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# COMMUNITY EDUCATION AND DIFFERENTIAL FERTILITY IN PERU

**Marta Tienda**
*University of Wisconsin, Madison, Wisconsin, U.S.A.*

**Violeta Gonzalez Diaz**
*United Nations, New York, New York, U.S.A.*

and

**Shelley A. Smith**
*University of Wisconsin, Madison, Wisconsin, U.S.A.*

*Abstract* — This paper investigates how community characteristics moderate the influence of individual characteristics on completed fertility in Peru. Although the median community education level did not condition the influence of women's education on completed fertility as hypothesized, this contextual variable exerted a significant negative effect on fertility. Thus, the social climate in which women make decisions about family formation does affect reproductive behaviour above and beyond what one would predict on the basis of individual characteristics alone; but it operates to set boundaries on the range of feasible alternatives rather than to amplify the influence of individual characteristics. We explore the policy implications of this finding.

*Key Words* — **education, community characteristics, completed fertility, Peru**

While the relationship between education and fertility is perhaps the most studied among the numerous socioeconomic correlates of human reproduction, it is one whose interpretation remains problematic (Cochrane, 1979). Policymakers observe with great interest the aggregate relationship between levels of education and birth rates, yet empirical evidence indicates that inverse relationships are less likely to be observed in developing countries (Cochrane, 1979; Friedlander and Silver, 1967; Tsui and Bogue, 1978) and that there exist notable variations in the magnitude – and sometimes the direction – of the relationship within and among developing nations.

Inconsistencies in the evidence regarding the relationship between education and fertility could stem from a failure to consider how community characteristics filter individual-level relationships. For example, Freedman (1974) hypothesized that poorly educated women living in a well-educated community may have lower fertility than is average for their education class because they interact among women who value small families. Simmons and Noordham (1977) have shown that women's education exerts its strongest impact on their contraceptive behaviour in places with a high level of educational attainment. Community isolation – or, rather, the lack of integration in the national economic structure – may also restrict the link between education and fertility by reducing economic mobility (Anker, 1977) and reducing the flow of information about the advantages and means of limiting family size (Shedlin and Hollerback Hass, 1976).

If the social and economic characteristics of an area do influence the degree to which women perceive, approve and achieve small family goals (Goldberg, 1976; Holmstron, 1973; Rosen and LaRaia, 1972), then community characteristics which define a normative environment may amplify or constrain the microrelationship between education and fertility. Therefore, we will investigate whether the community of residence moderates the influence of women's educational attainment on fertility either by setting bounds on the alternatives to childbearing, or by conditioning the patterns of relationship (interaction) between education and fertility (Glassman and Ross, 1978). Peru is an excellent case study for the investigation of community effects because of the pronounced intranational socioeconomic differentiation that is maintained by sharp physical and cultural barriers (see Paulston, 1971). For this analysis, we use community median education level as a proxy for the normative context that sets boundaries for modern or traditional childbearing patterns.

By specifying the individual and community-level determinants of

fertility, the following section sets forth the theoretical framework for the empirical analysis. In the data and methods section, we outline the procedures for the analysis.

## *Theoretical Considerations*

Following the work of Davis and Blake (1956) and Bongaarts (1978), we depict fertility as a function of an array of sociocultural variables and as a set of proximate variables which mediate the effects of the former. Table 1 summarizes the variables used in the empirical analysis, along with their operational definitions. Because the theoretical justification for the proximate determinants is well documented (Bongaarts, 1978), we focus our attention on the sociocultural and community level variables.

### Sociocultural Determinants of Fertility

The social and cultural variables that we hypothesize influence Peruvian fertility include occupational position of the spouse, women's educational attainment, migrant status, ethnicity and age at first marriage. Although there is consensus that the observed negative effect of education on fertility operates largely through intermediate variables, there exist various substantive interpretations of the mechanisms that produce the inverse relationship. Several analysts argue that education influences fertility indirectly by affecting women's employment aspirations and opportunities, their perception of the economic utility of children, their access to other sources of information, their awareness of and willingness to use modern contraceptives, their desire to postpone childbearing until after schooling is completed, and the degree of equality in conjugal relationships (See discussions in Cochrane, 1979; Conger and Campbell, 1978; Friedlander and Silver, 1967; Harrison, 1981; Kasarda, 1979; Wolfe, 1977).

Kasarda (1979) posited direct negative effects of education on fertility, arguing that education portrays a woman's sense of self-efficacy in determining her life course and, in particular, her development of positive feelings about herself and her abilities. From his perspective, the effects of education represent the outcome of a socialization experience that guides the formation of values and aspirations about family forma-

## TABLE 1. SOCIOCULTURAL, DEMOGRAPHIC AND COMMUNITY LEVEL DETERMINANTS OF COMPLETED FERTILITY IN PERU: SUMMARY OF VARIABLES AND THEIR OPERATIONAL SPECIFICATION

| | |
|---|---|
| Fertility | |
| Completed | Children ever born to ever-married women aged 40-49 |
| Intercourse Influencing Factors | |
| Duration of marriage<br>< 5 years<br>5-9 years<br>10-19<br>20+ | Categorial variable indicating years since first marriage |
| Currently married | Dummy variable, coded 1 if married or in consensual union at time of survey |
| Conception Influencing Factors | Categorical variable indicating ever use contraception by level of reliability |
| If ever used contraception<br>yes, efficient methods<br>yes, inefficient methods<br>no, never used | |
| Sociocultural Factors | |
| Woman's education<br>none<br>some primary<br>completed primary<br>some secondary<br>secondary completed or more | Categorical variable indicating years of schooling |
| Migrant status | Dummy variable coded 1 if ever migrated |
| Spanish spoken | Dummy variable coded 1 if respondent was interviewed in Spanish |
| Husband's occupation<br>Independent farmer<br>Unskilled laborers<br>Semi-skilled or unskilled workers<br>Skilled or semi-skilled production workers<br>Professionals and technicians | Categorical variable |
| Age at first marriage | Age at entry into first union coded in 5-year groups |
| Community Characteristics | |
| Median education | Median education of all individual 15+ years residing in a primary sampling unit |

tion. Higher educational attainment undoubtedly expands women's access to information about alternative life choices, broadening their horizons and raising their aspirations for themselves and their children. Moreover, formal schooling increases women's awareness of family planning, and increases the likelihood of their using contraception to regulate their fertility. Thus, while the effects of education that represent an increased sense of self-efficacy could be viewed as more direct than most effects of education, we believe that it operates largely as an indirect effect – one mediated by the proximate variables that often are only imprecisely measured.

One further complexity of the education-fertility relationship concerns the pattern of association. Although most specifications depict education as linearly related to fertility, Miro and Mertens (1968) argue that in Latin America the general relationship is not monotonic. They illustrate that completion of primary school produces the largest reduction in fertility, while the negative effects produced by the attainment of secondary and post-secondary education are less pronounced. Fernando (1977) generated similar results for Sri Lanka, and Ketkar (1978) did so for Sierra Leone. Our preliminary analyses also suggested the existence of educational thresholds that were associated with large reductions in fertility. Because the average educational levels of Peruvian women are quite low, the first major threshold should be completion of primary school. As the median educational attainment of the female population rises, completion of secondary school could conceivably become more important. To evaluate this possibility, we introduce education as a categorical variable with cutpoints representing educational thresholds.

Husband's occupation, which depicts the social status of the family, should reveal how reproductive behaviour varies as a function of social position. Past studies have shown that wives of professional and technical workers have lower fertility than wives of semi-skilled and skilled production workers, other factors being equal. Women in the former group are more likely to hold full-time professional or semi-professional jobs themselves, which potentially compete with domestic responsibilities. Alternatively, women whose husbands are employed as farm managers or independent farmers should have the highest fertility. This prediction is consistent with the notion suggesting the greater economic value of children in rural environments (Tienda, 1979).

Although ethnic variation in reproductive behaviour largely reflects socioeconomic differences, ethnicity could be associated with fertility variations that cannot be attributed to social and demographic

characteristics. Group membership could portray varying norms about reproductive behaviour resulting from differences in exposure to outside influences, views about family formation, and marriage patterns (Anker, 1977; Davis and Blake, 1956). As a proxy for ethnic group membership, we use language of interview, which distinguishes speakers of Spanish from those who only speak an indigenous language. This distinction, while crude, captures the major dimension of ethnic differentiation in Peru. The non-Spanish speakers are the most traditional and ethnically distinct individuals vis-à-vis those who have adopted the Spanish language and other forms of the *mestizo* culture.

Specification of the relationship between migration and fertility is complex because there exist competing explanations regarding the ways in which geographic movement alters fertility attitudes and behaviour. The selection and adaptation perspectives of the relationship between migration and fertility (see Goldstein and Goldstein, 1981) differ from each other in that one perceives fertility differentials to have existed before migration occurred (selectivity), while the other posits that these differentials arise in response to the clash with a new set of fertility norms in the place of destination (adaptation). A third explanation of the lower fertility of migrant women is that the process of migration directly disrupts the family formation process via postponement of childbearing, and this postponement inevitably reduces completed family size. Although our data do not permit us to adjudicate between these competing explanations, we can determine whether there exist any significant differences in the fertility behaviour between migrant and nonmigrant women. This is especially important in light of the extensive internal migration in Peru since 1940.

We treat age at first marriage, which includes as married those involved in consensual union, as an intermediate determinant of fertility which is shaped by strong social and cultural norms. Although it would appear unnecessary to consider the effects of age at first marriage on fertility once age and exposure have been taken into account, there are compelling theoretical reasons for doing so. These have to do with the way entry into marriage signals a major life transition that activates a set of expectations about family formation and familial roles. In Peru, the timing of marriage is important because of the rapid tempo of childbearing during early marriage (INP, 1979). Thus, women who enter marriage later in life may feel a sense of urgency to begin their family formation and make up for time lost through marriage delay. This would be reflected as higher age-specific fertility rates for the recently married.

However, later entry into marriage necessarily shortens the period required for achieving a desired family size, so the expected effect of age at first marriage on completed fertility should be negative.

## Community Characteristics

Because there exists considerable variation in the magnitude of the effects of graded schooling on fertility (Cochrane, 1979), a growing number of scholars have suggested that the social arrangements which define a range of opportunities and boundaries within which couples make decisions about family formation may constrain its influence (Anker, 1977; Cain, 1981; Caldwell, 1981; Caldwell and Caldwell, 1978; Lesthaeghe, 1980; McNicoll, 1980; Simmons and Noordham, 1977; Stycos, 1978). In her extensive review of research concerning education and fertility, Cochrane (1979) identified several studies which demonstrated that the micro-level relationship between education and fertility depends upon the levels of education and socioeconomic development achieved by communities. Moreover, her review of the empirical literature suggests that the large decrease in fertility associated with higher levels of education diminishes as the overall level of development increases. This suggests that the pattern of relationship between education and fertility may depend upon (and/or interact with) the educational context in which it emerges.

We evaluate the influence of one community variable which we and others hypothesize to affect reproductive behaviour in Peru. In identifying community educational levels as a condition for demographic innovation, we intend to convey the extent to which communities are relatively closed to or open to new ideas or, more generally, the circumstances defining the diffusion of information and subsequent breakdown of traditional modes of reproduction. Caldwell (1980) claims that mass education reduces the extent of family authority over younger generations by eroding traditional authority structures and by raising the cost of children, thereby modifying the transfer of wealth flows (Caldwell, 1976). In Peru, a community's level of education also seems to be an important determinant of individual women's knowledge of contraception, even after controlling for individuals' formal schooling (Simmons and Noordham, 1977).

In sum, the median educational level of communities indicates the relative openness of residents to new ideas and, more specifically,

whether a social environment is conducive to demographic innovation. It is conceivable, therefore, that the educational composition of a community could modify the individual-level relationship between education and fertility because the changing institutional arrangements made possible by rising community education levels facilitate greater tolerance for changed modes of reproductive behaviour and initiate demonstration effects for high fertility women (Caldwell, 1980). These circumstances could either amplify or diminish the effects of women's educational attainment on fertility, or simply produce an additional decrease in completed family size, above and beyond the effects of women's socioeconomic characteristics. The former effect would be detected through a significant interaction between women's education and the community education level, whereas the latter would be depicted by a significant additive effect of the community education level.

## *Data and Methods*

We base our empirical analyses on the National Fertility Survey of Peru (ENAF-PERU) which was conducted between 1977 and 1978 as part of the World Fertility Survey (WFS). When properly weighted, the sample represents all populated rural and urban areas that contain housing units (INP, 1979). Two of the three natural region subsamples — the coast and highland regions — are self-weighting. The sampling fraction for the sparsely settled jungle region was increased by a factor of four to permit disaggregated analyses by natural region. However, for multivariate analyses at the national level, weighting poses methodological problems which we circumvent by taking a 0.25 random subsample of the jungle region. This procedure produced a self-weighting sample, but reduced our sample size of ever-married women aged 40-49 from 1,285 to 1,269 observations. Parameters generated by our "adjusted" sample are virtually identical to those produced by weighting the coast and highlands subsamples by a factor of four. The advantage of using the reduced sample is that the tests of significance are not distorted by an artificially inflated sample size.

A particular strength of the ENAF-PERU for the proposed investigation is the availability of information about community characteristics in addition to data on children ever born. While the ENAF-PERU survey contains adequate information about the social and economic characteristics of respondents and their spouses, the information about

the proximate determinants of fertility is more limited. Specifically, the measure of contraception is imprecise because this variable does not refer to specific birth intervals. This limitation is not insurmountable, but requires cautious interpretation of results.

Researchers who have recently included global or contextual ecological variables in their analyses of individual fertility provide hints about how to detect ecological effects. Anker (1977) hypothesized group (caste and village membership) and community influences on reproductive behaviour in rural India above and beyond the influences due to individual-level characteristics, and he modeled the effects of ecological variables additively. Using multiple cross tabulations, Simmons and Noordham (1977) demonstrated that in Peru the relationship between contraceptive knowledge and respondent's education depends on the community educational level. Glassman and Ross (1978) examined alternative specifications to determine how the effects of modernization on fertility develop over time, illustrating a methodology to evaluate the functional form of the community variable. However, they conducted an aggregate level analysis using countries as units of analysis, whereas we pursue a multi-level strategy combining individual and community level data.

The core of our analysis involves estimating models to determine whether and how the relationship between education and fertility is affected by the community educational context. We first examine the mean levels of completed fertility according to the education levels of respondents and their communities. This information provides a descriptive background for interpreting the results of a multivariate model predicting completed fertility as a function of intermediate and sociocultural variables, and the contextual education variable. Using an analysis of covariance framework, we evaluate whether the community education level conditions the micro-level relationship between education and fertility in Peru. Procedurally, we designate the community variable as a covariate and compute interaction terms between women's educational attainment and community education level. These contextual measures were computed using all individuals aged 15 and over, so they do not represent mere aggregations of the education of the women in the sample.

*Results*

Table 2 illustrates the predicted inverse relationship between education and fertility in Peru.[1] Peruvian women aged 40-49 bore an average of 6.8 children, and among them, those with no education bore almost eight children. Obtaining some primary schooling reduced completed fertility by approximately 10 per cent, while finishing primary school resulted in an additional 20 per cent drop in completed fertility. Apparently primary school was an important threshold for reducing completed family size among this cohort of women, but its impact was notably lower than that produced by the completion of secondary school. Compared to women who had attended high school, those who graduated bore 1.4 fewer children during their reproductive period. However, relatively few women aged 40-49 at the time of the survey attended secondary school. This situation is much different for younger cohorts.

The lower panel of Table 2 shows the average completed fertility levels corresponding to communities with low, moderate and high educational attainment levels.[2] It appears that post-primary school training is required to alter the social props supporting high fertility in Peru. Women residing in communities where the average resident had completed seven or more years of formal schooling bore two fewer children than women of comparable marriage durations who resided in communities with lower educational thresholds. A comparison of the bivariate relationships between education and fertility at the individual and community level suggests a general consistency in direction, but not in magnitude.

One might infer that individual modernity – representing a person's mental flexibility in dealing with new situations – is less difficult to achieve than social modernity, which involves the collective replacement of old values (for example, large families) with new ones (for example, small families). Such an explanation would be consistent with the evidence shown in Table 2. Although the behavioural linkages represented by the individual-level relationships are more direct and hence stronger than those involving community characteristics and individual fertility outcomes, the emergence of an inverse education-fertility relationship for the contextual measure suggests that the normative context in which childbearing takes place does influence completed family size. Whether this effect persists above and beyond what

TABLE 2. EDUCATION AND COMPLETED FERTILITY[a] BY RESPONDENT'S EDUCATIONAL ATTAINMENT AND COMMUNITY EDUCATION LEVELS, PERU, 1977-1978

| | Completed Fertility |
|---|---|
| Respondent's Educational Level | |
| No schooling | 7.85 |
| Some Primary School | 7.11 |
| Completed Primary School | 5.93 |
| Some Secondary School | 5.25 |
| Completed Secondary School or More | 3.83 |
| Community Educational Level | |
| Low ( < 2.0 years) | 7.48 |
| Medium (2.1 to 7.0 years) | 7.50 |
| High (7.1+ years) | 5.46 |
| Overall Mean | 6.78 |
| (N) | (1269) |

[a] Adjusted for duration of marriage.

one would predict based on individual characteristics is an empirical question we explore more rigourously in the following section.

## Multivariate Analysis

The means and standard deviations of the individual-level variables included in the regression analysis (Table 3) deserve a brief comment before presenting the analysis of covariance. First, notice that the average educational attainment of ever-married Peruvian women (aged 40-49) who are near, or have reached, the end of their reproductive cycle is very low. Roughly 40 per cent of the women in our sample did not even attend primary school, and an additional 30 per cent did not complete six

## TABLE 3. MEANS AND STANDARD DEVIATIONS FOR VARIABLES INCLUDED IN ANALYSIS OF COMPLETED FERTILITY, PERU 1977-78

| Variables | MEAN | STD. DEVIATION |
|---|---|---|
| **Intercourse Influencing Factors** | | |
| Duration of Marriage[a] | | |
| 5 years | .007 | .084 |
| 5-9 years | .014 | .118 |
| 10-19 years | .169 | .375 |
| Currently Married[b] | .855 | .352 |
| **Conception Influencing Factors** | | |
| Contraception[c] | | |
| Efficient | .115 | .319 |
| Inefficient | .372 | .484 |
| **Sociocultural Factors** | | |
| Woman's Education[d] | | |
| None | .396 | .489 |
| Some primary | .303 | .460 |
| Complete primary | .141 | .348 |
| Some secondary | .048 | .214 |
| Migrant Women[e] | .350 | .477 |
| Spanish Spoken[f] | .821 | .383 |
| Husband's Occupation[g] | | |
| Independent farmers/farm managers | .353 | .478 |
| Unskilled laborers/agricultural workers | .180 | .384 |
| Semi-skilled/unskilled workers | .150 | .357 |
| Semi-skilled/skilled production workers | .175 | .380 |
| Age at First Marriage[h] | 3.599 | 1.680 |
| **Community Level Factors** | | |
| Community Education Level[i] | 4.484 | 3.000 |
| (N) | | (1269) |

[a]Reference category: married 20+ years.
[b]Reference category: widowed, divorced, and separated women.
[c]Reference category: never uses contraceptives.
[d]Reference category: completed secondary or more.
[e]Reference category: non-migrant.
[f]Reference category: indigenous language of interview.
[g]Reference category: professionals and technicians.
[h]Coded 1-7 for five year age groups.
[i]Community median educational level.

years of formal education — the minimum level of schooling required to produce a noticeable drop in fertility. Only 11 per cent had completed high school. Although this situation has improved for more recent cohorts, the average education level of the Peruvian population continues to be quite low, as revealed by the mean value of the community education level.

Table 4 presents the results of an analysis of covariance predicting completed fertility as a function of individual demographic and socioeconomic characteristics (model 1). Subsequently we introduced the community education variable as an additive term (model 2) and as an interaction with women's education level (model 3). Because our substantive interest is in the influence of community education levels on fertility, we will not dwell on a detailed interpretation of the individual level results, except to highlight the major findings.

Our results show that the community education variable exerts an independent and statistically significant effect on completed fertility, above and beyond that due to the set of individual socioeconomic and demographic variables, but there is no evidence that the effect of women's education depends upon the community education level. None of the interaction terms introduced in model 3 were statistically significant, nor was the overall increment to $R^2$ resulting from inclusion of the interaction terms significant. On the basis of this information, we selected model 2 as the preferred specification. This model indicates that the partial effect of women's schooling on fertility is uniform across communities with differing education levels.

As predicted, respondents' education depressed completed fertility levels, but the pattern of decline associated with each level appears to be monotonic once the proximate determinants and other sociocultural factors are taken into account.[3] Only slight attenuation of these effects occurs as a result of introducing the community education terms (model 2). Still, one must be cautious about interpreting the negative effect of education as a direct effect. To be sure, formal schooling influences fertility by endowing women with a greater sense of control over their lives and exposing them to a broader range of alternatives upon which to act. Behaviourally, this effect manifests itself through increased contraceptive usage and delayed marriage. The effects of delayed marriage are strong and unattenuated by the contextual education term. However, the range of alternatives to childbearing appears to have been circumscribed by the normative context for reproductive behaviour, as reflected by the negative effect of the community education variable.

## TABLE 4. REGRESSION ANALYSIS OF COMPLETED FERTILITY: EVER-MARRIED WOMEN AGED 40-49, PERU, 1977-1978[a]

(Standard Errors in Parentheses)

| Independent Variables | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| **Intercourse Influencing Factors** | | | | | | |
| Duration of Marriage[b] | | | | | | |
| < 5 years | -4.204 | -.103 | -4.195 | -.103 | -4.142 | -.102 |
| | (.990) | | (.985) | | (.986) | |
| 5-9 years | -1.823 | -.063 | -1.870 | -.065 | -1.913 | -.066 |
| | (.731) | | (.728) | | (.732) | |
| 10-19 years | -.675 | -.074 | -.649 | -.071 | -.640 | -.070 |
| | (.287) | | (.285) | | (.286) | |
| Currently Married[c] | 1.298 | .133 | 1.271 | .131 | 1.274 | .131 |
| | (.229) | | (.228) | | (.229) | |
| **Conception Influencing Factors** | | | | | | |
| Contraception[d] | | | | | | |
| Efficient | .319 | .030 | .391 | .036 | .436 | .041 |
| | (.273) | | (.273) | | (.275) | |
| Inefficient | .313 | .044 | .363 | .051 | .363 | .051 |
| | (.195) | | (.196) | | (.196) | |
| **Socio-cultural Factors** | | | | | | |
| Woman's Education[e] | | | | | | |
| None | 3.053 | .436 | 2.885 | .412 | 2.277 | .325 |
| | (.364) | | (.368) | | (.948) | |
| Some primary | 2.389 | .320 | 2.230 | .299 | 1.862 | .250 |
| | (.342) | | (.343) | | (.948) | |
| Completed primary | 1.629 | .166 | 1.535 | .156 | 1.470 | .149 |
| | (.345) | | (.344) | | (1.099) | |
| Some secondary | 1.028 | .064 | 1.056 | .065 | 2.864 | .180 |
| | (.453) | | (.451) | | (1.520) | |
| Migrant Women[f] | -.792 | -.110 | -.602 | -.084 | -.619 | -.086 |
| | (.185) | | (.196) | | (.202) | |
| Spanish Spoken[g] | .423 | .047 | .400 | .045 | .340 | .038 |
| | (.234) | | (.247) | | (.253) | |
| Husband's Occupation[h] | | | | | | |
| Independent farmers/farm managers | .686 | .096 | .463 | .065 | .479 | .067 |
| | (.328) | | (.336) | | (.338) | |
| Unskilled laborers/agricultural workers | .575 | .065 | .366 | .041 | .343 | .038 |
| | (.344) | | (.347) | | (.348) | |
| Semi-skilled/unskilled workers | .477 | .050 | .398 | .041 | .394 | .041 |
| | (.322) | | (.321) | | (.323) | |
| Semi-skilled/skilled production workers | .203 | .023 | .197 | .022 | .212 | .023 |
| | (.319) | | (.318) | | (.321) | |
| Age at First Marriage[i] | -.587 | -.288 | -.589 | -.288 | -.589 | -.288 |
| | (.067) | | (.066) | | (.067) | |
| **Community Education Levels** | | | | | | |
| Additive Terms | | | | | | |
| Low level[j] | | | .606 | .084 | .120 | .015 |
| | | | (.290) | | (.763) | |
| Medium level[k] | | | .917 | .123 | .557 | .076 |
| | | | (.231) | | (.458) | |
| Interactive Terms | | | | | | |
| Ed threshold * No schooling | | | | | -.004 | -.002 |
| | | | | | (.113) | |
| Ed threshold * Some primary | | | | | -.076 | -.058 |
| | | | | | (.125) | |
| Ed threshold * Completed primary | | | | | -.122 | -.084 |
| | | | | | (.150) | |
| Ed threshold * Some secondary | | | | | -.388 | -.178 |
| | | | | | (.201) | |
| Constant | 2.409 | | 2.056 | | 3.077 | |
| $R^2$ | .323 | | .331 | | .334 | |
| (N) | (1269) | | (1269) | | (1269) | |

[a]Net of the effects of age.
[b]Reference category: married 20+ years.
[c]Reference category: widowed, divorced, and separated women.
[d]Reference category: no current contraceptive use.
[e]Reference category: completed secondary or more.
[f]Reference category: non-migrant.
[g]Reference category: indigenous language of interview.
[h]Reference category: professionals and technicians.
[i]Coded 1-7 for 5 year age groups.
[j]Community median education level <2.0 years.
[k]Community median education level 2.1 years to 7.6 years.

The net effect on completed fertility of the contraception variable was not significant. Partly this resulted because the crude measure precluded precise specification of the timing and use of contraception with respect to the timing of specific conceptions. The gross effect of the use of efficient contraceptive methods was statistically significant and negative; moreover, this effect persisted even after controlling for intercourse-influencing factors, but it was attenuated considerably once the indirect effects of socioeconomic characteristics on fertility were taken into account.[4]

The effects of migrant status on completed fertility were significantly negative in all models, but it is unclear whether this reflects greater selectivity in the place of origin, or is the result of the process of adaptation to an urban setting where large families are more difficult to manage. Although several demographers have shown that internal migration in Latin America is a highly selective process, much of the geographic movement in Peru involves migration of individuals from the relatively underdeveloped highlands region to the more developed coastal strip. Who migrates is largely determined by a complex chain migration process and existing social networks. For this reason, we believe that the negative effect of migrant status on fertility largely reflects the consequences of the process of adaptation to settings where the reproductive norms differ, and where the support systems needed to maintain large families are difficult to sustain. The fact that the negative effect persists after introducing the contextual education term supports this interpretation.[5]

Our significant effects for community education conform with our expectations and warrant further discussion. The basic message is that Peruvian women with similar socioeconomic and demographic characteristics who resided in communities where the general level of education was low (median attainment 2.0 years) or medium (median attainment 2.1 to 7.0 years) had, respectively, 0.6 and 0.9 more children during their reproductive years than those who resided in communities with high education levels (median attainment levels 7.1 years). Although the unique contribution of the community education variable to explained variance is quite modest (just under one per cent), it is statistically significant. A comparison of the partial betas of the contextual and individual-level education terms helps in the appreciation of the importance of the community education effects. Also, the variance partition of the four categories of fertility determinants shows sociocultural factors to be most responsible for the substantial variation in completed fertility,

followed by intercourse-influencing factors and the community education levels. However, the large joint effects suggest that the overall effects of the community education levels may be much greater than one per cent, an interpretation supported by the size of the standardized coefficients. These are roughly equivalent to those of two categories of the individual-level education terms. In short, the magnitude of the partial betas indicate that the influence of the community education variables on completed fertility is not-trivial.

Although the nonmonotonic influence of the community education levels on completed fertility may seem unusual at first glance, it is consistent with the premises of transition theory, which posits a period of disequilibrium when the rate of natural increase rises substantially as a society moves from high to low equilibrium during the early stages of industrialization and modernization. A parallel argument can be made with respect to the effects of community education levels — as proxies for normative contexts for reproductive behaviour — on completed fertility. The cohort of women who had essentially completed their fertility by the time of the WFS survey did not participate in the fertility decline

TABLE 5. COMPONENTS OF VARIANCE ANALYSIS: UNIQUE AND JOINT EFFECTS DESCRIBING VARIATION IN COMPLETED FERTILITY

| Unique Effects of | Percent of Explained Variance | Relative Percents |
|---|---|---|
| Intercourse Influencing Factors | .0292 | 8.8 |
| Conception Influencing Factors | .0033 | 1.0 |
| Socio-cultural Factors | .1235 | 37.3 |
| Age | .0033 | 1.0 |
| Community Education Levels | .0086 | 2.6 |
| Σ Unique Effects | .1678 | 50.6 |
| Joint Effects | .1636 | 49.4 |
| Total Explained Variance | .3314 | 100.0 |

as extensively as the younger cohorts partly because they responded to a more traditional set of reproductive norms and stimuli, and partly because they had fewer opportunities to obtain sufficient education and incentives to encourage them to scale down family size goals.

As one might predict, in communities with low levels of education the influence of community education on fertility was positive, indicating that the critical threshold for lowering fertility had not been reached. In effect, normative change in traditional reproductive norms had not been activated. A rise in the educational level of communities precipitates a change in demographic behaviour by slowly eroding the norms that sustain high fertility (Caldwell, 1978; 1980).

However, the early stages of demographic transition often result in a modest increase in fertility due partly to increased nutrition and decreased intrauterine mortality which, by raising the share of conceptions successfully carried to term, can increase – at least for the short run – the number of children ever born. Our data suggest that this may have occurred in Peru, a country which only began its fertility decline during the early 1970s. It is impossible to establish causality about the processes of social and demographic change using cross-sectional data, but our results are consistent with the predictions from longitudinal evidence derived from transition theory.

## *Conclusion*

Overall, our results support the notion that the social climate in which our cohort of Peruvian women made decisions about family formation influenced their reproductive behaviour above and beyond what one would have predicted on the basis of individual characteristics alone. Generalizing from our findings, it would appear that once the median education levels of communities reach the primary level or beyond, the stimulus for demographic innovation is strong enough that the set of reproductive norms favouring high fertility and large families are diluted and replaced by those favouring smaller families. Thus, if residence in more highly educated communities promotes lower fertility by facilitating the diffusion of new ideas and information about the advantages of smaller families and by presenting a new set of opportunities for women which make childbearing and rearing more costly, this suggests an avenue for accelerating fertility decline in poorly educated countries.

In Peru, the receptiveness of communities to new ideas, and their access to the benefits of development, promoted innovative demographic behaviour that resulted in smaller completed family size. Therefore, one could make a case for the need to promote educational campaigns requiring Peruvian women to complete primary school as a minimum requirement. However, for education to be of any consequence in accelerating a fertility decline, women must have access to contraceptive technology that will enable them to actualize their lowered family-size preferences. This means that family planning programs that make women aware of their alternatives for limiting their family sizes – once the desire to do so exists – will further enhance the indirect effect of education on fertility via the adoption of efficient contraceptives.

The negative influence of community education on completed fertility should interest planners because it implies that further progress in lowering fertility can be made by promoting education campaigns among younger cohorts of women. Such policies are morally appealing because they also serve to enhance human welfare and the quality of labour resources. In supporting education campaigns, politicians need not take a stand for or against anti-natalist population goals. However, this solution must be qualified to recognize that unless alternatives to reproduction – such as expanded opportunities for employment outside the home – are developed concurrently, the total effect of education in reducing fertility levels will probably not rise because some of its indirect effects via employment outside the home and increased contraceptive practice will be frustrated. Our results based on an analysis of completed fertility suggest that in the long run, raising education levels in Peru holds substantial promise for accelerating the pace of the incipient fertility decline. Further improvements in the social and economic development of communities should also promote changes in reproductive behaviour, above and beyond those to be realized from changing characteristics of married women.

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## *Footnotes*

1. We evaluated the fertility differentials in completed fertility according to husbands' and wives' educations in order to determine whether their effects differed and, if so, in what ways. Based on these tabulations (not shown), we concluded that education of wives was preferable to education of husbands because the effects of the former were always greater and because their interpretation is more direct. We saw no need to evaluate further the effects of education of the husband on fertility because our results fell in line with those of previous studies which show wife's education to be the more important determinant of fertility (Cochrane, 1979).

2. The cutpoint for the medium category is specified at seven rather than six years of completed schooling because students enrolled in the night shift usually require seven rather than six years to complete the basic cycle. The individual education variable similarly reflects this circumstance.

3. We also estimated the effect of education using a linear term, and the strong, consistently negative effect emerged, roughly equal to one-fifth of a child less for each year of schooling completed.

4. These results are available from the authors. Unadjusted effects of contraceptive use on completed fertility showed that women who used inefficient methods bore the same number of children as women who had never used contraceptives to limit their family size. Thus among the older cohort of women, the use of efficient contraceptive methods may have been restricted to higher status women, particularly those with higher levels of education. Although the point estimates were not statistically reliable, the positive effects suggest that high fertility women were more likely than low fertility women to be selected into contraceptive use.

5. A series of regressions estimated separately for each of the natural regions supported this argument, but the evidence was mixed. In these analyses, a significant negative effect of migrant status emerged only for migrant to the coast, suggesting that the adaptation process is basically what lowers fertility among migrant women. However, this does not totally rule out the influence of selection processes, and because a similar effect did not appear for the Lima metropolitan area, we could not adjudicate between the alternative explanations. This requires information about the timing of moves with respect to the timing of births, which is not available in the Peruvian WFS.

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