

Developmental Implications of Early Mortality Factors in Nigeria

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ABSTRACT

Past empirical findings about early mortality factors in Nigeria are examined within a proximate determinants framework. This shows that higher parental income and higher density of modern health facilities constitute the combination of factors most likely to bring about sustained reductions in early mortality levels. Evidence relating to various areas of the country do not, on the whole, show up maternal education as the primary early mortality reducing factor that it is acclaimed to be in other developing areas. The need to focus on the fundamental problem of raising general living standards rather than the pursuit of 'short-cut' solutions to higher early mortality risks is implied.

Introduction

This article views development as a process of reducing and, ultimately, eradicating high levels of malnutrition, morbidity, illiteracy, unemployment and the worst aspects of absolute poverty. For any society this process is indicated by changes in the levels and conditions of living of the mass of the population. It is, therefore, not surprising that various attempts to provide an international index of real development, standard of living, or human suffering have all included infant and/or under-five mortality rates as a major component (Kelley, 1989; Grant, 1989). In other words, early mortality may essentially be seen as the terminal outcome of the poor conditions in which affected children were born and raised.

In recent years, early mortality (ie mortality before the age of five) in developing countries has been receiving considerable research attention from scholars interested in population-development interactions. This special focus derives from the fact that one in three deaths in the world is the death of an under five year old, and most occur in the developing world (Grant, 1988). Despite the dramatic decline in overall developing world mortality levels since 1950, an

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underfive mortality rate of over 100 per 1 000 live births still occurs in 60 developing countries, 35 of which are in SubSaharan Africa (World Bank, 1987).

For Nigeria, which has the 30th highest early mortality rate in the world, the indications are that, in general, the components of the health status of the population have changed little over the last 30 to 40 years. Nearly 50 percent of all deaths still occur among children below five years of age (Adeokun, 1985; Ransome-Kuti, 1986). The emergence of the Acquired Immune Deficiency Syndrome (AIDS), as a major contributor to mortality at very young and middle ages, does not seem to have affected Nigeria on a scale that will drastically shift the shape and level of mortality there. By the end of 1989, only 71 (including one baby) out of 26 965 blood samples collected by the central health authorities tested positive for the AIDS virus (HIV) antibodies (Obadina, 1989).

Given that the bulk of deaths in Nigeria are of infants and young children, any analysis that examines the factors behind the high level of early mortality in a way that highlights strategies that could be successfully used to reduce it would be useful. Moreover, having lately accepted the view that rapid population growth poses a danger to further economic development, the national government has embarked on a policy directed towards simultaneously lowering fertility and early mortality. The goal is to reduce the annual rate of population growth from 3.3 in 1984/85 to 2.0 by the year 2000, while reducing the infant mortality rate from 90 per 1 000 live births to 30 (Federal Ministry of Health, 1988). This is probably because the latter often eventually induces the former (Okore, 1986). Yet, compared to Senegal or Kenya for example, not much is known about early mortality determinants in Nigeria.

In all high-mortality countries there are a few sub-groups that experience low early mortality risks comparable to the overall levels in more advanced societies. For Nigeria, estimates of neonatal, infant and overall early childhood mortality rates for the 1970-79 period (shown in Table 1) point to striking regional inequalities in child survival.

More definitive statements about these regional differentials would require rigorous statistical analysis of the data sets from which they were derived. It is likely that they mainly reflect differences in prevailing levels of household poverty, provision of public utilities and social services, and in the educational levels of the population of these regions, all of which are well-documented (Barbour, 1982a; Ikporukpo, 1987). Ecological differences are unlikely to be very important since all parts of Nigeria are afflicted by one localised tropical disease or another, eg meningitis to the north and malaria to the south (Barbour, 1982b).

In fact, the data from which the estimates in Table 1 were derived show that children of literate mothers, urban residents, women with at least seven years of schooling and men with more than six years education experience infant mortality

risks that are 30%, 21%, 81% and 21% less than those experienced by children of illiterate mothers, rural residents, and women and men with no schooling respectively (Morah, 1985; Cochrane and Farid, 1989).

Nigeria is a particularly interesting case to look at the developmental implications of early mortality factors. Up to 1987 it was a middle-income country, and had by 1980 achieved near-universal primary education and rates of secondary and tertiary education well-above the SubSaharan African average, and had an observable edge in medical personnel levels. However, in terms of life expectancy and early mortality it is worse than the average for the continent (Green and Singer, 1984). The problem seems to be the very skewed distribution of resources. In other areas of the developing world relatively more egalitarian income distribution and greater devotion of public resources to broad-based health services produce notable reductions in early mortality levels (Cochrane, 1980; Caldwell, 1986).

These issues are pursued further in this paper via a critical appraisal of the findings from available empirical studies of early mortality determinants in Nigeria, and selected areas of Africa and the developing world. The next section presents the analytical framework adopted to guide subsequent discourse, and is followed by discussion of early mortality factors. The last two sections draw the main lessons of this analysis for development in Nigeria, especially in relation to health policies and administration.

The analytic framework

The simple fact that more children die from poorer households than from richer ones is not due directly to their differentiated residential location. Rather, it is the outcome of differential clustering of the biomedical factors that directly produce ill-health and early death. There has, therefore, been an increased awareness of the need for research integrating the socioeconomic and biological factors in childhood morbidity and mortality. However, in Africa the data required for such analysis is rarely available (M'Backe and Van de Walle, 1987). Nevertheless, since the early 1980s various conceptual frameworks to guide such analyses have been put forward. The widely known Proximate Determinants Framework of child survival developed by Mosley and Chen (1984) has been adopted in this paper. This is because it allows for careful tracing of the pathways through which socioeconomic factors impinge on child health and survival in the developing world.

Briefly, the framework presumes the following:

- * Under optimal conditions, less than five percent of newborn infants will die during their first 60 months of life.
- * A higher death probability in any society is due to the effects of social, economic, environmental and biological forces which necessarily operate

through more basic (proximate) determinants of the risks of disease and the outcome of disease processes.

- * Specific diseases and nutrient deficiencies are biological outcomes of the operation of the proximate determinants.
- * A child's death is the cumulative consequence of multiple disease processes including their biosocial interactions.

The model identifies five groups of mechanisms through which socioeconomic factors act to influence the risk of mortality, namely maternal factors (age, parity, and birth spacing); environmental contamination (air, food/water/fingers, skin and insect vectors); nutrient deficiency; personal illness control; and injury. It recognises the possibility of interactions among these factors, which are assumed to influence a child's transition from a healthy to a sick state and *vice versa*.

Maternal education can be thought of as influencing child health and survival through better health care practices, hygiene, preventive care and treatment, the allocation of more resources to child care, use of appropriate weaning foods, timely visits to prenatal clinics, optimal birth spacing, and maintenance of home hygiene. Women from low income households, relative to those from high income ones, may be exposed to greater risk of child death due to their own poor nutritional status and rapid childbearing, raising children in less sanitary environments and possessing more limited capacity to provide adequate nutrition to their children or to exploit available medical services in the event of a child's illness.

However, an important lesson from crossnational analyses of childhood mortality factors (Hobcraft *et al*, 1984; 1985; United Nations, 1985) is that the relative importance of each proximate determinant will vary with the age of the child. Thus, maternal factors such as teenage motherhood and short birthspacing would be expected to have a greater impact on mortality during infancy than beyond, while the reverse would be the case as regards factors of environmental contamination.

The usefulness of the Mosley-Chen framework here is that it enables a categorisation of the various possible determinants of child health and survival in a way that allows the integrative linking of environmental conditions, dietary status, health care, reproductive patterns and disease states, ie the proximate determinants, on one hand, and the socioeconomic, ie the ultimate factors, on the other. In examining the empirical findings about early mortality in Nigeria, the few studies incorporating both sets of factors are considered more analytically illuminating than those focused on socioeconomic variables only. This is because the main lesson that can be drawn from the latter is that poverty, lack of adequate education, and poor environmental sanitation account for high levels of early mortality. This conclusion would not be of much help to a policy-maker, concerned with lowering the levels of early mortality, in making choices between various possible health-enhancing strategies.

Determinants of early mortality in Nigeria

Data considerations

All the studies reviewed in this paper use data from some sort of multistage demographic sample survey (due to the absence of up-to-date sampling frames and a proper vital registration system) usually devoted to fertility questions. For most of them the data relating to mortality derive from special questions used in these surveys of women of reproductive age on the number of children they have ever born (CEB) and the number surviving (CS). The proportions dead by age of woman are then translated, using indirect demographic estimation techniques, into life-table probabilities of dying, such as between birth and the eleventh month of life (infant mortality rate), or between birth and fifth birthday. A few studies based on more recent surveys have derived mortality estimates directly from data on the complete or partial birth history asked of the sampled women, ie by relating the number of births that died during a specified time interval to the total number alive at the beginning.

It is worth noting that in none of the empirical studies considered is the sample of live births whose mortality was examined less than 1 000. In fact, about half of them covered total births more than three times this minimum. Sampling errors or fluctuation aside, there is also no strong indication that differences in the methodologies of these studies are so fundamental as to alter the picture of early mortality factors for Nigeria discussed in this paper.

The ultimate factors

Parental education

Two main reasons can be given for expecting the education of parents to affect the survival of their children. First, it enhances their income potential by raising their occupational status. Second, it provides them with knowledge for the prevention and treatment of ill health. In this context, the most frequently cited study of early mortality determinants in Nigeria is that by Caldwell (1979).

Based mainly on CEB/CS survey data from Ibadan, a city in Southwest Nigeria, Caldwell's results show that children of women with some primary schooling and those with post-primary schooling experience mortality levels which are 68% and 40% respectively of the level experienced by children of women with no schooling. These differentials persist irrespective of residence in the new or old areas of the city. More importantly, father's schooling, though producing a monotonic decline in the child mortality index as its level rises, yields a weaker effect than mother's schooling, whose effect also survives controls for both parents' occupational status and use of family planning. The study concludes that

the impact of maternal education is independent of the household's living standards. Three main mechanisms through which it acts to influence early mortality are suggested, namely:

- * Education reduces mothers' fatalism about illness and hence raises their willingness to adopt modern and more effective child health care practices.
- * It enhances a mother's ability to manipulate existing modern medical facilities and personnel through better utilisation of the services and extraction of better treatment from the personnel for their children.
- * It uplifts a woman's status within the family in a way that increases her command over household resources which leads to the devotion of more resources to child welfare irrespective of sex.

An earlier study comparing two sociostructurally identical Southwest villages - Ido, with a well-staffed hospital, and Isinbode, without any modern health facility within 40 kilometres (Orubuloye and Caldwell, 1975) - found the maternal education differential in the average number of dead children in Ido to be twice as wide as that in Isinbode. This finding supports the argument that it is the education of mothers which ensures their maximum utilisation of existing health services for the benefit of their children. In fact, in a later study with the same data, maternal education in the absence of health services was shown to be associated with a 33% improvement in child survival, compared to 87% when they are available (Caldwell and Caldwell, 1985).

It is worth noting, however, that the three studies did not provide an empirical demonstration of how the suggested mechanisms of maternal education act on child survival. Some scholars accept the primacy of maternal schooling as a determinant of early mortality in developing areas, but strongly argue for the relative unimportance of better health service utilisation and superior health knowledge, or of the devotion of more resources to child care linked with enhanced female status within the family, as mechanisms (Cleland and Van Ginneken, 1989). Instead, they suggest improved domestic care of children by way of better home and child hygiene, more intensive child supervision and more effective use of modern medical remedies.

Nevertheless, there are strong grounds for suspecting that the beneficial effect of maternal schooling on early mortality in Nigeria may have been exaggerated. First, the Ibadan study, for example, did not account for the influence of such proximate factors as birth interval size, parity, or birth order which, as will be shown later, are crucial determinants of early mortality. This omission, perhaps due to the nature of the data used, may partly account for the huge educational differentials presented.

Secondly, the notable effect of female white-collar occupational status was dismissed as being dependent on schooling. But it is now well-established that in

Southern Nigeria high maternal occupational status has an independent lowering influence on child mortality (Sulaiman, 1987; United Nations, 1985). Equally important is the omission of income/wealth factors (for which data is admittedly difficult to collect in Nigeria) and micro-environmental variables such as housing quality and type of toilet facilities.

Later analyses of child mortality data from Nigeria have tried to account for some of the factors omitted by the earlier studies. A 1985 United Nations study of 15 developing countries, including Southwest Nigeria, simultaneously considers many variables using ordinary least square regression methods. The Nigerian data shows that, with the exception of mothers with Koranic schooling (showing higher child mortality than unschooled mothers), there is a decline in child mortality as mothers' years of schooling increases. Bivariate results indicate the persistence of this pattern irrespective of husband's education, area of residence and water supply categories. As for paternal education, the downward trend is broken at the intermediate level which leads the authors to argue that maternal education has a greater impact on early mortality than paternal education.

When all other variables are controlled for, the coefficients for both mothers' and fathers' schooling remain large and statistically significant, with the estimates indicating the effect of one year of maternal schooling in lowering child mortality to be 0,9 percent compared to 0,5 for fathers' schooling. The coefficients also suggest that beyond six years of schooling, maternal education confers no additional net advantage. This is similar to Caldwell's Ibadan observation of the stronger effect on child mortality of the transition from no schooling to primary schooling than from the latter to secondary schooling, but is contrary to what has been observed in wider areas of the developing world (Caldwell and McDonald, 1981; Hobcraft *et al*, 1984). More importantly, the study reveals an exaggerated effect of mother's schooling in the absence of control for her income. However, an Ile-Ife study shows an increased beneficial effect of mothers' education on infant mortality net of five factors including paternal income and breastfeeding (Bankole, 1989).

Recent data from Benin City in the Midwest, based on a five-year birth history, also indicates that mothers' schooling produced the expected effect - women with no education experienced higher risks of child mortality, 1,33 compared to those with some education, even in the presence of controls for parity, type of refuse disposal facilities, toilet facilities and timing of antenatal clinic visits (Onyemunwa, 1988). However, when immunisation of the last live birth (whose distribution shows no notable socioeconomic variation) is incorporated in the controls, the significance is reduced to marginality. Similarly, a study of nearby Ilorin provides findings suggesting weak maternal education effects (Oni, 1988). Although women with no schooling recorded a child mortality index four times higher than

that observed for women educated up to secondary level, this effect turns out to be insignificant when the effects of husbands' education, woman's occupational status, parity, contraceptive use, residential milieu, and presence of indoor tap water, were accounted for within a multiple regression model.

The more recent studies suggest that, once some of the health disadvantages of being born to poorly educated parents are reduced through the provision of broadbased and accessible health services (such as immunisation) and of health-enhancing resources (like clean water), the direct influence of parental education (especially mother's) on child survival in Nigeria seems to decline substantially. It is also worth noting that two wide-ranging crossnational analyses of child mortality differentials in developing countries have revealed weaker effects of maternal education relative to father's educational or occupational status in SubSaharan Africa when compared to other regions (Hobcraft *et al*, 1984; United Nations, 1985). Widespread poverty and a generally higher level of mortality in this environment may be the modifying influence on maternal education, whose effect seems to be widely viewed as mainly engendering 'choice' or 'decision-making' about child health as opposed to being a means of overcoming economic constraints on such choices.

The issue of the exaggeration of the maternal education effects can be taken further by looking at the situation in Senegal and Kenya, two countries which by African standards are well-studied. A multivariate examination of two data sets for the profile of mortality and its determinants in Senegal between 1960 and 1980 shows urbanisation to be the dominant early mortality factor, accounting for 58-72% of the total variance explained by the study's 'best-fitting' models (Cantrelle *et al*, 1986). By contrast, the level of education of both parents appears to be less important once demographic variables are controlled, leading to the conclusion that the Senegalese situation is one in which social lines have become more sharply drawn during the process of modernisation, so that it is an immense advantage to live in an urban area, with parental education merely supplementing this advantage.

For Kenya, whose early mortality situation has been presented as illustrating the primacy of the maternal education factor (Mosley, 1985), analysis of data from four large scale surveys shows that in only one of five ecological zones is maternal education important, although it is important at the national level (Ewbank *et al*, 1986). The inference drawn by the study is that education tends to be available and more successful in those areas where other kinds of social change are taking place, and hence general modernisation is the main factor behind long term mortality decline in Kenya. There is, therefore, a need for very careful consideration of particular societal settings before increased maternal education is recommended as the most cost-effective means for reducing early mortality levels in societies like Nigeria.

Household income, wealth and parental occupational/employment status

Household income, wealth and parental occupational/employment status are variables that directly determine a household's economic position. They, therefore influence the quality and quantity of nutrient intake that can be afforded for children, and the quality of shelter and use of medical services, all of which may be expected to affect child health and survival.

The 1979 Ibadan study found a comparable effect between mother's white-collar occupational status and her schooling in producing child mortality declines, but this was considered as having no independent effect since over 93 percent of women in such occupations have received at least secondary education. On the other hand, a substantial impact from fathers' white-collar occupation is deduced. A more detailed analysis of this group of factors, with data relating to the whole of Southern Nigeria, found an inverse association between father's as well as mother's income and child mortality risks, although only paternal income of at least US\$600 has a major impact compared to \$300 for maternal income which shows an even greater impact (Sulaiman, 1987). The effect of mother's income is also found to be greater in complex households (two or more family nuclei) while paternal income has a greater impact in nuclear households. When a wide range of socioeconomic and environmental variables are controlled for, both parents' income show effects independent of each other. Some of the initial effect of mother's income is shown to be due to its association with her education and husband's income, while the effect of paternal income is reduced, mainly by controlling for the availability of toilet and water facilities.

Furthermore, the Ile-Ife study finds a linear downward effect on infant mortality of father's income net of mother's education and three other factors, although only children of men earning under 2 000 naira annually show a statistically significant higher infant mortality. Income, it should be noted, has also been shown to have a net lowering impact on early mortality in Greater Khartoum (Farah and Preston, 1982), in urban Burkina Faso (M'Backe and Van de Walle, 1987), and in Egypt (Casterline *et al.*, 1989). In all three cases, income had a much greater effect than the educational variables.

All the post-1980 studies in Nigeria reveal that mother's work outside the home in non-white-collar occupations is associated with higher child mortality than economic inactivity, a finding supported by data from many countries in Africa and Asia (Hobcraft *et al.*, 1984). In particular, women working in farming and the informal economic sectors have the highest mortality, and Sulaiman's study shows this to be due to the very low income they earn and their residence in large households lacking modern toilet or water facilities. But the Ile-Ife study indicates that this effect is due largely to reduced devotion to child care (as measured by intensity of breastfeeding).

On the other hand, the United Nations study and Sulaiman's work indicate that once other variables, especially income and education, are taken into account, father's white-collar occupational status conveys no notable advantage for child survival. This is somewhat at variance with the results from the 1979 Ibadan study, and data from Senegal, Lesotho, Kenya and Northern Sudan, which indicate the preeminence of paternal occupational status as a determinant of child mortality risks (Hobcraft *et al*, 1984). However, the contrast may be due to the non-inclusion of income or wealth and health service availability factors in these other studies.

Other ultimate factors

Other intimate factors include residential milieu, marital status, family structure, and religion. The influence of area of residence on early mortality may be expected because easier access to health services and other health-enhancing resources may be a result of their greater concentration in cities in most African countries (Cantrelle *et al*, 1986; Mosley, 1985), as well as the greater exposure of their residents to modernising influences.

In Ibadan a higher child mortality level in the old core areas than in the newer areas was observed. The Ilorin study observed a statistically significant lower early mortality level in medium and high status areas relative to low status areas. By contrast, the Benin study found lower child mortality in the old core areas, but this is not sustained when other variables are held constant. Results from the United Nations study in Southwest Nigeria reveal a 20% child mortality disadvantage at the univariate level to residing in rural areas, an effect which disappears once other variables are controlled for. This suggests that it is the socioeconomic characteristics of the urban population rather than residence in the city which accounts for the lower urban early mortality levels observed.

Polygyny, complex household structure, and Islam have been shown to be associated with higher early mortality than have monogamy, nuclear structure, and Christianity in various parts of Africa, although the precise mechanisms for this remain unclear (Gaisie, 1980). Holding constant five other socioeconomic factors, the Ibadan study shows a probability of dying for children of monogamous marriages that is 25% less than that for children of polygynous marriages. Muslim mothers in Ilorin experience a child mortality rate that is twice that of Christian mothers, and those polygynously married show a rate 51% higher than those in monogamous unions, although these effects disappeared when adjusted for the effects of other socioeconomic and environmental variables.

However, the United Nations study indicates that in Southwest Nigeria women in both types of marital unions who have been married more than once have higher child mortality than women in stable monogamous unions, net of the effects of other factors. This suggests that the disruptive influence of marital instability on

child care overrides the effect of traditionalism that is associated with polygyny. Sulaiman's study reveals that at each parental income level, child mortality in complex households is higher than that experienced by nuclear households, a finding that probably reflects an increased scarcity of resources for child care as the number of people sharing available resources increases.

The proximate factors

The proximate factors are biodemographic and health factors through which socioeconomic and community factors are presumed to act. Most of the Nigerian studies have not explicitly treated these factors as mechanisms within an integrated framework. Nonetheless, the infant mortality rate estimates for various regions in Nigeria presented in Table 2 do help to capture the magnitude of the role of this group of factors as early mortality determinants.

Microenvironmental factors

Microenvironmental factors include type of toilet facilities, source of household water supply, household crowding, housing quality, and methods of refuse disposal, all of which are generally thought of as determining the level of potential exposure to infectious diseases, the leading cause of child deaths in the developing world (Mosley and Chen, 1984).

The figures in Table 2 reveal a clearer association between infant mortality risks and type of toilet facilities than with the source of water supply. The same pattern is reported in the Benin study which indicated a child mortality impact of modern toilet facilities (and no effect for water supply source) net of parity, maternal education, type of refuse disposal and antenatal clinic attendance. In the Ilorin study, which had specific information on the presence of indoor tap water, this factor shows a statistically significant net beneficial effect on early mortality. Thus the relatively poor performance of piped water supply in Nigeria probably reflects the tendency for modern toilet facilities to be located within the living quarters and thus more directly associated with household living standards than piped water resources. The latter is often located outside the living quarters, and so water has to be fetched and stored, a process that provides additional opportunities for its contamination.

Biodemographic factors

The biodemographic factors include maternal age, birth order, sex of child, and birth spacing, ie the 'maternal factors' which are seen as closely intertwined with the biological processes leading to early death.

A rural Southwest study based on prospectively collected data revealed no strong effect from previous birth interval size variation on survival and weight gain

of the following child, and reached the conclusion that where, as in the Imesi village studied, an adequate level of nutrition or child health services exists the adverse effects of short birth intervals can be prevented (Doyle *et al*, 1978). This finding is, however, at variance with the results based on data covering the whole country, as shown in Table 2. The figures indicate that short preceding birth intervals are clearly associated with an elevated risk of infant death irrespective of region.

Though not shown in Table 2, elevated mortality risks to children born to teenagers and women aged 35 years and above, relative to children born to 20-29 years old mothers, are observed. A U-shaped association is also shown between birth order and infant mortality rate (section C of Table 2). It should be noted that studies simultaneously considering this group of factors in many developing countries show that both maternal age and birth order effects are almost completely explained away once the birth-spacing factors are controlled for (Hobcraft *et al*, 1984; Pebley and Millman, 1986).

Nutritional factors

Many studies, in Asia in particular, have shown that severely malnourished children are at much greater risk of dying than mildly malnourished and well-nourished ones, and such children usually come from poor households headed by uneducated or poorly educated parents (Martorell and Ho, 1984). Only in the Ile-Ife study, however, was nutritional status identified as being a factor in this regard. The intensity of breastfeeding, measured by the age at which artificial milk was introduced to a child, exerted a significant negative net impact on infant mortality when supplementation takes place in the first month of life.

Child care practices and accessibility/use of modern health services

The steps taken by parents to prevent child illness and, when ill, to ensure a child's quick return to good health are perhaps the most directly linked to child mortality risks. This is an area where questions are raised about the relative role of parental knowledge and attitude concerning child health care *vis a vis* the ability to procure good health care. Underutilisation of rural health services in developing countries is sometimes blamed on noneconomic factors, such as unwillingness and traditional attitudes towards use of modern facilities (Mosley, 1984). It is, therefore, often argued that it is unwise to put large amounts of resources into health service provision rather than into the expansion of female education. Evidence for Nigeria, however, suggests that economic and location factors are the more important barriers to frequent usage of modern health facilities for the prevention of early deaths among the bulk of the population.

The 1975 study of rural Southwest Nigeria, for example, found no educational differentials in the use of a modern hospital where it was available. In comparing the two rural populations studied differences in treatment of child illness was found to be due to the ready access of one to modern health facilities not easily available to the other, rather than to any contrast in attitudes about the proper treatment of sickness. This difference in access produced a large child mortality advantage (0,234 to 0,344) in favour of the served village. The conclusion was that mortality decline is not "a matter of overcoming ignorance but of providing a sufficient density of health services of reasonable calibre" (Orubuloye and Caldwell, 1975:272).

However, a decade later a reanalysis of the same data showed that presence of health services alone lowered child mortality by 20%, while its effect when the mother is educated jumps to 87% (Caldwell and Caldwell, 1985). This striking finding does not tally with the expectation that easier access to health services would tend to lower socioeconomic differentials in mortality. Two wide-ranging reviews have noted that this finding is yet to be replicated elsewhere (United Nations, 1985; Cleland and Van Ginneken, 1989). In fact, the overall evidence for Nigeria shows that provision of health services often produces lower child mortality net of socioeconomic factors.

Data from the Southwest indicates that mothers living in rural areas who are eight or more miles away from the nearest hospital or dispensary show a child mortality index that is 30% greater than that for mothers residing in a community with both a dispensary and hospital. A striking 38% net difference in child mortality between urban areas that have hospitals and those that have only dispensaries is observed (United Nations, 1985). The Benin study, while documenting no educational differentials in the use of antenatal care services, showed that this factor along with the take-up of the first dose of BCG vaccine significantly reduces child mortality risks.

It is not being suggested that superstitious beliefs about child health care do not exist in Nigeria. But overall the evidence from attitudinal surveys in the urban Southwest (Maclean, 1971), rural Midwest (Mott, 1976), and rural Southwest (Uche, 1985), indicate a high level of awareness and willingness to use modern health facilities, provided they are by location and financially accessible. Indeed, studies in rural Northcentral Nigeria (Stock, 1983), urban Southeast (Freeman *et al.*, 1983) and the Southwest (Egunjobi, 1983), all show distance and cost as the major factors in the utilisation of modern health facilities. Thus, if these facilities do significantly contribute to lower child mortality levels, as seems the case in Southern Nigeria, extending these services will greatly reduce social inequalities and high levels of early mortality in Nigeria.

Developmental issues

The main issue the foregoing review has tried to readdress is whether to view poverty and deprivation as the cause of nutrient inadequacies, underutilisation of medical service and lack of personal or home hygiene, all of which significantly account for the high early mortality levels in the Nigerian population; or rather to attribute the early mortality situation mainly to ignorance and other attitudinal factors.

This dichotomy may be a false one since it is reasonable to expect an educated woman to be better placed to appreciate the effectiveness of modern therapies and the potential seriousness of a child's ailment, and so ensure timely visits to hospital. But it is also arguable that such timeliness would depend on the ease with which she can get to the facility, tied to the economic resources available to her household, especially where transportation costs are high. Similarly, a lack of basic services, such as clean water and refuse disposal facilities, may make it difficult to practice home hygiene in poor and under served communities.

In accepting the mutually reinforcing interactions between knowledge and poverty as ultimate determinants of early death in Africa, many analysts have tended to overemphasise the importance of the former without allowing for the possibility that the relative significance of both factors may be dependent on the social structure of the area involved.

For the majority of households in Nigeria, there may be no choice about, for example, the use of soap for hand washing, consumption of protein-rich foods and the use of child health services, simply because they are out of reach. A 1980/81 National Consumer Survey showed that almost 60% of all monthly earnings by Nigerian households headed by a selfemployed man is spent on food alone, irrespective of residence. For households headed by a wage earner the equivalent figures for the rural and urban areas are 40 and 50% respectively (Federal Office of Statistics, 1983). Living conditions have massively deteriorated since then, so in present-day Nigeria, after meeting minimal feeding costs, little is left of most household incomes to meet health-related expenditure like decent accommodation, transportation and medical care.

The efforts of UNICEF and the World Health Organisation (WHO) in promoting the education of mothers on low-cost health measures like birth-spacing, breastfeeding, child immunisation, safe weaning, proper feeding during and after a child's illness, oral rehydration therapy, and domestic hygiene (Grant, 1988) have a greater potential for lowering early mortality levels in Nigeria - but the

extent to which this will be actualised seems to be largely dependent on the extent to which the actual living conditions of the people are improved.

Targeting the proximate factors can be rewarding in the shortrun but ultimately, for the sustainable impact of such measures, sharper focus will need to be made on the material circumstances of households and their communities, while not denying the importance of educational and attitudinal change. The previous section has shown that in Nigeria higher parental income and density of health facilities tend to have a greater lowering impact on early mortality than paternal and maternal education. In short, the power of informed parents to take control over the health of their children is often limited by poverty and the inaccessibility of basic public utilities and services that make for humane living conditions.

Concluding remarks

The central thrust of this paper has been that while it is important to extend modern education to an increasing proportion of the population (especially females), and to promote 'low-cost' health interventions, both of which empower parents to assume greater responsibility for child and family health, greater efforts will have to be made to facilitate this process and guarantee the permanence of its salutary mortality benefits. This could be done through the provision of extensive health and community services and the creation of more economic opportunities to raise living standards for the bulk of the population.

On balance, much of the empirical evidence studied indicates that higher parental income and higher density of modern health services are the most effective combination of factors, net of the proximate ones, for lowering the high level of early mortality in Nigeria. The pursuit of 'short-cut' solutions, such as oral rehydration therapy and birth-spacing campaigns, in the absence of basic improvements in the living conditions of the mass of the people, are unlikely to be in the long run health and development interest of Nigeria.

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Table 1

Nigeria: Neonatal (NNM), Infant and Underfive Mortality Rates (per 1 000 live births) by Region 1970-79

Region	NNM	Infant	Underfive
Southwest	39	68	116
Southeast	45	93	162
Northwest	43	96	187
Northeast	43	92	148
All Nigeria	45	91	162

Source: National Population Bureau (1986) Table 31.

Table 2

Nigeria: Infant Mortality Rate (per 1 000 live births) by Selected Background Characteristics and Region, 1970-79

Region Characteristics	Southeast	Southeast	Northwest	Northeast
a) <i>Type of toilet</i>				
Flush or pit	59	79	91	89
Bucket and others	83	115	96	104
b) <i>Source of water supply</i>				
Piped or pumped	58	65	89	104
Ground well	42	104	92	99
Others	92	97	101	59
c) <i>Birth order of child</i>				
First	68	110	87	93
Second and third	56	84	69	90
Fourth to sixth	68	88	104	85
Seventh and above	116	105	208	120
d) <i>Length of preceding interval</i>				
Under 24 months	68	72	102	135
24 - 35	43	56	55	105
36 - 59	34	53	43	84

Source: National Population Bureau (1986) Table 31.