A Suggested Framework for Analysis of Urban-Rural Fertility Differentials with an Illustration of the Tanzanian Case

Sally Evans Findley

Minnesota State Planning Agency

This paper offers a framework for analyzing how individual characteristics and urban or rural "place" factors interact to influence fertility decisions. The framework builds on the Davis-Blake model and additionally shows how place or community variables influence exposure to intercourse, conception, and birth, either with or without a conscious decisionmaking process. The framework emphasizes the way person and place related factors combine to determine a woman's perception of her life options before bearing any children, as well as how changes in these factors may affect subsequent child decisions. The framework is briefly illustrated by the Tanzanian case. The analysis highlights urban-based considerations, such as education-wage differentials, which may influence the rural couple's decisions. A comparison of two rural cohorts shows that specific community variables such as cultural attitudes, accessibility, general educational levels, and child mortality mediate the influence of these urban-based phenomena.

Recent analyses show that, although there are exceptions, urban fertility levels in developing countries tend to be 20-25 percent lower than rural levels (Findley & Orr, 1978; Schultz, 1976; Kuznets,

Research for this project was completed while the author was affiliated with GE-TEMPO, Washington, D.C., under contract to the Office of Urban Development, U.S. Agency for International Development. The author gratefully acknowledges the comments and assistance of Ann C. Orr, James E. Kocher, Paula E. Hollerbach, and two anonymous referees. Requests for reprints should be directed to Sally Evans Findley, Minnesota State Planning Agency, Room 101 Capitol Square Building, 550 Cedar Street, St. Paul, Minnesota 55101.

1974). Explanations for these urban-rural fertility differences may be broadly grouped into two groups, those focusing either on differences between the characteristics of the women or on differences associated with the places in which women live. This paper briefly summarizes the theories which attempt to account for urban-rural differentials and then presents a fertility analysis framework that explicitly shows the interaction of person and place factors in determining fertility. The framework is illustrated with an application to fertility variations among the rural Chagga of the Kilimanjaro region. This analysis draws heavily on recently released data from the Tanzanian National Demographic Survey.

Theories Accounting for Urban-Rural Fertility Differentials

A simple model for explaining fertility differentials, offered by Davis and Blake (1956), posits that fertility within any culture can be accounted for by factors affecting exposure to intercourse, conception, gestation, and successful parturition. High fertility results from frequent intercourse, little use of contraception, and low fetal mortality. Exposure to intercourse is governed by the establishment and dissolution of unions and frequency of intercourse within unions. The proportion of women currently engaged in some form of sexual union is determined by the age of entry into sexual unions, proportion of permanent celibacy, and length of time between unions, while actual exposure to intercourse varies with respect to voluntary or involuntary abstinence and coital frequency. Intercourse, of course, does not necessarily result in conception, which depends on the couple's fecundity and use of contraceptive methods. Similarly, a birth does not follow every conception. Spontaneous or induced abortions and fetal mortality can terminate a pregnancy without a live birth.

Varying customs and constraints in pre-industrial societies affect these intermediate variables to produce high fertility, whereas in industrial societies low fertility tends to result. In pre-industrial societies, extended family systems benefit from early marriage, because this increases the likelihood of having heirs. Marriage is nearly universal; only rarely do couples become divorced. In pre-industrial societies, little use is made of voluntary contraception, not because methods are necessarily unknown, but because they are considered unpleasant or unhealthy. Instead, a common fertility reducing practice is voluntary abstinence, usually after a birth, to protect the child or mother from health risks or ritual dangers. In ad-

dition, abortion and infanticide may be used to limit the number of children (Polgar, 1972, p. 207). Despite these fertility reducing factors, the net effect of the entire set of socio-economic factors is high fertility in most pre-industrial societies (Davis & Blake, 1956).

At first glance, it appears that rural communities in developing countries conform to the high fertility pattern and urban areas follow the industrial pattern; however, intra-urban variations cause us to question this assumption. For the model to be useful in describing intra-urban or intra-rural variations, individual social, economic, and cultural factors affecting the intermediate variables must be incorporated directly into the model.

Perhaps the simplest theory for describing fertility differentials is that which links high mortality to high fertility. In societies where postpartum amenorrhea and voluntary abstinence while nursing constitute the major impediments to high fertility, any shortening of either period may lead to an earlier exposure to the risk of pregnancy, thus to more frequent births. If rural areas have higher infant mortality, rural fertility will exceed urban fertility.

Equal infant mortality levels may not translate into equal urban and rural fertility levels, however. Urban mortality declines may not result in proportional fertility declines if city women do not uphold sex taboos while nursing (Li, 1973, pp. 103-4; Adegbola, Page, & Lesthaege, 1977). Similarly, rural fertility declines may lag behind mortality changes if the mortality change is not perceived and parents continue to "replace" anticipated child deaths by more children than the number of desired survivors (Schultz, 1976, p. 271).

Many studies of fertility determinants show that education is inversely related to fertility through a variety of possible intermediate variables: delay of marriage, better knowledge of contraception, aspirations for upward mobility, preference for modern goods, a higher opportunity cost of child rearing, desire for "quality" rather than "quantity" in children, better hygiene and lower infant mortality, practice of joint decision-making, and possession of a sense of self-efficacy (Holsinger & Kasarda, 1976).

These intermediate variables remove some of the confusion concerning urban-rural differences in the fertility response to education. First, education has a stronger inverse impact in urban than rural areas because women with aspirations often move to town where they perceive a higher likelihood of goal attainment (Kennedy, Paul-Bello, & Rojas de Lara, 1974). Second, a little education is less likely to have an inverse impact on fertility because a certain minimum may be necessary to generate change in aspirations or the

sense of self-efficacy. Third, if education operates through aspirations, education leads to smaller families *only* among women for whom large families and aspirations are incompatible. If well-educated women can afford to hire servants to care for children while they work, large families do not necessarily conflict with their aspirations (Carlton, 1965; Caldwell, 1976, p. 214; Handwerker, 1977). Fourth, education may actually delay marriage, and thus shorten the period of childbearing. If post-primary educational opportunities are available only in urban areas, a stronger correlation between education and delayed age at marriage will exist in urban rather than rural areas (Balakrishnan, 1976; 1970).

Differences in the perceived costs and benefits of children may also account for urban-rural fertility differentials. Some of the benefits relevant to childbearing decisions are strongly influenced by the community context in which a woman or couple lives.

Where children work, large families are seen as advantageous. In many rural communities, children begin with such simple tasks as scaring away birds and as they grow so do their work responsibilities, both at home and in the fields (Nag, White & Peet, 1978; DaVanzo, 1962). In fact, a large family may be fundamental to a family's strategy to raise its income above bare subsistence, as in Java and Nepal where larger families actually have more disposable income than smaller families, partially because the children's work allows the parents to put their energies into the most productive tasks (Nag, et al., 1978, pp. 297-8).

If the community offers non-child related, low risk opportunities by which parents may expand their present and future income, they may be willing to have fewer children. For example, in her study of women in the town of Diegei, Liberia, Bledsoe shows that women are willing to de-emphasize having sons when they have access to cash or jobs which can substitute for or allow the purchase of services previously available only through children (Bledsoe, 1976). We must caution that offering paid employment opportunities does not necessarily have a negative impact on fertility aspirations. Women's earnings may be so low that they continue to desire several children who can maintain a small family farm to supplement the woman's meager earnings (Kane, 1977).

Children are also strongly valued for the assistance they provide to parents in their old age (Caldwell, 1976). With rising costs of living and higher expectations for modern medical care in their old age, parents may feel more dependent on children than they did in the past (Thompson, 1978). For many couples, the best strategy to

ensure old age security is a large number of children some of whom will be likely to obtain a white collar job and be able to support the parents. Until there are other means to guarantee support for elderly parents, parents will continue to have a strong incentive to raise several children.

Costs of children are also influenced by the community context. If female employment requires costly child care arrangements, raising children may impose an opportunity cost through the mother's foregone income. Such opportunity costs will be higher in urban areas which offer better paying opportunities such as clerical or other non-agricultural jobs (DaVanzo, 1972). Where children are expected to go to school and education-related costs are high, as in urban areas, these costs can act as a disincentive to large families (Tienda, 1977; Caldwell & Caldwell, 1976, p. 358). If parents value purchases of radios and other consumer non-durables, another cost of large families is lower consumption. The perception of this consumption opportunity cost again may be more likely among couples who have modern consumption tastes and opportunities to purchase these goods, as in urban areas (Freedman, 1976; Thompson, 1978).

Many couples never make conscious decisions about first or subsequent births. This may be due to a lack of understanding of the reproductive process, inadequate knowledge or unavailability of methods, unacceptability of known methods, perceived disapproval of kin, or fatalistic views that women should have as many children "as God gives" (Shedlin & Hollerbach, 1978). Those who do not have a history of independent choice and decision-making typically do not question cultural norms regarding childbearing patterns (Reining and others, 1977, p. 92).

Societal norms may encourage large families by requiring children for essential or cultural functions, such as nurturance of ancestral spirits (Swartz, 1969, p. 81), fulfillment of maturity rites (Swantz, 1970, p. 363), or enhancing familial prestige. In both town and country, the need for children may only decrease when parents have access to non-familial means to reduce the uncertainties in their lives, to other "unconditional" sources of social status, or to ways in which to meet ritual needs with fewer children (Schnaiberg & Goldenberg, 1975, pp. 940-6).

The urban environment may be more likely to offer suitable alternatives by which to meet these needs, such as through stable, salaried jobs, long-term investment opportunities, non-familial based routes to political power, or consumption based symbols of

prestige. The simple availability of these alternatives, however, does not guarantee automatic acceptance of these alternatives by all urban dwellers. Clignet and Sween (1978) demonstrate that only among the ethnic groups which are loosely structured is there any correlation between place of residence, individual modernization, and fertility aspirations. Among the tightly knit, more socially isolated ethnic groups, there is little difference between urban and rural fertility levels (Clignet & Sween, 1978).

Several researchers stress the role of attitudes in determining fertility behavior. Miller and Inkeles (1974) report that modern attitudes more strongly correlate with acceptance of family limitation than urban or rural residence. Because psychological modernity is largely determined by education, modern attitudes seem to be a principal link between education and use of contraceptive methods (Armer & Isaac, 1978, p. 328).

The specific modern attitudes most likely to correlate with acceptance or use of contraceptive methods are belief in science, medicine, and technology; secularism (Miller & Inkeles, 1974, p. 181); approval of a wife's activities outside the home (Hass, 1972); interest in owning modern consumer goods (Freedman, 1976); acceptance of planning; an orientation toward the future (Schnaiberg & Armer, 1974); aspirations for one's child (Kar, 1978); a sense of personal efficacy or ability to influence the course of one's life (Reining et al., 1977, pp. 89-98); and a sense of relative economic deprivation (Thompson, 1978). The important thing to note here is that modern attitudes, not necessarily modern behavior, correlate with approval of smaller families.

City life may stimulate development of these modern attitudes more than village life. Because female enrollment rates are much higher in urban areas, the attitudinal changes associated with education are likely to be more common in urban areas. For both men and women, the urban environment may offer ample exposure to media, to opportunities to purchase goods, and to opportunities to earn money with which to do so. Finally, contraceptive information and methods are more widely available in cities.

City life may also increase the salience of modern attitudes for determining fertility aspirations. For example, modern attitudes do not correlate with fertility aspirations among non-urban Bugandans, but among urban Bugandans the modern attitudes of consumption aspirations and a sense of relative economic deprivation are inversely related to fertility aspirations (Thompson, 1978, p. 161).

In summary, it appears that none of the individual

characteristics—health, educational, or economic status; cultural norms; or attitudinal orientation—is sufficient to explain the differences between urban and rural fertility levels. We suggest that this is because the place of residence mediates the influence of these factors on fertility aspirations and behavior. Although there has been little research directly focusing on the place variable itself, the most salient place-related factors affecting small family size desires appear to be heterogeneity of contacts, experiences, and op-

FIGURE 1. Summary of person and place factors affecting fertility variables.

Fertility Variables	Place Factors	Person Factors
Age at first union or first birth	Sex role expections of community Educational or economic opportunities	Patrilineal inheritance Non-marriage options Familial control of marriage process
Fecundity	Prevalence of venereal disease General sanitation and health levels Maternal and child health care facilities	Nutrition and health status Duration of post-partum amenorrhea and lactational infecundity
Exposure to intercourse	Community's sexual customs General concern for replacement Divorce and separation rates	Infant and child mortality experience Knowledge of reproductive process Type of marriage Observance of post-partum sex taboos
Decision to limit births	Social or cultural importance of children Costs-benefits of children Examples of small families Range of economic opportunities for women General educational level and costs Access to long-term investment capital Access to consumer goods Maternal and child health care facilities Cultural openness to innovation and change	Educational attainment Awareness of reproductive process and FP methods Approval of non-motherhood roles Consumer good preferences Employment experience and options Aspirations Imp. of own children to reducing risks Health status and childbearing experience
Ability to limit births or family size	Access to acceptable, low-cost FP methods and counseling Access to abortions Effectiveness of contraceptives	Family influence on childbearing decisions H-W joint decision-making Normative support for decision Personal acceptability of FP methods and abortions

portunities (Goldberg, 1976, pp. 405-7). In the absence of opportunities to use education or to act on preferences, education will be of little consequence (Simmons & Noordam, 1977). Heterogeneity in opportunities explains why exposure to modernizing influences may have a greater fertility reducing impact in urban areas.

Framework for Analyzing Fertility Differentials

In Figure 1, we have attempted to summarize the findings concerning the various factors affecting fertility behavior. The fertility variables are the major intervening variables outlined by Davis and Blake (1956), with the category "decisions to limit births" replacing their category of voluntary conception. Note that this category allows for all factors affecting non-decisions and decisions for or against conception. These fertility variables are jointly affected by person and place factors. Place factors subsume the environmental context of individual decisions which make it more or less feasible for women to have small families. Person factors include the characteristics which affect an individual's perception of the desirability of small families.

Research on the mechanisms by which education and modernity affect fertility suggests that place factors operate at two areal levels, city or district and neighborhood or village, for urban and rural areas, respectively. The larger or macro-level places determine the types of opportunities generally available and set the context for micro-level behavior.

Due to historical, cultural, or economic differences in the evolution and development of a city, people living in one city, a macro-level place, may have a different range of options than those residing in another (Duncan & Schnore, 1959; Nagata, 1974). Variations in the acceptability or feasibility of certain options affect aspirations and, consequently, choice behavior. If a certain pattern of behavior is not known or prevalent within a community, residents are not likely to consider that action feasible.

The micro-level place factors of the neighborhood or village determine the immediate constraints under which individuals operate, thereby influencing the actual fertility outcomes from among the wider range considered feasible (or likely) at the macro-level. (For an empirical test showing the influence of village level variables see Anker, 1977.)

The most critical part of the model is the link between individual and place characteristics. This link is the fertility decision

process. At any parity level decisions may be made to try to achieve a given birth pattern, as defined by the total number and spacing of births. The model explicitly allows for changes to previous decisions. Following the Triandis model of behavioral intentions, we assume that a woman's fertility decisions are based on her belief about the consequences of having or not having a child at any given time, weighted by the importance of those consequences; and by her belief of what "relevant others" think she should do, and her desire to act in accordance with their desire (Davidson, Jaccard, Triandis, Morales, & Diaz-Guerrero, 1976, p. 3). It follows that:

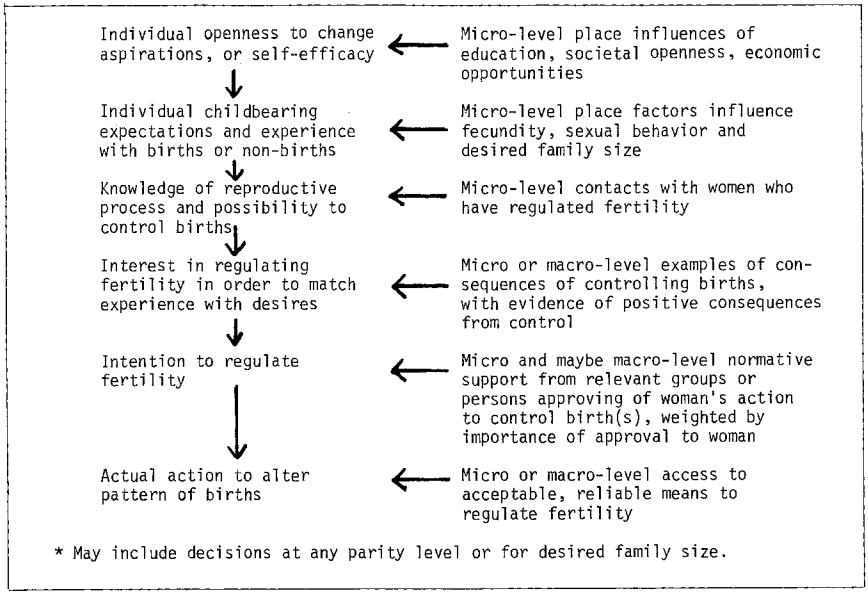
1. If a woman lives in a community where she has few role models of women with small families, she will have limited knowledge about the consequences of small families and is unlikely to choose a pattern of childbearing which varies the spacing of births to achieve a small family (Schnaiberg & Reed, 1974). She may not even know that it is possible to control births and therefore may not perceive that a choice exists (Hass, 1974, p. 139; Shedlin & Hollerbach, 1978). This awareness of small families is very much determined by micro-level characteristics, especially the variation of family sizes.
2. If she does know about small families, she may not choose to limit her births if so few examples exist that the consequences of a small family may be deemed undesirable or uncertain. Such might be the case if only a few women with small families live in the neighborhood or village.
3. If she views the consequences of limiting births as desirable, she may still not limit births if she feels that family, friends, or influential individuals will disapprove of limiting births. This case is demonstrated by an urban Venezuelan example in which peer and family approval of use of contraceptives is the single best predictor of use of family planning methods (Kar, 1978, p. 182). Generation of social support for fertility regulation may depend on micro-level heterogeneity, which provides a broad range of examples of desirable consequences, both for the woman and for her partner, kin, friends, or other influential people who are not likely to approve of limitation or spacing if they perceive few benefits.
4. If a woman feels that the consequences are ones she prefers, despite the lack of adequate normative support from local kin or other groups, she may still try to achieve her desire if persons at the macro-level strongly support her action. This case would re-

quire strong personal incentives as well as strong support from macro-level groups. Such might be the case for the better educated woman who can find support from a nonlocal peer group, for example, people for whom she works or with whom she studies (as Davidson et al., 1976, have shown in Mexico).

5. Finally, a woman may still take steps to achieve a given birth pattern in the absence of micro-or macro-level normative support if her preferences are so great that they override the lack of approval. Such might be the case, for example, of women who move to town to get an abortion and thereafter do not return. In this instance the woman's action includes moving away from possible negative sanctions.

Figure 2 is a graphic conceptualization of the interaction of place factors in the childbearing decision process. Not all women proceed through the entire process and, at any point, the place factor conditions may inhibit a woman's further progress to alter her pattern or number of births.

FIGURE 2. Model of place factors affecting the childbearing process.



This model seems to operate for both family size goals and in-

dividual parity decisions. With regard to family size goals, it seems logical that the *consequences* in question are the perceived costs and benefits of children, weighted by expected mortality. At specific parity levels the perceived consequences are those associated with having or not having a child at a specific point in time. The *normative* component embodies the cultural and social factors highlighted above. Where family preferences are weighted heavily, a family size decision may not be economically optimal.

To avoid giving the impression that all births are calculated as wanted or unwanted, we must reiterate the possibility of *not* making a decision. If a woman is not aware that she is likely to conceive, she is not likely to make any decision about conception. If she *does* conceive, she will have to decide whether or not to have the birth. If abortion is feasible and not severely negatively sanctioned, she may choose abortion if she perceives negative consequences of a birth at that time. Where abortions are difficult, disapproved, or dangerous she may not make a decision until after the child's birth (Hass, 1974, p. 151). At this point, she may still resort to infanticide (Shedlin & Hollerbach, 1978) or emotional and physical rejection of the child (LeVine, Dixon, & LeVine, 1974), but clearly her options are far more limited and are very much determined by societal norms.

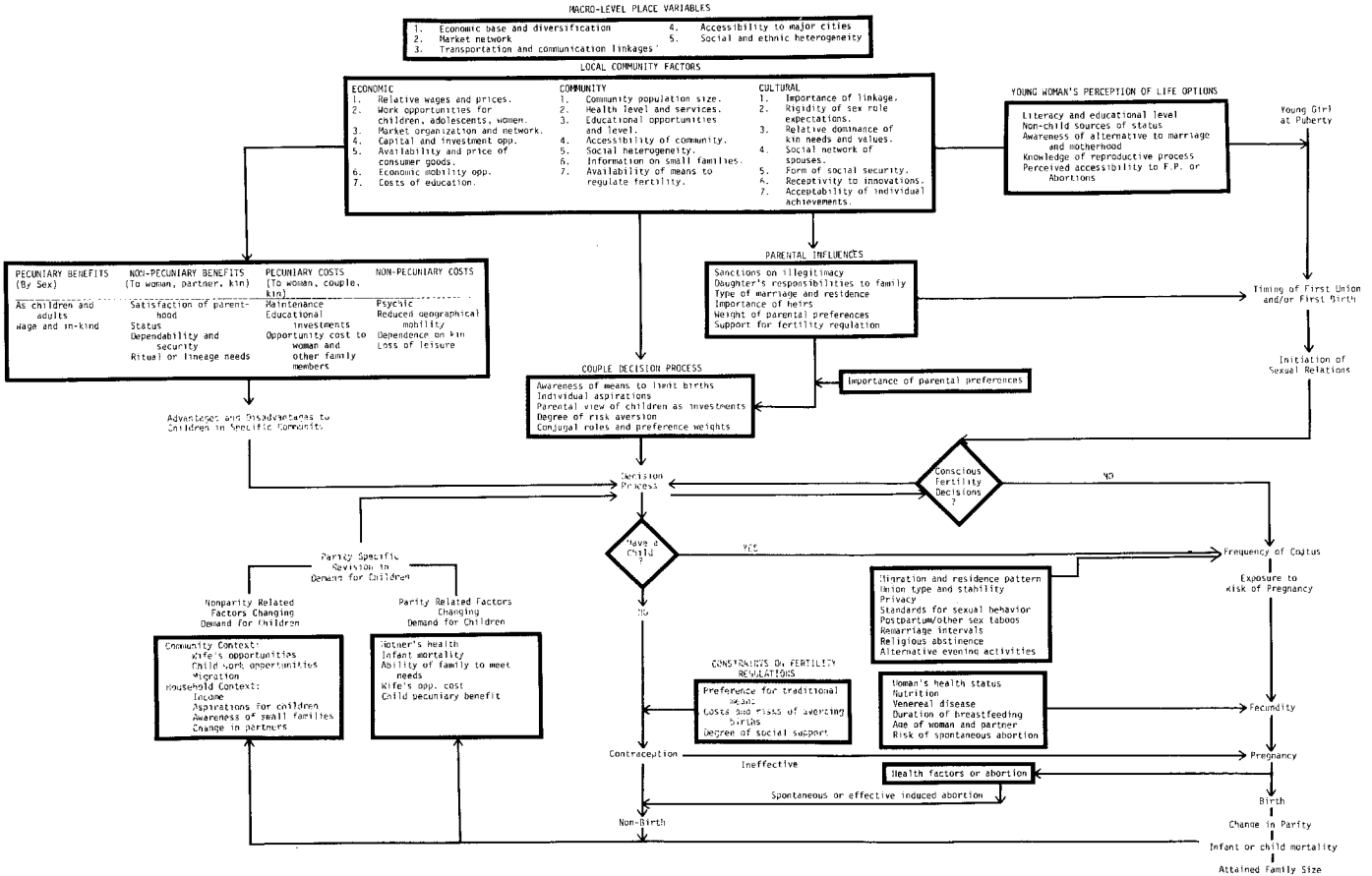
Figure 3 integrates the decision process outlined in Figure 2 with the person and place factors summarized in Figure 1. This framework is intended as a guide for analyzing fertility differences within and between communities.

Essentially, the framework is a set of testable hypotheses regarding the mechanisms by which place or community factors influence fertility decision-making. Not all the factors shown will operate in every community. Community-specific analysis is necessary to determine which factors are most critical in a given context. The framework illustrates the variables' points of influence; interaction of variables may be either additive or multiplicative. Because the framework focuses on the decision process, we suggest that analysis begin with the variables directly pertaining to the "couple decision process." These variables will in turn provide clues for identifying key place variables, those determining economic considerations, societal or familial norms, constraints on fertility regulation, or life options for young women.

Fertility Variations Among the Chagga of Rural Tanzania

In this section of the paper we shall demonstrate how the

FIGURE 3. A framework for analyzing person and place factors in fertility decision-making.



framework can be used to identify key place factors affecting fertility outcomes. The illustration is drawn from Tanzania, which has an urban-rural fertility difference typical of many developing countries.

Completed families in urban Tanzania are 23 percent smaller than rural Tanzanian families. As shown in Table 1, rural women bear more children than urban women at every age between 20 and 34. By the end of the 30-34 cohort, rural women have borne 4.3 children, one child more than urban women, and this difference is maintained through subsequent ages (Tanzania Government, 1976, pp. 215-230).

Table 1

Children Ever Born by Age of Mother

for Urban and Rural Tanzania, 1973

Area	15-19	20-24	25-29	30-34	35-39	40-44	45-49
Rural	.401	1.751	3.177	4.302	4.865	4.949	5.024
Total Urban	.419	1.626	2.833	3.320	3.975	3.822	3.906
Urban Small (towns)	.460	1.784	3.106	4.036	4.498	4.388	4.046
Urban Large (cities)	.394	1.668	2.980	3.407	4.130	4.227	4.123
Dar es Salaam	.430	1.555	2.645	3.079	3.724	3.287	3.680

Source: Calculated from the 1973 National Demographic Survey of Tanzania, Vol. 1. Urban large are larger towns down to a size of 14,000 and urban small are towns up to that size. Data are unadjusted and do not reflect the analyses of Vol. 6.

Rural fertility is not uniformly high, however. Some rural districts have a total fertility level close to 5.0, while others exceed 7.0 (Henin, Ewbank, & Hogan, 1977, p. 91). In analyzing regional variations in fertility, Ewbank (1977) concludes that childlessness and early sterility are responsible for a large share of the variation in total fertility rates. Sterility seems to be most common in regions where malaria is prevalent (Henin et al., 1977, p. 92). In addition, women in unstable, polygynous, or traditional marriages also tend

to have fewer children. One tribe with very high fertility are the Chagga. The Chagga live on Mt. Kilimanjaro, which is one of the zones free from sterility producing malaria. Therefore, they have one of the lowest rates of sterility in Tanzania and potentially very high fertility (Henin et al., 1977, p. 170). In examining the determinants of their high fertility, we will first identify the factors which encourage high fertility among this fecund population. Second, we shall discuss the factors which correlate with lower fertility goals among the population.

The Chagga have long inhabited the slopes of Mt. Kilimanjaro. They are known as an outward looking, entrepreneurial people who were quick to capitalize on opportunities introduced by Christian missionaries and foreign entrepreneurs. As a result of the missionary activity, most Chagga are Christian. The Chagga also have the highest literacy rate of any tribe in the country. In addition to subsistence crops of maize, beans, and bananas, most households produce some coffee for sale. Each household also keeps livestock, averaging two or three cattle per household (Henin et al., 1977). By Tanzanian standards the Chagga are definitely bourgeois (Stahl, 1969, p. 221).

Referring back to Figure 1, we can expect high fertility among the Chagga if marriage is nearly universal; first births occur at an early age; intercourse is frequent; and contraception, abortions, and fetal mortality are uncommon. In the discussion below, we will attempt to show that this is generally the case among the Chagga or at least among the Chagga of Moshi district, a district central to Chaggaland.

By ages 40-49, Chagga women are no more likely to be married than other rural women, but they are much more likely to have stable, monogamous marriages, perhaps due to the Christian proscriptions against polygamy. Among married Chagga women aged 40-49, 75.3 percent have been married only once to monogamous husbands, compared to only 47.8 percent of all currently married rural Tanzanian women. Because monogamous women attain higher parity levels than polygynous women, this marital pattern has a pronatal effect. The Chagga also have almost twice as many stable marriages as the rest of rural Tanzania. This stability increases the total duration during which a woman is exposed to the risk of pregnancy, further increasing the likelihood of a large family (Henin et al., 1977, p . 172).

While the Chagga marital pattern contributes to high fertility, compared to other rural women, their age at first birth does not. On-

ly 10.3 percent of the Chagga women aged 40-49 had their first births before age 16, compared to 19.9 percent of all rural women of the cohort (Henin et al., 1977, p. 175).

We have no direct measure of frequency of intercourse, but there are some indications that frequency of intercourse may be higher among the Chagga than among other rural women. Parity levels are higher among monogamously married women, and in a non-contracepting, fecund population, this indicates a higher frequency of intercourse. Broken or unstable marriages also limit the frequency of intercourse (Chen, Wishik, & Scrimshaw, 1974); thus, the Chagga marital stability contributes to more frequent intercourse. Finally there has been a recent decline in the period of breastfeeding, thereby reducing the period of amenorrhea or postpartum sex taboos, increasing the period during which intercourse is allowed (Kocher, 1976, pp. 83-9).

Although we have no data on use of contraceptives or abortions among the Chagga, data pertaining to sterility and childlessness demonstrate the relatively high fecundity of the Chagga. Childlessness occurs among 11.1 percent of all rural 40-49 year old women but among only 3.9 percent of the Chagga women. In addition, the Chagga are less likely to become sterile midway through the childbearing years. A total of 50.8 percent of all rural 40-49 year old women did not give birth in the previous ten years, as compared to only 34.0 percent of the Chagga women.

Therefore, except for the age at first birth, the Chagga pattern of marriage, likely frequency of intercourse, and fecundity levels make possible high fertility levels. We now examine the community context of Chagga fertility decision making: cultural and familial influences, economic advantages and disadvantages of children, options for young women, and constraints on fertility regulation.

Chagga culture requires children for fulfillment of familial and clan obligations. Conception is said to unite the blood of the mother's clan with that of the father's, through the father's sperm, which itself derives from his mother's milk. Hence, only childbearing unites and perpetuates the clans (Swantz, 1970, pp. 242-244). Among the Chagga a woman is not a true wife until she has two children. Bearing sons is the way a woman gains status in her husband's lineage. Men in turn want a large family to demonstrate their wealth and virility (Henin et al., 1977, p. 163). Children are also essential for fulfillment of the female maturity rites which are not complete until the firstborn grandchild reaches maturity (Swantz, 1970, pp. 175, 363). Finally, children are the means by which a couple can insure

the immortality of their own and their parents' spirits. Children are named for each of the couple's parents, and the grandparents' spirits live on through the children. Therefore, couples want at least two children of each sex (Zalla, in progress).

Chagga culture contains a series of myths to ensure that women produce numerous offspring. At initiation women learn that they must respect men and can earn respect only through childbearing. For example, according to the Myth of the Anal Plug, men used to be able to bear children but lost this power when women took the anal plug. Women are unplugged during menstruation and are not properly "replugged" until pregnant (Zalla, in progress). As among other neighboring peoples, the theme of procreation is central to the Chagga maturity rites accompanying male circumcision and female puberty (Swantz, 1970).

With regard to the perceived economic advantages of children, there are indications of perceived net benefits. Like women elsewhere in East Africa, Chagga women may work over 2,000 hours per year on and off the farm. A woman relies on both sons and daughters to help ease the onerous burden of her duties (Cleave, 1974, p. 49). Not surprisingly, Kocher's 1973 survey of the Chagga women in Moshi indicates that women are more likely than men to value children for their help in farming (Kocher, 1976, p. 83).

The district's economic structure may also influence childbearing. The area's economy is quite diversified, and most families raise some coffee as a cash crop (Kocher, 1976, pp. 64-89). The coffee income enables Moshi residents to live fairly well, including being able to afford the large families that their culture emphasizes.

Educational opportunities and levels also influence childbearing decisions, particularly by altering women's aspirations of life options. In Tanzania, women with more than four years of schooling have lower fertility than those without schooling, but fertility is actually higher among women with one to four years of education than for those with no education, probably due to a better understanding of prenatal care and hygiene, both of which enhance the likelihood of healthy, full-term babies (Ewbank, 1977, p. 7). Twenty-seven pecent of the Kilimanjaro women have one to four years of education, compared to 15 percent of all rural women (Tanzania Government, 1976, pp. 48-53). Thus, the larger share of women with a little education can be related to higher fertility through lower rates of spontaneous abortions and infant and child mortality.

With regard to constraints on fertility regulation, we have a very incomplete picture. Pregnant, unmarried girls will abort a

pregnancy rather than bear an unsanctioned child (Zalla, in progress). As noted above, recent reductions in the duration of the postpartum sex taboo shorten the period during which a woman is safe from conception. We were not able to obtain other information pertaining to use of other means of fertility regulation.

Table 2 indicates that the Chagga women of Kilimanjaro have among the highest age-specific fertility rates in mainland Tanzania. Shorter breastfeeding periods and better health conditions promote high fertility, and as yet there has been little modification in economic and cultural benefits of large families.

Table 2

Age-Specific Fertility Rates for the Chagga of Kilimanjaro District, Tanzania, 1973

Area	15-19	20-24	25-29	30-34	35-39	40-44	45-49
Kilimanjaro	.076	.286	.298	.258	.201	.112	.039
Mainland	.137	.283	.256	.195	.145	.074	.037

Source: 1973 National Demographic Survey of Tanzania, Table 3090B, Vol. 1.

Despite overall high fertility, fertility behavior is by no means uniform among the Chagga. As noted in Table 2, young Chagga women bear *fewer* children prior to age 25 than their counterparts in mainland rural Tanzania. Although this situation may represent a delay in early childbearing, it is also possible that the completed fertility of these young women will be lower than that of the older cohorts. This section of the paper explores place variables that can influence the childbearing patterns of these younger women.

Figure 2 shows that women may alter their childbearing pattern as situational factors change, such as the probability of child survival. If infant and child mortality are perceived as declining, couples may no longer feel the need for additional children to replace expected deaths (Kocher, 1976). Partially due to missionary activities, the Chagga have a well-developed health care system

with 56 health care facilities, and almost the entire population lives within ten kilometers of a facility (Henin et al., 1977, p. 162). Kocher's 1973 survey showed that over 70 percent of the Moshi women aged 20-29 had delivered their last baby in a hospital. Perhaps as a result of the better maternal and infant care in Moshi, child survival rates are 93 percent among 20-29 year olds, and over two-thirds of those surveyed believe that children live longer these days (Kocher, forthcoming, pp. 104-107). This perception is associated with a desire for no more children, especially among women who already have four to five surviving children.

Accessibility can influence the degree to which women's perceptions of infant and child mortality match changes in actual levels. Although child mortality levels do not vary greatly in the Moshi area, the perception of improved chances for child survival is greater within communities having better road access to Moshi town than in more distant communities. Apparently accessibility expedites introduction of new ideas such as belief in the efficacy of health care, thereby increasing the likelihood that women perceive and accept the reality of the mortality declines (Kocher, forthcoming, pp. 34, 90-104).

Completed family size may also fall if age at marriage rises, thereby shortening the duration of exposure to pregnancy and reducing fertility. In Moshi, the age at marriage has been rising (Kocher, forthcoming, pp. 57, 108-110). Although the explanation for this situation is not clear, one contributing factor may be higher educational attainment of women and a concomitant delay in marriage. Most Chagga children go to school at the age of ten (Henin et al., 1977, p. 162). Thus, attainment of eight years of schooling can delay marriages and first births until at least age 18. Almost half the Kilimanjaro women aged 15-19 have five to eight years of schooling, a proportion equal to that in cities and towns.

Fertility is also dependent upon changes in the perceived economic value of children. In recent years, population density has risen, resulting in problems with farm fragmentation (Henin et al., 1977, p. 161). Therefore, women may find large families less necessary for farm work. However, if Chagga women adopt improved farm practices, their demand for assistance from children may actually increase, because the improved practices require more water and weeding, tasks performed by women and children. In addition, women are increasingly purchasing land in order to plant their own cash crops (Fortman, 1978). If land ownership and coffee incomes generate the prestige and income formerly available only

from a large family, Chagga women will have less incentive to have the traditional large family.

Parents may also become less dependent on children's help on the farm if they have non-agricultural sources of income. As the Chaggaland economy has grown more diversified, Chagga families increasingly rely on non-agricultural sources of income. Kocher's survey of Moshi district residents shows that by 1973 over 20 percent of the Moshi men and seven percent of the Moshi women were primarily non-agricultural workers.

Along with farm fragmentation, there has been an overall deterioration in rural incomes relative to urban incomes. In the period of 1955-1970, smallholder farm incomes stagnated while urban incomes rose. By 1969 the overall rural-urban income differential was 258 percent. This difference strongly biases parents in favor of sending children to work in the city rather than keeping them on the farm.

Secondary or university education dramatically improve one's chances for higher paying employment. Although zero to four years of schooling has little effect on wages, more than eight years of schooling can increase wages by 242 percent (Barnum & Sabot, 1976, p. 54). In communities in which secondary schooling is not available, parents may not perceive the long-term benefits of investment in education. However, given access to advanced education, the relative costs involved may encourage fertility reduction.

Clearly, wage incentives to educate children operate throughout rural Tanzania. Why do the Chagga of Kilimanjaro respond to these incentives more than other tribes? The Chagga encourage individual achievement and do not penalize success per se. They have long perceived education as one of the most powerful mechanisms by which to achieve upward mobility (Zalla, in progress; Stahl, 1969, pp. 210-211). Due to the early efforts of missionaries the Chagga have had access to schooling for several generations. Kocher's survey shows that although not all Moshi households have children who have attended secondary school enough have gone to render the goal of secondary school *feasible* for nearly all families (Kocher, forthcoming, p. 64). Finally, as noted previously, farm fragmentation and the lack of agricultural options for children strengthen the existing interest in education. Sons have traditionally supported elderly parents by farming their inherited lands but, where farms have become successively smaller, parents can no longer rely on children to have surpluses above that meeting the needs of their own nuclear family. Thus, the employment of

children in higher paying positions may be the preferred or only option by which parents can guarantee their security in old age (Moock, 1973, p. 306). This option is more readily attainable for Chagga parents, not only because of the area's well-developed educational structure, but also because Chaggaland is economically diversified and contains Moshi town, a regional market and processing center.

The educated youth who fail to find jobs in Moshi can always go to Dar es Salaam, and Kilimanjaro district's high out-migration rates document the high frequency at which this occurs. Compared to their rural Tanzanian counterparts, Chagga men with 5 to 8 years of schooling are 1.6 times more likely to leave their home rural areas. Those with more than 8 years of schooling are 2.6 times more likely to leave than their rural Tanzanian counterparts (Barnum & Sabot, 1976). Given the employment possibilities and wage potentials for those with post-primary schooling, examples of successful educated Chagga migrants are common and known at district levels. Thus, the education-migration option can be easily perceived as feasible and advantageous relative to the traditional pattern of farming the land.

Young educated Chagga women may be the first cohort to view these education-migration successes in sufficient quantity to encourage aspirations of a better life for themselves and their children. Further, having a moderate or small size family may be viewed as facilitating these attainments, either because large families prevent the accumulation of savings necessary for schooling or because the education-migration strategy requires only two to three well-educated children.

Education also alters perceptions of the disadvantages of children. Educated women in Moshi are more likely to recognize *disadvantages* of large families, which is in turn correlated with a desire for no more children (Kocher, forthcoming, p. 65). They are also more likely to perceive *advantages* to small families. This may result from the fact that Moshi parents value offspring as adults for old age support, rather than as children providing farm assistance. Since the children most able to provide assistance to parents are those with higher education employed in town, parents pressed by rising costs may prefer two well-educated sons to three or four less educated ones.

This change in perceptions regarding the advantages and disadvantages of small or large families seems to be more likely in *less* prosperous communities. Two Moshi communities have similar

levels of female educational attainment and proportion of non-agricultural workers, yet in the "less prosperous" community which has a ten percent lower income and where only 65 percent, as opposed to 97 percent, have invested in good roofs, only one-third of the women think there are advantages to large families, compared to over half the women in the more prosperous community. Evidently, it is the combination of high educational aspirations plus slight economic *limitations* which alters couple's perceptions of family size benefits. As in urban areas in other African nations, those who may be the first to limit family size are those who desire to advance through educational achievements, but who can afford to do so *only* with a small family (Caldwell & Caldwell, 1976, pp. 358-9).

In summary, it is possible that the present low levels of fertility among 15-24-year-olds merely reflect delays in childbearing but, according to the decision process outlined above, the young, more educated Chagga women in the less prosperous Moshi community may have smaller families than those currently attained among the Chagga because they:

1. Live in a district (macro-level place) where educational attainments are high and where education past the primary level is a feasible goal for many residents.
2. Live in a district with high rural out-migration rates for the better educated and probably have direct knowledge (at the micro- or local-level) of the favorable consequences of the education-migration strategy through acquaintance with successful Chagga migrants to cities.
3. Live in a district (macro-level) with improving health status and in a village (micro-level) where women actually have access to and use prenatal and maternal care services, which alters perceptions and experiences of child mortality, hence making family limitation seem less risky.
4. Live in a village (micro-level) which has problems of farm fragmentation or other economic constraints which make large families more costly and less advantageous, thereby reducing the economic justification for the traditional large family.
5. Live in a village (micro-level) with good transportation and communication access to a nearby town, providing opportunities for employment and access to modern consumer goods, both of which alter parental perceptions about the need for children and possible tradeoffs between children and the acquisition of desirable consumer items.
6. Have more than a "little education" and therefore a different set

of individual aspirations that may be incompatible with the traditional large family pattern.

7. Are members of a cultural group which sanctions individual advancement and therefore are more likely to act to attain aspirations.

Thus, a unique combination of place characteristics may affect these young women's perceptions about family size advantages or disadvantages. These young women will be operating under a somewhat different set of constraints than their predecessors and may be more likely to desire a non-traditional childbearing pattern with fewer children. Chagga children may be no less important to parents, but the timing and nature of their contributions is shifting the parental focus from the need for children to assist with farm work to a need for adult children sending remittances back to parents.

The discussion of place factors affecting fertility decisions does not include all possible factors. A more conclusive analysis requires examination of residence-related access to reliable and acceptable contraceptive methods, of changes in employment among educated women, and of changing kin attitudes to smaller families. Our review has served to illustrate how the framework can be used to identify key place-related influences on fertility decision-making. Although the present example is limited, we hope it indicates the importance of viewing fertility decision-making within local and district contexts.

REFERENCES

Adegbola, O., Page, H.J. & Lesthaege, R. Breastfeeding and post-partum abstinence in metropolitan Lagos. Paper presented at the annual meeting of the Population Association of America, St. Louis, April 1977.

Anker, R. The effect of group level variables on fertility in a rural Indian sample. *Journal of Development Studies,* 1977, *14,* 63-76.

Armer, M. & Isaac, L. Determinants and behavioral consequences of psychological modernity: Empirical evidence from Costa Rica. *American Sociology Review,* 1978, *43,* 316-334.

Balakrishnan, T.R. Determinants of female age at marriage in rural and semi-urban areas of four Latin American countries. *Journal of Comparative Family Studies,* 1976, *7,* 167-173.

Barnum, H.N. & Sabot, R.H. *Migration, Education and Urban Surplus Labor: The Case of Tanzania.* Paris: Organization for Economic Cooperation and Development, 1976.

Bledsoe, C. Women's marital strategies among the Kpelle of Liberia. *Journal of Anthropological Research,* 1976, *32,* 372-389.

Caldwell, J. C. Fertility and the household economy in Nigeria. *Journal of Comparative Family Studies,* 1976, *7,* 193-253.

Caldwell, J.C. & Caldwell, P. Demographic and contraceptive innovators: A study of transi-

tional African society. *Journal of Biosocial Science,* 1976, *8,* 347-365.

Carleton, R.O. Fertility trends and differentials in Latin America. *Milbank Memorial Fund Quarterly,* 1965, *43,* 15-31.

Chen, K.-H., Wishik, S.H. & Scrimshaw, S. Effects of unstable sexual unions on fertility in Guayaquil, Ecuador. *Social Biology,* 1974, *21,* 353-359.

Cleave, J.H. *African farmers: Labor Use in the Development of Small-holder Agriculture.* New York: Praeger, 1974.

Clignet, R. & Sween, J. Ethnicity and fertility: Implications for population programs in Africa. *Africa,* 1978, *48,* 47-65.

Davidson, A.R., Jaccard, J.T., Triandis, H.C., Morales, M.L., & Diaz-Guerrero, R. Cross-cultural model testing: Toward a solution of the etic-emic dilemma. *International Journal of Psychology,* 1976, *11,* 1-13.

Davis, K. & Blake, J. Social structure and fertility: An analytical framework. *Economic Development and Cultural Change,* 1956, *4,* 211-235.

DaVanzo, J. *The Determinants of Family Formation in Chile, 1960: An Econometric Study of Female Labor Force Participation, Marriage, and Fertility Decisions.* Report R-830-AID, 1972. Santa Monica, California: Rand Corporation.

Duncan, O.D. & Schnore, L.F. Cultural, behavioral and ecological perspectives in the study of social organization. *American Journal of Sociology,* 1959, *65,* 132-146.

Ewbank, D.C. Indicators of fertility levels in Tanzania: Differentials and trends in reported parity and childlessness. Paper presented at the annual meeting of the Population Association of America, St. Louis, April 1977.

Findley, S.E. & Orr, A.C. Patterns of urban-rural fertility differentials in developing countries: A suggested framework for analysis. Washington, D.C.: U.S. Agency for International Development, Development Support Bureau, Office of Urban Development, 1978.

Fortman, L. Women and Tanzanian agricultural development. Economic Research Bureau Paper 77.4. Dar es Salaam, Tanzania: University of Dar es Salaam, Economic Research Bureau, 1978.

Freedman, D.S. Mass media and modern consumer goods: Their suitability for policy interventions to decrease fertility. In R.G. Ridker (ed.), *Population and Development: The Search for Selective Interventions.* Baltimore: Johns Hopkins University Press, 1976.

Frisch, R.E. Demographic implications of the biological determinants of female fecundity. *Social Biology,* 1975, *22,* 17-22.

Goldberg, D. Residential location and fertility. In R.G. Ridker (ed.), *Population and Development: The Search for Selective Interventions.* Baltimore: Johns Hopkins University Press, 1976.

Goody, J. & Buckley, J. Inheritance and women's labor in Africa. *Africa,* 1973, *43,* 108-121.

Handwerker, W.P. Family, fertility and economics. *Current Anthropology,* 1977, *18,* 259-287.

Hass, P.H. Maternal role incompatibility and fertility in urban Latin America. *Journal of Social Issues,* 1974, *30,* 125-165.

Hass, P.H. Wanted and unwanted pregnancies: A fertility decision-making model. *Journal of Social Issues,* 1972, *28,* 11-127.

Henin, R.A., Ewbank, D. & Hogan, H. (eds.). *The Demography of Tanzania: An Analysis of the 1973 National Demographic Survey of Tanzania, Vol. 6.* Dar es Salaam: BRALUP and Bureau of Statistics, 1977.

Holsinger, D.B. & Kasarda, J.D. Education and human fertility: Sociological perspectives. In R.G. Ridker (ed.), *Population and Development: The Search for Selective Interventions.* Baltimore: Johns Hopkins University Press, 1976, 154-181.

Kane, F. Femmes proletaires du Senegal, a la ville et aux champs. *Cahiers d'Etudes Africaines,* 1977, *17,* 77-94.

Kar, S.B. Consistency between fertility attitudes and behavior: A conceptual model. *Population Studies,* 1978, *32,* 173-185.

Kennedy, R.E., Jr., Paul-Bello, M. & Rojas de Lara, M. Linkages between female educational status and fertility in Venezuela. Paper presented at the annual meeting of the Population Association of America, April 1974.

Kocher, J. Rural development and demographic change in northeastern Tanzania. *New*

Perspectives on the Demographic Transition. Interdisciplinary Communications Program Monograph No. 4. Washington, D.C.: Smithsonian Institution, 1976.

Kocher, J. Rural development and fertility change in tropical Africa: Evidence from Tanzania. African Rural Economy Paper No. 18. East Lansing, Michigan: Michigan State University, forthcoming.

Kuznets, S. Rural-urban differences in fertility: An international comparison. *Proceedings of the American Philosophical Society,* 1974, *118,* 1-29.

LeVine, R.A., Dixon, S. & LeVine, S. High fertility in Africa: A consideration of causes and consequences. Paper presented at the African Studies Association, 1976.

Li, W.L. Temporal and spatial analysis of fertility decline in Taiwan. *Population Studies,* 1973, *27,* 97-104.

Michaelson, E.J. & Goldschmidt, W. Female roles and male dominance among peasants. *Southwestern Journal of Anthropology,* 1971, *27,* 330-352.

Miller, K.A. & Inkeles, A. Modernity and acceptance of family limitation in four developing countries. *Journal of Social Issues,* 1974, *30,* 167-188.

Moock, J.L. Pragmatism and the primary school: The case of a non-rural village. *Africa,* 1973, *43,* 302-316.

Nag, M., White, B.N.F., & Peet, R.C. An anthropolgical approach to the study of the economic value of children in Java and Nepal. *Current Anthropology,* 1978, *19,* 293-307.

Nagata, J. A tale of two cities: The role of non-urban factors in community life in two Malaysia towns. *Urban Anthropology,* 1974, *3,* 1-26.

Polgar, S. Population history and population policies from an anthropological perspective. *Current Anthropology,* 1972, *13,* 203-211.

Reining, P. and others. *Village Women: Their Changing Lives and Fertility: Studies in Kenya, Mexico and the Philippines.* Washington, D.C.: American Association for the Advancement of Science, 1977.

Schnaiberg, A. The concept and measurement of child dependency: An approach to family formation analysis. *Population Studies,* 1973, *27,* 69-84.

Schnaiberg, A. & Armer, M. Urbanism, modernism and fertility: A comparative evaluation. Paper presented at the annual meeting of the Population Association of America, 1974.

Schnaiberg, A. & Goldenberg, S. Closing the circle: The impact of children on parental status. *Journal of Marriage and the Family,* 1975, *37,* 937-953.

Schnaiberg, A. & Reed, D. Risk, uncertainty and family formation: The social context of poverty groups. *Population Studies,* 1974, *28,* 518-533.

Schultz, T.P. Interrelationships between morality and fertility. In R.G. Ridker (ed.), *Population and Development: The Search for Selective Interventions.* Baltimore: Johns Hopkins University Press, 1976.

Shedlin, M.G. & Hollerbach, P.E. Modern and traditional fertility regulation in a Mexican community: Factors in the process of decision-making. Working Paper of the Center for Policy Studies. New York: The Population Council, 1978.

Simmons, A.B. & Noordham, J. Education and contraceptive knowledge in rural areas of four Latin American nations. Mimeo. Ottawa: International Development Research Centre, November 1977. (Forthcoming in *Canadian Studies in Population.)*

Stahl, K.M. The Chagga. In P.H. Gulliver (ed.), Tradition and Transition in East Africa: Studies of the Tribal Element in the Modern Era. London: Routledge and Kega Paul, 1969, 209-222.

Swantz, M.L. *Ritual and Symbol in Transitional Zaramo Society.* Uppsala, Sweden: Almquist and Wiksells Boktryckeri AB, 1970.

Swartz, M.J. Some cultural influences on family size in three East African societies, *Anthropological Quarterly,* 1969, *42,* 73-88.

Tanzania, Government of. *National Demographic Survey, 1973, Vol. 1.* Dar es Salaam, Tanzania: Bureau of Statistics, 1976.

Tienda, M. The economic activity of children in rural and urban Peru: Labor force behavior in a familial context. Paper presented at the annual meeting of the Rural Sociological Society, 1977.

Thompson, R.W. Fertility aspirations and modernization in urban Uganda: A case of resilient cultural values. *Urban Anthropology,* 1978, *7,* 155-168.

Zalla, M.T. Kwashiorkor in Kilimanjaro: A study of the etiology, epidemiology, care, and prevention of malnutrition in an East African people. Ph.D. dissertation, Michigan State University, in progress.