

AGENCY FOR INTERNATIONAL DEVELOPMENT
 WASHINGTON, D. C. 20521
BIBLIOGRAPHIC INPUT SHEET

FOR AID USE ONLY

Batch 70

1. SUBJECT CLASSIFICATION	A. PRIMARY Health	NH00-0000-G190
	B. SECONDARY Maternal and child health care--West Africa	

2. TITLE AND SUBTITLE
 The effect of high infant and childhood mortality on fertility; the West African case

3. AUTHOR(S)
 Harrington, J.A.

4. DOCUMENT DATE 1971	5. NUMBER OF PAGES 15p.	6. ARC NUMBER ARC
--------------------------	----------------------------	----------------------

7. REFERENCE ORGANIZATION NAME AND ADDRESS
 Mich.

8. SUPPLEMENTARY NOTES (Sponsoring Organization, Publisher, Availability)
 (In Concerned demography, v.3, no.1, p.22-35)

9. ABSTRACT

10. CONTROL NUMBER PN-AAE-650	11. PRICE OF DOCUMENT
12. DESCRIPTOR Children Fertility Infants Mortality West Africa	13. PROJECT NUMBER
	14. CONTRACT NUMBER CSD-2547 211(d)
	15. TYPE OF DOCUMENT

171-22-35
1977, vol 3, p. 1.
D.D-2547 21(1) mcd
PN-AAE-650

THE EFFECT OF HIGH INFANT AND CHILDHOOD MORTALITY ON FERTILITY:
THE WEST AFRICAN CASE

JUDITH A. HARRINGTON

Increasing attention has been paid to the relationship between high infant and childhood mortality and high fertility and its effect on the adoption of family planning in developing countries. In essence, the argument has been that if a couple cannot be reasonably sure that their children will survive, they will be unlikely to want to restrict their family size, and will have more children than they actually want to have, either to offset anticipated child loss, or to make up for deaths that have actually occurred. Studies carried out in Egypt, India, Turkey and Taiwan¹ have established that women are more likely to want more children if they have experienced child loss than if they have not had this experience, and that such women are more likely to have more children than are their counterparts who have not lost any children. In these studies, however, the importance of mortality experience in explaining the high fertility varied and would seem, on comparing the four studies, to be a function of the level of mortality experienced in each case. In Taiwan, for example, where infant mortality is low relative to the other three areas the relationship was found to be less strong, and here it seemed to be the fear of child loss, rather than the experience, that was more important in determining family size.² It is important, then, to see the relationship of mortality on fertility under conditions of high infant and childhood mortality, and it is this situation that will be discussed in this paper.

Discussion here will center on findings of three surveys carried out in Ghana, Niger and Upper Volta, where levels of infant and child mortality are among the highest in the world. These particular data are interesting not only because of the high mortality conditions, but also because these mortality levels are seen as a major obstacle to family planning programs in the area, thus providing an opportunity to better spell out the policy implications of the mortality-fertility relationship for family planning in the West African situation.

Discussion will refer specifically to the effect of child death on subsequent births and the role played by a short birth interval between the death of one child and the birth of the next. This pattern, the death of one child followed very

quickly by the birth of another, has been noted in several studies and has engendered some confusion as to the mechanics of the situation. The difficulty has been determining whether high fertility is a conscious (or unconscious) behavioral response to child loss or merely the result of physiological factors. Central to this confusion is the presence of the short birth interval which can be seen as either the result of the mother becoming pregnant again as quickly as possible to 'replace' the dead child, or as the result of the early cessation of lactation at the death of the child which removes the inhibitory influence on ovulation and exposes the woman to pregnancy at an early date. Studies seem to indicate, however, that the short birth interval appears to be less a function of the shorter duration of lactation and consequent early resumption of ovulation and exposure to pregnancy and more a function of an effort to replace dead children.³ This paper will suggest that there is also another pathway to this same pattern of child death and birth after a short interval, that is important in the West African situation.

The discussion will draw on data collected by D.I. Pool⁴ in three KAP and fertility surveys in Ghana in 1965-1966, in Upper Volta in 1969, and in Niger in 1970. Information relating to mortality in both infancy and childhood were drawn from detailed retrospective pregnancy histories gathered from a total of 5536, 1834, and 2988 women respectively in each of the countries. While retrospective data of this type has been felt to be deficient, especially for infant mortality information, a larger study by this author⁵ found rather convincing evidence for the validity and usefulness of these particular data.

The relationship between high infant and childhood mortality and high fertility was investigated by seeing first if the higher rates of deaths in infancy and childhood in large as opposed to small families might be explained by the greater risks of death faced by high parity births.⁶ Next parity-specific analysis of deaths at ages 0-4 years in large and small families (defined as total number of children ever born alive to women 30 and above) was carried out to see if the high proportions dying in large families occurred at early or late parities. It had been argued that in larger families there is a greater burden placed on parents to feed and care for all of the children adequately.⁷ In such a case the high proportions dying in large families might be expected to occur at the later parity births and one could argue that it is the high fertility that has led to the high rates of mortality. In this case the provision of family planning services would become an important policy issue in the reduction of infant and childhood mortality. On the other hand, if it is the experience of child loss that in some way compels women to go on to have more births, that is, if it is high mortality that

leads to high fertility, one would expect the high proportions dying in large families to come at the early parities. If this indeed is the case, a decrease in the levels of fertility in West Africa and the acceptance of family planning services can be expected to depend on the lowering of the risks of death in infancy and childhood.

Findings on the Influence of Mortality on Fertility

Comparison of the proportions dying by parity and proportions dying by family size, (total number of children ever born alive)⁸ in Table 1 showed that in both Ghana and Upper Volta the proportion dying in large families were higher than might be expected on the basis of the higher risks of death to high parity births alone. Unfortunately, in Niger data are not strictly comparable in this case as the parity data were based on only a sub-sample of urban women and were not collected at all for the rural sample.

Information on the parity distribution of deaths in families of various sizes was available only for Ghana and Upper Volta but these data, presented in Table 2, seem to indicate that the higher proportions dying in large as opposed to small families do not seem to be the result of the increased burden of large numbers of children. There is a tendency for the higher proportions dying in large families to be spread out over all parities or to cluster at the early parities. Also, in larger families the proportions dying in the early parities were considerably higher than those dying at these same parities in small families. It would seem then that it is the early experience of child loss that leads women to have larger families.

Several comments need to be made regarding these data. First, it should be noted that differential exposure to both the possibility of having large numbers of children and to the risks of deaths in those children is largely controlled for here as these data refer only to women over age 30 and only to deaths within the 0-4 year age group.

Secondly, these data present rather strong evidence that the high proportions dying in larger families are disproportionately experienced early in the childbearing histories when the existence of two trends is taken into consideration. The first is the possible presence of the classic cases of women who have repeated infant deaths due to various sorts of reproductive inefficiencies that would tend to obscure the clustering at early parities. The second is the fact that deaths at early parities have occurred in the more distant past and thus would tend to be subject to memory error to a greater extent than deaths among later parity births, and are therefore likely

TABLE 1

Comparison of Proportions of Children Dying by
Parity and Total Number of Children Ever Born Alive

	Upper Volta			Niger		Ghana	
	Ouagadougou	Bobo-Dioulasso	Rural-Urban Fringe	Rural	Niamey Rural (a)	Accra Rural	Rural
<u>Parity</u>							
1	.273	.230	.335	.365	.212	.208	.308
2	.285	.249	.354	.311	.108	.184	.303
3	.277	.221	.349	.322	.167	.205	.270
4	.261	.200	.299	.347	.282*	.200	.278
5	.236	.219	.290	.285	.312	.190	.261
6	.224	.175	.286	.315	.222*	.237	.264
7	.283	.218	.462	.256	.182	.191	.269
8	.255	.270	.233	.400		.184	.315
9						.170	.365
10+						.262*	.358
<u>Total Number of Children Ever Born Alive</u>							
1	.185	.111	.158	.200	.171	.911*	.649*
2	.229	.121	.068	.086	.360	.185	.265
3	.253	.147	.189	.262	.158	.159	.213
4	.238	.184	.276	.203	.202	.171	.241
5	.252	.280	.337	.281	.210	.182	.241
6	.268	.292	.319	.318	.198	.157	.295
7	.362	.241	.536	.388	.275	.244	.254
8	.338	.194	.406	.431	.365	.242	.340
9	.343	.330	.370	.420	.311	.103	.328
10+	.340	.310	.458	.540	.346	.258	.391

(a) Niamey parity data based on a sub-sample of urban respondents.

(b) Niger Rural parity data not available.

* Based on less than 45 births, results for cells based on less than 10 births not reported.

Table 2

Proportions Dying at Ages 0-4 of Children Born Alive to Women Aged 30+: Parity-Specific Death Rate Classified According to the Total Number of Children Born Alive: Upper Volta and Ghana.

Survey	Parities	Total Children Born Alive							
		-3	4	5	6	7	8	9	10+
<u>Upper Volta</u>									
Ouagadougou	N=	123	121	152	246	187	190	108	97
	1,2	.276	.259	.435	.208	.449	.250	.478	.167
	3,4	.222	.134	.148	.282	.396	.208	.292	.556
	5,6	--	--	.190	.198	.241	.375	.304	.368
	7,8	--	--	--	--	.258	.239	.261	.438
	9+	--	--	--	--	--	--	--	.077
Bobo-Dioulasso	N=	24	38	60	60	131	79	91	84
	1,2	.238	.111	.333	.350	.343	.167	.350	.462
	3,4	--	.150	.217	.316	.235	.053	.316	.333
	5,6	--	--	.375	.143	.189	.222	.250	.200
	7,8	--	--	--	--	.200	.125	.389	.400
	9+	--	--	--	--	--	--	.286	.154
Rural-Urban Fringe	N=	17	32	65	111	49	64	27	59
	1,2	.333	.286	.280	.368	.692	.375	.333	.455
	3,4	--	.333	.304	.270	.571	.438	.500	.455
	5,6	--	--	--	.143	.333	.462	.333	.455
	7,8	--	--	--	--	.500	.188	.167	.417
	9+	--	--	--	--	--	--	--	.286
Rural	N=	57	87	193	231	258	104	81	124
	1,2	.234	.195	.250	.217	.423	.500	.667	.583
	3,4	.200	.196	.387	.329	.301	.346	.278	.435
	5,6	--	--	.119	.221	.342	.346	.333	.348
	7,8	--	--	--	--	.171	.346	.333	.174
	9+	--	--	--	--	--	--	.222	.452
<u>Ghana</u>									
Accra	N=	239	221	329	391	336	316	248	486
	1,2	.145	.116	.181	.143	.107	.250	.097	.216
	3,4	.083*	.096	.089	.132	.189	.120	.081	.202
	5,6	--	--	.000	--	.154	.165	.145	.184
	7,8	--	--	--	--	--	.122	.071	.073
	9+	--	--	--	--	--	--	--	.089
Rural	N=	88	164	263	416	592	623	432	856
	1,2	.174	.206	.269	.191	.253	.343	.278	.353
	3,4	--	.113	.197	.190	.258	.335	.250	.335
	5,6	--	--	--	.176	.106	.210	.296	.324
	7,8	--	--	--	--	.063*	.146	.210	.302
	9+	--	--	--	--	--	--	--	.243

*Based on less than 45 births.

Thirdly, it is interesting to note that clustering of deaths at early parities is more evident in the Upper Volta than in the Ghanaian data, and in particular in the rural samples, for it is in Upper Volta generally and in the rural samples where mortality was found to be highest. This tendency, while slight, would support the comment made above in reference to the studies carried out in other countries, that the strength of the findings on the relationship between mortality and fertility would seem to be a function of the level of mortality involved.

The Role of the Short Birth Interval

There were unfortunately no data on the length of birth intervals in these three surveys that could be directly related to survivorship experience and subsequent pregnancy, but there was indirect evidence that helped to further clarify the role of this short birth interval in producing the positive relationship between high fertility and high mortality. When the proportions of women ever becoming pregnant again after the survival or death of their previous child was compared (see Table 3), it was found that a woman was more likely to have a subsequent birth if her previous child died rather than survived (a finding in line with those discussed above). However, she was more likely to become pregnant again if that child had died between the ages of 1 and 4 rather than between the ages 0 and 1. The explanation for this finding would seem to lie not in the possibility that older children are 'missed' more than younger ones after their death and therefore are more likely to be replaced, but rather in the possibility that the proportions represented cases not where the death of child 1 led to the birth of child 2, but where the birth of the second child indirectly caused the death of the first. And the explanation for this pattern lies in the character of childhood death in West Africa.

The most striking feature of death under age 5 in West Africa is the age pattern. Here the proportions of children dying over the four-year age group 1-4 is in many cases as high as the proportions dying in the one year age group 0-1. Table 4 illustrates this by presenting age-specific survival ratios for the three countries under study. This age pattern results from the synergistic relationship between the tremendous range of infectious and parasitic diseases in West Africa, involving both tropical and common childhood conditions, and widespread protein-calorie malnutrition⁹. Malnourished children are more susceptible to infection, less able to combat it once acquired, more likely to have a more severe course of illness, more likely to have complicating conditions, and indeed, more likely to die from what in well-nourished children would be a simple childhood illness.

Proportion of Women Ever Going on to Have a Subsequent Pregnancy
Given the Survival or Death at Various Ages of Previous Child

Proportion ever becoming pregnant after survival or death of
previous child of parity X.

Survey	Fate Previous Child	No.	Parity										TOTAL
			1	2	3	4	5	6	7	8	9	10	
<u>Upper Volta</u>													
Ouagadougou	Survived	1637	.811	.734	.772	.771	.684	.550	.576	.389*	.455*	.583*	.727
	Died 0-1	236	.855	.880	.783	.905*	.947*1.000*	.846*	.583*	---	---	---	.850
	1-4	302	.987	.947	.930*	.897*	.917*	.900*	.667*	---	---	---	.921
Bobo-Diou- lasso	Survived	883	.792	.784	.787	.723	.744	.758	.628*	.625*	.563*	.727*	.752
	Died 0-1	124	.938*	.958*	.950*	.923*	.889*	---	---	---	---	---	.944
	1-4	122	.929*	.964*	.947*	.769*	.786*	---	---	---	---	---	.877
Rural-Urban Fringe	Survived	492	.856	.692	.756	.691	.673	.400*	.857*	.706	---	---	.756
	Died 0-1	81	.958*	.895*	.786*	---	---	---	---	---	---	---	.877
	1-4	131	.931*	.932*	.960*	.900*	.909*	---	---	---	---	---	.921
Rural	Survived	1075	.882	.870	.797	.776	.643	.602	.414	---	---	---	.755
	Died 0-1	169	.956	.917*	.927*	.926*	.769*1.000*	---	---	---	---	---	.917
	1-4	295	.938	.984	.942	.950*	.929*	.821*	---	---	---	---	.915
<u>Ghana</u>													
Accra	Survived	3607	.736	.679	.684	.640	.573	.598	.660	.620	.455*	.533*	.674
	Died 0-1	273	.840	.869	.825*	.838*	.933*	.750*	---	---	---	---	.821
	1-4	271	.896	.920	.881*	.867*	.864*	.692*	---	---	---	---	.875
Rural	Survived	4487	.774	.727	.717	.673	.673	.620	.587	.566	.636	.382*	.720
	Died 0-1	577	.848	.872	.883	.840	.844	.842*	.667*	.714*	.417*	---	.827
	1-4	776	.930	.943	.876	.900	.836	.909	.771*	.952*	.667*	.818*	.899
<u>Niger</u>													
Niamey (a)	Survived		.707	.730	.620	.594 ^(b)							.667
	Died 0-1		.818*	---	.800*	.741* ^(b)							.750

N= Number of Women

*= Less than 45 women in cell; results for cells with less than 10 cases not reported.

(a)= Data based on urban subsample respondents only; no rural data available.

(b)= Parities 4+

TABLE 4

Age Pattern of Child Mortality

Upper Volta	Proportion dying in age group:	
	0-1	1-4
Ouagadougou	.106	.135
Bobo-Dioulasso	.109	.107
Rural-Urban Fringe	.111	.179
Rural	.107	.184
Niger		
Niamey (a)	.065*	.102*
Rural	n.a.	n.a.
Ghana		
Accra	.060	.060
Rural	.096	.123

(a) data available for subsample of urban respondents alone.

* based on less than 45 births.

Malnutrition is then a decisive feature of the disease complex in this area, and a central factor in explaining the high incidence of malnutrition is a pattern of infant feeding and weaning that involves prolonged breastfeeding that may range from under one to over 3 years, followed by an often abrupt weaning to starchy adult diet.¹⁰ If the breast milk is not supplemented after the first six months by other foods, in particular protein, the child reaches weaning already undernourished. The process of weaning itself is a critical period, for when it occurs the child not only loses his primary, and perhaps sole source of protein, but he often undergoes considerable physical and psychological trauma in adjusting to an adult diet and the lack of his mother's attention. The net result is often a loss of appetite which further depletes the child nutritionally and helps to push him over into a severe malnourished state known as kwashiorkor. With lowered resistance to infection, the child is stricken with diarrheal disease, caused in some cases by organisms that in the well-nourished child would be innocuous. Diarrheal disease, in fact, is so closely associated with weaning that it has been termed 'weanling diarrhea.' The child, further weakened and dehydrated by prolonged and severe diarrhea, has little hope of survival.

A pattern of malnutrition that is an unfortunate product of 'modernization' is being seen with increasing frequency and involves the baby who is weaned at an early age onto a feeding bottle. Without proper kitchen or refrigeration facilities, and without adequate income, feeds given in this way are usually dilute and bacteriologically dangerous. The child is not only given a nutritionally poor feed that makes him more susceptible to infection, but he is also infected in the process. The end result is a baby suffering from diarrheal disease and malnutrition at an early age, with, again, a poor prognosis for survival.

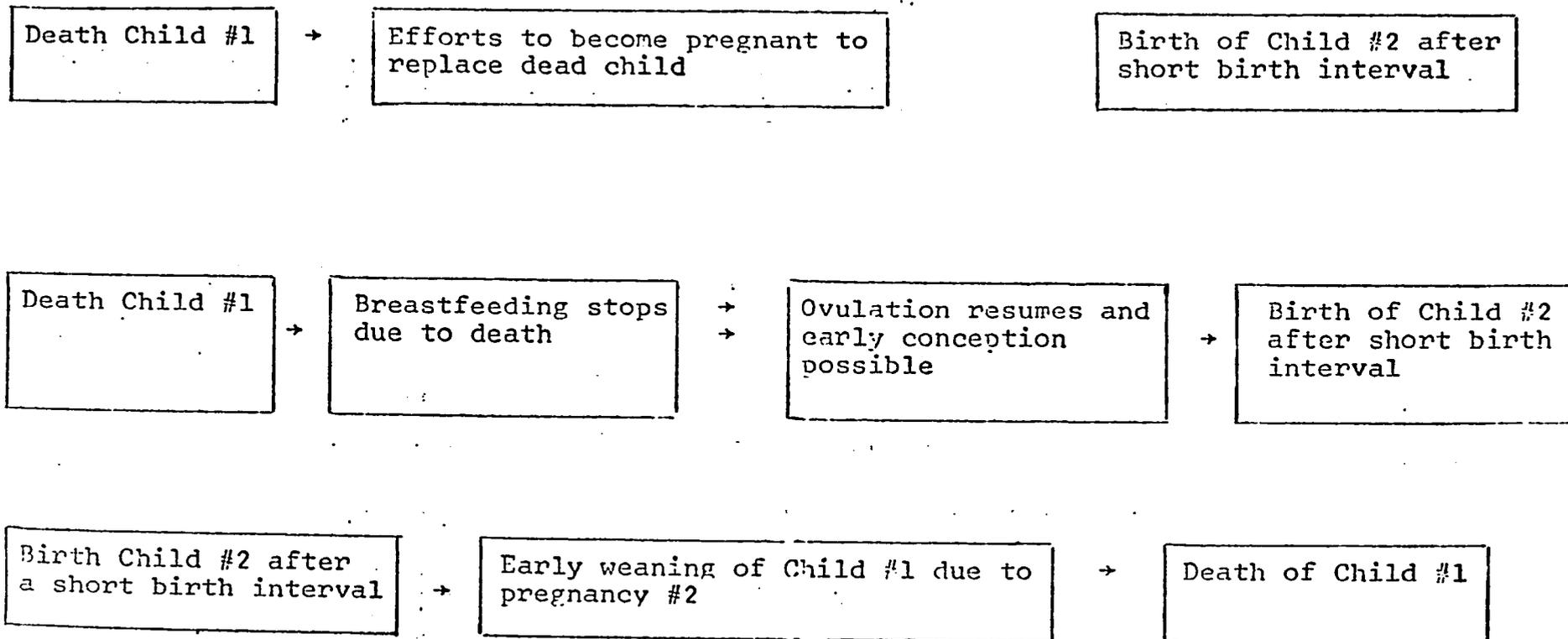
In both the feeding bottle and the kwashiorkor cases the problem centers around weaning and the post-weaning diet. To a large extent the earlier and more abrupt the weaning, the greater the danger for the child, and one of the major reasons for abrupt early weaning is a subsequent pregnancy. Indeed the name kwashiorkor refers to this very situation, as it means the child that is displaced from its mother's breast by the birth of the next child.

It is this situation, a child's death indirectly caused by the birth of a subsequent child which entailed his abrupt weaning, that would seem to be making an important contribution to the positive relationships between high mortality and high fertility under study here.

Thus, one can say that there are at least three pathways to the pattern of the death of child 1, the birth of child 2, and a short birth interval in between (see Figure 1). The first

Figure 1

Three Pathways to Pattern of Child Death followed by a Short Birth Interval



involves the conscious or unconscious desire to replace the dead child by having a second child sooner than would normally be the case; the second involves the death of child 1, the early stopping of lactation, and therefore of suppression of ovulation, and a subsequent early pregnancy. The third pathway is one that has been studied in depth by physicians and nutritionists, but has been largely ignored by demographers, and it involves the birth of a second child too soon after the previous birth which necessitates the early and abrupt weaning of the first child, and leads to his death. While demographers have always been aware of the dangers of a short birth interval on the survival chances of the child who is born at the end of the interval, little attention has been paid to the risks such an interval entails for the first child, and in the West African context it would seem that it is this child that is at greater risk.

Policy Implications

The policy implications of these findings would appear at first to be contradictory. On one hand, the finding that women seem to be spurred on to have a large number of births by the early experience of child loss supports the idea that a decrease in child mortality is a prerequisite to family planning and that therefore efforts should be concentrated in maternal and child health before family planning. On the other hand, the finding that early pregnancy, often causing the death of the previous child, plays an important role in producing the high mortality -- high fertility relationship, indicates an important role for family planning -- that of spacing births. Also, this role can be expected to become increasingly important as there is evidence that birth intervals are becoming shorter among certain groups as modernization breaks down traditional spacing practices.¹¹ Thus, the desirability of the use of family planning as a means to better space births cannot be denied. However, the critical question here is one of emphasis and coordination of programs and activities, for the complexity of the situation demands a comprehensive approach. The multiple effects of modernization alone on mortality and fertility illustrates this point.

Much has been written about the effects of modernization on fertility and the adoption of family planning, even if it has been difficult to isolate just what modernization is or does. One thing that is evident, however, is that people are selective about what aspects of the so-called modern world they adopt and the order in which they do so. While there may be a time lag before family size norms catch up with a change in the standard of living, some things associated with being 'modern' are picked up before the standard of living justifies it. Bottlefeeding, for example, is adopted by mothers because they want to be 'modern' but given their actual conditions of living, they only

assure the child's death. Modernization also tends to decrease spacing between births by shortening lengths of lactation and weakening post-partum abstinence prescriptions. Given the lack of concomitant change in desired family size, this not only works to increase fertility directly by allowing more children to be born over the woman's childbearing years, but also indirectly by increasing the risks of death to the children who will be subjected to early weaning and bottlefeeding as a consequence.

Because of these types of interrelations, comprehensive programs that will take such factors into account are needed. Family planning services will have little success if mortality conditions do not improve. However, providing curative and only isolated preventative services will not affect the mortality situation greatly. A baby that is already marasmic or a child who already has kwashiorkor has a poor prognosis for survival, let alone freedom from long-term physical and mental deficiencies, even given the best curative services. Such services require an intensity of care that is simply impossible to deliver to more than a minority of these populations. Vaccination programs may prevent specific diseases, but they do not touch a whole range of infectious and parasitic conditions, nor do they prevent the compounding effects of malnutrition on disease. It is obvious that in such a situation there is a need to coordinate and restructure the emphasis placed in programs of maternal and child health, nutrition and health education, vaccination programs, preventive and curative services and family planning.

Maternal and child health must not be added to family planning programs to make them more palatable to African governments, or more desirable to African families, for the health situation cannot afford to have its resources, activities, and services dominated by family planning. Rather, family planning must be made an integral part of a larger maternal and child health program and the funding that is so available for family planning activities must be channeled with as much zeal into these broader programs.

1. See Shafuk S. Hassan, Influence of Child Mortality on Population Growth, Ph.D. Thesis, (Cornell University, 1966); John B. Wyon and John E. Gordon, Chapter 7, "Deaths and Population Pressure," The Khanna Study: Population Problems in the Rural Punjab, (Cambridge, 1971); Arjun L. Adlakha, A Study of Infant Mortality in Turkey, Ph.D. Thesis, (University of Michigan, 1970); and Shea O. Rutstein, The Influence of Child Mortality on Fertility in Taiwan, Ph.D. Thesis, (University of Michigan, 1971).
2. Shea O. Rutstein, op. cit. p. 190.
3. Arjun L. Adlakha, op. cit. p. 2.
4. Descriptions of these studies may be found in: D.I. Pool, "A Note on a Demographic Sample Survey for the Study of Factors Effecting Fertility in Ghana," Africa, vol. XXXVII, no. 3, July, 1967; D.I. Pool, "Enquete sur la Fecondite en Haute-Volta," Notes et Documents Voltaiques, Ouagadougou, Upper Volta, July 1969, and D.I. Pool, "Enquete sur la Fecondite et la Famille au Niger: Methodologie," Collections Methodologiques, no. 1, C.N.R.S.H., Miami, 1970.
5. See discussion in J. Harrington, A Comparative Study of Infant and Childhood Survivorship in West Africa, Ph.D. Thesis, (Cornell University, 1971), pp. 43-51.
6. High parity births (i.e., over parity 5) are associated with higher risks of death. See N.R. Butler and D.G. Bonham, Perinatal Mortality, Edinburgh, 1963.
7. See for example, United Nations, Foetal, Infant and Early Childhood Mortality, vol. II, Pap. St. No. 13, Department of Soc. Affairs, Pop. Div., 1954, p. 14.
8. It is important to distinguish carefully between the two concepts of parity and total born alive. The proportions dying by parity refers to a child's chances of dying depending upon whether he was the first, second, third, or so on, child born to his mother. Proportions dying by total children ever born alive refers to a child's chances of dying given the fact that he is born into a family of a given size, that is, that his mother has had a total of X children ever born both before and after his birth.
9. For a discussion of how the African child is subject to a series of risks that compound one another to produce the high rates of death, see M.I. Ogbuide, "The Relative Merits of Preventive and Curative Services in the Maintenance of Health and Nutrition in the Rural African Child," in Les Conditions de Vie de l'Enfant en Milieu Rural en Afrique, Centre International de l'Enfance, Reunions et Conferences, XIV, Dakar, 1967.

10. For a discussion of the role of infant feeding and the difficulties of the weaning period, see D.B. Jelliffe, "Culture, Social Change and Infant Feeding: Current Trends in Tropical Regions," American Journal of Clinical Nutrition, vol. 10, Jan. 1962.
11. See D.B. Jelliffe, op. cit., p. 35.