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MATERNAL HEALTH AND CHILD SURVIVAL RATES IN ZAMBIA: A COMPARATIVE COMMUNITY STUDY

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Summary

This paper presents the summary results of maternal/reproductive data and child mortality patterns collected in two rural communities in Zambia. The data derives from an on-going, longitudinal study sponsored by the Government of Zambia and UNICEF. The purpose of the study is to evaluate and monitor the impact of Primary Health Care in remote rural areas with particular emphasis on women and children. A core sample of one hundred households in Luampungu, Western Province and Kabinga, Northern Province have been selected and monitored since 1982. The maternal and reproductive data on 111 mothers in Luampungu and 101 mothers in Kabinga is summarised. The results indicate that the combination of poor nutrition, high morbidity and enviromental conditions result in a higher U-5 mortality and a high pregnancy wastage rate in Luampungu than Kabinga.

It is suggested that a percentage child survival rate calculated for each gravidity category can be a useful indicator for identifying "at risk" women. Moreover, the index can be a useful complement to other community health status indicators.

Finally, the importance of ante-natal Clinic attendance, CHWS and health education to improved maternal health is stressed.

Introduction

The data upon which this paper is based derives from an on-going study sponsored by the Government of Zambia and UNICEF. The general purpose of the research, which began in 1981, is to investigate the problem of delivering health services to remote rural populations and to evaluate and monitor the impact of Primary Health Care. It is currently the only such study being conducted in Zambia and is therefore, of direct concern to the Ministry of Health's efforts to promote Primary Health Care as a national policy. Another important overall component of the project is to provide information to UNICEF/GRZ as to specific areas of need by health workers and the village communities and to offer suggestions for improvements in health care delivery.

It is now acknowledged by health planners that the most serious health problems in Zambia involve women and children. In any given year in Zambia, these categories constitute nearly 75% of the total population. There is generally a high mortality and morbidity resulting from various interrelated conditions including: malnutrition, infection, and consequences of ill-timed, closely spaced and to frequent pregnacies, the absence of poor distribution of health care and other social welfare services, against a background of endemic poverty.

In this context Zambia shares similar features with many underdeveloped countries of the Third World. Research findings indicate that the overall deficient nutritional state of populations in these countries is the single most important factor influencing excessive mortality, poor nutritional status of mothers and high energy loss associated with deprived enviroments have been noted to influence low birth weight of babies. In turn under-nourished children are vulnerable to infectious diseases and other enviromental hazards in addition to the risks of mental retardation associated with deficient prenatal nutritional intake.

Women hold the key to success for the Health for all Campaign. Femals have always been largely responsible for the health of the family and good primary health care must start in the home. Therefore, it is clearly appropriate that in order for Primary Health Care to succeed that the emphasis be placed on women and children.

In Zambia with a comparatively high proportion of total Government budgetary allocations, both recurrent and capital, provided to the health sector, there is need to assess the extent to which such expenditure is having the intended effects particularly on these two at risk populations.

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The Settings

Field work was begun in January 1982 and has to date focused on two rural areas. The criteria for the selection of the sites were that primary health care be in its initial stages of implementation (i.e. training of community health workers) that they be sufficiently remote from large urban centres and that the two areas chosen should be different in terms of enviroment so that comparisons and contrasts could be made.

The Luampungu research site lies within Sesheke District, Western Province and is approximately 3,025 km^2 in area, with a population of 1,600 Lozi-speaking persons residing in 18 villages scattered along the three major rivers; the Njoko, Nagombe and Luampungu. The population density is 2 persons per square kilometer. The landscape is characteristic of most of the Western Province, with flat terrain, sandy soil and vast expenses of bush and areas of open grassy plains. In general, the area can be described as a semi-desert enviroment.

The villagers are predominantly subsistance farmers, who grow maize, sorghum, millet, cassava, groundnuts, beans and maintain small herds of cattle. Fishing and some wild game provides an additional source of protein. There is a notable lack of cash crops and few retail outlets in which to purchase goods, the nearest is Sichili Mission. The average per capital income is K50 per annum. There is one school in the Ward, located in Luampungu compound, with 210 students in Grades 1 to 7. The RHC (Nawinda) is 45km from the nearest Luampungu village and the Mission hospital is 104 km distant.

Kabinga study site is located within Mpika District, Northern Province and is approximately 1,00 km^2 in area, with a population of 3,150 predominantly Bisa-speaking people distributed in 17 villages situated along the periphery of Lake Chaya. The population are mainly fishermen who are able to cultivate cassava, in the relatively infertile swampland. Fish and cassava are supplemented by subsidiary crops such as groundnuts, beans and sweet potatoes. In addition most villages have small plots of bananas, oranges, papayas and mangoes.

The heavy rainfall makes the area inaccessible throughout the rainy season (December-April). Some villages are also inaccessible by vehicle even during the dry season and transport requires the use of canoes. The area is served by two primary schools (Grades 1-7), a small grocery stores a Government Rural Health Centre and a mobile market. There is an active trade network involving fish, maize meal, bread, sugar soap and other assorted goods. As a result of fishing the average per capita income in Kabinga is K350 per annum. The RHC lies within 5-8km of the majority of the Kabinga villages and a Mission RHC is approximately 40km distant.

Methodology

Our approach has been oriented toward isolating those factors that not only derive from individual health characteristics but from the broader socio-political, economic and enviromental constraints within which individuals find themselves. Moreover, this involves more than an investigation of individual socio-demographics and health seeking behaviours but also monitoring on-going community changes which may impact on health status (e.g. agricultural schemes, significant out-migration, community participation in health promotion, literacy programme, etc.). In order to assess both micro and macro factors, a multi-faceted and creative methodologial approach is required. These include informal and formal discussion/meetings with local and district-level leaders, designing and implementing alternative community information collection system, household surveys using structured questionnaires, review of health records and village registers, key informant interviewing and observational studies of community activities. Our household survey instrument consisted of items on illness episodes, mortality, nutrition, maternal and reproductive histories and household health service utilisation.

Sampling

After a pilot survey and a comparative baseline study was conducted we decided to use a small number of households (100) from each area which would constitute the 'core sample' to be monitored over the next 2-4 years.

The unit of enquiry were heads of household and their spouses. The sampling frame included all villages within the Luampungu ward and Kabinga RHC catchment area in which there was a family within child bearing age (i.e. where the youngest child was below five years and/or woman was still below 45). The villages were selected by the research team with the aid of local leaders, medical personnel from the rural health centres, the Primary Health Care Coordinator from Sesheke District and in Kabinga by the use of data from a household survey carried out several years earlier by the Tropical Disease Research Centre, Ndola, Zambia. The intent was to obtain a sample of those villages throughout the Luampungu and Kabinga areas which would represent a fair geographical distribution. A sim-

ple random selection process was used to obtain a sample of 100 households (approximately eight per village) in Luampungu and Kabinga. This sample represents 30 percent of the total Luampungu Ward and roughly 22 percent of the Kabinga population.

Maternal and Reproductive Data

Data was gathered from a total of 111 mothers in Luampungu and 101 mothers in Kabinga (including all wives in polygnous households). The proxy indicators for maternal health included age at marriage, age at first pregnancy, number of previous marriages, antenatal attendance, place of delivery for last child, total pregnancies, total miscarriages, total stillbirths, number of children who died under age of 5, and current pregnancy status as well as other socio-economic and nutrition variables.

The summary results are presented in Table 1. The mean age of first marriage and first pregnancy is lower in Kabinga and reflects a still common cultural practice of child bethothal in that area. The higher percentage of previous marriages (34%) in Luampungu as opposed to 22 percent in Kabinga is consistent with other studies in Western Province. The markedly higher percentage of difficulties in childbirths in Luampungu (33%) tended to occur in women who had a history of stillbirths and miscarriages. While the reported difficulties among Kabinga women (8%) were concentrated in those women aged (15-17) (a defined at risk interval).

age specific under five mortality rate is higher in Luampungu. 154/1000 (86/577) than in Kabinga 149/1000 (116/751). The majority of women delivered at home (78% — Luampungu) (90% — Kabinga), and a substantial number were assisted by a TBA (27% — Luampungu) (16% — Kabinga). However, most women were attended by a close relative, (41% — Luampungu) (56% — Kabinga). Twelve percent in both Luampungu and Kabinga delivered alone. The accessibility factor is important in maternal/child deliveries. For instance, in our Nawinda pilot survey (Kalumba and Freund, 1982) we found that 65 percent of women interviewed delivered at the Nawinda clinic or Sichili Mission Hospital. In Kabinga the District hospital in Mpika (150km) is the nearest facility that can handle deliveries. Therefore, in terms of accessibility, Luampungu and Kabinga are comparable.

A rate that can provide a useful indication of maternal health in a community consists of the percentage of children who survive out of the total pregnancies in each gravidity category. This is a modification of the survival index as proposed by Blom (1981). The survival index is the relation between gravidity number and mean number of children alive and is calculated for each group of women with the same gravidity number. However, the index as calculated by Blom, which increases as gravidity increases, merely shows that as women have more children more are likely to survive. A more useful and meaningful indicator would be the percent of children who survive by each gravidity category. Although both indexes are subject to the cohort effect (i.e. older women are more likely to have more children surviving) the survival index does provide an way of identifying at risk categories

TABLE 1
SUMMARY TABLE-MATERNAL AND REPRODUCTIVE DATA
LUAMPUNGU AND KABINGA

	Luampungu	Kabinga
Total women	111	101
Mean age of first marriage	17	15
Mean age of first pregnancy	20	17
Total pregnancies	609	420
Mean pregnancies	5.6	4.2
Stillbirths	5% 33/609	2% 12/420
Miscarriages	6% 40/609	5% 23/420
Average birth interval (months)	17	26
Total children under age 5	215	192
Under five mortality rate	154/1000	149/1000
Reported difficulties in childbirth	33%	8%
Attended ante-natal clinic last pregnancy	45%	67%
Where last child delivered — home	78%	90%
Those pregnant-attending ante-natal	47% 9/19	46% 6/13
Under 5 Children vaccinated	67%	68%

The total pregnancies in Luampungu was 609 ($\bar{X} = 5.6$) and 420 ($\bar{X} = 4.2$) in Kabinga. Miscarriages (6%) and stillbirths (5%) resulted in an overall higher pregnancy wastage rate (12%) in Luampungu than the 7 percent in Kabinga. The

of women. Moreover, the index provides an indicator of relative community maternal health and can be a useful complement to other health status indicators. Table 2 which provides a summary of percentage survival rates by gravidity for Luampungu and Kabinga shows a number of interesting patterns. For example, for those who experienced 1-5 pregnancies only 20-25 percent of their children died.

However, for those women with 9 or more pregnancies the survival rate falls markedly with an average of 40 percent of the children failing to survive. Another factor is that these 'at risk' women in gravidity category (9-12) accounts for the high child mortality in Luampungu. If we compare the total pregnancies in Luampungu and Kabinga we find that Luampungu women had 64 percent more pregnancies to achieve almost the same mean survival rate (69%) as Kabinga (70%). There are undoubtedly a number of factors contributing to this situation.

knowledge, availability and use of contraceptive methods (traditional or modern), socio-economic and cultural, general health and disease it is clear from the data that the rate of loss of children becomes more rapid with increasing number of pregnancies, so that those Luampungu women with 1-4 pregnancies had a 79 percent chance of having all her children alive (Table 3) while Kabinga women in this gravidity category had 77 percent of their children surviving. (Table 4) however, from gravidity 5 plus the chances of child survival gradually decreased until a woman might have 4 living children out of 6 pregnancies.

Therefore, in order to ensure a family of 5 she would need 8-10 pregnancies. Obviously, given this situation most women will not be receptive to the idea of child spacing and family size limitation until they are assured that almost all of their children born will survive to become healthy adults. It should be noted that this situation is not unique to Luampungu or Kabinga. O'Keefe (1976) describes a very similar child survival picture for group of villages near Choma, Southern Province and the author's recent analysis of maternal/reproductive data collected by the Tropical Disease Research Centre in Kampumbu, Northern Province provides yet another similar case.

TABLE 2

SURVIVAL RATE OF CHILDREN BY GRAVIDITY FOR LUAMPUNGU AND KABINGA

Number of present gravidity	No. of Women Luampungu	Total No. of pregnancies	Number of children alive	Percentage surviving	No. of women Kabinga	Total No. of pregnancies	Number of children alive	Percentage surviving
1	14	14	12	.86	16	16	13	.81
2	17	34	27	.79	15	30	25	.80
3	8	24	18	.75	12	36	26	.72
4	10	40	31	.78	15	60	45	.75
5	8	40	30	.75	13	60	40	.67
6	5	30	24	.80	12	72	49	.68
7	13	91	69	.70	4	28	20	.71
8	11	88	65	.74	6	48	32	.67
9	9	81	47	.57	1	9	6	.67
10	10	100	57	.57	1	10	6	.60
11	5	55	32	.58	1	11	7	.64
12	1	12	8	.67	—	—	—	—
13	—	—	—	—	2	26	16	.62
14	—	—	—	—	1	14	8	.57
Total	111	609	420	69	101	420	293	70

Not only are these at risk women having more miscarriages and stillbirths (56% of the stillbirths and abortions in Luampungu and 44% of Kabinga occurred in women with 5+ pregnancies) the also reported higher household mobidity which was probably a consequence of the larger family size, cross-infection rates and poorer nutrition. The combination of these factors also resulted in increased child mortality.

Although there are a number of variables affecting the rate of birth such as lack of

In spite of the substantial numbers of women who experienced difficulties in childbirth only 49 percent of the women in Luampungu and 67

TABLE 3

PERCENTAGE OF CHILD DEATHS BY GRAVIDITY CATEGORY FOR LUAMPUNGU WOMEN

No. of mothers	Range of pregnancies	No. of pregnancies	No. of child deaths	% Child deaths of pregnancies
25	9-12	248	104	42
37	5-8	249	61	25
49	1-4	112	24	21
Total 111	1-12	609	189	31

TABLE 4

PERCENTAGE OF CHILD DEATH BY GRAVIDITY CATEGORY FOR KABINGA WOMEN

No. of mothers	Range of pregnancies	No. of pregnancies	No. of child deaths	% Child deaths of pregnancies
19	9-12	70	27	39
24	5-8	208	61	29
58	1-4	142	33	23
Total 101	1-14	420	121	29

percent in Kabinga attended the antenatal clinic during their last pregnancy. In fact only half of the 18 Luampungu women who were pregnant at the time of interview were attending antenatal clinics. This finding may be a reflection of a general decrease in antenatal attendances in Zambia. Data from the Ministry of Health Country Health Profile for 1978 shows a 12 percent decrease for Zambia overall (1977-1978) with the largest declines in Western, Eastern and Southern Provinces (31%, 32% and 32% respectively). Although there is evidence that the trend is reversing (MCH Annual Report for 1982) present figures are still below 1977/78 attendance levels. Paradoxically, we discovered on a recent trip to Luampungu that the activities of the community health worker may have contributed to decreasing antenatal attendace. After we were alerted by Mission hospital staff that attendances of the Mission mobile services by Luampungu villagers had declined dramatically we asked respondants why they did not attend. We found that many mothers felt that now that the CHW provided anti-malarials and aspirin that it was no longer necessary for them to go to the mobile clinic. Obviously, there is a need for the CHW to devote more time to health education to encourage pregnant mothers to attend clinics.

In summary, women and children are clearly at risk due to the combined effects of environmental conditions, inaccessibility of health facilities and socio-economic factors. Consequently, they suffer high morbidity, mortality and inadequate nutrition. If the key to PHC success depends on women then an essential component must be health education. In order to be effective health care personnel at all levels should be involved including, CHW's traditional healers, RHC staff, District hospital staff, PHC Coordinators, and Mission workers. Other categories not directly involved in health work can also play an important role. For example, school teachers can transmit health, sanitation and nutrition information which can have an impact on the community. At the family level older children can be educated by CHWs or teachers to look after the health interests of their younger brothers and sisters. In short there are a number of possibilities to improve a community's health status by using available resources but its success depends on communication and cooperation.

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