard. The baseline model shows no significant effect of migration on the probability of birth. The effect of war migration relative to not migrating tends to be positive but is not statistically significant; the effect of non-war migration is negative but is not

Table 1. Sociodemographic profile of respondents by gender and migration status (percentages unless noted otherwise)

	War migrants			Non-war migrants			Non migrants			
	Women	Men	All	Women	Men	All	Women	Men	All	All
Municipality										
Samba	24·2	34·7	30·0	64·5	56·8	60·8	55·7	56·0	55·8	50·8
Viana	75·8	65·3	70·0	35·5	43·2	39·2	44·3	44·1	44·2	49·2
Age (mean)	28·0	31·0	29·7	24·4	26·3	25·3	26·4	29·4	27·9	27·8
Children ever born (mean)	3·2	2·3	2·8	1·7	1·8	1·7	2·3	2·2	2·2	2·2
Currently married/living with a partner	65·7	66·9	66·4	60·2	48·9	54·7	57·6	53·6	55·5	57·5
Education										
4 years or less	60·4	16·9	35·9	32·6	10·5	21·9	26·1	9·6	17·7	22·4
5–8 years	27·1	62·1	46·8	46·7	67·4	56·7	47·2	52·4	49·9	50·4
9 years or more	12·5	21·0	17·3	20·7	22·1	21·4	26·7	38·0	32·5	27·2
Household has electricity supply	54·6	52·0	53·2	60·2	58·0	59·1	68·7	65·5	67·1	63·0
Currently works outside home	70·7	89·5	81·2	45·2	77·7	60·7	50·8	76·2	63·7	66·9
Number of cases	99	124	223	93	88	181	323	336	659	1063[a]
Percentage in sample	9·2	11·5	20·6	8·6	8·1	16·7	29·9	31·1	61·0	100[a]

[a]Eighteen cases with missing cases excluded.

Table 2. Odds ratios and standard errors for discrete-time hazard models of the effects of migrating in current or preceding year on the probability of birth

	A. Migration in current year		B. Migration in preceding year	
	Model 1	Model 2	Model 1	Model 2
Migration				
Non-war migration	0·704 (0·297)	0·674 (0·317)	0·729 (0·286)	0·823 (0·307)
War migration	1·300 (0·197)	1·398 (0·223)	1·629 (0·189)**	1·784 (0·205)**
Not migrating (Ref.)				
Age (years)	1·477 (0·036)**	1·245 (0·041)**	1·477 (0·036)	1·248 (0·041)**
Age^2	0·994 (0·001)**	0·994 (0·001)**	0·994 (0·001)	0·994 (0·001)**
Gender				
Woman		0·796 (0·118)		0·793 (0·118)*
Man (Ref.)				
Marital status				
Married		3·359 (0·123)**		3·349 (0·123)**
Not married (Ref.)				
Children ever born		1·856 (0·040)**		1·853 (0·040)**
Birth in previous year		0·202 (0·133)**		0·204 (0·133)**
Education				
4 years or less (Ref.)				
5–8 years		1·019 (0·122)		1·015 (0·122)
9 years or more		0·869 (0·165)		0·866 (0·165)
Intensity of war				
High intensity		0·867 (0·105)		0·879 (0·104)
Low intensity (Ref.)				
Intercept	0·001 (0·490)	0·012 (0·552)**	0·001 (0·491)	0·012 (0·553)**
Variance (ρ)	0·062	0·036	0·062	0·036
Log-likelihood	− 2232·85	− 1859·733	− 2230·7	− 1857·695
Person-years	4906	4906	4906	4906

Significance level: **$p<0·01$; *$p<0·05$.
Ref., reference category.

statistically significant either. To test the difference between the effects of migrating due to war relative to migrating due to war-unrelated reasons, the reference categories are switched. The odds of having a birth in a given year, among those who migrated for war reasons, are nearly double the odds among those migrating for non-war reasons, but this difference is marginally significant ($p<0·1$) (not shown in Table 2). The addition of controls (Model 2) does not alter the pattern of relationships across migration categories. The difference between the two types of migration (war and non-war) also becomes smaller but maintains marginal statistical significance at $p<0·1$ (not shown in Table 2). Assessement of overall model fit, using the log-likelihood and Wald test, shows that Model 2 is a better fit to the data than Model 1 ($p<0·01$).

The same tests are now replicated for whether migration occurred in the preceding year (section B of Table 2). The baseline model shows the pattern of association is

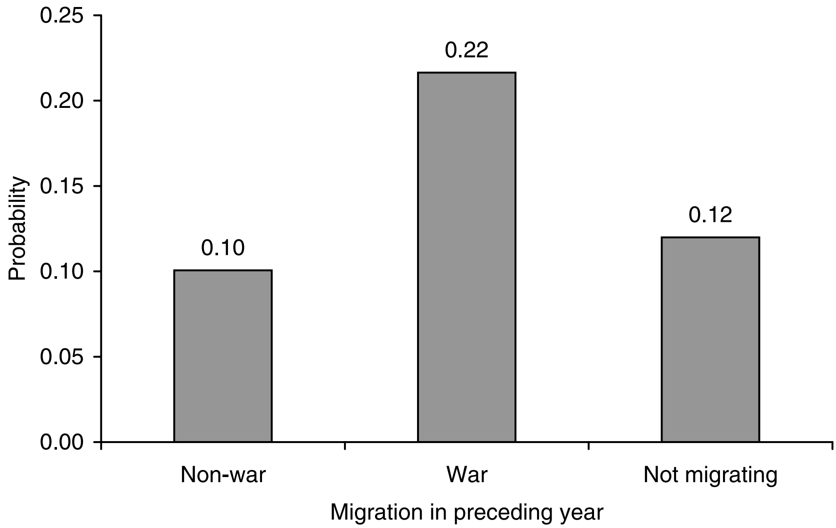

Fig 1. Predicted probability of birth in any given year.

the same as in the previous test, but the increase in the odds of birth associated with war migration, relative to not migrating in a given year, is much larger and highly significant ($p<0{\cdot}01$). In the full model, the gap between non-migrants and war migrants looms unabated (and, in fact, becomes a bit wider) and is statistically significant ($p<0{\cdot}01$). At the same time, the difference between migrating for non-war reasons and not migrating is not statistically significant even in the baseline model. Also, the difference between war and non-war migration remains strong and statistically significant ($p<0{\cdot}05$), even after the addition of controls (not shown). In sum, the two specifications presented in sections A and B produce similar patterns, but lagging the effect of migration results in stronger associations between non-migration and war migration and war migration and non-war migration and a slightly better fit of the model. Lastly, the specification of random effects to account for within-person clustering of births did not contribute much to the total proportion of variance explained by the models ($\rho=0{\cdot}036$ in Model 2 of section A and B).

The predicted probabilities of birth corresponding to the full model with the lagged effect of migration are depicted in Fig. 1. The figure shows a higher probability of birth in any year after war-related migration in the preceding year, compared with non-war migration and not migrating in a given year. It is important to note that this graph should be interpreted in conjunction with the statistical significance of the odds ratios reported in section B of Table 2.

Lifetime fertility

Table 3 summarizes the results of negative binomial regression of the total number of children born to respondents in their entire lives. The baseline model replicates the pattern of the mean number of children ever born reported in Table 1, showing a statistically significant effect of migration status on lifetime fertility. Non-war

Table 3. Negative binomial regression of lifetime birth (regression coefficients and standard errors)

	Model 1	Model 2
Migration		
Non-war migrant	−0·233 (0·097)**	−0·047 (0·050)
War migrant	0·225 (0·084)**	0·016 (0·036)
Non-migrant (Ref.)		
Age (years)		0·252 (0·015)**
Age^2		−0·003 (0·002)**
Gender		
Woman		0·166 (0·037)**
Man (Ref.)		
Marital status		
Married		0·679 (0·060)**
Not married (Ref.)		
Education		
4 years or less (Ref.)		
5–8 years		−0·164 (0·037)**
9 years or more		−0·274 (0·049)**
Employment		
Currently works outside home		0·014 (0·043)
Does not work outside home (Ref.)		
Electricity supply to household		
Has electricity		−0·074 (0·032)
Has no electricity (Ref.)		
Municipality of residence		
Samba (most urbanized)		−0·074 (0·032)*
Viana (less urbanized) (Ref.)		
Intercept	0·787 (0·043)**	−4·525 (0·249)**
Deviance	1253·96	1112·98
df	1079	1055

Significance level: **$p<0{\cdot}01$; *$p<0{\cdot}05$.
Ref., reference category.

migrants tend to have significantly fewer lifetime births than non-migrants, whereas war migrants tend to have significantly more lifetime births than non-migrants. By extension, the gap is even larger between war migrants and non-war migrants. However, when covariates are added (Model 2) the differences among the three migration categories disappear. An exploration of these mediating effects suggests that the difference between non-migrants and non-war migrants is due largely to age differences between these groups. While age also accounts for much of the excess of cumulative fertility among war migrants, it is the addition of education to the model that effaces any traces of statistically significant differences between the two groups.

In addition to age and education, gender, marital status and municipality of residence significantly influence lifetime fertility, whereas electricity at home and employment do not. It should be remembered, however, that most of these covariates are derived from respondents' characteristics at the time of the survey and therefore their predictive power should be interpreted with caution. Finally, the models show a reasonable good fit to the data; this is indicated by the ratio of the deviance to the degrees of freedom, which should be about one. Model 1 indicates a ratio of 1·16, while Model 2 shows a ratio of 1·05; since these values are only marginally above unity, it can be concluded that the negative binomial models are correctly specified (Cameron & Trivedi, 1998).

Conclusion

In times of protracted civil conflict such as the one that prevailed in Angola for most of its independent existence, the processes and motives of migration may differ. At the same time, the causes and circumstances of exit from places of origin may affect migrants' adjustments in places of destination. This study drew from two bodies of literature and their corresponding theoretical repertoires – that of war and fertility and that of migration and fertility – to test differences in probabilities of birth and in lifetime fertility across types of migration experience and to interpret these differences in the light of selection, disruption and adaptation mechanisms.

With respect to probability of birth, a significant difference between war and non-war migrants was expected. Indeed, it was found that net of other factors, war migration was associated with a higher probability of birth than non-war migration, but also that the difference between the effects of the two migration types was particularly pronounced when these effects were lagged by a year. Similarly, in congruence with expectations, it was found that the probability of birth in a given year increased significantly if a war-related migration move took place a year earlier, relative to not experiencing any migration. This relationship was in the same direction but was not statistically significant for migration in the same year. At the same time, non-migrants and non-war migrants were not statistically different from each other in the likelihood of having birth, regardless of the specification of the time of migration.

Combined, these findings fit within the debate about the relationship between migration and fertility. Thus, the lack of difference between the effects of migrating for war-unrelated reasons and not migrating lends support to the selection assumption: non-war (i.e. voluntary) migrants are a self-select group that may be similar in many socioeconomic characteristics and in reproductive aspirations and behaviours to the population of migration destinations. At the same time, they may be better prepared to cope with the uncertainties associated with war. The differences between the effects of migrating for war reasons and not migrating and between migrating for war reasons and migrating for war-unrelated reasons support the assumption that war migration is much less selective on individual characteristics and entails much less planning than non-war migration. Although the unique nature of this sample – urban dwellers with different past migration trajectories – calls for caution in the

https://doi.org/10.1017/S0021932007002702 Published online by Cambridge University Press

interpretations of these findings, the control for educational background in the statistical test and the comparisons across all three types of migration experiences in the same model, instills confidence in these findings.

The findings on the effects of migration status on lifetime fertility further stress the contrasts among the three migration-status groups. However, they also point to the source of these contrasts. The difference between non-migrants and non-war migrants was almost entirely due to age (i.e. was largely biological in nature); the excess of lifetime fertility of war migrants over that of non-migrants was largely caused by educational differences. More broadly, these findings, again, illustrate the socioeconomic differences between the two types of migration and the enduring effects of these differences on fertility outcomes. They also hint at adaptation mechanisms. It is plausible that incentives and pressures of the urban environment such as educational and employment opportunities eventually induce war migrants to reduce their fertility to levels prevalent in their new environment. Yet the findings also illustrate that such adaptation may take more time among war migrants than among non-war migrants, mainly because of the educational and related socioeconomic and sociocultural disadvantages of the former. Overall, these findings are consistent with findings of previous studies that looked at the relationship between migration and fertility, mainly in peace time (Goldstein & Goldstein, 1981; Levine & Price, 1996; Lindstrom & Saucedo, 2002; Chattopadhyay *et al.*, 2006). Yet they also highlight the distinctive nature and consequences of war migration and, therefore, stress the importance for policy-makers to heed reproductive health constraints and needs of war migrants at places of destination, as these unique needs and constraints may endure for a long time after migration.

This study's sample was limited to a part of Luanda's population, and therefore any generalizations of the findings to other post-war settings should be made with prudence. Similarly, the cross-sectional nature of the data does not allow selection mechanisms at areas of migration origin to be directly accounted for. Consequently, little is known about how war and non-war migrants were different before migration. Another important limitation of the data is the lack of retrospective socioeconomic status indicators. Lastly, a more complete analysis of fertility response to war and social upheavals would be aided by retrospective measures of proximate determinants of fertility, such as involuntary abstinence due to temporary separation, with its effects of inhibiting fertility or exposure to intercourse outside unions (either through coercion or commercial sex), with increased risks of extramarital childbearing. Similarly, measures of postpartum amenorrhoea, due to prolonged or curtailed breast-feeding during war, could help clarify fertility differences between migration groups. The absence of such measures hindered the full interpretation of the patterns observed in the analysis.

Nonetheless, this study makes an important contribution to the literature, as it bridges the analysis of interconnections between migration and fertility behaviour with that of interconnections between migration directly triggered by war and migration in which war does not play any significant role. Future studies should heed these important complexities and interconnections if they are to produce adequate and nuanced assessments of demographic consequences and implications of migration.

Acknowledgment

This study was partially supported by the NIH/NICHD(USA) Grant No. R12HD048257.

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