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Infant Mortality in Ile-Ife, Nigeria : An Examination of the Effects of Mother's Occupation and Father's Income

1 Introduction

THE maternal role incompatibility hypothesis which has been extensively used to explain the various patterns of fertility-female employment relationships (Jaffe and Azumi, 1960; Waller, 1968; Stycos and Weller, 1967) has probably been formulated with little or no realization that the conflict between mothering and female participation in economic activity—the basic tenet of the hypothesis—can be used among other things to explain the variations in infant mortality-female employment relationships. Female employment outside the home may not only affect fertility, it may also affect the amount and quality of care children receive from their mothers with the consequent effect on infant and child mortality.

This paper examines the relationship between the probabilities of infant death and two indices of parent's social status—mother's occupation and father's income. As usual, an examination of the impact of socio-economic variables on infant mortality is undertaken in this study not because these variables are assumed to affect infant mortality directly but because they condition the proximate or immediate determinants of infant mortality. For instance, the different settings in which mothers undertake their economic activities may have different implications for child care which tend to have more direct implications for child survival. Mothers who carry out their economic activities around the home or in the informal sector outside the home can combine child rearing with economic activity and hence are likely to offer a better quality care to their infants than mothers who take up structured employment in factories and

offices where children are not allowed. In situations where child rearing and participation in economic activity cannot be simultaneously undertaken, an inverse relationship between female employment (or occupation) and child care may be anticipated. In contrast to the impact on amount and quality of child care, variations in occupation may cause variations in income and, by implication, variations in income available for food, clothing and medical care for the infants.

The persistence of differentials in infant mortality along lines of differentials in mother's occupation can be said to result from either of two basic effects : income and amount and quality of child care effects. In situations where mothers in higher ranked occupations experience lower rates of infant mortality than mothers in lower ranked occupations, it could be argued that higher income associated with higher occupational statuses influence the provision of better food, clothing and medical care for the infants. The separation of the work place from the home environment and the regulation against child rearing in the work place both have the implication that mothers in structured employment (who, coincidentally are in higher ranked occupations) have less time for child care; the likely consequence of this situation is that mothers in lower ranked occupations or who are not working may experience lower rates of infant mortality than those in higher ranked occupations. The use of mother surrogates may, however, alter this pattern of relationship. The nature of relationships observed between mother's occupation and infant mortality in a society could therefore be said to reflect dominance of either of the two effects. The two effects may also be discernible simultaneously but in different segments of the population.

The impact on infant mortality of father's income, rather than that of his occupation, is examined in this paper. In Africa, as in many developing societies, the burden of child care falls on the mother. The man hardly stays at home to take care of the infant even when the infant is ill. The influence of father's occupation is therefore mostly felt through occupational differences in the amount of income available for food, clothing and medical care for the infants,

Using the data on births and infant death? collected in Ile-Ife, Nigeria, an investigation of the effect of mother's occupation and father's income on infant mortality is undertaken- In the process of the investigation some other relevant variables were controlled in order to have a "purer" effect of the variables in question.

2. Framework

Although most empirical studies concentrate on the impact of father's occupation on infant mortality, the possible interconnections between mother's employment and infant and child deaths have also been explored (see, for

example, Ware, 1984; Mason, 1984). The models so used will no doubt stimulate more research interests in this area. In these models, mother's occupation per se is not perceived as the determinant of infant mortality; rather it is the conditions of work that could affect infant survival chances through their influence on child care practices.

Variations in infant mortality along lines of variations in father's occupation (indexed by his income in this study) and mother's occupation (especially when it is used as an index of her social status) have been extensively demonstrated in the literature. Almost all the findings have suggested lower rates of infant death among white collar workers, consisting of professionals, administrators, managers and executive officers (U.S. National Center for Health Statistics, 1968; Humphreys, 1887; Ruzicka and Kanitkar, 1973; Antonovsky and Bernstein, 1977; Taucher, 1978; WHO, 1978; Higgs and Booth, 1979; Hogan and Frenzen, 1982; Tekce and Shorter, 1984). As an extension of our argument that variations in infant mortality are brought about by variations in father's occupation through variations in income associated with the occupations, Tekce and Shorter perceived occupation of household head as a measure of his work status and environment both of which may influence the organization of home life and the ability of household to provide better health care.

The inverse relationship between infant mortality and income, which has at times been a subject of critical examination, has been found to be prominent in macro-level analyses and in micro level analyses with broad income ranges (Gortmalcer, 1979; Carvajal and Burgess, 1978; Anker and Knowles, 1977; Titmus, 1943; U.N., 1973; Tekce and Shorter, 1984). Household income is usually perceived as an indicator of the ease with which the household could obtain good medical services and amenities which influence health. Hence, the higher rate of infant mortality experienced by low income earners is explained in terms of their inability to seek adequate medical assistance when they (or their wives) are pregnant, lack of sanitation facilities, poor maternal and infant nutrition. The significance of income as a determinant of infant mortality is said to reduce when maternal education is taken into account (Cochrane *et al.*, 1980; Bairagi, 1980; Butz *et al.*, 1982).

3. Source of Data

The data for this study were obtained from a sample survey conducted in Ile-Ife, Nigeria. The survey, primarily aimed at collecting data on births and deaths, was executed through a two-part questionnaire administered in follow-up visits. The births and infant deaths are those that occurred in 1980 and 1981 among three categories of mothers, viz., (i) those who received antenatal care and delivered in either of two maternity centres (Enuwa and Modakeke) or State Hospital, Ife; (ii) those who were known to have received antenatal care in one of these health institutions but did not deliver in any of them, and (iii)

those who did not receive antenatal care from the centres and delivered at home.

The names and addresses of the first two categories of mothers were obtained from the records of the three health institutions. Subsequently, 1,000 mothers who received antenatal care and delivered in the centres in 1980 and 1,000 mothers who received antenatal care but did not deliver in the centres in 1980 were randomly selected from the list compiled from the records of the three institutions. These mothers were traced by the community health nurses who were employed for this purpose.

It must be, however, noted that a civil disturbance that occurred in the town around the time of the survey engendered a considerable spontaneous out-migration of the population. This precluded a realization of the desired sample size for each of the two groups of mothers using only the 1980 records. In order to achieve a larger sample size, therefore, the interviews were extended to randomly selected mothers of both categories who had births in 1981. In spite of this additional effort, the desired sample size was not met although a considerable improvement in the sample size was achieved. Thus, out of the over 1,000 chosen mothers of the first category, 634 were located while 839 of the over 1,000 mothers of the second category were traceable.

The third category of mothers were located using a two-stage sampling procedure. First, community health nurses who lived in different parts of Ife were asked to conduct household interviews in selected neighbourhoods that have similar socio-economic characteristics with those in which the first two categories of mothers resided to determine those who gave birth in 1980. Following the exercise, a sample of 1,000 mothers was drawn through a random selection procedure from the list of such mothers. The desired sample size, again, could not be achieved as a result of the internal rift which occurred in the town around the time of the survey. Consequently, it became imperative to extend the interview to mothers in that category who delivered their babies in 1981 in order to obtain a larger sample size. At the end of the exercise, only 638 of such mothers were successfully interviewed.

4. Method of Analysis

The principal tool of analysis is the Ordinary Least Squares Regression. A few other variables, namely age of mother, parents' education, the number of surviving children before the last birth and age at which breastfeeding was first supplemented with artificial food were controlled in the estimation of the parameters of the equation that determine the influence of mother's occupation and father's income on infant mortality. The independent variables are dummy variables which take the value one or zero depending on whether the infant's mother or father is or is not a member of the group to which it refers.

The estimation of the parameters of the regression equation, was preceded by

an examination of the crude probabilities of infant mortality according to some selected characteristics of the parents. The probabilities were obtained through separate cross-tabulations of infant's 'life status' with each of the selected characteristics without controlling any other variables. The crude probabilities are presented in Table 1.

TABLE I-PROPORTIONS OF INFANTS DEAD ACCORDING TO SOME SELECTED CHARACTERISTICS OF THE PARENTS

<i>Variable</i>	<i>Proportion Dead Among Infants</i>
1 Work Situation of Mother at the Time of Survey :	
Working	0.091
Not Working ¹	0.090
2 Usual Working Status of Mother :	
Employer/Employee in the Formal Sector	0.057
Self Employed in the Informal Sector	0.101
Not Working	0.095
3 Occupation of Mother :	
Professional, Technical, Administrative, Executive and Managerial	0.046
Clerical	0.068
Sales	0.098
Farming	0.188
Transport, Crafts, Production and Service Networking	0.112
	0.095
4 Mother's Income :	
Below N 1,000	0.127
Between N 1,000 and N 1,999	0.074
Between N 2,000 and N 3,999	0.02
N 4,000 and above	—
Unknowns	0.090
5 Employment Status of Father :	
Employer/Employee in the Formal Sector	0.063
Self Employed in the Informal Sector	0.104
6 Income of Husband	
Below N 1,000	0.137
Between N 1,000 and N 1,999	0.102
Between N 2,000 and N 2,999	0.073
Between N 3,000 and N 3,999	0.033
N 4,000 and above	0.020
Unknown ³	0.083

Notes, includes mothers who were usually working but not working temporarily at the time of the survey.

^{1,3}Majority of respondents in the unknown category are self employed in the informal sector.

The general equation of the probability of infant death is specified as :

$$D_{ij} = a_0 + \sum_{i=1}^p \sum_{j=1}^{g-1} b_j x_{ji} + \epsilon_{ij}$$

where D_{ij} — the probability of infant death among women in group j of variable i ; a_0 = intercept; b_j = regression coefficients; X_{ji} = the category of independent variable; (j ; $i = 1, 2, \dots, p$; $j = 1, 2, \dots, g - 1$); ϵ_{ij} = error term.

Estimates of the parameters of the equation are presented in Table 2, The b coefficients are differences between the probabilities of infant death among parents at designated levels of the factors and those of the excluded levels.

5. Results

The proportions of infants that are dead according to some variables that index the economic activities of the parents are shown in Table 1. Panel I of the table shows no significant difference in the proportions of infants of working and non-working women that are dead. The aggregation of various types of workers under the category "working" might be responsible for this pattern. A breakdown of the working status was therefore undertaken. Panel 2 reveals that the likelihood of experiencing an infant death is highest among mothers who are self employed and is lowest among mothers who are either employers or employees in the formal sector. While the result suggests that the dichotomy between workers and non-workers is not as important as the situation of work in determining infant mortality, the effect of working situation that is operating is indeterminable now since some other variables that may influence the relationship between working situation and infant mortality are not yet controlled.

The use of mother's occupation in this study is an attempt at obtaining a more refined measure of working situation. Panel 3 shows the likelihood of losing an infant according to the different occupations of the mothers. Except for professional, technical, administrative, managerial and clerical workers, other categories of workers are likely to have an equal or higher probability of experiencing an infant death than non-working mothers. Since child care and economic activities are more incompatible in the professional and clerical occupations than in the other non-formal occupations, it can only be inferred at this stage that the result tends to reflect a negative association between infant mortality and income generated from these occupations. This line of reasoning is somewhat strengthened by the data in Panel 4 of Table 1 which indicate a negative association between the likelihood of infant death and mother's income.

An investigation of the relationship between infant mortality and employment condition of the father was also undertaken. Panel 5 of Table 1 shows a

TABLE 2-ORDINARY LEAST SQUARES REGRESSION RESULTS RELATING
MOTHER'S OCCUPATION AND FATHER'S INCOME TO INFANT
MORTALITY

Coefficients of:

1	Mother's Occupation	
	Professional, Technical, Administrative, Managerial	0.00647
	Clerical	0.02064
	Sales	0.03330'
	Farming	0.13138*
	Crafts, Transport	0.05411*
	Not Working	R.C.
2	Father's Income :	
	Below N 2,000	0.02818*
	Between N 2,000 and N 3,999	0.00013
	N 4,000 and above	-0.02816
	Unknown	R.C.
3	Mother's Age :	
	15-19	0.10227*
	20-24	0.06579
	25-29	0.05014
	30-34	-0.00511
	35-39	0.00027
	43 and above	R.C.
4	Mother's Education :	
	No Schooling/Primary uncompleted	-0.04088
	Primary Completed; Secondary uncompleted	-0.05773
	Secondary Completed	R.C.
	Post Secondary	-0.01005
5	Father's Education	
	No Schooling/Primary uncompleted	0.03381
	Primary completed/Secondary uncompleted	0.00449
	Secondary completed	R.C.
	Post Secondary	-0.00280
6	Number of Surviving Children Before Last Birth :	
	0	0.40473*
	1	0.27849*
	2	0.18842*
	3	-0.09391*
	4-5	-0.07190*
	6 and above	R.C.

Table 2 (contd. on Page 172)

7 Age Artificial Food was First Introduced to Baby		
3 week		-0.34548*
2 weeks		-0.34715*
1 month		-0.37025*
2 months		-0.38709*
3-4 monthj		-0.40495*
5-6 months		-0.40187*
Not applicable		
8 Antenatal Registration Status and Place of Delivery		
Registered and Delivered in the Clinic		-0.02576
Registered and Delivered at Home		0.00234
Did not Register and Delivered at Home		R.C.
Intercept		0.43725
Ri		0.20910

R.C. Stands for Reference Category

* Significant at the 5% level.

lower probability of death among infants whose fathers work as either employers or employees in the formal sector. Since, in Ile-Ife, employees and employers in the formal sector of the labour market generally have higher income than workers in the informal sector in addition to health related facilities, it could be argued that the results reported in Panel 5 of Table 1 are a reflection of those in Panel 6 where a monotonic decline in infant mortality is discernible as father's income increases. The two results suggest a positive association between father's income and resources expended on infant's nutrition, clothing and medical care.

In order to obtain more refined estimates of the probabilities of infant death according to mother's occupation and father's income, some of the characteristics of the parents were controlled. The results are presented in Table 2.

Estimates in panel 1 of Table 2 depict two features. One, non-working mothers are less likely to experience infant deaths than working mothers. This result probably reflects differentials in the amount of child care time and quality of child care between the two categories of mothers; infants of non-working mothers are likely to receive greater maternal attention and care from their mothers who have greater proportion of their time expended on child care. Two, the pattern of differentials in infant mortality within working mothers tends to reflect the pattern of differentials in income generated from the occupations which in turn reflects differentials in income available for child care.

Estimates in panel 2 of Table 2 depict a negative association between probabilities of infant death and father's income. This pattern of association tends to represent the effect of differences in the amount of child care resources associated with differences in disposable income. Higher income earners are likely to offer better quality child care to their infants than their lower income counterparts. The effect of free medical care offered to employees of public enterprises (majority of whom fall in the high income category) and their dependents may supplement that of disposable income for child care since infants of such men tend to have more access to medical care.

The mother's age is one of the variables whose effects were held constant in the process of examining the relationship between infant mortality and mother's occupation. Mother's age can determine the nature of her occupation as well as influence the probability of infant death: its inclusion in the equation is therefore necessitated by the desire to remove its impact on the relationship between mother's occupation and infant mortality. Nevertheless, its relationship with infant mortality just like those of other variables controlled is briefly described. The probabilities of infant death according to mother's age, presented in panel 3 of Table 2, depict a negative association between the two. As pointed out earlier (see Feyisetan, 1986) older mothers are usually more experienced in child care than their younger counterparts. Moreover, the probability of infant death is particularly higher among first births usually experienced by very young mothers.

The impact of parent's education on the relationship between mother's occupation and infant mortality is also controlled. Panel 4 of Table 2 shows the probabilities of infant death according to mother's education. The pattern of relationship suggests that more educated mothers appear to experience higher rates of infant mortality than their lower educated counterparts once the effects of other variables are controlled. As pointed out previously (Feyisetan, 1986), the finding for higher educated mothers may reflect the effect of employing the services of mother substitutes that lack the skills to offer the infants the type of care they need at the tender age. With respect to the father's education (Panel 5), a negative association with infant mortality is discernible.

Additional variables that can be used to measure variation in the amount of time available for child care were included in the equation. A woman's number of surviving children before the last birth (henceforth referred to as infant's siblings) can provide a measure of the intensity and quality of care the new infant receives from its mother. Although the ages of the infant's siblings are not controlled, it is assumed that the size of the siblings provides an insight into the competing demands on mother's attention and other family resources (see Wray, 1971; Butzer, *al.*, 1982). In that respect, an inverse relationship may be anticipated between the proportion of the woman's child care time that is allocated to the new infant and the size of the infant's siblings; as a result an increase in infant mortality may be expected as the size of the infant's siblings

increases.

Two effects are demonstrated by the result in panel 6: "mother's child care experience" and "amount and quality of child care effects." The mother's child care experience effect is operative among infants with less than three siblings who experience higher mortality than their counterparts with three or more siblings. The higher rate of mortality among infants with less than three siblings can be attributed to the dominance of the effects of mother's comparative disadvantage in child-rearing over the effects of the mother's comparative advantage in the proportion of child care time that can be allotted to the rearing of the new infant. The amount and quality of child care effect is demonstrated after two siblings.

For most mothers, the duration of feeding babies on breast milk alone is highly conditioned by the length of time, after birth, that they could stay at home to give breast milk to the babies on a continuous basis. An attempt is not made here to overlook other factors like lactational capability, and adoption of feeding babies on breast milk alone. However, for most of the mothers, the length of time, after birth, they can stay with the infant on a continuous basis can be captured by the age at which artificial food was first introduced to supplement breast milk. In that regard employee mothers are likely to supplement breast milk earlier than their counterparts who are either not working or who are self employed. And consequent on the nutritional value of breast milk to the health of the infants, it can be expected that infants fed on breast milk alone for longer period of time are much more likely to survive. Estimates in panel 7 of Table 2 show a negative association between infant mortality and duration of feeding on breast milk alone. The not applicable category is mostly composed of infants who died before they were introduced to any artificial food.

An attempt was also made to control the effects of variations in antenatal care and place of delivery. Panel 8 of Table 2 shows that the least probability of infant death is recorded among mothers who had antenatal care and delivered in one of the health institutions.

6. Conclusions

Investigation of the relationship between mother's occupation and probability of infant death has been rooted on the maternal-role incompatibility hypothesis. A logical extension of the tenet of the maternal role incompatibility hypothesis is that if child rearing and participation in economic activity outside the home do actually conflict, then employment of mothers outside the home may not only lead to a reduction in fertility but may also bring about a reduction in the quality of child care with an implication for infant mortality. The father's income is believed to condition the probability of infant death in as much as differentials in income reflect differentials in amount of resources

available for food, clothing and medical care of the infant.

The analysis suggests, among others (i) a negative impact of female employment on the amount and quality of child care since non-working mothers experience lower infant mortality than working mothers; (ii) that within the working group, infant mortality and income generated from employment appear negatively correlated; (iii) that a negative association exists between father's income and infant mortality.

The pattern of association between infant mortality and mother's occupation brings into question the adequacy of the existing work regulations as they affect entitlements in Nigeria. It is believed that the higher rate of infant mortality experienced by working mothers is not necessarily brought about by working per se; rather, it is brought by lack of adequate child care that results from regulations that make it impossible for mothers to devote much time to child care especially at the tender age. Since the direct and indirect effects of female employment on socio-economic development of a country are well known, a policy that encourages non-participation in income activity in order to achieve lower rates of infant death can not be contemplated. Rather, policy that allows mothers to adequately nurse their infants at the tender age without losing their jobs is in order.

Consequently, the following policy alternatives are recommended; (i) For employee mothers, a maternity leave of six months, at least four of which should be taken after (the birth of the baby should be granted. A full pay may be granted for the first four months and half pay for the remaining two; (ii) For mothers in self employment whose income may be low, adequate medical care subsidy may be provided in government owned medical institutions, (iii) Establishment of day-care institutions that meet well-defined standards should be encouraged by the government. The indiscriminate establishment of day-care centres that are not guided by environment as well as other regulations and as such are incapable of providing adequate care to infants and children should be discouraged.

The need to avoid having large family sizes that could create a situation in which additional births have high probabilities of dying is demonstrated by the association between size of infant's siblings and infant mortality. The positive association is, of course, discernible after two siblings. In addition, the study also demonstrates the high nutritional value of breast milk; the longer babies are fed on breast milk alone, the higher their survival chances. The policy implication of this finding is that working mothers should be allowed more time, after birth, to breast feed their babies.

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