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# Education as a Factor in Mortality Decline

## An Examination of Nigerian Data\*

J. C. CALDWELL†

Over 40 years ago a usable fourfold classification was suggested analysing the influences on mortality and mortality change: political, social, sanitary and medical.<sup>1</sup> In subsequent years this was more commonly reduced to two influences, socio-economic and medical or technological, partly by ignoring societies where violence (and hence 'politics') played a major role, and partly by adding sanitation to either the social or medical side or to both.<sup>2</sup> On the social (or, at least, the non-medical-technology) side, it was argued that an important aspect of some mortality declines had been improvements in nutrition, housing and clothing, or in standards of living more broadly,<sup>3</sup> and sometimes in cleanliness and individual hygiene.<sup>4</sup> Others have stated that, at least in the con-

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<sup>1</sup> A. M. Carr-Saunders, *World Population: Past Growth and Present Trends* (London: Frank Cass, 1964, first published 1936), p. 75.

<sup>2</sup> For some of the major works in the debate, see T. McKeown and R. G. Brown, 'Medical Evidence Related to English Population Changes in the Eighteenth Century', *Population Studies*, 9 (1955), pp. 119-141; G. J. Stolnitz, 'A Century of International Mortality Trends: I', *Population Studies*, 9 (1955), pp. 24-55; 'A Century of International Mortality Trends: II', *Population Studies*, 10 (1956), pp. 17-42; T. McKeown and R. G. Record, 'Reasons for the Decline of Mortality in England and Wales during the Nineteenth Century', *Population Studies*, 16 (1962), pp. 94-122; United Nations, Department of Economic and Social Affairs, *Population Bulletin of the United Nations*, No. 6 - 1962, with *Special Reference to the Situation and Recent Trends of Mortality in the World* (New York, 1963); H. Frederiksen, 'Determinants and Consequences of Mortality and Fertility Trends', *Public Health Reports*, 81 (1966), pp. 715-727; A. Kusakawa, 'Social and Economic Factors in Mortality in Developing Countries', *World Population Conference Belgrade 1965*, Vol. 2, pp. 337-341; S. Shapiro, E. Schlesinger and R. Nesbit, *Infant, Perinatal, Maternal and Childhood Mortality in the United States* (Harvard, 1968); A. Yankauer, 'An Approach to the Cultural Base of Infant Mortality in India', in K. C. W. Kammeyer (ed.), *Population Studies: Selected Essays and Research* (Chicago: Rand McNally, 1969), pp. 268-286; F. Sloan, *Survival of Progeny in Developing Countries: An Analysis of Evidence from Costa Rica, Mexico, East Pakistan and Puerto Rico*, A Report Prepared for Agency for International Development (Santa Monica: Rand, 1971); T. McKeown, R. G. Brown and R. G. Record, 'An Interpretation of the Modern Rise of Population in Europe', *Population Studies*, 26 (1972), pp. 345-382; United Nations, Department of Economic and Social Affairs, *The Determinants and Consequences of Population Trends: New Summary of Findings on Interaction of Demographic, Economic and Social Factors*, Population Studies No. 50 (New York, 1973), pp. 152-157; Evelyn M. Kitagawa and P. M. Hauser, *Differential Mortality in the United States: A Study in Socioeconomic Epidemiology* (Cambridge, Mass., Harvard University Press, 1973); P. E. Razzell, '"An Interpretation of the Modern Rise of Population in Europe" - A Critique', *Population Studies*, 28 (1974), pp. 5-17; Judith A. Harrington, 'Economic Development and Mortality in Infancy and Childhood: Comments from the West African Case', *Population Planning Working Paper No. 10* (Ann Arbor: Department of Population Planning, School of Public Health, University of Michigan, mimeographed, 1974); S. H. Preston and V. E. Nelson, 'Structure and Change in Causes of Death: An International Summary', *Population Studies*, 28 (1974), pp. 19-51; S. H. Preston, 'The Changing Relation between Mortality and Level of Economic Development', *Population Studies*, 29 (1975), pp. 231-248; S. H. Preston and R. Gardner, 'Factors Influencing Mortality Levels in Asia: International Comparisons and a Japanese Case Study', *Seventh Summer Seminar in Population* (Honolulu: East-West Center, 1976); T. McKeown, *The Role of Medicine: Dream, Mirage or Nemesis?* (London: The Nuffield Provincial Hospitals Trust, 1976a); *The Modern Rise of Population* (London: Edward Arnold, 1976b).

<sup>3</sup> See particularly McKeown and Brown, *loc. cit.* in footnote 2; McKeown and Record, *loc. cit.* in footnote 2; McKeown, Brown and Record, *loc. cit.* in footnote 2; McKeown (1976a and b), *op. cit.* in footnote 2.

<sup>4</sup> McKeown and Record, *loc. cit.* in footnote 2; and specifically Razzell, *loc. cit.* in footnote 2.

temporary developing world, technology could be shown to be paramount,<sup>5</sup> as evidenced by similar mortality declines in areas with different rates of economic development<sup>6</sup> or by a 'massive shift that occurred in the income/life expectancy relation' which must be 'plausibly attributed to . . . improvements in the knowledge of techniques of disease control.'<sup>7</sup>

The antagonists may well be equally guilty of ignoring major contributions to the decline in mortality (which could have been described as 'social') by failing to ask questions of the following types. How does individual hygiene change, and who decides upon greater cleanliness and why? Can nutrition change for the better among some members of society or the family without consumption per head rising? Who uses the modern medical technology, how well, and in keeping with whose decision? Is the population merely the passive recipient of these changes, or does it play an active role? Does its nature change over time, and does formal education play some part in this? Is the role of education so marginal that it is adequately covered by the following statement: 'The institution of free and universal compulsory schooling, resulting in mass literacy, and the inclusion of lessons in personal hygiene in the school curriculum, have created a far greater awareness of health matters among the population, encouraging the application of basic good health practices, and leading to earlier recognition and treatment of disease.'<sup>8</sup>

In an earlier paper it was reported that the existence of public health services in small traditional villages undoubtedly reduces mortality.<sup>9</sup> However, that investigation was designed to minimize as much as possible all other factors: in one village everyone had easy access to public health services, while in the other no-one did, except at great distance; and in each village sanitary conditions, and even access to food, were similar for all inhabitants regardless of socio-economic characteristics. As was expected from the survey design, most socio-economic factors contributed little to an explanation of mortality differentials. Nevertheless, one factor, mother's education, was of surprising importance, although the mechanism was not clear and the problem was not explored further at that time. In the town that enjoyed ample health facilities, the differential use by mother's education was not statistically significant, and, in fact, most families used the facilities frequently. Yet the chance of a mother without schooling losing a child was two-and-a-half times that of a mother with schooling. In the town without health facilities this ratio was higher still - four times - and very little of this extra margin could be explained by more educated mothers sending their children to facilities elsewhere, for few made such a journey, and those who did were mostly adults and mostly men.<sup>10</sup>

Evidence has accumulated that maternal education plays a major role in determining the level of infant and child mortality, but little attempt has been made to explain this phenomenon and it frequently seems to have been assumed that maternal education is merely a reflection of the standard of living.

Figures from the 1960 Census of Ghana show very large differences in child survivorship by education of mother.<sup>11</sup> The proportion of children dead was almost twice as high for mothers with no education as for mothers with elementary education, and over four times as high for mothers with no education as for mothers with secondary education. Furthermore, these ratios

<sup>5</sup> Stolnitz (1955), *loc. cit.* in footnote 2; United Nations (1963), *op. cit.* in footnote 2; United Nations (1973), *op. cit.* in footnote 2; Preston (1975), *loc. cit.* in footnote 2; Preston and Gardner, *loc. cit.* in footnote 2.

<sup>6</sup> E. Arriaga and K. Davis, 'The Pattern of Mortality Change in Latin America', *Demography* 6 (1969), pp. 223-242.

<sup>7</sup> Preston and Gardner, *loc. cit.* in footnote 2, p. 3.

<sup>8</sup> United Nations (1973), *op. cit.* in footnote 2, p. 149; African primary schools do take the teaching of hygiene seriously. See Esther Koeune, *The African Housewife and Her Home* (Nairobi: East African Literature Bureau, 1952), p. 35.

<sup>9</sup> I. O. Orubuloye and J. C. Caldwell, 'The Impact of Public Health Services on Mortality: A Study of Mortality Differentials in a Rural Area of Nigeria', *Population Studies*, 29 (1975), pp. 259-272.

<sup>10</sup> *Ibid.*, pp. 264-268.

<sup>11</sup> S. K. Gaisie, *Dynamics of Population Growth in Ghana*, Ghana Population Studies No. 1 (Legon, Accra: Demographic Unit, University of Ghana, 1969).

were similar in urban and rural areas; indeed the rural-urban ratio of dead children, a ratio which might be expected to measure access to health services, was only about 1.5. Figures from a 1966 survey of Greater Bombay, carried out by the International Institute for Population Studies, showed that the infant mortality rate among mothers with no education was almost double that among mothers who had completed elementary education and almost three times that among mothers with education beyond elementary levels. The ratios were higher still if the first month of life was excluded.<sup>12</sup> Surveys carried out in Ghana in 1965-66, Upper Volta in 1969 and Niger in 1970<sup>13</sup> showed the ratios of the proportion of children dead to mothers without education to the proportion dead to mothers with education ranging from 1.1 to 1.4 in urban areas and from 1.3 to 1.4 in rural areas.<sup>14</sup> In a 1973 survey of Indonesia it was shown that the proportion of a birth cohort dying before reaching their fifth birthday fell with increasing education of mother, from no education to some elementary education to completed elementary education and above, in the rural areas of West, Central and East Java, in Bali, Sulawesi (Celebes) and Sumatra (the six survey regions) and in the urban areas of all regions except West Java (where the mortality of children of mothers with incomplete elementary schooling was highest).<sup>15</sup> In the 1973 National Demographic Survey of the Philippines infant and child mortality rates fell steeply by education of mother through five levels of educational attainment (although the smallest differential was that between mothers with no education and those with between one and four years of elementary schooling).<sup>16</sup> Similarly  $q(2)$ , derived from proportions of children surviving, for eight Latin American countries during the first half of the 1970s declined steeply with increasing education of mother so that the level for mothers with no education was usually at least 25 per cent higher than that of mothers with only one to three years of elementary schooling and, in the majority of countries, around four times the level of that recorded when the mother had received ten or more years of education;<sup>17</sup> furthermore, once maternal education was controlled, urban-rural differentials could be shown to be trivial in the two countries for which figures were published (Ecuador and Chile).<sup>18</sup> Child mortality has been recorded as declining with maternal literacy in Costa Rica, Mexico and East Pakistan (now Bangladesh).<sup>19</sup> In the United States, the infant mortality rate for mothers with no education or elementary education has been shown to be double that of mothers with college education, and the differential was greater than by fathers' education.<sup>20</sup>

Two analyses of a range of countries are important. Kusakawa showed that female literacy

<sup>12</sup> L. T. Ruzicka and Tara Kanitkar, 'Infant Mortality in an Urban Setting: The Case of Greater Bombay', in K. E. Vaidyanathan (ed.), *Studies on Mortality in India*, Monograph Series No. 5 (Gandhigram; The Gandhigram Institute of Rural Health and Family Planning, 1972), pp. 199-200.

<sup>13</sup> See D. I. Pool, 'Ghana Fertility Survey: A Preliminary Report', in J. C. Caldwell and C. Okonjo (eds.), *The Population of Tropical Africa* (London: Longmans, 1968), pp. 393-400; A. Courel and D. I. Pool, 'Upper Volta', in J. C. Caldwell (ed.), *Population Growth and Socioeconomic Change in West Africa* (New York: Columbia University Press, 1975), pp. 737-738; I. Dandoussou, S. Diarra, D. Laya and D. I. Pool, 'Niger', *ibid.*, pp. 680-681.

<sup>14</sup> Harrington, *loc. cit.* in footnote 2, p. 16.

<sup>15</sup> Lembaga Demografi, *Fertility-Mortality Survey, 1973*, Unpublished data (Jakarta: Fakultas Ekonomi, Universitas Indonesia).

<sup>16</sup> A. N. Alcantara, 'Differential Mortality among Population Sub-groups', *Research Note No. 63* (PREPF Research Note No. 25) (Manila: Population Institute, University of the Philippines System, mimeographed, no date), Table 5.

<sup>17</sup> H. Behm *et al.*, 'Mortalidad en los primeros años de vida en los países de la América Latina', Serie A, No. 1024 a 1032 (Santiago: CELADE, 1976-1977), cited in S. H. Preston, 'Research Developments Needed for Improvements in Policy Formulation on Mortality', (mimeographed, 1978), p. 10. The countries covered and the dates of the data are: Chile, 1970; El Salvador, 1971; Paraguay, 1972; Costa Rica, 1973; Colombia, 1973; Ecuador, 1974; Dominican Republic, 1975; Bolivia, 1975.

<sup>18</sup> CELADE, 'La mortalidad en los primeros años de vida en países de la América Latina', (Santiago: 1977), cited in Preston (1978), *loc. cit.* in footnote 17, p. 8.

<sup>19</sup> Sloan *op cit.* in footnote 2, pp. 42-57. The relationship is not shown for Puerto Rico but Sloan argues that the data are suspect.

<sup>20</sup> Kitagawa and Hauser, *op. cit.* in footnote 2, pp. 28-29.

played an important part in explaining variations in expectations of life at birth.<sup>21</sup> In a United Nations study of 115 countries correlation between literacy and expectation of life at birth was higher than between any other specific factor considered and expectation of life; indeed, the correlation with literacy was only marginally lower than that with the General Development Index.<sup>22</sup>

It might also be noted that very low infant and child mortality levels have been achieved in some societies where levels of female education are high, health inputs moderate and incomes per head low to moderate: Kerala is a prime example, but Sri Lanka probably also fits the description.<sup>23</sup>

Where these data are discussed, two aspects are particularly disturbing. The first is an almost universal tendency to take the level of maternal education as a proxy for general economic development or as a reflection of socio-economic status generated primarily by other conditions, such as husband's income. The second is the use of figures on the proportion of children a woman has lost as a proxy for infant and child mortality, which is admittedly reasonable, and also as a proxy for mortality among such mothers and in the whole community, which is much more debatable. Nevertheless, the fact remains that in the first place these are data on the propensity for women to lose children (differentiated by the women's levels of education).

These problems require further investigation and the statistics available from the largest survey of the 1973 Nigerian Segment of the Changing African Family Project<sup>24</sup> allow this, while figures from another survey of the same project can be employed to examine urban-rural differences and certain other data collected only in that survey.

#### *The Data and the Analysis of Child Mortality by Maternal Educational Levels*

The analysis will essentially be based on Survey 1 of that project (referred to subsequently as CAFN1 or Changing African Family Project Nigerian Segment Survey 1), a probability sample of 6,606 Yoruba women, 15-59 years of age, carried out in May-June 1973 in the city of Ibadan. The omission of fewer than five per cent of the population as being non-Yoruba provides a more culturally homogeneous sample. Ibadan probably contained about 750,000 inhabitants at the time,<sup>25</sup> and, by African standards, possessed good medical and health facilities (and also traditional health services).<sup>26</sup> Everyone had potential access to modern medicine, although members of the middle class could still contrive preferential access.<sup>27</sup> The small area covered by the survey meant that tight control over interviews was maintained and a special emphasis was given to collecting accurate information about mortality.

Survey 2 (CAFN2), used only for supplementary purposes, was a probability sample of 1,499 Yoruba women (and 1,497 men, information about whom will not be analysed here),

<sup>21</sup> Kusakawa, *loc. cit.* in footnote 2.

<sup>22</sup> D. V. Granahan *et al.*, 'Contents and Measurement of Socioeconomic Development', (New York: United Nations Research Institute for Social Development, 1972) cited in World Health Organization, *Statistics Report* 27 (1974), p. 688.

<sup>23</sup> In the early 1970s income per head for India as a whole, Kerala and Sri Lanka was around \$120. However, their literacy levels were 36 per cent, 60 per cent and 85 per cent respectively, and female levels were closer to male levels in Kerala and Sri Lanka. Infant mortality rates were around 130, 65 and 50 respectively.

<sup>24</sup> F. O. Okediji, J. C. Caldwell, Pat Caldwell and Helen Ware, 'The Changing African Family Project: A Report with Special Reference to the Nigerian Segment', *Studies in Family Planning*, 7 (1976), pp. 126-136.

<sup>25</sup> *Ibid.*, p. 126. This calculation of the city's population, made by inflating the residents of both the sampled and non-sampled households (no eligible women or non-Yoruba), is probably the most accurate estimate available.

<sup>26</sup> Department of Demography, The Australian National University: *The Value of Children: Information Sheets on Individual Centres*, The Changing African Family Project, Nigerian Segment (Canberra: 1974), pp. 77-84.

<sup>27</sup> F. O. Okediji, 'Socioeconomic Status and Attitudes to Public Health Problems in the Western State: A Case Study of Ibadan', in Caldwell (ed.), *op. cit.* in footnote 13, pp. 275-297.



Table 1. *Proportion of children dead by age and education of mothers, 15-49 years of age, Ibadan City, Nigeria, 1973*

	Education of mother			
	No schooling	Primary schooling only	At least some secondary schooling	All mothers
Code identification henceforth	NS	PS	SS+	—
No. of respondents	3,369	1,732	1,272	6,373
Age of respondents				
15-19	0.069	0.030	0.000	0.049
20-24	0.112	0.075	0.055	0.089
25-29	0.140	0.113	0.078	0.119
30-34	0.188	0.131	0.079	0.159
35-39	0.216	0.114	0.098	0.173
40-44	0.266	0.159	0.079	0.232
45-49	0.296	0.248	0.118	0.276

Source: CAFN1.

aged 17 or over, living in June-July 1973 in Nigeria's Western and Lagos States (now Ogun, Ondo, Oyo and Lagos States), an area with perhaps eight million people. It is included in this analysis primarily to allow an examination of rural-urban contrasts where marked differentials in access to modern health services exist. However, certain other figures not available in Survey 1 are used: father's education, answers to two questions on mother's marriages, and on common parental activities.

Some educational facilities have been available in this region throughout the present century but over the last 25 years, both before and after independence, schooling has expanded greatly, mostly in response to popular demand. By 1973, almost half the female respondents in each survey had enjoyed some schooling. At the time of the survey the expectation of life at birth in Ibadan was about 53 years<sup>28</sup> and in rural Western Nigeria probably less than 44 years.<sup>29</sup> In Ibadan the infant mortality rate was about 83 per thousand and  $4q_1$  around 0.054;<sup>30</sup> in the whole of the Survey 2 area infant mortality would still have been well over 100 per thousand because more than one-third of the population lived in rural areas. The near absence of fertility differentials by education means that the relationship between maternal education and child mortality can be examined without having to be concerned with the possibility of fertility operating as an intermediate explanatory factor.

Table 1 provides data for CAFN1 respondents of reproductive age on the proportions of children dead by mother's age and education. Throughout the analysis, separate tabulations were prepared for the 84 per cent of ever-married women who were living with their husbands (unlike the other 16 percent who were separated, divorced or widowed) but the two sets of results did not differ significantly in the comparisons being made.

<sup>28</sup> I. S. L. Sembajwe, 'Fertility and Child Mortality Levels and Differentials among the Yoruba of Western Nigeria', Unpublished Ph.D. thesis (Department of Demography, The Australian National University, 1977), pp. 256-296.

<sup>29</sup> For an estimate of the expectation of life at birth for the whole of the Western State (i.e. rural + urban) at this time, see Orubuloye and Caldwell, *loc. cit.* in footnote 9, p. 271, which drew upon U. Ayeni, 'Demographic Characteristics of Nigeria: An Analysis of Population Data from 1931 to 1965', Unpublished Ph.D. thesis (University of London, 1974) and P. O. Olusanya, 'Nigeria: Population Growth and its Components and the Nature and Direction of Population Change', in Caldwell (ed.), *op. cit.* in footnote 13, pp. 269-271.

<sup>30</sup> Sembajwe, *op. cit.*, in footnote 28.

Clearly, the Nigerian figures exhibit the marked child mortality differentials by education of mother reported elsewhere. Furthermore, if there is any understatement of dead children, it is likely to be proportionately greater among the uneducated than the educated, and hence the true differences may be even greater than those shown in Table 1.

The sub-divided figures in Table 1 are not well suited for cross-tabulation against other characteristics of the respondents – as will be necessary when attempting to determine the primacy of mother's education as a factor in depressing mortality. This problem can be overcome by aggregating the proportions, as is done in Table 2, to provide a Child-Mortality index (CM). One advantage of such an index over a simple proportion of children dead to women 15–49 years of age is that it controls for age structure, thus allowing better comparison between populations and also preventing the youngest population from dominating the index. Another is that it can be sub-divided into component indices, which has also been done in Table 2, to allow separate examination of differentials which affected older populations, perhaps largely the product of conditions during the 1950s and 1960s, and those which have affected younger populations, perhaps mostly during the late 1960s, and the 1970s.<sup>31</sup> In the analysis that follows all cross-tabulations were performed for the full CM index and also for the younger (CMY) and the older component (CMO), but the latter two are reported here only where the relations differed from the full index.

In Table 2 we also present equivalent 'North' model life table<sup>32</sup> expectations of life at birth determined from the tables after converting the proportions of children dead by age of mother to life table survival functions by Brass's method.<sup>33</sup> 'North' tables appear to incorporate the closest approximation to the southern Nigerian mortality structure.<sup>34</sup> One might note a rise in expectation of life at birth in recent years of around two-thirds of a year per elapsed year, with the differences between the groups defined by maternal education narrowing. The CMY and CMO indices rarely have to be reported separately, because the trend was almost always similar within each education group no matter what other characteristic was used for further sub-division.

The use of Brass correction factors allows the examination of a matter of fundamental importance, namely the extent to which the greater loss of children among women with less education reflects their earlier commencement of child-bearing. In the final column of Table 2 mortality ratios are presented from the different life tables yielded by the different fertility schedules of the three education groups of mothers (i.e. we are now comparing the proportions of children dying up to specified ages). This exercise shows that we can employ PS/NS ratios with confidence. Later marriage and child-bearing characterize only women with education beyond the primary school. Even so, the SS+/PS comparison is completely valid for the CMO index, reasonably satisfactory for the CM index which is mostly employed in this paper, and a cause for real care only in the case of the CMY index.

In Survey 1, carried out solely in the city of Ibadan with potential access to modern medical facilities by all, the CM index for women with some primary schooling, but no more, was only 68 per cent of that recorded by women with no schooling; while that for women with more than primary schooling was 39 per cent of that of women with no schooling (or 44 per cent if corrected to take note of the later fertility schedule). In a much broader area, with rural as well as urban population, remarkably similar figures were recorded in CAFN2 for these two comparisons: 68 per cent and 41 per cent (44 per cent when corrected for later fertility) respectively.

A comparison of the figures from the two surveys also confirms the finding reported else-

<sup>31</sup> See W. Brass, *Methods for Estimating Fertility and Mortality from Limited and Defective Data*, An Occasional Publication (Chapel Hill: POPLAB, 1975), pp. 56–57.

<sup>32</sup> A. J. Coale and P. Demeny, *Regional Model Life Tables and Stable Populations* (Princeton: Princeton University Press, 1966), pp. 220–243.

<sup>33</sup> See W. Brass, A. J. Coale, P. Demeny, D. F. Heisel, F. Lorimer, A. Romaniuk and E. van de Walle, *The Demography of Tropical Africa* (Princeton: Princeton University Press, 1968), pp. 104–114.

<sup>34</sup> *Ibid.*, p. 113.

Table 2. *Child mortality indices by education of mother, respondents 15-49, Ibadan City, Nigeria, 1973*

Index	Symbol	Definition	Education of mother			Ratio of indices			Ratio of indices corrected for the different fertility schedules
			NS	PS	SS	All mothers	PS/NS	SS/NS	
Child-Mortality Index <sup>a</sup>	CM	(a) Sum of proportions of children dead in each five-year age group of respondents from 15-49 years of age <sup>b</sup>	1.287	0.870	0.507	1.097	0.68	0.39	0.43
		(b) Equivalent expectation of life at birth <sup>c</sup> (years)	51.2	58.5	65.2	52.6			
		(c) Number of respondents	3,369	1,732	1,272	6,373			
Child-Mortality Index for younger women <sup>a</sup>	CMY	(a) Sum of proportions of children dead in each five-year age group of respondents from 15-29 years of age <sup>b</sup>	0.321	0.218	0.133	0.257	0.68	0.41	0.57
		(b) Equivalent expectation of life at birth <sup>c</sup> (years)	57.4	62.6	67.2	58.8			
		(c) Number of respondents	1,698	1,310	933	3,941			
Child-Mortality Index for older women <sup>a</sup>	CMO	(a) Sum of proportions of children dead in each five-year age group of respondents from 30-49 years of age <sup>b</sup>	0.966	0.652	0.374	0.840	0.67	0.39	0.39
		(b) Equivalent expectation of life at birth <sup>c</sup> (years)	46.6	55.3	63.7	49.9			
		(c) Number of respondents	1,671	422	339	2,432			

Source: CAFNI

Notes: <sup>a</sup> CM = CMO + CMY.<sup>b</sup> Proportions are taken from Table 1 but proportions have been summed from more complete decimal fractions so may not always tally exactly.<sup>c</sup> Equivalent expectations of life at birth, according to 'North' model life tables, after employment of Brass's method for estimating child mortality.



where that urban-rural child mortality differences, once education of the mother is controlled, are often small. This is an astonishing situation in view of undoubted differences in access to health facilities, and the fact that a specific study of two Yoruba villages, with and without medical facilities respectively, established marked mortality differentials which could not be explained by differences in educational composition.<sup>35</sup> While CAFN1 reported CMs for the NS, PS and SS groups of 1.287, 0.870 and 0.507 respectively, in CAFN2, where the majority of respondents lived outside cities and at least one-third in villages, very similar levels for the three groups were recorded, namely 1.375, 0.941 and 0.569. Most rural populations are no longer as isolated as the two villages previously studied; furthermore, this reduction in effective isolation may be a fairly recent change as the comparison of CMO and CMY indices noted below in discussion of Table 3 would suggest.

### *Child Mortality by Various Socio-economic Characteristics*

These child mortality differentials by mother's education do not appear to be merely reflections of other even broader differentials. They are the largest socio-economic differentials found, and are clearly important in their own right. This is brought out by Table 3 which contains the greatest child-mortality differentials found in the survey. Because some statistics can be easily dichotomized while others cannot, and because the data on maternal education can be divided fairly easily into either two or three meaningful measures of considerable size, in Table 3 child mortality by maternal education is compared with child mortality by other characteristics in the form of both dichotomized and trichotomized data. In the latter, the ratio represents the comparison of the highest mortality with that of the lowest mortality group and so omits the intermediate group. The close similarity between the figures for mother's education and mother's occupation is most revealing. White-collar occupation is hardly an independent variable in its own right; over 93 per cent of women in such occupations have received at least secondary education, and, at any given time, nearly half the women with secondary education are working in white-collar occupations.

The relatively low level of some of the other ratios is surprising, as, for instance, in the extreme contrast between the two cities, where health services are potentially available, and the villages where they are infrequent, or in the contrast between those employing modern medical facilities for the last birth and those not doing so, which is presumably an index of the likelihood of using Ibadan City's modern health services. Nor are there large differentials with measures distinguishing the traditional and modern societies: the practice of polygyny, wives and husbands eating or sleeping together, or the maternal grandfather's occupation. Whilst child mortality falls continuously as maternal education lengthens, there is no similar continuous movement as occupation changes from more to less traditional; there is a single downward jump with white-collar employment.

It may be argued that family well-being, or at least the capacity to purchase health, is better measured by family income than by the education or occupation of either parent or by the area of residence. This is, in fact, debatable in West Africa, but in any case is irrelevant. In both surveys very considerable effort was made to collect information on individual and family income, but comparison with occupation and with official figures on income and expenditure show the responses to be unreliable and unusable. To date, this has been the common experience in West African surveys partly because of uncertainty about irregular incomes, but largely because respondents are afraid of relatives and others overhearing the information given to the interviewers.

Two further measures are of interest. The contrast between the child mortality levels of Old Ibadan, the traditional centre with high settlement densities and almost insoluble sewage and refuse problems, and the new parts of the city is smaller than might have been anticipated. The contrast between mortality levels where mothers have used birth control and where they have not

<sup>35</sup> Orubuloye and Caldwell, *loc. cit.* in footnote 9.

Table 3. *Ratio of highest CM to lowest CM in socio-economic divisions, Surveys 1 and 2, Nigeria, 1973*

Source	Socio-economic division	Highest CM		Lowest CM		Ratio of highest to lowest CM
		Sub-division	Index value	Sub-division	Index value	
<i>(a) Dichotomized socio-economic divisions</i>						
CAFN1	mother's education	NS	1.287	PS+	0.716	1.80
	marriage type	polygynous	1.295	monogamous	0.865	1.50
	area of residence	Old Ibadan	1.240	rest of Ibadan	0.856	1.45
	birth control	never practised	1.179	have practised	0.728	1.62
	conditions of last child's birth	no doctor or hospital	1.283	doctor and/or hospital	0.973	1.32
CAFN2	mother's education	NS	1.375	PS+	0.739	1.86
	father's education	NS	1.356	PS+	0.914	1.48
	number of mother's marriages	2+	1.306	1	1.206	1.08
	whether children of school age sent to school	not all sent	1.303	all sent	0.973	1.34
	whether parents eat together	never or rarely	1.316	usually	0.867	1.52
	whether parents sleep in the same room	never or rarely	1.201	usually	1.196	1.00
<i>(b) Trichotomized socio-economic divisions</i>						
CAFN1	mother's education	NS	1.287	SS+	0.507	2.54
	mother's occupation	housewife	1.196	WC <sup>a</sup>	0.468	2.56
	father's occupation	unskilled and trader	1.294	WC <sup>a</sup>	0.847	1.53
	maternal grandfather's occupation	farmer	1.151	WC <sup>a</sup>	0.844	1.36
CAFN2	mother's education	NS	1.375	SS+	0.569	2.42
	father's education	NS	1.356	SS+	0.766	1.77
	urban-rural residence	village	1.431	city (Lagos and Ibadan)	0.722	1.98

Note: <sup>a</sup> WC = 'white collar' and is used throughout the paper to mean working in the modern sector. It includes professionals, administrators, clerks, ministers of religion, police and army officers and those who work in offices and modern large shops.

is considerable; but this has been explored before<sup>36</sup> and the practice of birth control appears to be at least partly a measure of profound changes in family relationships and especially parent-child relationships.

Not only has there been a lessening over time of the relative impact of different levels of maternal education, but this is also true of mother's occupation, father's occupation and maternal grandfather's occupation, probably because those with higher levels of schooling or in white-collar occupations are no longer such a highly selected elite. Rural-urban ratios have also fallen, as health facilities have been brought into or nearer rural areas, communications have improved, and the contrasts between urban and rural populations have lessened. However, the birth control ratio has become more significant, perhaps because the proportion of more persistent controllers, who believe they have restricted fertility, has grown.

Further comment on the table is hardly warranted, because, although the profile presented is suggestive, interactions between the various characteristics mean that these must be explored first. This is so much the case with the education of the two parents that comment has been completely withheld on the relative impact of father's education.

Some of the more important interactions are explored in Table 4, where CMs are expressed as a percentage of that of the highest CM in each group. In the table only those characteristics which might prove to provide the underlying explanation for the relationship between child mortality and maternal education are examined - namely the mother's place of residence, her

Table 4. *Relative child mortality by education of mother and one other characteristic: percentage CM in each group is of highest CM*

Source	Characteristic	Subdivisions of Characteristic	Mother's education		
			NS	PS	SS+
A. CAFN1	Mother's occupation	WC	—	—	32
		Rest (100 = CM of 1.287)	100	68	46
B. CAFN1	Father's occupation	WC	84	59	32
		Rest (100 = CM of 1.335)	100	72	59
C. CAFN1	Maternal grandfather's occupation	WC	96	68	32
		Rest (100 = CM of 1.240)	100	66	45
D. CAFN1	Area of residence	Old Ibadan	100	69	41
		Rest of Ibadan (100 = CM of 1,367)	80	55	33
E. CAFN1	Marriage type	Monogamy	79	54	33
		Polygyny (100 = CM of 1.405)	100	70	50
F. CAFN2	Father's education	NS	100	39	15
		PS	89	70	—
		SS+ (100 = CM of 1.378)	79	64	37
G. CAFN2	Area of residence	city <sup>a</sup>	110	37	25
		town <sup>a</sup>	90	74	43
		village <sup>a</sup> (100 = CM of 1.408)	100 <sup>b</sup>	51	46

Notes: <sup>a</sup> city = Lagos and Ibadan; town = centres with 20,000–100,000 inhabitants; village = centre with fewer than 20,000 inhabitants.

<sup>b</sup> chosen because all city CMs total less than village CMs.

<sup>36</sup> J. C. Caldwell and Pat Caldwell, 'The Achieved Small Family: Early Fertility Transition in an African City.', *Studies in Family Planning* 9 (1978), p. 16.

husband's occupation and education, and the type of marriage in which she finds herself. The analysis is restricted to cells containing at least 40 women (averaging over 100 births and more than 20 child deaths). In each case, the analysis is also restricted to significant differences (for instance, in Panel A the only mother's occupational group with a significantly different CM was that of 'white-collar' occupation).

The figures in Table 4 demonstrate that, at least in terms of child mortality, a woman's education is a good deal more important than even her most immediate environment. If any one of these environmental influences had wholly explained child mortality, and if female education had merely been a proxy for them, the CM index would not have varied with maternal education in that line of the table. This is clearly far from being the case.

Area of residence has little and even ambiguous impact. In both old and newer Ibadan – two areas which to the observer give the appearance of representing the contrast between traditional Africa and the new imported society – the child mortality of a woman with only primary schooling is about 30 per cent lower than that of a woman with no schooling, and, of a woman with secondary schooling, around 60 per cent lower. In contrast, at every level of schooling the gain measured by living in newer Ibadan (with all that means as a measure of the likelihood of being richer, better fed, better housed, having neighbours who understand the modern world and its health and other facilities, and so on) is only about 20 per cent. If urban and rural areas are compared, this finding is confirmed, but other complexities are also revealed. When more populous Lagos, with its even more contrasting societies is added to Ibadan, it becomes clear that the illiterate mother may be no better off in the city than in the village. In the former, she is now part of an underprivileged minority, in Lagos often living far out in fringe settlements, while in the village she is the typical citizen. In fact, mothers with secondary education can exploit the facilities of the city, while in the village and even in many towns there are few facilities to be exploited.

Perhaps the most revealing aspects of the table is the evidence it presents of the much greater significance of the mother's education than the father's. Where a wife has had no education, the CM index for husbands with primary and secondary schooling is only about 10 and 20 per cent lower respectively than for those with no schooling. However, where the husband has had no schooling, similar comparisons for the wife yield falls of 61 and 85 per cent respectively, and where the husband has had secondary schooling the comparable falls with the wife's increasing educational levels are around 20 and 50 per cent. The most striking differences occur in the relatively small proportion of marriages where the wife is better educated than the husband; in this important case, to which we will return later when discussing causal links, decisions about child care are likely to be exclusively in the hands of the mother, and child mortality is particularly low.

Where the father is in a white-collar occupation child mortality is reduced about one-sixth for the lower maternal educational groups. The major decline appears when the father is in a white-collar position and the mother has had secondary education – that is in the case of the modern elite. Even this decline is explained to a somewhat greater extent by mother's education than father's occupation.

Two other moulding influences on mothers are also demonstrated. Her upbringing, as measured by her father's occupation, is of little importance except where it is a measure of the two-generational modern elite: where the father not only was in a white-collar position (relatively rare a generation ago) but educated his daughter to secondary school level. Monogamy, as might be expected, has a greater impact, reducing mortality by 21 to 33 per cent as education rises (polygynously married highly educated women are something of an anomaly and their marriages tend to be subject to peculiar strains), but in each type of marriage the education of wives to secondary school level at least halves mortality.

Such interrelations can be taken further as in Table 5, but decreasing numbers in specific cells means that many have to be omitted (it should be noted that the omitted cells often represent

Table 5. *Child mortality by education and occupation of mother, occupation of father, and residence area of family, type of marriage and family planning practice,<sup>a</sup> Survey 1, Ibadan City, Nigeria, 1973*

Education of mother	NS				PS				SS+			
	non-WC				non-WC				non-WC			
	WC		WC		WC		WC		WC		WC	
Occupation of mother	non-WC		WC		non-WC		WC		non-WC		WC	
Occupation of father	non-WC		WC		non-WC		WC		non-WC		WC	
Area of residence <sup>b</sup>	OI	NI	OI	NI	OI	NI	OI	NI	OI	NI	OI	NI
No. of respondents	1887	598	517	232	560	348	333	280	109	90	182	177
<i>(a) CM</i>												
Monogamous:												
no FP	1.282	1.126	1.010	0.679	0.499	0.918	0.276	0.801	0.659	1.029	0.334	0.640
FP	—	—	—	—	—	—	0.557	0.690	—	—	0.186	—
Polygynous:												
no FP	1.523	1.347	1.427	1.046	1.191	0.622	1.025	0.620	—	—	—	—
FP	1.078	—	—	—	—	—	—	—	—	—	—	—
all respondents	1.391	1.254	1.263	0.890	1.077	0.776	0.738	0.790	0.675	0.622	0.452	0.488
<i>(b) Relative child mortality,<sup>c</sup></i>												
(i) all respondents	100	90	91	64	77	56	53	57	49	45	33	40
(ii) by marriage type and family planning practice												
Monogamous:												
no FP	84	74	66	45	33	60	18	53	43	68	22	42
FP	—	—	—	—	—	—	37	45	—	—	12	26
Polygynous:												
no FP	100	89	94	69	78	41	67	41	—	—	—	—
FP	71	—	—	—	—	—	—	—	—	—	—	—

Notes: <sup>a</sup> 'FP' means that some attempt to prevent conception or to practise abortion has been made; 'no FP' means that no attempt has ever been made.<sup>b</sup> OI = Old Ibadan; NI = newer Ibadan<sup>c</sup> Percentage of highest CM.



groups of little significance in the community - the types of combinations of characteristics not generated on any considerable scale by social change).

The contrasts are persistent and very considerable. A couple, both with white-collar jobs and where even the wife has received some secondary education, living in newer Ibadan, tend to lose only about one-quarter of the children lost by a couple who live in Old Ibadan, neither working in white-collar jobs, and where the wife at least is illiterate. Children in families of the former type experience a mortality regime (that characterizing populations with expectations of life at birth in the high sixties) found fairly recently in industrialized countries (in the 1950s or later),<sup>37</sup> while those in the latter experience a regime (that characterizing populations with expectations of life at birth around 37 years) found in industrialized countries a century and a half ago<sup>38</sup> and little above the contemporary level in western Nigeria's remotest villages.<sup>39</sup> The CM index continues to decline steeply with maternal education even when what might be regarded as the three major socio-economic indices are held constant. When both parents are in non-white-collar occupations and live in Old Ibadan, the relative child mortality for mothers with no education, primary schooling only, or at least some secondary schooling is 100, 77 and 49 respectively, and, when they live in newer Ibadan, the figures are 90, 56 and 45; when the mother is in a non-white-collar occupation and the father in a white-collar one, the levels for Old Ibadan are 91, 53 and 33 and for newer Ibadan are 64, 57 and 35.

The figures in Table 5 confirm the relative importance of mother's education for the reduction of child mortality but show also that father's occupation has a distinct and substantial impact. Where other characteristics are held constant, the area of residence seems to be of greatest importance among the poorest or most traditional population where neither spouse works in a white-collar position and where the wife has received, at most, primary schooling (the one exception to this general rule of residence is the highest elite group, perhaps evidence that those of their number who live in Old Ibadan are very atypical, even in terms of child care).

When the analysis is sub-divided by marriage type and family planning practice, even when cells with fewer than 40 women are excluded, problems of small cell size are encountered and these three points can be established.

First, even when five other control variables are employed, there is still a downward trend in child mortality so that children of mothers with secondary schooling average little more than half the chance of dying than children with mothers similar in terms of the other five characteristics but who have not had any schooling. This is even more remarkable when it is noted that one of these characteristics, the practice of family planning, must itself incorporate a behavioural and personality component.

Secondly, the probability of children of monogamous marriages dying is only three-quarters of that applying to children of polygynous marriages even when the five other factors are held constant. In the society as a whole, the difference in child mortality between the two types of marriage is much greater than this, but the difference owes much to the fact that polygynously married women are likely to be more traditional in every way, and certainly to be poorer, to live in a poorer area, to be less-well educated and to do work that requires no education, and to be married to a man with similar characteristics. These differences have usually been held to explain the entire differential in child mortality between the two types of marriage, but the figures in Table 5 suggest that, in addition, the contrasting family structures arising from the different marriage structures have an impact of their own.

<sup>37</sup> In England and Wales, U.S.A., France, Sweden and Australia, these levels were reached in the mid-1950s. See N. Keyfitz and W. Flieger, *World Population: An Analysis of Vital Data* (Chicago, University of Chicago Press, 1968).

<sup>38</sup> In England and Wales, France, Sweden and Australia, these levels were reached at various dates between 1860 and 1900. See Keyfitz and Flieger, *op. cit.* in footnote 37, and C. M. Young, 'Life Tables: Introduction and Some Applications with Supplementary Calculations for Nineteenth-century Australia', (Canberra: Department of Demography, The Australian National University, mimeographed, 1975).

<sup>39</sup> Orubuloye and Caldwell, *loc. cit.* in footnote 9.

Thirdly, child mortality is somewhat lower when the mother has practised birth control than when she has not, but the difference in this case is very much smaller than it is when fewer characteristics are controlled. There probably still remains a residual and explanatory personality element. Mothers who are careful about controlling conception may also be more careful about controlling children's illness and about many other aspects of life. They may regard themselves as more active protagonists in the dramas of life. In the relatively few cases where they have actually succeeded in restricting their number of children, they may be more apprehensive of losing any of them.<sup>40</sup>

### *The Impact of Maternal Education on Child Mortality*

The society studied is one which is not only experiencing rapid economic growth, but one where the culture, and especially the structure of the family, incorporates both traditional and imported elements.<sup>41</sup> There are both stresses and very different ways of life—a point amply demonstrated by the fact that different groups in a single city, Ibadan, exhibit child (and probably more general) mortality regimes characterizing populations with expectations of life at birth as far apart as 45 and 70 years.

The preceding analysis has shown that maternal education is the single most significant determinant of these marked differences in child mortality. These are also affected by a range of other socio-economic factors, but no other factor has the impact of maternal education and in their totality they do not even come close to explaining the effect of maternal education. Clearly, maternal education cannot be employed as a proxy for general social and economic change but must be examined as an important force in its own right. So important is it that it goes far towards mitigating the child mortality impact of the presence or absence of medical facilities in the area of residence. There are other straws of evidence: monogamous families differ from polygynous ones in the effect they exercise on child survivorship; mortality is lower not only when a mother is educated but when she was herself reared in a modern, urban-elite household; mortality is especially low when the mother has not only been to school but is better educated than the father.

It has been claimed that African parents cope with illness as well as the community's knowledge and the family's circumstances allow.<sup>42</sup> This may have been true of traditional society, which, in its intact form, no longer exists in southern Nigeria, but is certainly not now true of Ibadan, or the whole of south-west Nigeria, as the large differences in child mortality indicate. In any case, community knowledge, the common tradition for explaining and treating illness, has been challenged and fragmented.

Explanation must be sought in the nature of the household and family and in terms of reactions to illness and of decision-making during illness. In the latter two areas there is a dearth of research not only in West Africa but elsewhere, and hence the discussion must be careful but also speculative, and the use of the literature eclectic.

There is one study of child health in the context of both the familial and more external environment, but it was carried out not in contemporary West Africa but in Newcastle upon Tyne, in 1947. A central conclusion was: 'In the study of these families and in attempting to correlate their environments with the health of the children, there emerged one dominating factor—the capacity of the mother. If she failed her children suffered. If she coped with life skilfully and pluckily, she was a safeguard of their health. . . . A family with a good mother can withstand a

<sup>40</sup> Caldwell and Caldwell (1978), *loc. cit.* in footnote 36.

<sup>41</sup> J. C. Caldwell, *The Socio-economic Explanation of High Fertility: Papers on the Yoruba Society of Nigeria*, Changing African Family Project Monograph Series, No. 1 (Canberra: Department of Demography, The Australian National University, 1976).

<sup>42</sup> M. Fortes, 'Family, Marriage and Fertility in West Africa', in C. Oppong, G. Adaba, M. Bekombo-Priso and J. Moge (eds.), *Marriage, Fertility and Parenthood in West Africa*, Papers from the Fifteenth Seminar of the International Sociological Association Committee on Family Research, Changing African Family Project Monograph No. 4 (Canberra: Department of Demography, The Australian National University, 1978), Vol. 2, p. 30.

feckless or even vicious father, but rarely can a family survive if the mother fails.<sup>43</sup> It might be noted that the researchers employed a categorization of mothers by the degree of maternal satisfactoriness and that this grading correlated highly with social class (as defined by the Registrar-General) and thus inevitably with education.<sup>44</sup> Twice as many children proportionately of 'unsatisfactory' than of 'satisfactory' mothers were affected by diarrhoea and vomiting,<sup>45</sup> and the same applied to home accidents,<sup>46</sup> while fewer were taken to child welfare clinics.<sup>47</sup>

These findings are relevant to the Nigerian situation, but are very far from telling the whole story, largely because of the complex situation involved in moving varying distances from a traditional to an imported way of life – an important matter in the area of family, and especially spouse and parent-child relations.<sup>48</sup> Furthermore, in Nigeria, as doubtless in much of the Third World, education serves two roles: it increases skills and knowledge as well as the ability to deal with new ideas, and provides a vehicle for the import of a different culture<sup>49</sup> (although it could be argued that Tyneside working-class mothers were being taught the middle-class way of life).

There are at least three explanations for the phenomenon examined in this paper, and each is almost certainly of importance, although, it will be argued here, probably in ascending order.

The first explanation is usually given as the only reason. That is that mothers and other persons involved break with tradition or become less 'fatalistic' about illness, and adopt many of the alternatives in child care and therapeutics that become available in the rapidly changing society.

This 'fatalism' is, of course, in reality a complex of traditional explanations for life and death, for disease, and for combating illness. Central is a belief that 'God gives and God takes away' (a view often misunderstood by those analysing the 'Up to God' replies to desired family size questions in fertility surveys). However, there are also encyclopaedic ranges of explanation for the causes of disorders and for the means of overcoming them<sup>50</sup> – many involving rites, and appearing to the outsider to be either harmful in preventing or postponing other action or to be positively deleterious.

Food habits and taboos in most traditional cultures are deeply engrained and rarely maximize the advantage to be gained from the existing foodstuffs;<sup>51</sup> certainly in tropical Africa the balance of food by type or amount tends to militate against children and even women. Traditional child care (and transitional child care in the sense of new weaning paps from new types of food) is often far from optimal, particularly in terms of weaning,<sup>52</sup> but also with regard to a range of other aspects of child care that go well beyond nutrition.

<sup>43</sup> J. Spence, W. S. Walton, F. J. W. Miller and S. D. M. Court, *A Thousand Families in Newcastle upon Tyne: An Approach to the Study of Health and Illness in Children* (London: Oxford University Press, 1954). The study was subsequently continued until 1952 and further reported in F. J. M. Miller, S. D. M. Court, W. S. Walton and E. G. Knox, *Growing up in Newcastle upon Tyne: A Continuing Study of Health and Illness in Young Children within Their Families* (London: Oxford University Press, 1960).

<sup>44</sup> Spence *et al.*, *op. cit.* in footnote 43, pp. 121-126.

<sup>45</sup> *Ibid.*, p. 195.

<sup>46</sup> *Ibid.*, p. 197.

<sup>47</sup> *Ibid.*, p. 209.

<sup>48</sup> Caldwell (1976) *op. cit.* in footnote 41, and Caldwell and Caldwell, *loc. cit.* in footnote 36.

<sup>49</sup> J. C. Caldwell, *Population Growth and Family Change in Africa: The New Urban Elite in Ghana* (Canberra: The Australian National University Press, 1968), pp. 104-110; 'Toward a Restatement of Demographic Transition Theory', *Population and Development Review*, 2 (1976), pp. 353-354; see also J. C. Caldwell and L. T. Ruzicka, 'The Australian Fertility Transition: An Analysis', *Population and Development Review*, 4 (1978), pp. 88-90.

<sup>50</sup> See H. Collomb and S. Valantin, 'The Black African Family', in E. J. Anthony (ed.), *The Child in His Family* (New York: John Wiley, 1970), pp. 371-372 and 379-380, and J. W. M. Whiting and I. L. Child, *Child Training and Personality: A Cross-Cultural Study* (New Haven: Yale University Press, 1973), pp. 119-128.

<sup>51</sup> See Anne Burgess and R. F. A. Dean (eds.), *Malnutrition and Food Habits* (London: Tavistock Publications, 1962); Mona Fikry, *Traditional Maternal and Child Health Care and Related Problems in the Sahel: A Bibliographic Study* (Ann Arbor: A.I.D. R. & D. Report Distribution Center, 1977), p. 16.

<sup>52</sup> On the Nigerian weaning paps see D. J. Naismith, 'Kwashiorkor in Western Nigeria: A Study of Traditional Weaning Foods, with Particular Reference to Lineolic Acid', *British Journal of Nutrition*, 30 (1973), pp. 567-576; on weaning and other aspects of traditional child care in southern India, see Yankauer, *op. cit.* in footnote 2.

Thus the educated mother may change a range of feeding and child care practices without imposing significant extra costs on the household. Of course, she may also add to the budgetary strain; in one study it was argued that maternal education necessarily affects 'the household consumption of health-related goods and services'.<sup>53</sup> In a West African study significant differences in child mortality were shown, depending on both the source of water and the toilet arrangements<sup>54</sup>—two areas of action which may mean a simple change in practices and not additional costs. However, the same work yielded only ambiguous results when it was asked whether children were treated by modern medical methods or not.<sup>55</sup> It also provided evidence of a clear relationship between duration of lactation and child survival (at least up to 18 months in urban areas and at all durations in rural areas),<sup>56</sup> an expected result, which is, nevertheless, in terms of the present analysis somewhat anomalous in view of a clear inverse relationship between maternal education and child's age at weaning in the Ibadan population.<sup>57</sup> Nevertheless, there are ample reasons why schooling which incorporates a strong element of Westernization, as it does in Nigeria, might reduce a woman's child loss.

The second explanation is that an educated mother is more capable of manipulating the modern world. She is more likely to be listened to by doctors and nurses. She can demand their attention even when their reluctance to do anything more would completely rebuff an illiterate.<sup>58</sup> She is more likely to know where the right facilities are and to regard them as part of her world and to regard their use as a right and not a boon.

There is a third explanation which may be more important than the other two combined, but which has apparently been almost totally ignored although it can be seen operating in any West African household which includes educated women. That is, that the education of women greatly changes the traditional balance of familial relationships<sup>59</sup> with profound effects on child care.<sup>60</sup>

A comparative study of a large number of peasant societies concluded that the traditional family exhibited a surprisingly common general pattern with a husband-wife link that was relatively weak and was kept that way by a variety of mechanisms: an inability of the wife to communicate easily with her husband, a maternal role of indulgence, and a husband/father role that was authoritarian yet remote at the same time.<sup>61</sup> This is a reasonably accurate description of the traditional Yoruba family. Elsewhere in southern Nigeria, Okonjo has described the wife/mother in the patrilocal culture as always a stranger in the household, at least to all except her own children as they grow up,<sup>62</sup> and this description can be applied to south-west Nigeria as well. Further north in the country it has been claimed that traditional mothers are even more indulgent to their children than their husbands,<sup>63</sup> and this too would apply in Yorubaland, although in both places the limits of that indulgence, certainly in terms of the sharing of food, is firmly fixed.

In terms of child care, and especially innovational child care, much centres on the nature of

<sup>53</sup> Sloan, *op. cit.* in footnote 2, pp. 17-18.

<sup>54</sup> Harrington, *op. cit.* in footnote 2, p. 23.

<sup>55</sup> *Ibid.*, p. 21.

<sup>56</sup> *Ibid.*, p. 20.

<sup>57</sup> J.C. Caldwell and Pat Caldwell, 'The Role of Marital Sexual Abstinence in Determining Fertility: A Study of the Yoruba in Nigeria', *Population Studies*, 31 (1977), p. 208.

<sup>58</sup> Orululoye and Caldwell, *loc. cit.* in footnote 9, p. 269.

<sup>59</sup> Christine Oppong, 'Attitudes to Family Type and Family Size in West Africa: A Study of Norms among a Ghanaian Student Population', *International Journal of the Sociology of the Family*, 4 (1974); Caldwell (1968), *op. cit.* in footnote 49, pp. 52-72.

<sup>60</sup> Caldwell and Caldwell (1978), *loc. cit.* in footnote 36.

<sup>61</sup> Evalyn Jacobson Michaelson and W. Goldschmidt, 'Female Roles and Male Dominance among Peasants', *Southwestern Journal of Anthropology*, 27 (1971), pp. 330-353.

<sup>62</sup> K. Okonjo, 'Aspects of Decision-Making in the Rural Igbo Household' (Nsukka: Institute of African Studies, University of Nigeria, mimeographed, 1978), presented at IUSSP conference on 'Economic and Demographic Change: Issues for the 1980s', Helsinki 1978, p. 6.

<sup>63</sup> Audrey Smedley, 'Women of Udu: Survival in a Harsh Land', in Carolyn J. Matthiasson (ed.), *Many Sisters: Women in Cross-Cultural Perspective* (New York: The Free Press, 1974), pp. 205-228.



decision-making. There are two largely separate issues: one is the taking of action within the traditional framework of treatment of bodily disorders, and the other is innovational action. In the former, the mother often has a good deal of freedom although she must consult and listen to many people. To understand innovational behaviour one must understand the whole structure of family authority.

Several points should be made. The first is that a range of literature has emphasized that women play major roles in family decision-making in traditional societies, and that as long as males are seen to make decisions they are frequently relieved to be able to consult their women-folk;<sup>64</sup> indeed, among the Igbos of eastern Nigeria a tendency towards matrilocality has been claimed.<sup>65</sup> This discussion frequently errs in the sense of not considering sex and generational role differences at the same time. Even among the Igbos, matrilocality is unlikely to give much influence to the mother of young children, although it may give commanding authority to her mother-in-law.<sup>66</sup> The second is the belief in sub-Saharan Africa that a child belongs to its family in the larger sense and not specifically to its biological parents. Grandparents have direct authority over children, and not authority delegated by parents. There is an Igbo saying: 'The rearing of a child is not a job for one person, nor is a child a child for only one person'.<sup>67</sup> The third is that for many matters, particularly illness, for which there are traditional explanations, neither decision-making nor action is expected. If, in spite of this expectation, an initiative does come from a mother, she would usually be expected first to consult her mother-in-law.

The questions of the locus of child control is complex. One work concluded that in sub-Saharan Africa one could not speak of parent-child relationships but only of a 'plurality of personal exchanges'.<sup>68</sup> Sons often sleep with their fathers and other male relatives from a young age<sup>69</sup> with some implication that henceforth males will note their disorders.

When we reach the crux of the question how these mechanisms operate in cases of child illness, the research record appears to be bare, and we can only surmise on the basis of more general family studies. Admittedly in one survey in the Ivory Coast the question was asked: 'When someone is sick in your family, who makes the decision to call for a doctor or bring the patient to hospital?'<sup>70</sup> However, the book that emerged failed to record the responses. Even in the cases where the initiative comes from the mother she may often need males to help her obtain the maximum assistance; the higher mortality of children in polygynous marriages suggested this even when there are claims, but divided ones, on a husband.

The important question is how maternal education affects this pattern.

As traditional society becomes transitional society and as educated people appear within it, those without schooling no longer expect the same adherence to traditional roles from the educated that they do from the illiterate.<sup>71</sup> Those who have been to school, even for relatively short periods to village schools, assume that they have been given different models and have experienced a deep personal change. The authority of the school directly challenges the traditional authority structure, especially the authority of the old. Indeed, in southern Nigeria, the old take the successful challenge so much for granted that there is little conflict. Everywhere in West Africa, and beyond, the

<sup>64</sup>For instance, see Louise E. Sweet, 'In Reality: Some Middle Eastern Women', in Matthiasson (ed.), *op. cit.* in footnote 63, pp. 379-397.

<sup>65</sup>Nancy Tanner, 'Matrilocality in Indonesia and Africa and among Black Americans', in Michelle Zimbalist Rosaldo and Louise Lamphere (eds.), *Women, Culture and Society* (Stanford: Stanford University Press, 1974), pp. 129-156.

<sup>66</sup>Okonjo, *op. cit.* in footnote 62, pp. 8-9.

<sup>67</sup>*Ibid.*, p. 12.

<sup>68</sup>Collomb and Valantin, *op. cit.* in footnote 50 pp. 378-379.

<sup>69</sup>For the Ga pattern in Accra, see I. Acquah, *Accra Society* (London: University of London Press, 1958), p. 47; according to Okonjo, *op. cit.* in footnote 62, from six years of age among the Igbos.

<sup>70</sup>Remi Clignet, *Many Wives, Many Powers: Authority and Power in Polygynous Families* (Evanston: Northwestern University Press, 1970), p. 373, Question 34.

<sup>71</sup>Caldwell (1968) *op. cit.* in footnote 49, pp. 52-72.



impact of schooling is so decisive because it changes not only the educated but the attitudes of others to them.

That the first and second explanations were not sufficient by themselves is shown by the decisive difference made by maternal education. Most of the changes in child life-style suggested by the first explanation, and even the manipulation of the modern world suggested by the second, could well be achieved merely by fathers achieving higher education and occupations, living in more salubrious areas and taking necessary action at critical times. Perhaps the best evidence that educating fathers has not the same effect as educating mothers is provided by the fact of uniquely low child mortality when the mother is better educated than the father.

The education of a girl is more likely to convert her maternal indulgence, which is well attested, into maternal protective action, governed by a feeling that, even if the old would not expect it (at least of an uneducated woman), the school, and the great community or culture that it represents, would. She is more likely to feel personal responsibility. There is a complex chain here, whereby the assumption of individual responsibility means an increasing need to assume more. Thus, child mortality was shown here to be lower amongst those who had ever practised birth control, and has been shown elsewhere to be far lower among those who have actually achieved a small family.<sup>72</sup>

A woman with schooling is more likely to challenge her mother-in-law, and the mother-in-law is much less likely to fight the challenge. More generally, the younger woman will assert the wisdom of the school against the wisdom of the old. She is more likely to attempt to communicate with her husband, and her husband is less likely to reject the attempt. With the strengthening of the spousal link, she is more likely to succeed in crystallizing out from the matrix of the extended family something more akin emotionally, and perhaps even residentially, to the nuclear family. In all these changes the initiative taken by the woman is usually more important than that taken by the man.

Ultimately, the family may even move towards child-centredness, with all that such a development means for reducing child mortality. In the language of another paper,<sup>73</sup> the direction of the net intergenerational wealth flow will no longer be from the younger to the older generation but in the opposite direction. More of the family resources will be deployed on the children; they may work less hard; they may take fewer risks; they will almost certainly live a healthier life.

Quite early in this process, important changes occur. The traditional family assumes that males get more and better food than females, that the old receive a superior share to the young, that babies are weaned cheaply, and that quite small children struggle from a position of extreme disadvantage for a share in the food.<sup>74</sup> It also assumes that greater expenses can be borne to heal the old rather than the young and that greater trouble is warranted. A young wife and mother with some schooling is likely to move towards reducing all these differences, thus lowering child mortality and perhaps reducing it relatively to adult mortality<sup>75</sup> and improving female child mortality faster than male.

There is at least one factor that operates in the opposite direction. Well-educated mothers are the ones most likely to work in occupations where they must be completely separated from their children, and consequently are almost certain to leave their children in the care of much less

<sup>72</sup> Caldwell and Caldwell (1978), *loc. cit.* in footnote 36, p. 16.

<sup>73</sup> Caldwell (1976), *loc. cit.* in footnote 49.

<sup>74</sup> Studies of unequal food distribution and the conditions of change within Third World families do not appear to exist. However, a memoir of life in a poor working class area in England in the first years of the present century records extreme maldistribution in traditional households, justified by age-old lore, and reports that the agents of change were women, usually of a new and exceptional type. See R. Roberts, *A Ragged Schooling: Growing up in the Classic Slum* (Glasgow: Fontana/Collins, 1978), pp. 70-72, describing the situation in Salford. Patrick Ohadike reports the Igbo proverb: "Children's mouths do not taste meat." (Personal communication).

<sup>75</sup> The peculiar tropical age structure of mortality discerned by Cantrelle may have social as well as epidemiological roots. See P. Cantrelle, 'Mortality: Levels, Patterns and Trends', in Caldwell (ed.), *op. cit.* in footnote 13, pp. 105-109.

well educated relatives or nursemaids. This is mitigated by the fact that they retain overall control of decision-making and resource allocation.

*The Significance of the Analysis in Terms of Demographic Transition*

Perhaps the most revealing aspect of most demographic transitions is that the timing of the mortality and fertility falls have been related, with the former usually occurring somewhat earlier. The problem of timing is simple if mortality decline is regarded as almost the sole determinant of fertility decline.<sup>76</sup> However, the intervening mechanism has been difficult to discern, and the forces leading to fertility decline appear to have been much more complex. There is evidence that major changes in family relationships play an important role,<sup>77</sup> and that education, especially that of women,<sup>78</sup> may be of key importance.

The analysis in this paper provides a way out of the problem by linking both mortality and fertility declines to the same fundamental social changes (without claiming that the mortality decline does not by itself contribute an additional pressure towards fertility decline). It is probable that profound changes in the nature of the family, and of relationships within the family, have made both child mortality (and perhaps all mortality) and fertility declines inevitable. In most cultures the central role of mass formal education has probably been frequently underestimated in explaining both mortality and fertility transitions and its inception in explaining the timing of the transitions.

The analysis also suggests that McKeown's attribution of mortality improvement to better nutrition can be taken much further; the death rate may decline not only because of an increase in the volume of food per head or because of an improvement in its quality, but also because of movement towards greater equality in its distribution both between social classes and families in the community as a whole and also within the family itself. This latter change can dramatically affect infant and child mortality levels.<sup>79</sup>

This conclusion should probably be generalized much further. Education moves individuals varying distances into new cultures with different emphases on the value of carefulness as distinct from resignation or endurance and with different priorities by age and sex for risk-taking, treatment within the family, and expenditure of effort or money in avoiding illness or its consequences. It is quite probable that further analysis of the Western mortality decline will reveal a similar significant transformation with changing community attitudes and with the absorption of middle-class values by the working class.

*Appended Note*

My attention has recently been drawn to an analysis of East African data collected in the early 1950s which showed infant and child mortality around 25 per cent lower where mothers had been married only once than where they had been married twice or more.<sup>80</sup> The Nigerian data yield CMs only 2½ per cent lower, and even this can probably be entirely explained by a tendency for men to divorce women characterized by high child mortality.

<sup>76</sup> See D. M. Heer and D. O. Smith, 'Mortality Level and Desired Family Size', *Contributed Papers: International Union for the Scientific Study of Population, Sydney Conference, Australia, 21st to 25th August 1967* (Canberra: 1967), pp. 26–36.

<sup>77</sup> J. C. Caldwell, 'A General Theory of Fertility: Conditions of High Stable Fertility and the Nature of Destabilization', *Population and Development Review*, 4 (1978).

<sup>78</sup> R. S. McNamara, 'Possible interventions to reduce fertility', extract from an address delivered at the Massachusetts Institute of Technology, 28 April 1977, *Population and Development Review*, 3, 1977, p. 165.

<sup>79</sup> McKeown (1976b), *op. cit.* in footnote 2.

<sup>80</sup> W. Brass, 'Differentials in Child Mortality by the Marriage Experience of the Mothers in Six African Communities', *Proceedings: International Union for the Scientific Study of Population Conference, Vienna, 1959* (Vienna: 1959), pp. 387–390.