



February 1987

Mother's income and child mortality in southern Nigeria

Ismaila Lawal Sulaiman

Follow this and additional works at: http://repository.upenn.edu/psc_african_demography

Sulaiman, Ismaila Lawal, "Mother's income and child mortality in southern Nigeria" (1987). *PSC African Demography Working Paper Series*. 15.

http://repository.upenn.edu/psc_african_demography/15

African Demography Working Papers Working Paper No. 15 February 1987

This paper is posted at ScholarlyCommons. http://repository.upenn.edu/psc_african_demography/15
For more information, please contact libraryrepository@pobox.upenn.edu.

Mother's income and child mortality in southern Nigeria

Abstract

Material resources affect the levels of mortality. In cross-sectional relationships income has been found to be positively associated with survival, both within and between countries. Preston (1975, 1976), in particular, using cross-national data for three separate decades of the 20th century, showed that at any point in time there was a positive relationship between national income per capita and life expectancy. Other studies (e.g., those reviewed in Cochrane et al., 1980) have arrived at the same conclusion. Within countries, just as at the cross-national level, child mortality has been found to be inversely related to the economic status of the family, but the measure of economic status used has not always been the same. In the minority are studies of socioeconomic determinants of child mortality which have examined the association between economic status, measured by income, and child survival (Anker and Knowles, 1980; Carvajal and Burgess, 1978; Farah and Preston, 1982; Schultz, 1980; Tekce and Shorter, 1983).

Keywords

Africa, Nigeria, child mortality, mortality, income, mother's income, parental income, survival, life expectancy, cross-national, data, survey, education, occupation, socioeconomic status, family, household income, female labor force participation, mothers, spouses, husbands, Igbo, Yoruba, wives, inheritance, property, National Fertility Sample, child survival, National Surveys of Fertility, Family and Family Planning, KAP Survey, National Fertility Surveys, data quality, questionnaires, polygyny

Comments

African Demography Working Papers Working Paper No. 15 February 1987



African Demography Working Papers

Working Paper No. 15

Mother's Income and Child Mortality in Southern Nigeria

Ismaila Lawal Sulaiman

February 1987

POPULATION STUDIES CENTER
UNIVERSITY OF PENNSYLVANIA

MOTHER'S INCOME AND CHILD MORTALITY IN SOUTHERN NIGERIA

BY

ISMAILA LAWAL SULAIMAN

1. Introduction

Material resources affect the levels of mortality. In cross-sectional relationships income has been found to be positively associated with survival, both within and between countries. Preston (1975, 1976), in particular, using cross-national data for three separate decades of the 20th century, showed that at any point in time there was a positive relationship between national income per capita and life expectancy. Other studies (e.g., those reviewed in Cochrane et al., 1980) have arrived at the same conclusion. Within countries, just as at the cross-national level, child mortality has been found to be inversely related to the economic status of the family, but the measure of economic status used has not always been the same. In the minority are studies of socioeconomic determinants of child mortality which have examined the association between economic status, measured by income, and child survival (Anker and Knowles, 1980; Carvajal and Burgess, 1978; Farah and Preston, 1982; Schultz, 1980; Tekce and Shorter, 1983).

In most cases income data are not readily available in sample surveys or, if available, there are serious misgivings about their quality. Many studies have, therefore, used proxies of income such as education, occupation, quality of housing and possession of consumer goods to measure family economic status (e.g., Antonovsky and Bernstein, 1977; Caldwell, 1979; Meegama,

1980). Apart from capturing other influences,¹ several of these income proxies may not adequately reflect family economic status.² In addition, the absence of income data restricts our knowledge of the determinants of child mortality, in part because income is a variable through which many variables, such as education and occupation, are presumed to affect child mortality (Preston, 1983).

Even in those cases in which income data are available the measure of family economic status that is employed has been either husband's or household income, instead of the separate incomes of spouses. In general, demographers have not examined income of the mother as an independent determinant of child survival, in part because mother's income is not often available in surveys, and also because of the prevailing assumption in economic theory that household income is pooled and consumption is shared through a joint husband-wife decision (Mincer and Polachek, 1974). There are, however, ethnic groups such as the Akan of Ghana (McCall, 1961) and the Yoruba of Nigeria (LeVine, 1966) with significant female labor force participation, in which spouses have traditionally maintained separate incomes. In those societies mothers have defined responsibilities in terms of providing for either some, or all, of their own and their

¹ For example, the variable "mother's occupation" may represent both the level of mother's earnings and the amount of child care time mother's have.

² See Meegama's (1980) argument on the extent to which husband's education and occupation reflect family standards of living in Sri Lanka.

children's food and daily needs. It is logical in these societies to expect mother's income to have an effect on child survival which is, at least to some extent, independent of that of the husband.

Using data from the National Surveys of Fertility, Family and Family Planning, this paper attempts to test the hypothesis that mother's income has an effect on child mortality that is independent of husband's income. It compares the effect of mother's income on child mortality with that of the husband and seeks to clarify the channels through which mother's occupation affects child mortality. In this study, a subset of data from these fertility surveys comprising the records of women residing in the southern part (i.e., in the eastern and western states) of Nigeria, who are currently married and below age 50 years and those of their husbands, is analyzed. Southern Nigeria, provides an ideal setting for exploring the impact of mother's income and occupation on child mortality because women in this area have traditional responsibilities in the family such as providing for either some or all of their own and their children's food (Meek, 1937; LeVine, 1966).

Besides examining, apparently for the first time, the effects of mother's income on child mortality,³ this paper

³ A similar analysis, limited to the western states of Nigeria, of the factors considered in this paper also appears in a cross-national study (United Nations, 1985). This latter study is, however, a comparative examination of child mortality correlates in 15 developing countries and avoids, for brevity, detailed discussion of the factors for each country. See also, Mensch et al., 1983, for a summary of findings from that study.

contributes to our understanding of the determinants of child mortality in the southern part of Nigeria, Africa's most populous nation. Even by African standards, very little is known of Nigerian child mortality and its determinants. In fact, the only work known to this writer on socioeconomic differentials in child mortality in Nigeria is that by Caldwell (1979). His analysis is, however, based mainly on data from a single city, Ibadan. Although information from all western states is also presented, it is used only for background.

2. Women, Income and Child Mortality

In southern Nigeria women participate to a high degree in the labor force. This section examines the cultural factors that encourage women to earn incomes, and the expected relationship between female income and child mortality. The discussion draws evidence from two ethnic groups - the Igbo and the Yoruba - who together comprise two thirds of the southern Nigeria sample.

The traditional expectation among the Yoruba is that "each wife be responsible for her own and her children's daily food and sundry needs" (Aronson, 1978). To some extent this is also true about the Igbo, whose women usually obtain food supplies from their own farms (Meek, 1937; Ottenberg, 1959). It is also traditionally expected among the Yoruba that wives provide themselves with clothing, jewelry and dress for weddings and other ceremonies (Fadipe, 1970). According to Levine (1966), "despite overt signs of deference [Yoruba] wives are generally

expected to be economically independent, quick to divorce their husbands if they found a more advantageous match, and generally difficult to control". These cultural expectations of the Yoruba and the Igbo appear to be shared by many other African societies such as the Akan of Ghana (McCall, 1961).

The result of these expectations, that women take care of themselves and their children, is the high degree of female labor force participation among southern Nigerian women. But this is not a recent phenomenon. Within both the Igbo and the Yoruba societies women have traditionally taken an important role in economic activities. Igbo women used to farm together with their husbands while, at the same time, they were dominating trade in the rural markets. Yoruba women, on the other hand, hardly farmed; they were engaged in trading and in traditional crafts such as pottery and weaving (Lloyd, 1972).

Apart from the traditional expectation that women contribute to the family, Baker and Bird (1959) argue that, outside claims on husband's income reduce the share going to a particular wife, motivate women to seek their own income and especially so increase the reliance of children on their mother's economic resources. The outside claims on a man's resources are by his relatives, his other wives (or girlfriends) and their children. In fact, according to Izzett (1961), the urban Yoruba husband often does not regard his wife and children as having first claim on his wage or salary, but instead feels that his mother, his siblings or cousins have prior claims.

Among both the Igbo and the Yoruba, incomes and property are separately owned by husbands and wives. A woman does not inherit from her husband, nor does a husband from his wife (Meek, 1937; Bascom, 1969). Her own property is inherited by her children. This arrangement, where property and income are individually owned, and inheritance is by children instead of by spouse, assures the mother that whatever she acquires will ultimately be hers alone, for her usage and that of her children. In effect, her property and efforts will not benefit her husband's girlfriends or other wives as would likely be the case if her property was to be inherited by her husband.

What the above discussion suggests is that the cultural definition of women's roles and financial responsibilities and the pattern of inheritance ensures that women in southern Nigeria have a high degree of labor force participation and consequently, independent sources of income. Evidence of their high economic activity is found in the National Fertility Sample, where up to 80 percent of women have some kind of occupation. As is true for parental education (where mother's education is more important than husband's education in determining child mortality), it is hypothesized that mother's income will have a greater impact on child survival than income of her husband. This is because a woman is "able to devote herself to [her children's] needs with more single-mindedness than is her husband with his many other commitments" (Baker and Bird, 1959:116).

To earn income, mothers typically engage in occupations

outside the home. Therefore, the variable "mother's occupation" could affect child mortality either through mother's income or through the amount of time mothers have for child care, or both. It is likely that once mother's income is held constant, only the effects of occupation through the amount of child care time will remain. That latter effect will, however, depend on the extent to which mother's occupation is compatible or conflicts with child care. Carvajal and Burgess (1978), among others, argue that because child-rearing is a labor-intensive activity, it requires a considerable investment in mother's time; having an occupation outside the home reduces the amount of time mothers have for child-rearing and increases the probability of child accidents. This argument has been used to explain the positive association between labor force participation and child mortality found in three Latin American cities (Carvajal and Burgess, 1978) and in Sudan (Farah and Preston, 1982).

In southern Nigeria the influence of mother's occupation on child mortality is likely to be primarily through her income and not through the amount of time devoted to child care, for two reasons. One is that in most occupations, except those in the modern white collar sector (which employs fewer than 10 percent of the women in the sample), female work is, in general, not divorced from household activities such as cooking (Aronson, 1978). This is especially true of petty trade in which one-third of the sampled women are employed. The second factor which reduces the likelihood of mother's occupation operating on child

mortality through child care practices is related to the significant role of others, especially close relatives, in child-rearing in southern Nigerian societies. Traditionally, within both the Yoruba and the Igbo societies, children are considered as belonging to the entire lineage and responsibility for them is shared (Meek, 1937; Bascom, 1969). In those societies the absence of the mother from home because of her occupation might be irrelevant to the care of the child.

3. Data Source and Data Quality

The data used in this paper were collected as part of the National Surveys of Fertility, Family and Family Planning-KAP 1971-73 covering eastern and western states (i.e., southern Nigeria). The National Fertility Surveys⁴ were single round inquiries conducted to obtain fertility data but also obtained a broad range of information on demographic, social and economic characteristics of samples of eligible women and their husbands and of the communities in which they lived. Three questionnaires, corresponding to three groups of respondents, were administered. First, the household questionnaire generated a summary of data on each member of the household; the respondent here was the household head. Second, eligible women, defined as those currently married and below age 50, were selected from the household records and were administered the female question-

⁴ All information pertaining to the National Fertility Surveys was obtained from Acsadi et al., 1972.

naire. The third questionnaire was administered to the husband of each eligible woman.

The National Fertility Surveys were divided into phases corresponding to the regions of Nigeria. The first phase of the project, 1971, covered the western states, which are predominantly inhabited by members of the Yoruba ethnic group. The second phase of the project, 1972-73, covered eastern states, which are home to the Igbo people. The third and final phase of the project, 1973, covered northern Nigeria but no data were available for this paper.

In the data set 3,014 and 1,627 household interviews were conducted for the western and eastern phases respectively. These generated 3,415 eligible female interviews for the western states and 1,838 for the eastern states. For estimating the effects of factors on child mortality, data records of female respondents aged 15-49, linked to those of their husbands, were used. This selection generated samples of 3,010 couples for the western states and 1,669 for the eastern states (southern Nigeria = 4,679).

The relevant mortality information in the surveys is derived from mother's responses to questions on number of children surviving, and on number of children dead. The questions used were: 1) Have you children at home? 2) Have you any children far from the family? 3) Have you any children who were born alive to you but who are not living now? If the response to any of the above questions was positive the respondent was asked to

give the number. The number of children ever born for each woman is, therefore, the sum of the responses for all of the three questions.

Questions on the annual incomes of mothers and their husbands were asked in the National Fertility Surveys. Considerable misgivings have been expressed about the quality of income data obtained from surveys in developing countries, in general, because developing economies are characterized by a high degree of subsistence production. In these systems production is mainly for home consumption and the peasants, it is argued, hardly know their incomes. Even where incomes are known, for example in urban areas, it is argued that there is often failure to report all earnings for fear of taxation and the claims of other relatives (Caldwell, 1976).

It is with these reservations in mind that we proceed to evaluate the quality of southern Nigerian income data. First we describe the principal occupations in which people are engaged and their degree of monetization and discuss the question used to elicit income information, as well as how the responses were coded.

Most respondents in the southern Nigeria sample are employed outside the agricultural sector, in occupations where the rewards are most likely to be in monetary terms. Only about 26 percent of the women and 37 percent of their husbands are engaged in agriculture. Almost half of the male respondents are either in white collar occupations such as teaching, nursing and admini-

stration, or in skilled occupations, such as driving and smithing. One-third of the female respondents are employed in the first two occupational categories, another third is in petty trading. Many of those employed in the agricultural sector were growing crops such as cocoa for cash. Moreover, almost half of both male and female respondents with missing information on income are in farming and agricultural occupations. It is expected that for most people working outside farming, cash incomes are important for purchasing food.

The question used to elicit information on income was: "could you give an estimate of your income from all sources during the last 12 months?". It was included in both male and female questionnaires, so that male incomes were reported by husbands, and female incomes by wives. The responses were coded to the nearest ten Nigerian pounds. Therefore, both the income question and its coding were designed to provide only an estimate of one's income. The income was later converted into dollar equivalents using the 1972 exchange rate of N1 - US \$3.04. Although income is measured as a continuous variable, for all the analyses in this paper income is treated as a categorical variable. Using income as a categorical variable precludes the need to exclude records with missing information on income. One-quarter of the female respondents and one-fifth of their husbands have missing information on income and 18 percent of the former and 4 percent of the latter report having no incomes. These figures imply that at least 25 percent, and probably as

much as 43 percent, of the records would have to be excluded from regression analyses if income is used as a continuous variable. Besides losing a substantial number of cases, selectivity of respondents with missing income data could result in biased estimates of regression coefficients. Five categories of income are used in the analyses. In addition to the two categories "none" and "unknown/missing", mother's income is classified into \$1-69, \$70-299 and \$300+; while husband's income is classified into \$1-139, \$40-599 and \$600+. 45 percent and 14 percent of the women have annual incomes of less than \$300 and greater than \$300, respectively. 49 percent of the husbands have annual incomes of less than \$600, another 29 percent have incomes greater than \$600. In general, women report lower incomes than men.

4. Methodology

The method of estimation used to study the effects of income and other factors on child mortality was developed by Trussell and Preston (1981). In their paper Trussell and Preston put forward a set of multivariate regression procedures for estimating the effects of individual, household and community level factors on child mortality. Measures required to use the method are number of children ever born, number of children born alive who died and an indicator of exposure to the risk of mortality, either the age of mother or her marital duration. To use this method one first selects a standard schedule of mortality. The

aim of adopting and using a standard schedule of mortality on a population is to facilitate the comparison of the relative mortality of groups by eliminating the likely biases that would arise if another measure, such as the observed proportion dead, D_i , for each group were used.⁵ The standard schedule of mortality for southern Nigeria was selected from Coale-Demeny north model life table systems. The selection was based in part on prior child mortality estimates (Sulaiman, 1984) which provided information on the southern Nigerian mortality level, and on the expectation that if the standard schedule fits the population in question, then total reported child deaths should equal total expected child deaths.

For the standard cumulative probabilities of dying, $q^S(a)$, to reflect child mortality experience accurately in a population, it must be adjusted to take into account the timing of childbearing. This is done by dividing $q^S(a)$ by an adjustment factor, K_i . The adjustment factors are provided for each of the four families of the Coale-Demeny model life table systems.

The equations for solving for K_i use average parities for either 5-year age or marital-duration groups. In this study age was used as the index of exposure to the risk of mortality, since almost 15 percent of the sample had missing information on age at first marriage. For our purpose the average parities used in computing the adjustment factors were derived from data of the

⁵ United Nations (1985), p. 7.

Survey on the Changing African Family.⁶ This was because the National Fertility Survey was restricted to currently married women, and the average parities based on that data set were too high for use with the age variant of the procedure. With the adjustment factors the expected proportion dead (EPD) for each age group (i) was

$$EPDi = q^S(i) / Ki$$

$q^S(i)$ being the standard cumulative probability of dying for group i. The expected number of children dead is then computed for each woman as the product of the number of children she has given birth to and the expected proportion of children dead for her age group. Thus for each individual woman her reported number of children dead divided by her expected number of children dead is our child mortality index. That ratio is taken as the dependent variable in a multiple regression whose independent variables are the socioeconomic factors that are assumed to determine levels of child mortality. The selected standard schedule of mortality found to fit southern Nigeria is based on the north model life table; its associated life expectancy at birth is 45.8 years.

Analysis of factors influencing child mortality was done in three ways. The number of children reported dead and the expected number of children dead are cross-classified by socioeconomic factors and the results are presented as the "gross"

⁶ See Sulaiman, op. cit., 34.

effect of each variable. The ratios indicate the extent of child mortality differentials controlling for differences in the length of exposure of children to the risk of mortality. To examine the extent to which the relationship between the independent variables and child mortality is mediated by other factors and to uncover the presence of interactions between factors, cross-classification analysis is also performed. The cell values are the child mortality indices described above. To examine channels through which socioeconomic factors influence child mortality as well as to examine the cluster of variables responsible for changes in the observed relationship between a specific variable and child mortality, ordinary least squares regressions were run (for women with at least one live birth) in stages. Footnotes at the end of Tables 5, 6 and 10 list the socioeconomic factors that are controlled at each stage.

5. Results and Discussion

A. Mother's and Husband's Incomes

At the univariate level, children of mothers with either no incomes or with annual incomes of less than \$70 have the highest mortality (Table 1). Table 1 also shows that maternal incomes up to \$300 do not greatly reduce the level of child mortality. However, when mothers have annual incomes of \$300 or more, the level of their children's mortality is decreased by about 40 percent relative to those whose mothers have no income and by 37 percent relative to those whose mothers have incomes \$70-299.

Table 1

Number of children reported dead, expected number of children dead and ratio of children dead to expected children dead by mother's annual income, southern Nigeria, 1971-1973

Mother's income last 12 months in U.S. \$	Southern Nigeria		
	CD ^a	CDEXP ^b	Ratio ^c
None	665	640.53	1.03
\$1 - 69	1323	1146.24	1.15
\$70 - 299	740	759.57	0.97
\$300 +	290	471.48	0.61

^aCD = Number of children reported dead.

^bCDEXP = Expected number of children dead.

^cRatio = CD/CDEXP.

Table 2 reveals that child mortality is inversely associated with husband's (father's) income. Mortality of children whose fathers have annual incomes of \$1-139 is about the same as that of children whose fathers have no income. Children whose fathers have annual incomes between \$140-599 have mortality levels that are only 12 percent lower than those of children whose fathers have no income, while mortality of children whose fathers have annual incomes of \$600 or more is 38 percent lower. It appears therefore that only paternal incomes of \$600 or more have a major impact on child survival.

Table 2

Number of children dead, expected number of children dead and ratio of children dead to expected children dead by husband's annual income, southern Nigeria, 1971-73

Husband's income last 12 months in U.S. \$	Southern Nigeria		
	CD ^a	CDEXP ^b	Ratio ^c
None	188	152.77	1.23
\$1 - 139	1051	873.56	1.20
\$140 - 599	1264	1171.51	1.07
\$600 +	803	1049.17	0.76

^aCD - Number of children reported dead.

^bCDEXP - Expected number of children dead.

^cRatio - CD/CDEXP.

Although these results indicate large child mortality differentials, important questions remain. It is probable that some or all of the effects observed at this level might be due to other unmeasured factors; of special interest is whether mother's income is a proxy for that of the husband, and whether the effect of mother's income on child mortality is largest in complex households where demands on a husband's income are probably greatest. These and other questions are addressed below.

Table 3 cross-classifies mother's income by household composition⁷ and shows that at nearly every level of income child

⁷ Defined by number of family nuclei and generations in a household.

Table 3

Cross-tabulation of the ratio children dead to expected children dead by mother's income and household composition, southern Nigeria, 1971-73 (CDEXP in parentheses)

Household composition/ mother's income	Nuclear family ^a	Complex (two or more family nuclei) ^b
None	0.8260 (380.14)	1.4062 (236.10)
\$1 - 69	1.0429 (564.76)	1.2508 (515.68)
\$70 - 299	0.7399 (396.02)	1.2128 (327.33)
\$300 +	0.5616 (318.72)	0.8598 (145.39)

^aIncludes one married couple living with parent.

^bIncludes polygynous households.

mortality is higher in complex households than in nuclear family households. The effect of mother's income appears to be much greater in complex households. For example, in households that contain only one family nucleus, mothers with annual incomes of \$1-69 have 26 percent higher child mortality than mothers with no income. However, in complex households, mothers who have incomes between \$1-69 have 14 percent lower child mortality than mothers without incomes. Similarly, within nuclear family households, maternal annual income of \$300 or more reduces child mortality by about 30 percent relative to the level among those with no income; while the reduction among complex households is almost 40

percent. In contrast the effect of father's income is more important in nuclear family households. This is apparent in Table 4 at every level of husband's income.

Table 4

Cross-tabulation of the ratio of children dead to expected children dead by husband's income and household composition, southern Nigeria, 1971-73 (CDEXP in parentheses)

Husband's income	One nuclear family household	Complex (two or more family nuclei) ^b
None	1.2260 (101.14)	1.4965 (52.79)
\$1 - 139	1.0722 (498.98)	1.3779 (356.35)
\$140 - 599	0.9510 (573.08)	1.2007 (523.85)
\$600 +	0.5827 (655.58)	1.0724 (344.10)

^aIncludes one married couple living with parents.

^bIncludes polygynous households.

Tables 3 and 4, therefore, indicate that while maternal income is slightly more important to child survival in complex households, paternal income has greater impact on child survival in nuclear family households. This finding lends some support to the argument of Baker and Bird (1959) which suggests that the competing demands of relatives, other wives and children, for husband's income reduce the share going to each wife and thereby increase the reliance of children on their mother's resources.

Table 5

Regressions of ratio of children dead to expected children dead on maternal income and a number of other socioeconomic factors, southern Nigeria, 1971-73 (unstandardized coefficients)

Mother's income	Regression equations				Mean value of variable weighted by births
	1 ^a	2 ^b	3 ^c	4 ^d	
\$1 - \$69	.1000**	.0876*	.0417	-.0854	.275
\$70 - \$299	-.1110**	-.0719	-.0833*	-.1820***	.185
\$300	-.4070***	-.2742***	-.1647	-.2080***	.123
Reference: none	--	--	--	--	.164
R ²	.019	.034	.062	.134	

*Significant at .10 level. **Significant at .05 level. ***Significant at .01 level.

^a Variables included: mother's income.

^b Variables included: mother's income, husband's income.

^c Variables included: mother's income and education, husband's income.

^d Variables included: All available variables: mother's income, and education, husband's income and education, mother's and husband's occupation and religion, mother's ethnicity, and occupation before first marriage, maternal and paternal grandfather's occupation, quality of housing, number of consumer goods possessed by a household, electricity and water system in a community, access to health care facilities, rural-urban residence, toilet and water system in a household, household size and composition and marital structure.

It seems likely that in complex households the potential effectiveness of husband's income for improving child survival is diluted by these demands from kin and other members of his family. On the other hand, the impact of increases in income is directly felt by children who tend to rely on maternal resources for their food and other needs. Within nuclear family households the demands on the husband's income are less and mother's income probably plays only a supplementary role to that of the husband.

Results of multivariate analyses presented in Tables 5 and 6 demonstrate that both mother's and husband's incomes have effects on child mortality that are largely independent of each other and of other socioeconomic factors. Equations 2 and 3 in Table 5 show that some of the effects of a mother's income on her children's mortality that are observed at the univariate level are accounted for by its correlation with husband's income and maternal education. In equation 4, with all other socioeconomic factors held constant, the effects on child mortality of annual incomes less than \$300 are strengthened relative to the coefficients in equations 1. The increase in the size of the coefficients may be attributed to the fact that women in low income groups have lower education and other characteristics which are associated, at the univariate level, with higher child mortality. But at the highest income levels (\$300+) the effect of income is reduced though still significant. Specifically equation 4 shows that women with annual incomes of \$70-299 have 18 percent lower child mortality, while those with incomes of

\$300 or more have levels 20 percent lower mortality than those without any income.

Husband's annual income also has a significant effect on the levels of child mortality after controlling for the effect of other variables, though its effect is less than that of mother's income. Table 6 shows that while the effect of income of over \$600 is reduced when other factors are held constant, the effects of income levels below \$600 are strengthened. This is similar to the effect of maternal income. In equation 2, when availability of toilet and water facilities in the household is held constant the effects on child mortality of paternal incomes of \$600 are reduced by about 24 percent. This attenuation suggests that part of the reason for the lower mortality of children whose fathers have high incomes might be because they are usually resident in houses with better sanitation. In equation 3 (complete model) children whose fathers earn some income, irrespective of the amount, have at least 17 percent lower levels of mortality than those whose fathers have no income. These results, which reveal an inverse association between father's income and the mortality of his children, are consistent with what has been found in Sudan (Farah and Preston, 1982), Kenya (Anker and Knowles, 1980), and elsewhere.

The results in Tables 5 and 6 show that mother's and husband's incomes have independent effects on child mortality. As some have suggested (see, for example, Aronson's 1978 description of Ibadan Yoruba couples), it seems likely that in

Table 6

Regressions of ratio of children dead to expected children dead on father's income and other socioeconomic variables, southern Nigeria, 1971-73 (unstandardized coefficients)

Mean value of father's income	Regression equation			Variable (birth weighted)
	1 ^a	2 ^b	3 ^c	
\$1 - \$139	.0198	-.0010	-.1665***	.219
\$140-\$599	-.1130	-.1224**	-.2541	.282
\$600	-.4340***	-.3287***	-.1849***	.265
Reference:				
none	--	--	--	.085
Constant	1.1720	1.2113	1.5453	--
R ²	.025	.042	.134	--

**Significant at .05 level.

***Significant at .01 level.

^aVariables included: father's income.

^bVariables included: father's income, toilet and water facilities in the household.

^cVariables included: all available, including household size. See Table 5 for the complete list.

southern Nigeria the functions of a mother's income are different from those of a husband's income. It is likely that the principal function of a mother's income as it relates to child mortality is to provide her own and her children's food while the role of the husband's income is in the provision of housing including facilities such as water, toilet and medicine. Partial support for the latter function is provided by results in Table 6 (equation 2): almost one-quarter of the univariate effect on child mortality of a husband's income of \$600 or more is due to its association with household toilet and water facilities.

As regards the relative importance of these variables,

mother's income seems to make a greater contribution to improving child survival than the husband's, as is seen in Table 7 where slopes of child mortality with respect to parental income are displayed. These results mean that at the univariate level a \$100 increase in mother's income reduces the level of child

Table 7

Slopes^a of regression coefficients for parental income, southern Nigeria, 1971-73

	Mother's income	Husband's income
No controls	-.0011	-.0006
All variables controlled	-.0004	-.00003

^aThe slopes were estimated by fitting a line to the univariate ratios and the corresponding variable coefficients. The values used for fitting the line were weighted by the expected number of children dead in each income category.

mortality by 11 percent; this compares with a reduction of about 6 percent associated with the same increase in husband's income when all other factors are controlled, and the reduction in child mortality due to a \$100 increase in mother's and husband's incomes is about 4 percent and 0.3 percent, respectively. The latter effect is, however, only the "direct" effect of income on child mortality.

Mother's income is, thus, a significant and independent determinant of child mortality with an impact that is greater than that of the husband's income. An important question at this stage is why the effect of mother's income on child mortality is

greater than that of the husband. Following Baker and Bird (1959), it was argued that because of the demands of kin and of other wives and children the potential effectiveness of husband's resources for improving child survival would be less than that of the mother's resources. These results seem to be consistent with the argument. Moreover, it seem likely that women's earnings could play a similar role in many African societies. After reviewing the role of women in several African societies, Baker and Bird (1959:116) argue:

. . . the importance of a woman as a providing mother. Whether she lives as a member of a firmly established monogamous conjugal family or of an insecurely monogamous family; whether she shares a husband with resident co-wives in a legally polygynous family or with non-resident official wife or non-resident 'outside' wives in scattered informal polygyny, her activities and efforts are equally directed towards her children. She is able to devote herself to their needs with more single-mindedness than is her husband with his many other commitments.

It is likely then that at any given level of income the potential effectiveness of a husband's income on his children's survival is lowered because of demands on the resources by kin and other wives and children. This argument becomes more acceptable when it is remembered that malnutrition is a major cause of morbidity and mortality in developing countries (Mata, 1975). These results are similar to findings specific to parental education which often show mother's education to be more important than father's.

B. Mother's Occupation

There are large child mortality differentials according to

mother's occupation. This is apparent from Table 8 where mothers in non-manual white collar occupations have the lowest child mortality followed by those who are economically inactive. Mothers in farming and agricultural occupations have almost two and a half times the level of child mortality of women in white collar occupations. Women who are in non-white collar occupations have higher child mortality levels than those who are economically inactive. Contrary to what was expected, it seems that working outside the home, in any occupation but a white collar one, is associated with higher child mortality than economical inactivity but slightly lower than labor in agriculture (Table 8).

Table 9 shows that women in farming have higher levels of child mortality than those in other occupations (excluding petty trading), in part because they are typically poorer. But, even at the highest income level, women in farming still have nearly two and a half times the level of child mortality of those in white collar occupations. In addition, when women have either no income or have annual income of less than \$70, the lowest child mortality is found among those who are economically inactive.

Regression equation 2 in Table 10 shows that the lower child mortality levels of women in white collar occupations that are observed in the simple univariate analysis (equation 1, and in Table 8), are mainly a result of their earning some income. Furthermore, when maternal income is introduced into the regression the higher child mortality of working women is accentuated,

suggesting that their earned income was offsetting some of the underlying disadvantages (in terms of child survival) of their participation in the labor force. When both income and education are held constant (equation 3) working outside the home, irrespective of the type of occupation, is found to be associated with higher child mortality. The differential remains

Table 8

Number of children dead, expected number of children dead, and ratio of children dead to expected children dead by mother's occupation, southern Nigeria and its component regions, 1971-73

Mother's occupation	Southern Nigeria		
	CD	CDEXP	RATIO
Non-manual white collar ^a	104	213.42	0.48
Farming and agricultural	1526	1337.43	1.14
Petty trade	1201	1191.86	1.00
Skilled ^b	574	543.45	1.05
Unskilled ^c	34	31.78	1.06
Economically inactive	558	625.45	0.89

^a Non-manual white collar occupation consists of those in teaching, nursing, clerical and administrative jobs.

^b Skilled occupations consist of drivers, tailors, mechanics, carpenters, etc.

^c Unskilled occupations include laborers and domestic servants.

CD = Number of children reported dead.

CDEXP = Expected number of children dead.

Ratio = CD/CDEXP.

Table 9

Cross-tabulation of ratio of children dead to expected children dead by mother's occupation and her income, southern Nigeria, 1971-73 (CDEXP in parentheses)

Mother's occupation	Mother's income			
	None	\$1-69	\$70-299	\$300
White collar	**	**	**	0.4103 (173.06)
Farmer/agriculture	1.2632 (110.83)	1.1372 (499.47)	0.9888 (200.24)	0.9845 (47.74)
Petty trade	1.5780 (58.30)	1.1665 (403.33)	1.0147 (378.44)	0.7003 (157.08)
Skilled	1.2609 (38.07)	1.2992 (184.73)	0.9154 (143.10)	0.8037 (83.36)
Inactive	0.9210 (412.61)	0.8958 ^a (42.42)	**	**

^a It is not clear how some mothers in the "inactive" category have incomes. This may be a reflection of the inaccuracies in the reporting of income or ambiguities in the definition of active.

**CDEXP <20

only slightly reduced after other husband's characteristics have been introduced in equation 4. However, in equation 5, when all available socioeconomic factors have been controlled, a significant proportion of the variation in child mortality due to mother's occupation is eliminated. This suggests that mother's occupation works through other factors in influencing levels of child mortality.

A number of cross-tabulations (not shown) were run to

Table 10

Unstandardized coefficients of regressions of ratio of children dead to expected children dead on maternal occupation and other socioeconomic variables, southern Nigeria, 1971-73

Mother's occupation	Regression equations					Mean value of variable (birth (weighted))
	1 ^a	2 ^b	3 ^c	4 ^d	5 ^e	
Economically inactive: reference category	--	--	--	--	--	.165
White collar	-.3976***	-.0383	.1035	.0804	-.0309	.056
Agricultural	.2604***	.3641***	.1907***	.1355***	.0293	.329
Petty trade	.1273***	.2907***	.1947***	.1614***	.0123	.291
Skilled	.1100*	.2703***	.2466***	.2101***	.0876	.133
Unskilled	.1692	.3349*	.3897**	.3469*	.1356	.007
Constant	.8813	.9434	1.1394	1.3127	1.5160	
R ²	.021	.033	.061	.073	.134	

*Significant at .10 level. **Significant at .05 level. ***Significant at .01 level.

^a Variables included: mother's occupation.

^b Variables included: mother's occupation and income.

^c Variables included: mother's occupation, income and education.

^d Variables included: mother's occupation, income and education, husband's education, income and occupation.

^e Variables included: all available. For a complete list, see Table 5.

determine why much of the child survival advantages of being economically inactive are eliminated. It was found that the major reasons why women who are economically inactive women have lower child mortality are that more of them: 1) are resident in nuclear family households (which is probably a proxy for the direct role of mother in child care), 2) have toilet and water facilities in their households, 3) are resident in areas with hospitals, 4) are urban and, 5) are Christian. All of those conditions are associated with improved child survival. In contrast, more of those employed in other occupations (except white collar) are in households without toilet and water facilities, are in complex households (where others probably have a greater role in child care), rural, and resident in areas without health facilities. All these conditions are associated with higher child mortality.

The results of these analyses, therefore, indicate that the higher child survival of those who are inactive is mainly because they have certain characteristics which are associated with low child mortality. However, to the extent that mothers have a more direct role in child care in nuclear family households, and more mothers who are economically inactive are in those households, there is some support for the position articulated by Carvajal and Burgess (1978) and Farah (1981). Those analysts argue that mother's employment outside the home reduces the amount of time available for child care, leads to a substitution of lower quality care for the care provided by the mother, interrupts

breast feeding, increases the probability of accidents occurring and ultimately leads to higher child mortality. Results for southern Nigeria, however, show that more than a single factor accounts for higher child mortality of working women.

6. Conclusion

This paper demonstrates that mother's income is a significant determinant of child mortality in southern Nigeria with effects that are greater than those of the husband and independent of factors controlled in the analyses. Moreover, it finds that maternal income makes a greater contribution to child survival in complex than in nuclear family households. Husband's income, even though still significant, has a greater impact in nuclear family households. This difference in effect is thought to be a reflection of the reduced effectiveness of husband's income due to the greater demands on it and the increased reliance of children on their mother's resources in the former type of household while in the latter (nuclear family households) mother's income plays only a supplementary role to that of the husband. The greater impact of mother's income on child mortality is thought to be a result of the more effective channels (for improving child survival) for which the income is used, such as in the provision of food.

In terms of mother's occupation, it was found that mothers in occupations other than white collar have higher child mortality than those who are economically inactive, although the

income they earn has a positive effect on child survival. The results show that several factors account for lower child mortality among those who are economically inactive, including the fact that more of them are resident in urban areas, have greater access to health care facilities and are in nuclear family household.

REFERENCES

- Acsadi, G.T., A.A. Igun, and G.Z. Johnson. 1972. Surveys of Fertility, Family and Family Planning in Nigeria. Ile-Ife, Nigeria: University of Ife.
- Anker, R. and J. Knowles. 1980. "An empirical analysis of differentials in Kenya at the macro and micro levels." Economic Development and Cultural Change 29.
- Antonovsky, A. and J. Bernstein. 1977. "Social class and infant mortality." Social Science and Medicine 11:453-470.
- Aronson, D.R. 1978. The City Is Our Farm: Seven migrant Ijebu Yoruba families. Cambridge, MA: Schenken Publishing Co.
- Baker, T. and M. Bird. 1959. "Urbanization and the position of women." Sociological Review VII(1):99-122.
- Bascom, W. 1969. The Yoruba of South-Western Nigeria. New York: Rinehart and Winston.
- Bascom, W. 1951. "Social status, wealth and individual differences among the Yoruba." American Anthropologist L 111, 4, October-December:490-505.
- Caldwell, J.C. 1979. "Education as a factor in mortality decline: An examination of Nigerian data." Population Studies 33(3):395-413.
- Caldwell, J.C. 1976. The Socioeconomic Explanations of High Fertility: Papers on the Yoruba Society of Nigeria. Canberra: Changing African Family Project #1.
- Carvajal, M. and P. Burgess. 1978. "Socioeconomic determinants of fetal and child deaths in Latin America: A comparative study of Bagota, Caracas and Rio de Janeiro." Social Science and Medicine (12 C) 3/4:89-98.
- Cochrane, S. et al. 1980. "The effects of education on health." World Bank Staff Working Papers, #405. Washington, D.C.: World Bank.
- Fadipe, N.A. 1970. The Sociology of the Yoruba. Ibadan: Ibadan University Press.
- Farah, A.A.M. 1981. Child Mortality and Its Correlates in Sudan. Unpublished Ph.D. dissertation, University of Pennsylvania, Philadelphia.

- Farah, A.A.M. and S.H. Preston. 1982. "Child mortality differentials in Sudan." Population and Development Review 8(2):365-389.
- Izzett, A. 1961. "Family life among the Yoruba in Lagos, Nigeria." In A. Southall, ed., Social Change in Modern Africa. London: Oxford University Press, pp.305-315.
- LeVine, R.A. 1966. "Sex roles and economic change in Africa." Ethnology 5:186-193.
- Lloyd, P.C. 1974. Power and Independence: Urban African's Perception of Social Inequality. London: Routledge and Kegan Paul.
- Lloyd, P.C. 1972. Africa in Social Change. Penguin Books.
- Mata, L.J. 1975. "Malnutrition-infections interactions in the tropics." The American Journal of Tropical Medicine and Hygiene 24(4):564-574.
- McCall, D. 1961. "Trade and the role of wife in a modern West African town." In A. Southall ed., op. cit., pp. 286-299.
- Meegama, S.A. 1980. Socioeconomic Determinant of Infant and Child Mortality in Sri Lanka: An analysis of postwar experience. International Statistical Institute. WFS Scientific Reports #8, April.
- Meek, C.K. 1937. Law and Authority in a Nigerian Tribe: A study in indirect rule. Oxford: Oxford University Press.
- Mensch, B. et al. 1983. Comparative patterns of child mortality differentials in developing countries. Paper presented to the annual meetings of the Population Association of America, Pittsburgh, Pa., April 13-15.
- Mincer, J. and S. Polachek. 1974. "Family investments in human capital: earnings of women." In T.W. Schultz, ed., Economics of the Family: Marriage, children and human capital. Chicago: University of Chicago Press, pp. 397-429.
- Nadel, S.F. 1952. "Witchcraft in four African societies: An essay in comparison." American Anthropologist 54:18-29.
- Ottenberg, P.V. 1959. "The changing economic position of women among the Afikpo Ibo." In W.R. Bascom and B.J. Herskovits, eds., Continuity and Change in African Cultures. Chicago: University of Chicago Press, pp. 205-223.
- Preston, S.H. 1983. "Mortality in childhood: Lessons from WFS." Mimeograph, Population Studies Center, University of

Pennsylvania, May 9.

- Preston, S.H. 1976. Mortality Patterns in National Populations: With Special Reference to Recorded Causes of Death. New York: Academic Press.
- Preston, S.H. 1975. "The changing relation between mortality and level of economic development." Population Studies 29(2):233-250.
- Schultz, T.P. 1980. "Interpretation of relations among mortality, economics of the household and the health environment." In Proceedings of the Meeting on Socioeconomic Determinants and Consequences of Mortality. New York-Geneva: United Nations and WHO.
- Sulaiman, I.L. 1984. Child Mortality in Nigeria: Levels and Socioeconomic Differentials. Unpublished Ph.D. dissertation, University of Pennsylvania, Philadelphia.
- Tekce, B. and F. Shorter. 1983. Socioeconomic determinants of child mortality and intermediary processes: Findings from a study of squatter settlements in Amman. Paper presented at Workshop on Child Survival: Strategies for Research, Bellagio, October 11-15.
- Trussell, J. and S.H. Preston. 1981. Estimating the coveriates of child mortality from retrospective reports of mothers. Paper presented at the annual meetings of the Population Association of America, Washington, D.C., March 26-28.
- United Nations. 1985. Socio-economic Differentials in Child Mortality in Developing Countries, ST/ESA/SER.A/97, New York.
- Ware, H. 1977. "Economic strategy and number of children." In J.C. Caldwell, ed., The Persistence of High Fertility Population Prospects in the Third World. Changing African Family Companion Series, #1, part 2:469-590.