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## **ISSN 1036-4005**

Published by the Health Transition Centre, National Centre for Epidemiology and Population Health,  
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Annual subscription: *Health Transition Review*, Health Transition Centre, Fax 61-6-249 0740

Publication frequency: April and October.

Printing by the Printery, The Australian National University

Cover design by Graphic Design Unit, The Australian National University

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## Social inequality and children's growth in Guatemala\*



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### Abstract

**This paper is an investigation of the effects of social inequality in Guatemala on children's health and nutritional status as measured by attained height. Guatemala remains a highly stratified and poor society. We examine the association of land distribution, land tenure, occupation, and other aspects of family social and economic status with children's height between the ages of three months and 36 months, using data from a cross-sectional survey. An important consequence of the poverty and poor living conditions of the majority of the Guatemalan population is substantial deficits in children's growth. Our results suggest that children's growth is affected by ethnicity, their father's occupation, land distribution in the area where they live, and maternal education. Substantial growth deficits are observed among children living at altitudes above 1500 metres; we hypothesize that this is because, in Guatemala, higher altitude is associated with land scarcity, poorer agricultural conditions, and greater remoteness from transport networks and other public services.**

During the past thirty years, research on variations in early childhood growth and on the effects of experimental nutritional supplementation has shown that inadequate growth in young children in poor countries is generally the consequence of infectious disease and of low nutrient intake, especially inadequate energy and protein intake, relative to nutritional requirements (Martorell and Habicht 1986; Lutter et al. 1990). These studies also indicate that genetic variation among racial and ethnic groups plays a relatively minor role in early childhood growth patterns compared with factors related to diet and infection such as social class and economic status (Habicht et al. 1974; Martorell and Habicht 1986). Ethnic differentiation in growth potential appears to be more important during adolescence (Martorell and Habicht 1986), although poverty probably has a substantial effect in poor countries during this period of life as well. Within a particular ethnic and socio-economic group, children's growth is affected by the genetic endowment they receive from their parents, as well as by the other factors mentioned above (Mueller 1986).

The prevalence of inadequate growth in young children in poor countries is a major public policy concern<sup>1</sup> for at least three reasons. First, children's growth patterns are a highly

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\*The authors gratefully acknowledge support for this research from NICHD grant no. R01 HD 27361, and comments and assistance from Jean-Pierre Habicht, Jere Haas, Marie Ruel, Narayan Sastry, James Trussell and Maryann Belanger, and a thorough and helpful anonymous reviewer.

<sup>1</sup> Growth retardation among children through the physiological effects of living at high altitudes, generally ascribed to hypoxia, is much less of a public health concern. Healthy children born at high altitudes are shorter than those born at lower altitudes (Beall et al. 1977; Haas et al. 1982). However, the

accurate indicator of children's physical health status (Tanner 1986). For example, young children suffering from growth retardation have a much higher risk of mortality than others (Pelletier 1991; Pelletier, Frongillo and Habicht 1993), because of malnutrition and greater incidence and duration of infection. Secondly, nutritional deprivation in childhood, which is reflected in poorer growth, is associated with poorer mental development and learning ability (Balderston et al. 1981; Cravioto and Arrieta 1986; Pollitt 1990); this association may be due to the impairment of the structural and biochemical development of the brain (Balázs et al. 1986; Cravioto and Arrieta 1986). The greater lethargy and lack of responsiveness often experienced by malnourished children also appears to affect cognitive development by reducing the amount of stimulation that malnourished children receive and initiate (Cravioto and Arrieta 1986). While Balázs et al. (1986) note that most impairments of brain development associated with nutritional deprivation appear to be reversible by subsequent nutritional rehabilitation, even at relatively late stages of development, disruptions in cognitive development due to early malnutrition may be more difficult to compensate for in later childhood.

Thirdly, poorer growth in childhood is associated with smaller adult body size (Martorell and Habicht, 1986), which is thought to impair physical work capacity and productivity in adulthood (Spurr 1983, 1990; Martorell, 1993). This is a particularly important concern in populations which depend on physical labour to earn income. Small adolescent and adult body size may also be detrimental for the health of women during pregnancy and childbirth.

This paper is an investigation of the effects of social inequality in Guatemala on children's health and nutritional status as measured by attained height. Guatemala remains a highly stratified society. The distribution of income is extremely uneven and is thought to have worsened during the 1980s; for example, Steele (1993) reports that 66 per cent of the population was below the poverty line in 1989 and 38 per cent was classified as extremely poor.<sup>2</sup> Despite major social and economic changes in both urban and rural areas during the past two decades, access to agricultural land remains an important determinant of poverty in rural areas where the majority (70%) of Guatemalans still live (MSPAS and INCAP 1989: 2). Much of the agricultural land is owned by relatively few wealthy landowners and most farmers or agricultural workers depend on small plots.

In our analysis, we examine the association of land distribution, land tenure, occupation, and other aspects of family social and economic status with children's growth between the ages of three months and 36 months, using data from a cross-sectional survey. We hypothesize that the major growth deficits observed among Guatemalan children are the consequence of widespread poverty, and in rural areas, highly inequitable distribution of land. We also hypothesize, in line with previous work by Thomas, Strauss and Henriques (1991), Thomas and Strauss (1992), and Ruel et al. (1992) that parental education, particularly education of the mother, can compensate to some extent for the detrimental consequences of poverty.

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contribution of hypoxia to growth retardation as compared with poor dietary intake and disease is minor in developing countries.

<sup>2</sup> The poverty line was defined as \$60 per person per month in 1985 purchasing power parity (PPP) US dollars, while extreme poverty is \$30 PPP per person per month. Of the indigenous population, 87 per cent was below the poverty line and 61 per cent classified as extremely poor.

## **Previous research on children's growth in Guatemala**

Over the past three decades, Guatemala has been the site of several major studies of children's growth patterns and their determinants.<sup>3</sup> These earlier analyses demonstrated that infectious disease often plays a major role along with dietary intake in causing poor growth, that nutritional supplementation of both mother and child can increase growth substantially, that ethnic differences in early childhood growth are mostly attributable to ethnic differences in socio-economic status, and that early growth affects adult physical work capacity.

The analysis presented here differs from and complements earlier work in two ways. First, although earlier studies often benefited from longitudinal observations, they were based on socially and geographically circumscribed, and generally small, populations. By contrast, while our data are cross-sectional, they are based on a large national sample of the Guatemalan population. Thus, we are able to evaluate the importance of patterns observed at the local level for the entire Guatemalan population.

Second, previous studies in Guatemala have generally relied on a single index of socio-economic status such as housing quality, or a very limited set of socio-economic measures, partly because the investigation of the socio-economic determinants of growth was not the central objective; instead, most earlier work focused on the effects of diet and illness on growth retardation, the consequences of poor growth, and comparisons of growth patterns between Guatemalan and other children. Thus, knowledge about the association between children's growth and social and economic characteristics is limited. In particular, little information is available on the relationship between land tenure patterns in rural areas and children's growth patterns and on the effects of recent increases in the educational attainment of parents, particularly mothers, on children's growth. While the data used in this analysis are limited in ways which are described below, they provide, for a national sample, more detailed information than many earlier studies on land ownership, occupation, the size of farms and other characteristics of the area in which the family lives, parents' education, and measures of housing quality and ownership of consumption goods.

## **Data**

Data for this analysis come from the National Survey of Maternal and Child Health (ENSMI) conducted in Guatemala in 1987. This Survey was conducted by the Ministry of Public Health (MSPAS) and the Nutritional Institute of Central America and Panama (INCAP) in connection with the Demographic and Health Surveys (DHS) project (MSPAS and INCAP, 1989). It was based on a nationally representative sample,<sup>4</sup> obtained from a multi-stage cluster sampling design.<sup>5</sup> The sampling was carried out in 240 clusters, which correspond to census tracts in urban areas and villages or neighbourhoods in rural areas or towns. A total of 5,160 women aged 15 to 44 were interviewed between September and December of 1987. The questionnaire included items on environmental conditions in the household, social and economic status of the family, and the use of health services for prenatal care, delivery assistance, and immunization. As part of the survey, all living children of respondents

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<sup>3</sup> See for example, Guzman et al. (1968), Yarbrough et al. (1975), Johnston et al. (1976), Mata (1978), Martorell (1980), Valverde et al. (1981), Bogin and MacVean (1982, 1983, 1984) and Martorell (1993).

<sup>4</sup> However, the sample excluded the department of El Peten.

<sup>5</sup> The sampling design involved stratification on the basis of population size of the clusters (according to the 1981 Census) and selection of clusters within the strata, with an average cluster size of 20 and 40 in urban and rural areas respectively (MSPAS and INCAP, 1989). As described later, a clustered sample results in higher standard errors of estimates than a simple random sample.

between the ages of three months and 36 months (n=2437) were weighed and their height was measured using standard anthropometric procedures. Among these, about 8.5 per cent had missing or inconsistent information on weight and height. No information was collected on birthweight and respondents (the mothers) themselves were not weighed. Anthropometric measurements were taken using standard NCHS methods, and standardization and validation procedures developed by the Demographic and Health Survey program (see DHS 1986).

Because the data were collected over several months, seasonal variations in diet alone might have produced some variation in anthropometric measures. However, seasonality is unlikely to have an important effect on our results, since height is cumulative in nature and, therefore, less subject to acute food deficits or surpluses. Furthermore, during most of the period when the data were collected, food supply was likely to be adequate and infectious diseases were less prevalent than in the rainy season or the colder weather in January and February. The period September to December is mostly a dry period and the season of the year for a major harvest.

Municipality-level data for this analysis were obtained from other sources. Specifically, information on population size was obtained from the 1981 census of population and housing, and on the distribution of farm sizes from the 1979 agricultural census. Data on altitude (or elevation) of municipality capitals were coded from information supplied by the Guatemalan Military Geographic Institute and the National Statistical Institute.<sup>6</sup>

### **Height and weight of Guatemalan children**

A comparison between Guatemalan children in the National Survey of Maternal and Child Health and data for other national surveys in Latin America in the mid-1980s indicates that Guatemalan children had the highest prevalence of chronic malnutrition or 'stunting' as measured by height-for-age (57.8 per cent) of all countries reported. In addition, Guatemalan preschool children had the second highest prevalence of 'total' malnutrition as measured by weight-for-age (33.5 per cent), exceeded only by Haiti (PAHO 1990: Tables 86 and 87).<sup>7</sup> As is observed in most Latin American populations (Victora 1992), however, the prevalence of acute malnutrition as measured by weight-for-height was a very low 1.4 per cent (MSPAS and INCAP 1989: Table 2.13).

Deficits in weight-for-age represent a composite of height-for-age, an index of chronic malnutrition, and weight-for-height, an index of acute malnutrition. Since the former deficit is common among Guatemalan children while the latter is rare, deficits in weight-for-age in this population reflect primarily deficits in height-for-age. Thus, we focus the analysis in this paper on variations in height-for-age.

In our sample, the average height-for-age is 2.3 standard deviations below the NCHS/WHO reference median, reflecting a prevalence of stunting (two or more standard deviations below the reference median) of 57.8 per cent.

The pattern of stunting observed in poor countries is frequently very different during the first year of life and in subsequent years (Martorell and Habicht 1986). The typical pattern is apparent in our sample and is shown in Figure 1 and Table 1. Average height-for-age declines relative to the standard through the first year of life and levels off early in the second year at a value of about 2.6 standard deviations below the median or a prevalence of stunting of about 70 per cent. Furthermore, the determinants of growth during the first year of life are

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<sup>6</sup> These data were coded as part of a project carried out by Haines, Avery, and Strong (see Haines et al. 1983), who generously provided them to us.

<sup>7</sup> No data were reported for Haiti on height-for-age. Cutoff points for all three measures of nutritional status are two or more standard deviations below the NCHS reference standard median.

considerably different from those in later years. Since we are not primarily interested in age patterns of growth, but rather differentials by social and economic characteristics, we exclude infants under one year of age from this analysis.<sup>8</sup> The sample of 1568 infants aged 12-36 months with reported height and weight data forms the basis for the estimates presented here.

**Figure 1**  
**Average standard deviation from NCHS/WHO reference median by age in months for children 3-36 months**

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<sup>8</sup> Our analysis (not shown) of infants aged 3-11 months indicates that the coefficients on social and economic variables are smaller in absolute value than those for older children and none are statistically significant.

**Table 1**  
**Percentage distribution and average height-for-age<sup>a</sup> by age (children 3-36 months) and by demographic, social and economic characteristics (children 12-36 months)**

<b>Characteristics</b>	<b>Per cent distribution</b>	<b>Average height for age (s.d)</b>
<b>Age of child (months)</b>		
3- 5	10.1	-1.14
6-12	19.6	-1.73
12-17	18.8	-2.47
18+	51.5	-2.62
<b>Family ethnicity</b>		
<i>Ladino</i>	58.0	-2.21
Indigenous, Spanish-speaking	22.5	-3.03
Indigenous, no Spanish	19.5	-3.16
<b>Education</b>		
Mother's education		
None	48.3	-2.96
Primary	43.9	-2.39
Secondary	7.8	-1.29
Father's education		
None	32.1	-2.86
Primary	46.0	-2.58
Secondary	11.9	-1.47
Missing <sup>b</sup>	10.0	-3.01
<b>Father's occupation</b>		
Agr., self-employed	34.5	-2.88
Agr., not self-employed	24.8	-2.79
Prof., technical	5.4	-1.35
Sales, clerical	7.5	-2.15
Skilled manual	14.7	-2.40
Service	7.1	-2.10
Unskilled	2.9	-2.47
None	1.1	-2.57
Missing <sup>b</sup>	2.0	-2.91
<b>Type of land<sup>c</sup></b>		
Father or family owned	29.9	-2.84
Someone else's	28.8	-2.84
Missing	41.3	-2.21

Note: see footnote 12 on page 11.

*Table 1 continued next page*

**Table 1 continued**  
**Percentage distribution and average height-for-age<sup>a</sup> by age (children 3-36 months) and by demographic, social and economic characteristics (children 12-36 months)**

<b>Characteristics</b>	<b>Per cent distribution</b>	<b>Average height for age (s.d)</b>
<b>Housing quality</b>		
Floor		
Earth	65.2	-2.90
Cement, other	34.8	-1.99
Electricity		
No	61.2	-2.88
Yes	38.8	-2.10
Household water		
Not piped	63.4	-2.83
Piped	36.6	-2.15
Toilet		
Not flush or septic	79.8	-2.79
Flush, septic	20.2	-1.75
Radio		
No	39.7	-2.82
Yes	60.3	-2.42
Television		
No	77.3	-2.80
Yes, don't watch daily	5.4	-2.40
Yes, watch daily	17.4	-1.64
Refrigerator		
No	92.1	-2.69
Yes	7.9	-1.36
Bicycle		
No	86.0	-2.68
Yes	14.0	-1.94
<b>Pregnancy care</b>		
Traditional, other	55.4	-2.96
Modern	44.6	-2.11
<b>Altitude</b>		
<500m	20.9	-2.23
500-1499m	31.8	-2.39
1500-2499m	35.3	-2.74
2500+ m	12.0	-3.23
<b>Area of residence</b>		
Urban	28.1	-2.19
Rural	71.9	-2.73

*Table 1 continued next page*

**Table 1 continued**  
**Percentage distribution and average height-for-age<sup>a</sup> by age (children 3-36 months) and by demographic, social and economic characteristics (children 12-36 months)**

Characteristics	Per cent distribution	Average height for age (s.d)
<b>Average farm size ( )<sup>e</sup></b>		
< 1	3.6	-2.83
1- 5	28.5	-2.86
5-10	25.6	-2.80
10-20	24.6	-2.47
20+	9.8	-2.17
Missing <sup>d</sup>	7.8	-1.61
<b>Total</b>	100.0	-2.58
<b>Number of children (12-36 months)</b>	1568	

<sup>a</sup> Measured as number of standard deviations from the NCHS/WHO standard of height-for-age.

<sup>b</sup> Includes about 30 children without fathers.

<sup>c</sup> Information not collected for most non-agricultural workers.

<sup>d</sup> Information not available for children in Guatemala City.

<sup>e</sup> 1 *manzana*: 0.7 hectare.

### Social and economic determinants of growth

Guatemala is geographically, socially, economically, and ethnically diverse. Despite its relatively small land area, it includes lowland tropical areas on both Atlantic and Pacific coasts, a large tropical rain forest in the north, a high semi-desert area in the east, and cool mountain areas in the west and north. Elevations range from sea level to about 3800 metres. A substantial proportion of the population is partly or wholly dependent on agriculture, as self-employed farmers, as farm labourers, or as workers on plantations. However, most rural areas have undergone major structural transformation to an economy at least partly based on markets, cash and wages during the past twenty years, as is true throughout Latin America.

The Guatemalan population is roughly evenly divided into two ethnic groups: Indians or the indigenous population who are descendants of Mayan and other pre-conquest groups and who have maintained a separate cultural identity and separate languages, and *ladinos*. *Ladinos* are those who, irrespective of ethnic origin, regard themselves as part of the national Guatemalan culture, speak Spanish exclusively, and wear Western clothing. Ethnicity and social class are closely intertwined in the sense that the members of the indigenous population, who are predominantly poor and rural, are usually of low social status (see Steele 1993); *ladinos*, on the other hand, are members of all social classes.

Dietary intake and infectious disease, as well as the interactive effects of these two factors, are the primary biological determinants of children's growth patterns in poor countries. The effects of the family's social and economic status on these two variables is complex. Parents' ability to provide their children with a better diet is generally severely constrained by lack of money; in addition, parents frequently lack relatives and friends who are able to provide them with financial assistance in lean periods. Inadequate knowledge and information about appropriate diets for young children (such as the appropriate duration of breastfeeding) may lead to additional constraints. The same sets of factors also limit parents'

ability to maintain a clean environment in which children are less exposed to disease and to provide effective treatment to children who become ill.

However, even in the presence of severely limited resources, parents and other family members affect children's diets, exposure to illness, and treatment during illness by making choices about the use of the resources that are available (Thomas, Strauss and Enriques 1990; Thomas and Strauss 1992; Thomas 1993; Cebu Project Team 1991; Behrman 1990). For example, research on the effects of the economic downturn in Guatemala by Ruel and Garrett (1992), and in other countries by Cornia, Jolly and Stewart (1987, 1988) and Palloni (1992), suggests that many families have used a variety of adaptive strategies to blunt some of the more serious health effects of deteriorating economic conditions. These strategies include changing dietary composition and allocation, spending less on 'luxuries' such as cigarettes and alcohol, borrowing more from others, and increasing or reallocating labour supply. Since the ENSMI data provide only a limited picture of household consumption and intra-household allocation patterns, we focus primarily on the relationship of children's growth to social and economic factors which are likely to constrain access to resources and which may affect parents' skill in allocating resources to improve their children's well-being.

Most of the variables examined in this analysis (shown in Table 1) are measures of a family's economic status and social class: occupation of the respondent's husband and land ownership for those in agriculture, housing quality, possession of consumer goods, whether the family lives in an urban or rural area, and, for those outside Guatemala city, the average size of farms in the municipality. Occupation is included not only as a determinant of income,<sup>9</sup> but as an indicator of social class and access to social resources and information associated with class. For example, because of a high degree of social stratification, individuals typically marry, and have as family members, persons of their own social class.

For husbands in agricultural occupations, we examine differences between those farming their own or family land (farmers) and those farming land owned by others (agricultural workers or labourers). While ownership of agricultural land in rural areas is itself a reflection of wealth and is likely to be correlated with income, we hypothesize that there are also other differences in living conditions between farmers working their own or family land and landless labourers. Specifically, despite the expansion of wage labour and cash-based commodity markets into many rural areas in Guatemala during the 1980s, many small farmers who work their own or family land remain relatively insulated from economic fluctuations, because they produce the majority of food for family consumption with relatively little dependence on purchased inputs. By contrast, agricultural labourers are very much exposed to variations in wages and prices, since they are either employed by large *fincas* (plantations) or face very thin local labour markets — or both, since work on *fincas* is often seasonal. Furthermore, the serious economic downturn during the middle and late 1980s in Guatemala (Ruel and Garrett 1992) undoubtedly reduced the demand for agricultural labour and wage rates. Thus, we hypothesize that relative to farmers, agricultural workers were much harder hit by the poor economic conditions during the late 1980s.

There is a caveat: many farmers working their own or family land have access to less land than is necessary to produce sufficient food for their families. The ENSMI did not collect information on the amount of land owned. However, areas of land scarcity and parcel fragmentation are highly geographically clustered in Guatemala, although of course, there is

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<sup>9</sup> Hourly wage differentials vary markedly by occupation and are lowest for those in agriculture. For example, average hourly wages for *ladinos* measured in quetzales in 1989 (one quetzal = \$0.36 US) were Q1.93 for office workers, Q1.54 for transport workers, and Q1.08 for manual labourers, but only Q0.68 for those in agriculture (Steele 1993). Although self-employed farmers are most likely to underreport earnings, misreporting is unlikely to account entirely for the large wage differential between persons in agriculture and those in other occupations.

variation in the amount of land owned among individual farmers within a given area. As measures of land tenure, we employ three variables in the analysis presented below that reflect the size of farms in the municipality of the respondent at the last agricultural census (1979) which took place about eight years before the ENSMI survey. While we would have preferred more recent information, the distribution of agricultural land is unlikely to have changed markedly during this period. The variables are: the average size of farms; the density of very large landholdings, that is, the number of farms greater than 20 *caballer'as* (about 894 hectares) per person; and the density of very small farms, under one *manzana* (about 0.7 hectare) per person. These variables are also likely to provide an indication of the demand for agricultural labour, since larger farms are much more likely to employ agricultural workers than small farms.<sup>10</sup>

As an indicator of family wealth, consumption, and living conditions, we examine family possession of several consumer durables, radio, television, refrigerator, bicycle; and variables measuring housing quality: the presence of a non-earth floor, electricity, piped household water, and a modern toilet. With regard to the possession of a television, we also distinguish those who watch television daily from those who own a television but watch less frequently. Work by Thomas et al. (1991) suggests that access to information, including watching TV, plays an important role in explaining the association between maternal education and children's height. Measures of housing quality and sanitation may also have a direct effect on growth by affecting the level of environmental contamination.

While parents' education is correlated with occupation and current economic status, and reflects family background, previous researchers have suggested that more educated parents, especially mothers, are more effective at using the available resources to improve the health of their children (Caldwell, Reddy and Caldwell 1983; Cleland 1990; Lindenbaum 1990; Thomas et al. 1991; Elo 1992). We examine both the mother's and father's education in this analysis.

As suggested above, it is likely that ethnicity, land tenure and occupation are highly correlated with parental education. For example, indigenous families are more likely to be poor, to work as agricultural labourers, and to have little formal education. In the analysis, we examine the interactions among these variables.

We also examine the effects of the geographical altitude of the child's residence: more precisely, the altitude of the capital of the municipality in which the mother lives. Initial analyses of the ENSMI indicated that there is a strong, negative relationship between height-for-age and altitude in Guatemala. Previous research elsewhere in Latin America found that children living at altitudes of above 3000 metres are shorter at a given age than those at lower altitudes (Beall et al. 1977; Haas et al. 1982), apparently because of the effects of hypoxia, or oxygen scarcity (Bailee and Haas 1986; Mayhew, Jackson and Haas 1990). However, hypoxia is unlikely to account for the association in Guatemala because only a very small portion of the Guatemalan population lives at altitudes greater than 3000 metres. We hypothesize that the apparent altitude effects are due to the close relation between altitude and poverty, specifically land scarcity, in Guatemala. Results not shown here<sup>11</sup> indicate that, for

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<sup>10</sup> It is important to note that agricultural labourers working on large plantations frequently have to migrate long distances to the Pacific Coast, where many of the plantations are located. The variables included in the analysis reflect the size distribution of local farms and plantations only in the area where the family lives. However, employment on the coast is generally available to labourers from all areas of the country and employment requirements are often advertised by plantation owners over the national radio station.

<sup>11</sup> These results are based partly on data from the ENSMI community survey, conducted in about two-thirds of the sample clusters in which the individual survey took place.

the ENSMI sample, communities at high altitudes are more likely to have very small farms, high levels of illiteracy, a lack of sewers and paved roads, and a high proportion indigenous compared with communities at lower elevations. Miller (1993) and de Meer (1993) have shown similar associations in Bolivia and in Peru.

## **Results**

In the first column of Table 1, we show the per cent distribution by age, ethnicity, altitude and the social and economic variables for children in our sample. In the second column, we present the average standard deviation in height-for-age from the NCHS reference median, in each of the categories. Although the first panel of numbers (by age of child) includes all children aged 3-36 months, the remaining numbers refer to children aged 12-36 months, who form the sample for the subsequent multivariate analysis.

The results indicate substantial variation in height-for age by demographic, social and economic characteristics. On average, indigenous children are substantially shorter than *ladinos*, with little difference between children of Spanish and non-Spanish speaking indigenous mothers; and children residing in rural areas are shorter than those in urban areas. The difference in average height-for-age between urban and rural areas is considerably smaller if children living in Guatemala City are excluded from the urban group. Children of poorly educated mothers and fathers<sup>12</sup> and of fathers employed in agriculture or unskilled occupations are considerably shorter than children of educated and skilled parents. Heights for age also vary systematically with farm size in the community — in general, the smaller the average farm size, the greater the deficit in height — although there is no difference in height by land tenure of persons employed in agriculture, that is, self-employed or not self-employed agricultural workers. The estimates also indicate that children living in higher-quality homes and in families with modern possessions consistently have smaller height deficits than their less well-off counterparts.

The data in Table 1 suggest that use of modern health care during pregnancy is positively associated with children's height: mothers who relied on a physician or nurse for prenatal care or for assistance at delivery have taller children, by almost a standard deviation on average, than do those who used other forms of health care, primarily a midwife. Finally, the estimates reveal a monotonic relation between altitude and height: the higher the altitude of the community, the shorter the child, on average.

### ***Multivariate models***

In order to assess the relative contributions of family economic and social status, parental education, land distribution, and altitude to children's growth deficits, we estimate multivariate models. The dependent variable is height-for-age, expressed as the number of standard deviations from the NCHS/WHO reference median multiplied by 100. Like most nationally representative surveys, the ENSMI was a multi-stage sample rather than a simple random sample. For example, the 1,568 children included in the multivariate analysis reside in 155 sample clusters, resulting in an average cluster size of about ten. To the extent that children living in the same area experience similar deficits in height, estimated standard errors derived from the conventional assumption of simple random sampling are likely to be too small, although the coefficients obtained from ordinary regression models are unbiased. In order to take the actual sampling design into account, we obtain our estimates in two

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<sup>12</sup> The information in the ENSMI refers to the most recent husband of the child's mother, who may or may not be the father of the child. For convenience, however, we refer to the most recent husband as the child's father.

stages. The first consists of estimating the classic linear regression model (based on the assumption of independent observations), including the individual-level, household-level and community-level covariates listed in Table 2 as explanatory variables. The second stage uses the observed clustering design to adjust the standard errors obtained from the classic regression model.<sup>13</sup> The sample size for the multivariate analysis is about ten per cent smaller than the full sample of children with anthropometric information because we excluded children in Guatemala City, for whom we have no information on land size in the municipality, and children with missing information on fathers' education or occupation.

Each of the variables presented in Table 1 was included in a preliminary set of regression models (not shown). Subsequently, several of the housing quality and consumer durable variables with coefficients not significantly different from zero were dropped from the model. In addition, for some of the variables retained in the model, the number of categories was reduced. For example, since there were no significant differences among different groups of non-agricultural workers, the occupation variable was collapsed to three categories: agricultural workers who farm their own or family land, agricultural workers on other land, and non-agricultural workers. Instead of using average farm size in the multivariate models, we included two continuous variables to capture the potentially different effects of large (predominantly commercial) farms and small holdings: the number of farms greater than 20 *caballer'as* (894 hectares) per capita and the number of farms smaller than one *manzana* (0.7 hectare) per capita.

We also explored the potential contribution of interaction terms to the multivariate model. In particular, we examined interaction terms between ethnicity and education, ethnicity and wealth (ownership of goods and housing quality), and ethnicity and occupation; between education and wealth; and between occupation and land size. The interaction terms were calculated as the product of the respective variables. Sets of interaction terms that did not significantly enhance the fit of the model, as determined by the appropriate F-test, were subsequently dropped. The only two sets that were retained in the final model reflect interactions between ethnicity and wealth and between occupation and land size.

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<sup>13</sup> We use a regression procedure known as *hreg* in the statistical package STATA that provides robust and consistent estimates of standard errors. This procedure is based on an adaptation of Huber's formula to handle clustered observations (Computing Resource Center 1993).

**Table 2**  
**Estimated coefficients and t-values<sup>a</sup> for regression of height-for-age<sup>b</sup>, children aged 12-36 months**

Covariates	All covariates		Reduced-form	
	Coefficient	t-value	Coefficient	t-value
<b>Ethnicity</b>				
(Ladino)				
Indigenous	-3.6	-0.31	-23.6*	-2.03
<b>Altitude</b>				
(<1500m)				
1500-2499 m.	-55.3*	-5.80	-57.5*	-5.51
2500 m.	-54.0*	-4.12	-57.8*	-4.03
<b>Pregnancy care</b>				
(No modern pregnancy care)				
Modern pregnancy care	29.1*	3.94	-	-
<b>Education</b>				
(Mother no education)				
Mother primary education	10.4	1.45	20.8*	2.89
Mother secondary+ educ.	40.2*	2.94	82.9*	5.51
(Father < secondary educ.)				
Father ≥ secondary educ.	24.3	1.93	48.4*	3.80
<b>Housing quality</b>				
(Earth floor)				
Cement, other floor	35.1*	3.64	-	-
(No flush/septic toilet)				
Flush/septic toilet	41.9*	2.59	-	-
<b>Consumer durables</b>				
(No TV, don't watch daily)				
Watch TV daily	41.9*	3.63	-	-
<b>Area of residence</b>				
(Rural)				
Urban	-18.2	-1.61	-5.6	-0.46
<b>Ethnicity interactions</b>				
Indigenous x cement floor	-5.5	-0.35	-	-
Indigenous x flush toilet	-56.3*	-2.19	-	-
Indigenous x watch TV often	-20.6	-0.59	-	-

Table 2 continued next page

**Table 2 continued**  
**Estimated coefficients and t-values<sup>a</sup> for regression of height-for-age<sup>b</sup>, children aged 12-36 months**

Covariates	All covariates		Reduced-form	
	Coefficient	t-value	Coefficient	t-value
<b>Farm size and occupation</b>				
No. of farms > 20 cab per capita <sup>c</sup>	73394.9*	3.09	67708.0*	2.56
No. of farms < 1mz per capita (Non-agricultural occupation)	292.9	1.31	-45.8	-0.17
Ag. worker, own land	37.7	1.81	-8.6	-0.37
Ag. worker, not own land	17.1	1.05	-28.3	-1.66
(Ag. own land) x (farms<1mz p.c.)	-999.2*	-1.97	-429.5	-0.78
(Ag. not own land) x (farms<1mz p.c.)	-828.6*	-2.21	-287.8	-0.70
<b>Constant</b>	-291.9*	-24.74	-232.2*	-18.23
<b>Number of observations<sup>d</sup></b>	1419		1419	
<b>R<sup>2</sup></b>	0.241		0.198	

\* p &lt; .05

<sup>a</sup> Huber regression which takes into account the cluster-based sampling design.<sup>b</sup> Number of standard deviations from the NCHS/WHO standard of height-for-age.<sup>c</sup> Twenty *caballer'as* (cab) is approximately equal to 894 hectares. One *manzana* (mz) is approximately equal to 0.7 hectare.<sup>d</sup> The numbers of observations in the regression models are about 10% smaller than the full sample size (n=1568) because of missing values on the father's occupation and education variables and on farm sizes for some municipalities in Guatemala City.

A statistical problem arises with regard to the inclusion of several variables in our model: type of pregnancy-related care, housing quality, and consumer durables. A mother's decisions about the type of health care to receive during pregnancy and delivery, and parents' decisions about the acquisition of modern possessions in the household, may be affected by the same unobserved factors as are decisions about a child's nourishment and health care that presumably affect a child's growth.

The potential endogeneity<sup>14</sup> of several of our covariates poses complications in this analysis since adequate identifying variables, such as average wage rates, needed to estimate

<sup>14</sup> Endogeneity means that some of the variables thought to affect nutritional status are themselves 'determined' or influenced by other variables within the model. For example, holding level of income constant, some parents may choose to spend less of their income on better housing quality or durable goods and more on food. In this case, both housing quality and dietary intake are 'jointly determined', i.e. decisions about the two types of expenditures are made jointly and are both affected by parents' characteristics. Statistical models which do not take endogeneity into account may produce misleading results. A typical procedure used by economists to deal with endogeneity is to use 'instrumental variables' which are correlated with the predictor variable but uncorrelated with the dependent variable, and are typically exogenous variables, such as the average female wage rate, which are not under the control of the family decision-makers (Wonnacott and Wonnacott 1970).

a simultaneous equation model are not readily available in these data. At the same time, inclusion of the variables describing pregnancy care, housing quality and consumer possessions on the right-hand side of the height equation may lead to biased estimates of all coefficients. In order to determine how sensitive our findings are to the inclusion of potentially endogenous variables, we estimate two regression models: the first includes modern pregnancy-related care, housing quality and possession of consumer durables along with the other covariates, and the second excludes these potentially endogenous variables, that is, it represents a reduced-form model.

### **Multivariate results**

The multivariate results confirm many — but not all — of the bivariate results shown in Table 1. Recall that height-for-age is measured in terms of standard deviations multiplied by 100, so that the estimated coefficients in Table 2 need to be divided by 100 to reflect the number of standard deviations.

The results in Table 2 substantiate the importance of family economic status and social class and inequitable land distribution for childhood growth. Estimates for the full model indicate that higher-quality homes and possession of modern conveniences are usually associated with smaller deficits in height. However, the interaction terms indicate that the effects are typically greater for *ladino* than for indigenous children. For example, estimates in Table 2 indicate that *ladino* children living in homes with modern toilets are 0.419 standard deviations taller, on average, than those without flush toilets or septic tanks in the household. On the other hand, indigenous children do not experience a growth advantage from this improvement in housing quality, as indicated by adding the coefficient for the main effect of a flush or septic toilet to the associated interaction term for indigenous children ( $0.419 - 0.563 = -0.144$ ).

The estimated coefficients in the full model indicate that, apart from modest interactions between ethnicity and wealth, there is virtually no association between ethnicity and height. That is, once controls for demographic, social, economic and community characteristics are included, ethnic differences in children's height are substantially reduced; much of the greater deficit in height observed among the indigenous population (e.g., in Table 1) can be accounted for by ethnic differences in social and economic factors and in altitude. This finding is consistent with results from earlier small-scale investigations of ethnic differences in growth of Guatemalan children (Johnston et al. 1976; Bogin and MacVean 1982).

In both the full and reduced-form models, the occupational and land variables, occupation, farm size and their interactions, are jointly significant ( $p < 0.01$ ), even though some of the individual coefficients have relatively small t-ratios. The estimated coefficients indicate that higher densities of large landholdings in a community are associated with smaller deficits in height. Moreover, higher densities of very small farms are associated with larger deficits in height, although only for those employed in agriculture, irrespective of whether or not they farm their own land. Since the interaction terms by themselves are not jointly significant in the reduced-form model, we re-estimated this model excluding these two terms (results not shown). The estimates indicate that children of fathers in agriculture, irrespective of land ownership, have significantly larger deficits in height than do children of fathers in other occupations, but that the density of very small farms is not significantly associated with children's growth.

In both models, mothers with more years of education have children with smaller deficits in height; the differentials are considerable between children whose mothers have no education and those whose mothers have a secondary education. As hypothesized, this result suggests that maternal education has a strong effect on children's growth, even when other aspects of a family's social and economic status are held constant. Thus, it appears that more

educated mothers can use limited resources more effectively than mothers with less education. More educated mothers may also have better information on health and nutrition-related practices. The effect of father's higher education is smaller than that of the mother and is significant only in the reduced-form model. When housing quality and consumer durable variables are included, that is, in the full model, the independent effects of father's education on children's growth are relatively small; in the absence of these variables, children whose fathers have more than a secondary education are about a half of a standard deviation taller than those whose fathers have lower levels of education.

As noted above, altitude is strongly associated with the distributions of farm sizes, ethnicity, literacy, and public services, such as sewers and paved roads, across the communities in the ENSMI sample. The regression coefficients in Table 2 indicate that the effects of altitude are significant and substantial even when social and economic factors are included in the model. The estimates from the full and reduced-form models are almost identical: children living in communities over 1500 metres of elevation have height deficits of at least half of a standard deviation greater than children at lower elevations. As noted earlier, these elevations are generally too low to reflect hypoxia effects on growth. Contrary to estimates from the bivariate results and the possible influence of hypoxia at the higher elevations, there is no difference in height between children at moderate and at high altitudes. The difference between the bivariate and multivariate results is due largely to the exclusion of children in Guatemala City in the multivariate analysis: children in Guatemala city are substantially taller, that is, have smaller height deficits, than children of the same age living in other urban and rural areas at a similar elevation, just over 1500 metres.

The results described above do not change markedly if altitude is omitted from the models (results not shown). The most notable difference is that the coefficient for ethnicity becomes more negative, indicating that indigenous children are substantially shorter than *ladinos*. The coefficients for the variables denoting the density of large farm sizes and the interactions between agricultural occupations and small farm sizes become larger in absolute value, a result which suggests that the effects of altitude may be partly due to variations in land distribution across different elevations.

Although the bivariate results in Table 1 indicate that children in rural areas are substantially shorter than urban children, the estimated coefficients in Table 2 suggest no significant difference in height between urban and rural children, once social and economic factors and altitude are included as control variables. This result is partly due to the exclusion from the multivariate analysis of children in Guatemala City, who are considerably taller than children living in both urban and rural areas outside of Guatemala City. With regard to health care, the full model indicates that the relation between use of modern pregnancy-related care and children's height persists in the presence of control variables: mothers who used modern health care during pregnancy or delivery have children with significantly smaller deficits in height.

## Conclusions

The objective of this paper has been to examine the association between a set of social and economic factors — family social class, economic status and land distribution — and children's growth deficits in a poor and highly stratified society. Our results indicate that an important consequence of the poverty and poor living conditions of the majority of the Guatemalan population is substantial deficits in children's growth. Despite the limitations of the measures of family economic status available from the ENSMI, approximately one-quarter of the variation in height-for-age is accounted for by the variables included in our models of children's growth. Differences in growth by father's occupation and by measures of living conditions and durable goods are substantial. The children of fathers in agriculture,

regardless of whether or not they farm their own land, are disadvantaged relative to other children.

The results also suggest that the distribution of farm sizes in the municipality affects children's growth. Children living in areas with a higher density of plantation-sized farms per capita experience substantially better growth than other children, presumably because the availability of regular employment in agricultural labour is greater than in other areas. In contrast, children in agricultural families suffer greater growth deficits if they live in areas where the density of small farms is high. Surprisingly, whether or not an agricultural family was farming its own land did not have a significant effect on children's growth. However, information on type of land tenure and land use was very limited in the ENSMI.

We hypothesized that parents with more education, especially mothers, are more effective at using available resources to improve the health of their children. As in previous research, our results show that even when other indicators of family social and economic status are held constant, children of more educated mothers are significantly taller.

An interesting result from the analysis is the strong association between altitude and growth, even when social and economic variables are held constant. As indicated earlier, growth deficits due to the stress of high-altitude environments are thought to occur only above 3000 metres, an altitude at which very few children live in Guatemala. Nonetheless, we observe substantial growth deficits among children living at altitudes above 1500 metres. Children living above this elevation are more than half a standard deviation shorter than children at lower altitudes. Haas (1994) suggests that the use of smoky cooking fires at altitudes less than 3000 metres may also reduce oxygen availability and children's growth. However, we hypothesize that the primary reason for the observed relationship is that, in Guatemala, higher altitude is associated with land scarcity, poorer agricultural conditions, and greater remoteness from transport networks and other public services, and that the effects of altitude partly reflect these unmeasured variables. Our results and those of Miller (1993) and de Meer (1993) suggest that further investigation of the association between altitude, social and economic conditions, and poor children's growth in Latin America is warranted. However, such an investigation would require better information on land ownership, use and productivity, family income, and public services than is available to us or to the authors of the other two studies.

A final result concerns the role of ethnicity in determining differences in height. Indigenous children are significantly shorter in Guatemala than *ladinos*, a fact which is often attributed by lay observers to genetic differences in growth potential. However, our results are consistent with those of previous research in showing that these ethnic differences are substantially reduced when social class, economic status, and altitude are held constant. Altitude is likely to represent unmeasured aspects of rural poverty, such as poorer land, lower family income, or remoteness. In fact, the high concentration of the indigenous population at higher elevations is partly due to the fact that, over the past two centuries, more productive, accessible, and desirable land at moderate elevations was frequently appropriated by *ladino* settlers. Thus, the shorter stature of indigenous as compared with *ladino* children is likely to result principally from greater poverty.

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## **Fostered children's perception of their health care and illness treatment in Ekiti Yoruba households, Nigeria\***



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*Children's statuses and their relationship to various adults in the household are crucial determinants of the household allocations they will receive (Bledsoe 1990a: 563).*

### **Abstract**

**This paper reports the findings from both quantitative and qualitative fieldwork conducted in six Ekiti Yoruba communities of southwestern Nigeria on the treatment of child illness within households. Relying heavily on data from focus group discussions, it shows how fostered children use local proverbs and day-to-day common sayings to describe their perception of the responses to and treatment of their illnesses in a very different way from that of the foster parents. Parents' responses and treatment of fostered and non-fostered children's illnesses were compared. Both the qualitative and quantitative evidence from the study showed that treatments were delayed for foster-children in comparison to own children, and foster-parents were found to be less sensitive to foster-child illness, which they often suspected was used to avoid housework. The different responses to, and treatment of, foster-children's illnesses are important for the understanding of the probable effects on differential morbidity, and possibly mortality, between fostered and non-fostered children.**

Child rearing in traditional Yoruba society is hardly a one-person job. One of the Yoruba proverbs is *eni kan lo n bimo, opo eniyan lo n ba'ni to*, meaning that only one person gives birth to a child, but many people take part in rearing the child. The supportive role of both close and distant kinsmen and other family members in child rearing has been documented (Page 1989:402). In recent years, information on the subject has become more plentiful, with substantial contributions from demographers and scholars in related disciplines (Schildkrout 1973; Fiawoo 1978; Goody 1982; Isiugo-Abanihe 1985; Bledsoe and Isiugo-Abanihe 1989; Page 1989; Bledsoe 1990 a, b; Renne 1993).

In traditional society, a child does not belong only to his biological parents, but rather he belongs to both the immediate and the whole extended family. The outsider finds difficulty in

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\* The author is grateful for the financial support received from the Australian National University's Health Transition Centre, NCEPH, and Demography Program, NCDS, for the fieldwork. The support of the Centre for Population and Health Research, Ondo State University, Ado-Ekiti, Nigeria, and Miss Folakemi Oguntimehin of that Centre during the fieldwork in Nigeria was also important. The co-operation of my field workers and respondents contributed in a major way to the success of the fieldwork. This research forms a segment of the Nigerian Health Transition Project, funded by the Rockefeller Foundation and co-ordinated by I.O. Orubuloye.

identifying the actual biological mother of a child in extended-household settings, especially in situations where every other mother regards the child of her sister as her own child (Isiugo-Abanihe 1983:3-7). Children live away from their parents for various reasons, some to attend school in other towns, while some are fostered because of their parents' economic hardship or to become house-helpers to relatives or well-to-do business men and women in urban towns.

Child fostering as a practice among the Yoruba carries with it both social and economic benefits. The child benefits from the assistance received from the foster-parents in terms of training and in return works for them, thus making it a mutually beneficial relationship (Isiugo-Abanihe 1983:4; Renne 1993:1). Most previous discussions on child fostering have centred mainly on the positive benefits derived from the practice by both families involved. The experience of the child is more assumed than discussed. Parents sending away their children to live with other kinsmen are primarily interested in either maintaining close kinship ties or in transferring some of the economic burden of raising the child to kinsmen who are in most cases economically better off (Caldwell 1977:91; Bledsoe and Isiugo-Abanihe 1989:442). The questions that have remained unasked are: what is the reaction and experience of the *object* of this practice - the child? How does the child feel about the change in its status? Do parents ever think of the psychological strain of separation from biological parents, especially mothers, that children encounter when they are fostered? How do the foster-parents respond to the illnesses of these children, and how well is the health of the child maintained?

Foster-children usually face a dual problem; first, the problem of psychological strain arising from the separation from their parents, and secondly, that of not being able to question whatever is done to them by their foster-parents in the new environment. The child is normally not expected to report back to the biological parents any difficulties experienced in the foster-home. In instances where children do report back, the tendency is for the biological parents to improve them for doing so.

Inevitably, foster-children have quite different experiences in their new homes. They have been found to lack good and nutritious food in their foster-homes. They are often deprived of some basic needs and subjected to hard work and numerous household tasks. Non-fostered children are treated better, while foster-children are often mistreated (Bledsoe 1990a:571). Thus, common proverbs state that 'home is sweet, and home is home', and most fostered children look forward to returning to their original homes. Similar proverbs are reported among the Igbo of Eastern Nigeria, as in the saying *agba nyeghi ihu na nya ndi ne leta nwata, obu nke nne na nna muru ya, ebe oga ala chi ri la*, meaning 'no matter how hospitable a foster parent (the rearer) might be, the child belongs to the real parents (the bearer), to which it must ultimately return' (Isiugo-Abanihe 1983:19).

Yoruba proverbs may be in the form of a plain statement of fact, or of a warning. They bring the desired point out more sharply and clearly than ordinary statements by describing a situation in a few striking words. They have been described as self-evident truths which give the gist of a statement in a brief but unmistakable form. The importance of Yoruba proverbs is summarized in another local proverb which says that *owe l'esin oro, bi oro ba sonu, owe ni a fi n wa a*, 'a proverb is a horse which can carry one swiftly to the idea sought' (Delano 1973:77).

More specifically, many Yoruba proverbs relating to fosterage have never been published. The proverbs explain in different ways, from the perspective of both foster-parents and foster-children, the different care and responses given to foster-children in comparison with biological children when they are ill. The relevant proverbs are examined in this paper as they reveal a great deal about the health condition of children in foster-homes.

Fostering, as used in this paper, refers to the transfer of parental role and responsibilities in child rearing from biological parents to others who might be called surrogate parents (Fiawoo 1978:273; Isiugo-Abanihe 1983:3; Page 1989:411; Renne 1993:1).

## **Methodology**

The data employed in this paper were collected in six communities in Ondo State, Nigeria, between April 1993 and February 1994. A total sample of 1538 Yoruba households were covered in the quantitative survey which generated information on fostering and household responses to various child illnesses. In each of the six communities, four clusters were randomly sampled, from which dwelling units were selected on a systematic basis until the quota for each cluster was reached. The first available household in each dwelling unit was selected for interview from which one currently married woman of childbearing age (15-49 years), with at least one surviving child under 15 years of age, was interviewed. In order to cover many households, only one respondent was interviewed from each household.

The first section of the questionnaire was on household listing. Questions were asked of the respondents about the most recent illness to all children living in their households. The questions on illness covered type of illness, symptoms noticed, the person who first noticed the symptoms, the duration between awareness of child illness and seeking treatment, the person who decided where to seek medical help, and the person or persons who paid for the treatment. There were also questions on type of revisits or change of health care providers. The reasons for fostering children in the households were only asked for children whose most recent illnesses were reported.

In addition to the quantitative survey, seven focus-group discussions were held. Six were for all mothers with at least a surviving child, and one for the fathers. Data generated from the focus-group discussions and the in-depth interviews were used to illuminate the findings from the quantitative data. The focus-group discussions were on the perception of illnesses, and the understanding of the causes of illnesses and health behaviour associated with treatment within the households. Common day-to-day proverbs and sayings among the people were discussed and explored to examine how foster-parents respond to and treat foster-children's illnesses. Light was also shed on how fostered children perceive the care they receive from their foster-parents.

## **Findings**

Table 1 shows the distribution of all children aged 0-14 years reported during the survey. A total number of 4,228 children were listed in all the households, out of whom 341 or eight per cent were foster-children. The table shows that the older children were more likely to be fostered than the younger ones.

A total of 2,279 children were reported ill in all the households during the investigation. The breakdown of this number showed that 168 of them were fostered children and the rest non-fostered children. The 168 foster-children represent 49 per cent of all foster-children in the households and the remaining 2,111 represent 54 per cent of all non-fostered children in the households. The breakdown of the 168 fostered children showed that 31 per cent were fostered for the purpose of education or to learn a trade, or were receiving some kind of training; 40 per cent for household work or as a return for financial assistance arising from their parents' financial difficulties, and 13 per cent were fostered as a result of the death of one or both of the biological parents.

**Table 1**  
**Age and sex distribution of children aged 0-14 in all the households**

		<b>Fostered (n=341)</b>	<b>Non-fostered (n)=3887)</b>
		%	%
<b>age-groups (years)</b>	0-4	13	35
	5-9	32	34
	10-14	55	31
<b>sex</b>	male	43	53
	female	57	47

Note: Percentages may not add to 100 because of rounding

Source: Fieldwork data

Table 2 shows the age distribution of children whose most recent illnesses were reported, while Table 3 shows the distribution of the illnesses reported by the status of the children reported ill.

**Table 2**  
**Age distribution of children whose most recent illness was reported**

<b>Age groups</b>	<b>Fostered (n=168)</b>	<b>Non-fostered (n=2111)</b>
	%	%
0-11 months	0	5
1-4 years	11	38
5-9 years	24	33
10-14 years	65	25

Note: Percentages may not equal add to 100 because of rounding

Source: Fieldwork data

As can be seen in Table 3, except in a few cases, there was no significant difference in the distribution of illnesses by whether a child is fostered or not. The differences in the distribution for measles and convulsions are a reflection of the age distribution of the children, as these two illnesses are commonest among younger children. Since the percentage of fostered children in the lower age-group was very low, the incidence of these two illnesses among them was low as well.

However, the differences in the distribution of general body pains and skin-related illnesses is probably connected with the fact that foster-children are expected to do heavy household work such as cleaning, cooking and washing clothes, while the differences in the percentage distribution of skin-related illnesses between fostered and non-fostered children is probably a reflection of the different care they receive from the foster-parents. Foster-parents usually care less for the personal hygiene of most children fostered by them in contrast to how they care for their own biological children.

**Table 3**  
**Children's illnesses by their status in the household (percentage distribution)**

Illness	Fostered (n=168)	Non-fostered (n=2111)
	%	%
Malaria (n=1322)	56	58
Convulsions (n=187)	4	9
Measles (n=179)	4	8
General body pains <sup>a</sup> (n=51)	6	2
Stomach-related illnesses <sup>b</sup> (n=183)	8	8
Skin-related illnesses <sup>c</sup> (n=81)	5	3
Cough-related illnesses <sup>d</sup> (n=141)	6	6
Others <sup>e</sup> (n=45)	4	2
Don't know (n=85)	8	3

<sup>a</sup> General body pains include chest, back, ear, eye pains; rheumatism (*lakuregbe / arunmoleegun*).

<sup>b</sup> Stomach-related illnesses include dysentery, diarrhoea, stomach ache.

<sup>c</sup> Skin-related illnesses include chickenpox and smallpox, body sores (*inarun*), scabies and boils.

<sup>d</sup> Cough-related illnesses include tuberculosis, pneumonia, asthma, cold and catarrh.

<sup>e</sup> Others include not reaching seven days (*makije / bomodije*), fontanelle (*oka-ori*), epilepsy (*warapa*), mumps (*segede*), anaemia, kwashiorkor, accident, bleeding, uvulectomy (*belubelu*), polio, appendicitis and dreadlock hair (*dada*).

Source: Fieldwork data

Table 4 shows the causes of illnesses reported for all children. 'Hard labour' or 'working too much in the sun' was the major cause of illness reported for fostered compared to non-fostered children. Furthermore, 'environmental' problems were reported as the cause of more illnesses among fostered than among non-fostered children. Table 4 confirms the existence of the traditional belief about disease causation: most illnesses were attributed to attack by enemy or evil spirits. The Yoruba have always had a belief in the supernatural, and evil spirits and forces capable of inflicting injuries and sicknesses upon human life. Quite often rituals are carried out to ward off these forces, and sacrifices are made to appease the gods as part of the treatment for illness.

**Table 4**  
**Causes of selected illnesses by status of child in households (percentage distribution)**

Causes of illness	Selected child illnesses											
	Malaria		Body pains		Dysentery-related		Skin-related illness		Cough-related		Others /don't know	
	fos (n=94)	non-fos (n=1228)	fos (n=10)	non-fos (n=41)	fos (n=13)	non-fos (n=170)	fos (n=9)	non-fos (n=72)	fos (n=10)	non-fos (n=131)	fos (n=20)	non-fos (n=110)
	%	%	%	%	%	%	%	%	%	%	%	%
Hard labour/in sun	25	17	10	7	-	-	-	-	-	-	5	3
Environmental <sup>a</sup>	4	2	10	2	46	8	22	4	-	8	-	3
Cold/catarrh	-	1	10	2	-	1	-	-	50	34	5	9
Teething/growing up	2	16	-	7	8	30	-	4	-	8	5	19
Mosquito bites	26	28	-	2	8	1	-	3	-	1	-	1
Attack/evil spirit <sup>b</sup>	43	32	40	59	15	21	33	50	30	42	70	53
Worms/impure blood	-	1	30	2	8	13	11	7	-	-	5	1
Food-related <sup>c</sup>	-	1	-	10	15	23	-	3	-	1	-	6
Virus/bacteria	1	2	-	7	-	5	33	29	20	7	10	6

Note: fos = fostered, non-fos = non-fostered

<sup>a</sup> Environmental causes include hereditary causes (eg. sickle-cell anaemia) and lack of immunization, unhygienic environment, bad water in the house.

<sup>b</sup> Attack includes evil spirit attack, enemy attack, unnatural causes, co-wives quarrelling, mother's new pregnancy, accident, regular monthly sickness.

<sup>c</sup> Food-related includes type of bitter soup, underfeeding etc.

Source: fieldwork data

## Awareness of children's illnesses

Seeking an immediate and appropriate treatment for children's illnesses is associated with being aware that the child is sick. Awareness arises from sensitivity to the symptoms manifested by the child. Generally, mothers are quick to notice physical changes that illness may cause in their children.

From this study, it was found that the mother was the first person to notice changes in her own children as a result of the illness. However, the case is different for foster-children. If a foster-child does not complain, it appears nobody takes note of its illness. In 29 per cent of cases of all illnesses to foster-children they actually complained before something was done. This was significantly different from the four per cent in the case of non-fostered children. Considering the age distribution of fostered and non-fostered children in the households, and assuming children under age five cannot describe illness symptoms, if we remove them from the analysis, the data still show that in most instances the fostered children were not treated until they complained of illness. Table 5 shows the distribution of those who first noticed that the child was ill in the households according to the children's status.

The data presented in Table 5 show a significant relationship (statistically significant at 1 per cent level) between the status of the child and the person who first noticed the occurrence of illness in the child. The insensitivity of foster-parents to a foster-child's illness is clearly revealed in the table.

**Table 5**  
**Person who first noticed child's illness by child's status in household (percentages)**

<b>For children of all ages</b>	<b>Fostered (n=168)</b>	<b>Non-fostered (n=2111)</b>
	%	%
Mother (respondent)	42	89
Father	4	5
Foster-child's parents	5	-
Child complained	29	4
Other members of household	21	2
$\chi^2 = 251.167$ d/f=4 p < 0.001		
<b>For children aged 5 to 14 years</b>	<b>Fostered (n=149)</b>	<b>Non-fostered (n=1217)</b>
	%	%
Mother (respondent)	39	84
Father	3	7
Foster-child's parents	5	-
Child complained	30	7
Other members of household	22	2
$\chi^2 = 192.99995$ d/f=4 p < 0.001		

Source: Fieldwork data

## Duration of interval between awareness and first treatment

The interval between the time when someone noticed a child's illness and when treatment was sought reveals the concerns of parents about such illnesses. The duration of the interval measured in days may also depend on the nature of the illness. However, as shown in Table 6, it is clear that treatment was delayed longer for foster-children than for own children. The mean duration of interval was 2.0 days for all child illnesses, 2.0 days for non-fostered

children, and 3.9 days for fostered children. From Table 6, the chi-square test shows that the difference between the duration of interval for fostered and non-fostered children is highly significant:  $\chi^2$  of 109.7 with  $df=7$   $p < 0.001$ .

Table 7 shows the mean duration of interval between awareness and first treatment for each illness by status of children in households. It is clear from the table that the interval was longer for fostered than non-fostered children in almost all cases.

**Table 6**  
**Duration of interval between awareness of illness and seeking treatment by child's status in the household (percentage distribution)**

	Fostered (n=168)	Non-fostered (n=2111)
	%	%
Up to 1 day	35	58
2 days	12	19
3 days	10	12
4 days	8	4
5 days	13	3
6 days	6	1
1 week	9	2
8 days and above	8	2

Note: Percentages may not add to 100 because of rounding

Source: Fieldwork data

**Table 7**  
**Mean duration of interval between awareness of child's illness and seeking treatment for each illness by status of child in household (days)**

Illnesses	All children	Fostered children	Non-fostered children
All illnesses	2.2	3.9	2.0
Malaria	1.7	2.8	1.6
Convulsions	1.4	2.0	1.3
Measles	3.3	7.3	3.1
General body pains	3.9	8.1	2.9
Dysentery-related illnesses	2.1	3.0	2.0
Skin-related illnesses	3.0	5.4	2.7
Cough-related illnesses	2.9	4.1	2.8
Others	4.0	4.2	3.9
Don't know	3.9	7.5	3.2

Source: Fieldwork data

The findings above show in various ways that the responses and treatment given by foster-parents to children's illnesses vary by the status of the child. The biological relationship between a child and its parents is very strong and cannot be compared with any other type of social relationship. This differing response and treatment of child illnesses may be deliberate on the part of the foster-parents, but most often they are not aware of it, and the foster-children are afraid to report illness because of rebukes from their foster-parents. It is important to ask what the foster-children think about their situations and the treatment they receive from their foster-parents, and how they perceive this kind of relationship. This

question is very important because of its implication for health, on the one hand, and for attitudinal change towards the practice of child fostering on the other. This is the focus of examination in the next section.

### **Fostered children's description of differential response to their illnesses**

*Ti eru ba n se aisan, won a ni alakori, o tun gbe ise re de, ti o ba s'omo eni, won a ni ko roju f'ata senu (Yoruba proverb).*

If the slave is sick, people will say, the idiot has come with his usual behaviour, but if it is one's own child, there will be pleading with the child to please try and sip some pepper soup.

The above is the fostered children's description of responses to, and treatment of their illnesses by foster parents. The proverb explains why treatment is often delayed more for fostered than non-fostered children. Bledsoe in one of her studies noted that fostered children do receive arduous work assignments and guardians are mostly suspicious of their illnesses as being ways to dodge further work (Bledsoe 1990a: 570-571). This is quite different from the perspective of the foster parents, which is the general belief among the Yoruba that *omo ti ko ba jiya ko le gbon*, 'a child who does not suffer will not be wise in the future'. The explanation for this is not far-fetched, for a child that has suffered, been denied parental support, and been ill-treated by guardians, may work hard and succeed in reaching the top in life. For example, Bledsoe found in her study of child fosterage among the Mende of Sierra Leone, that it is often believed that the knowledge and skills that children need to advance in life lie beyond their parents' domain, and that children cannot rise beyond their parents' level without undergoing hardship in life, hence the saying that 'hardship builds character' (Bledsoe 1990a: 571; Bledsoe 1990b: 75-85).

This kind of statement suggests that foster-parents are not unaware of the hardship foster-children go through and the differential care they receive from them. Foster-parents do not regard such treatment as wrong, rather they see it as a way of helping and building the child up for the future. There can be no denying the enormous assistance that foster-children often receive from their foster-parents in terms of education, training and general assistance. But it is also important to note that studies that have examined the relationship between child fosterage and both morbidity and mortality in sub-Saharan Africa have shown that fostered children have a higher risk of malnutrition, morbidity and subsequently mortality than other children in the households as a result of the different care and treatment they receive (Bledsoe 1990a:570-571; Bledsoe and Brandon 1992: 279-302).

This study has shown the differential care experienced by children in households according to their status, and explains how fostered children perceive their experience in order to shed more light on the relationship of child fostering to morbidity, malnutrition and mortality. Various proverbs and day-to-day common sayings illustrate the point of discussion. People often say:

*Omo olomo la n ran ni'se de toru toru, to ba somo eni, a o so wipe tile ba su ki o sun s'ohun.*

It is other people's children that we often ask to return from late night errands (not easily accomplished tasks) whereas one's children are often warned not to stay out at night.

This statement implies that, when fostered children are sent on errands, their guardians tell them that no matter how late at night they must return home: if the child stays overnight

because of darkness, he or she will not be available for the normal housework the following day. However, when it is their own child, parents will be more concerned about the safety of the child, and tell him or her to stay overnight if it is too late to return home.

### **Case studies of differential treatment**

Qualitative evidence was recorded from respondents who had been previously fostered. One such respondent was a 32-year-old Christian woman, a hairdresser, educated up to the secondary school level and the second wife of her husband. Her experiences as a foster-child are reported below.

You see, the person I was living with then was not in any way related to me. The way she treated her own children was quite different from the way she treated me. For example, early in the morning, she would give me *gaari*<sup>1</sup> to eat, while she gave her own children rice. I would wash her clothes, those of her husband and all other members of the household, as well as preparing the household food. Living with someone else other than one's parents was quite different. When I was sick, I was afraid to tell her and she would not take any notice. If I told her, she would think I was afraid of house work. She might eventually give some medicine or after other people living in the house had told her about the illness by saying to her, 'look at this child, she is sick or can't you see?'

The second respondent was a 24-year-old Muslim woman who divorced her first husband and remarried as the seventh wife of her new husband. She narrated her experience as a foster-child as follows.

That proverb you are talking about is true, but everything is based on the notion that someone may be wise. Like me for example, if I had not been sent on late night errands, I would not have been able to know the cooking and preparation of different type of foods that I know now. When I was living with my own mother, I did not know many things about domestic cooking, but when I was living with somebody elsewhere, she would put the alarm of the clock on to wake me up for the day's chores at 5.00 a.m. If the clock alarms and I was not up, the next thing she would say is 'Jonah the sleeper,<sup>2</sup> is it not yet time for you to wake up?'. She would wake me up with whips. It has now become part of me, there is nothing that can make me remain in bed after 5.00 am. Whereas, if I was

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<sup>1</sup> *Gaari* is processed powder from cassava and is considered not to be a delicacy or favourite food of many people.

<sup>2</sup> 'Jonah the sleeper' is a term for someone who sleeps too much, and the statement has its origin in the Book of Jonah in the Old Testament: the prophet Jonah was running away from God and boarded a ship travelling to Tarshish, to avoid going to preach to sinners in Nineveh as commanded by God.

But the Lord sent out a great wind into the sea, and there was a mighty tempest in the sea, so that the ship was like to be broken. Then the mariners were afraid, and cried every man unto his god, and cast forth the wares that were in the ship into the sea, to lighten it of them. But Jonah was gone down into the sides of the ship; and he lay, and was fast asleep. So the shipmaster came to him, and said unto him, What meanest thou, O sleeper? arise, call upon thy God... (Jonah 1.4-6).

Hence, anyone found sleeping while something important is going on or is supposed to be done is referred to as 'Jonah the sleeper' (*Jona oloorun*).

living with my own mother, it would have been difficult for me to cope with my present situation in life. When I was with my foster mother, I was always ill but she hardly took notice of my illness unless it was on for several days, after which she was usually convinced that I was truly ill. Sometimes she would take care of me and exempted me from domestic chores. However, she occasionally threatened that she would send me to the farm to fetch firewood irrespective of my health status, and that would be the end of the illness.

As a result of these experiences by foster-children, there are common sayings such as *orisa bi iya ko si, ta ni je fun ni lobe bi iya eni*: 'There is no god like mother; who can give enough soup except one's mother?'. This reflects the experiences of a fostered child like Mrs Jemwitemi, a 23-year-old secondary-school dropout who later became a sewing mistress. She described her treatment by her foster parents: she had lived with the younger brother of her father and was always at home with his wife; she was then in Primary 4.

Every morning when we were preparing to go to school, she would give me only one slice of bread and one slice to the other boy also living with her, while she would give three or four slices to each of her own children. On arrival from school in the afternoon, I would be asked to take the left-over tea which had been contaminated by flies with the other fostered boy living with her. I was always anxious to go back to my parents in the village. When we were told to go to the river to fetch water, her own children would be playing at home doing nothing. She was in the habit of whipping us with sticks.

Mrs Majiyagbe, a 25-year-old sewing mistress and a second wife of her husband, reported her experience as a fostered child with a relation. She went through a lot of difficulties as a foster-child:

*Oju mi ri mewa* - my eyes saw 'ten'<sup>3</sup> where I was living then. I would carry heavy stones from morning till evening as a punishment for any offence committed by me. She would never do that to her own children. She would not give me any food for almost two days, she would only be enjoying eating with her own children.... whenever I was sick, she would not even buy ordinary Panadol or Phensic for me.

The foster-child experiences cited above and the findings from the quantitative data show that foster-children are treated in different ways from non-fostered children in the households. Other proverbs that explain some of these differential treatments include *Oju mewa ko jo oju eni*, 'ten eyes are not like one's own eyes': no matter how good foster-parents might be, the situation cannot be compared with being with one's biological parents. Therefore, in addition to the psychological trauma experienced by fostered children, they are given less nutritious food and receive poorer medical care than children whose mothers are present in the household. This inevitably contributes to the high rates of morbidity and mortality among foster-children (*cf.* Bledsoe and Brandon 1992:280).

If it is true that hardship builds character as noted earlier, and foster-children perceive and describe this kind of hardship from a perspective quite different from that of their guardians, then there remain the thought-provoking questions: does wisdom necessarily have to come through hardship and suffering? Do children need to go through hardship before they become wise? Why were parents sending their children away to live elsewhere not concerned

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<sup>3</sup> 'Ten' was used here to describe the numerous and various bad experiences she went through in her foster-homes.

with the welfare of the children? Some other related questions were raised by Bledsoe in her study of how fostered children suffered in their new homes (Bledsoe 1990:75-76).

Answers to some of these questions demand an objective assessment of the perceptions of both foster-parents and fostered children, although it has been demonstrated qualitatively that in many ways fostered children are treated differently from non-fostered children. This does not, however, imply that foster parents are devils. An examination of some other Yoruba proverbs helps to clarify the situation.

### **Foster parents' responses to, and treatment of fostered children: a cautionary note**

Although a causal relationship between the treatment received by fostered children and mortality has not been established, the influence on foster-children's health of their treatment by foster-parents cannot be overlooked (Holman 1973:114). The kind of treatment they receive from their foster-parents affects their attitudes and behaviour in a number of ways. The assumption for this is based on the findings that foster-parents are less sensitive to foster-children and they tend to behave differently to them from the way they behave to their own biological children.

It is possible to have bad foster-children as well as bad foster-parents, and it is possible that the relationship between a foster-child and foster-parents could be reversed so that it is arguable the bad character and attitudes of the fostered children themselves make the foster-parents behave in different ways. Holman (1973:114) suggested that the aggressive behaviour of a fostered child resulting from his earlier treatment at the hands of probably his natural parents could also be the factor that brings about the kind of treatment he now receives from the foster-parents, rather than the bad attitude of the foster-parents. The question then is 'Who is to blame when a child is maltreated? Is it the child or the foster-parents?'

The answers to these questions generate more argument than resolution. Nevertheless, what seems obvious is found in one of the Yoruba proverbs discussed during the fieldwork. The proverb is *oni'le ni s'owo, alejo di s'eru*: 'the landlord [foster parent] has his own peculiarity while the stranger who comes to live with him is also filled with his or her own idiosyncrasies'. The implication of this proverb is that both fostered children and foster parents share the blame for the kind of relationship that exists between them. A common English adage is that 'one good turns deserves another', and the Yoruba are also fond of saying *ohun rere ni nyo obi lapo, oro buburu a yo ida ninu apo*: 'good words bring gifts from the pocket, while bad words bring out the sword from the sheath'. Similarly, the Yoruba believe that *omo to ba mo owo we, yoo ba agba jeun*: 'a child who knows how to wash his hands clean will feast with adults'. All these suggest that fostered children have a role to play in establishing and maintaining cordial relationships between themselves and their foster parents.

Nevertheless, if foster parents are less concerned about the welfare and health of the children they foster, or are insensitive to their illnesses as demonstrated in the analysis, it follows that parents should be more careful in having their children fostered. An attitudinal change in this direction has been observed in an experimental study conducted in a village among the Yoruba (Renne 1993:1). However, it was reported from an Ado-Ekiti survey that there seemed to be no sign of a drop in the proportion of families having at least one of their children fostered, but what seemed obvious from the survey was a massive decline in the proportion of children fostered (Caldwell, Orubuloye and Caldwell 1992: 16). The small proportion of children reported as fostered in this survey (8 per cent) may be a reflection of a continuous decline in the number of children being fostered.

If people who had been fostered themselves and had been treated differently decide not to have their children fostered, the cessation of the economic and social advantage that parents derived from this age-old tradition may have a significant impact on the household budget of the poor families who have been the greatest beneficiaries. The implication of this change for fertility will be worthy of future investigation.

## Summary

Fostered children are treated in different ways from non-fostered children by their foster-parents. Yoruba foster-parents are less sensitive to the illnesses of foster-children, and treatments are delayed for them longer than for non-fostered children. Some local proverbs were examined to illuminate the childhood experiences of some of the respondents as foster-children: these local proverbs explained their different treatment. The study has also documented some social phenomena which exert a significant influence on child health among the Yoruba. It was observed that the different care received by foster-children is a matter of the dual relationship between them and the foster-parents, for which both may share the blame. Some attitudinal changes to fostering have probably started among the Yoruba: this may have implications for child fostering and possibly fertility.

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## **Early-age mortality, socio-economic development and the health system in Mongolia**



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### **Abstract**

**Since the 1920s Mongolia has developed an extensive and well-staffed health care system that has made modern health technologies accessible to most of its population. In addition, the country experienced rapid economic and social development whose benefits were equitably distributed among the population. In spite of this progress, infant and child mortality levels are high by contemporary standards and during the past 20 years these rates have remained virtually constant.**

**The modern health care delivery system, externally imposed, failed to take into account the specific characteristics of the Mongolian culture; this fact is identified as one of the major determinants of the unexpected levels of early-age mortality. The excessive orientation toward curative medicine, the lack of health prevention and promotion activities and the lack of community participation have resulted in the people continuing to believe in traditional therapeutic patterns and self-care. They perceive the modern system exclusively in curative terms and not with regard to health preservation and disease prevention.**

**Most Mongolians do not fully understand the health care system, and use its services mainly because they have no alternative, or because of coercion rather than conviction based on the learning and internalization of its basic principles. In practices and ideas of child care, preservation of health and disease prevention, people seem to identify more with the traditional health care system.**

**Like other former socialist countries, Mongolia is experiencing deep economic and social transformations, whose implications for the health care system are discussed. An economic crisis whose end is nowhere in sight, emergent social inequalities, a vague health insurance model with unclear financing sources, and lack of concern by most policy-makers in strengthening the preventive component of the health system, are not positive factors for substantial infant and child mortality decline in the near future. A clear advantage is, however, the fact that there is a wide space for major improvements with existing internal and external resources.**

During the two decades following the end of War World II remarkable advances have been made in reducing early-age mortality in the developing countries. These declines created rampant optimism in the 1960s and 1970s about a real possibility for a child survival revolution unprecedented in speed and geographical extent. During the 1980s this trend continued in most Third World countries. Nevertheless, some studies suggest that a slowdown in infant mortality decline has taken place in many countries at still relatively high mortality levels (Gwatkin 1980; Palloni 1981; Hull and Jones 1986). The main reason provided for this deceleration is that public health interventions, usually exogenously developed, could not result in sustained mortality declines because of only limited

improvements in the developing-country living standards (Ruzicka and Hansluwka 1982). In other words, there is a limit to the mortality decline that can be achieved primarily through medical techniques, if socio-economic development remains at a low level. Other more recent studies suggest, however, that the rate of infant mortality decline in most Third World countries has not decelerated over the last three decades (Hill and Pebley 1989). Moreover, the evidence provided suggests that, in some countries, infant mortality decline has continued in spite of a downturn in economic conditions.

The relationship between socio-economic progress, improvements in living standards and development of the health system on the one hand, and infant mortality on the other, has been repeatedly established in several studies (see, for example, Vallin and Lopez 1985). However, this relationship does not seem monotonic nor has the mechanism that explains it been extensively explored. Like any other processes that happen within a society, infant mortality trends are affected and regulated by the society's institutional structure. To ignore this postulate is to assume that social processes are uniform across societies or change in predictable ways through time. A series of case studies is required to understand fully the extent of variation in early-age mortality across countries and to identify commonalities. These should be undertaken in countries at diverse stages of development, with different health policies and economic, social and political conditions. Comparisons of country experiences should allow better assessment of infant and child mortality levels and trends in individual countries and help to identify similarities and differences under distinct sets of historic, social, economic and environmental conditions.

This paper is concerned with early-age mortality in Mongolia in relation to its health system and socio-economic development. A number of characteristics make this country a particularly interesting case that will certainly provide new insights for the study of infant and child mortality in developing nations. Mongolia developed an extensive and well-staffed health care system that has made modern health technologies widely accessible. In addition, during the past five decades the country has experienced a process of rapid economic and social development and the benefits of such development have been equitably distributed among the population. In spite of this progress, infant and child mortality levels are high by contemporary standards and during the past twenty years these rates have remained virtually constant. Recent estimates show that the infant mortality rate is 92 deaths per thousand births and the under-five mortality rate is 136 per thousand. During the past two decades early-age mortality rates have declined by only 10 per cent. This paper has three objectives: first, to show that infant and child mortality in Mongolia are high considering its economic and social progress records as well as its extensive health care services; second, to provide an explanation for the unexpected level of mortality; and third, to discuss some policy implications.

## **Background of the country**

Mongolia is a land-locked country in the northern part of Central Asia bordering Siberian Russia to the north and China to the south, east and west. The country has a vast but sparsely populated territory. It covers more than 1.5 million square kilometres, about one half the size of India and four times that of Japan.

In 1206, Genghis Khan unified Mongolian tribes and formed the first Mongolian state that subsequently expanded its territory to cover most of modern-day China, Korea, and as far as Central Europe. By the mid-1300s, however, the Mongolian Empire had disintegrated and a long period of internal strife followed. In 1691 Mongolia ceased to exist as a political entity and became a frontier province of China; it remained as such until the second decade of the present century. It was a traditional and impoverished society with an economy based almost exclusively on subsistence nomadic animal husbandry (Milne et al. 1991).

By 1924, political autonomy from China was achieved and a socialist People's Republic founded. A system of centrally planned economy dates from the late 1930s. The following decades witnessed a dramatic process of economic and social change, a strengthening of ties with the former Soviet Union, and increasing industrial and mining activity facilitated by Soviet aid. Modern Mongolia is a well-structured society with a population of approximately 2.3 million, 51 per cent of whom live in urban areas with major concentrations in the three industrial cities of Darhan, Erdenet and the capital Ulaanbaatar. As previously stated, in the past Mongolians were totally nomadic, moving seasonally with their herds over the vast lands of the country. Currently, most of the rural population is involved in semi-nomadic animal husbandry, along with wheat and vegetable production on state co-operatives and farms (Sanders 1987; Bawden 1989; Worden and Savada 1991).

By the mid-1980s, mounting internal and external economic imbalances became evident. Domestic prices were not adjusted to balance the higher costs of imported inputs, resulting in a distorted structure of investments and output. Budgetary subsidies expanded but were not equated by domestic revenue increases. This plus increasing capital outlays led to expanding deficits that were financed almost entirely by loans from the Soviet Union (Milne et al. 1991). These economic problems, combined with the emerging political and economic reforms in the USSR, pressed Mongolia into the loosening of central economic, social and political directives. Reforms were limited and focused mainly on improving the efficiency of the command economy. However, by late 1989 Mongolia began to experience an unequivocal transformation of its economy from a centrally controlled one to a market-oriented system, followed by the opening of the country to international socio-economic and political forces. The country also experienced changes in political leadership and a drastic revision of its economic, social and political ideology. Throughout the present decade, because of the protracted crisis of central planning, the economic and social reforms themselves, and the discontinuation of economic support from the former USSR, Mongolia has been experiencing a deep economic crisis characterized by increasing unemployment, high inflation, shortages of food, and a drastic reduction in government expenditures.

### **Early-age mortality in Mongolia**

Life expectancy at birth in the developing countries has increased by almost a third since 1960, from 46 years to 62 years. Most of this rise was caused by a reduction in infant mortality rates, from almost 200 deaths per thousand births in 1960 to 79 in 1988 (UNDP 1990). Infant mortality has also declined in Mongolia and its present level, 92 deaths per thousand births, is lower than the rate exhibited by a number of developing countries. However, it is higher than the developing countries average and, what is more important, it has declined by only 10 per cent since the early 1970s.

Table 1 shows infant and child mortality estimates for Mongolia. The values are expressed in terms of probabilities of dying. (1)Q(0) represents the probability of dying between birth and age 1 and (4)Q(1) the probability of dying between age 1 and age 4. Considering that early-age death statistics from the vital registration system in Mongolia are affected by serious problems of underregistration, an indirect technique was used to estimate infant and child mortality. A discussion of this technique is presented in an appendix at the end of the paper.

**Table 1**  
**Mongolia: probabilities of dying between ages 0 and 1<sup>a</sup> and between ages 1 and 4<sup>b</sup>, 1970 - 1989**

	1970-74	1975-79	1980-84	1985-89
<b>Male</b>				
<b>(1)Q(0)</b>	0.10689	0.10460	0.10228	0.09992
<b>(4)Q(1)</b>	0.05889	0.05385	0.05151	0.05083
<b>Female</b>				
<b>(1)Q(0)</b>	0.09789	0.08760	0.08555	0.08386
<b>(4)Q(1)</b>	0.05283	0.05370	0.05135	0.04716
<b>Total</b>				
<b>(1)Q(0)</b>	0.10235	0.09614	0.09401	0.09199
<b>(4)Q(1)</b>	0.05589	0.05378	0.05143	0.04901

Notes <sup>a</sup> (1)Q(0); <sup>b</sup> (4)Q(1). Source: Author's calculations based on the 1989 Census.

It was possible to compute indirect estimates only up to the period 1985-89. For more recent years, direct estimates of infant mortality based on registered births and deaths were calculated. The probabilities of dying between birth and age 1 for the years 1990, 1991 and 1992 are 0.0646, 0.0623 and 0.0639 respectively. Although these values are affected by problems of underregistration, they suggest that infant mortality has not experienced major changes during the first years of the present decade. Regarding the period before 1970, reliable estimates could not be obtained either; however, it can be speculated that early-age mortality in Mongolia began to undergo a substantial decline starting in the 1930s. This decline can be associated with the development of a public health sector, the import of modern medical technology, and improvements in the standard of living of the population. Anyhow, as mentioned before, infant and child mortality in Mongolia almost ceased to decline by the early 1970s and this deceleration occurred at a still high level.

Information regarding infant mortality by cause of death is quite deficient: data are available only for some years but there are serious problems of definitions and reliability. According to data from the Ministry of Health, corresponding to 1988, acute respiratory infections, especially pneumonia, and gastro-intestinal diseases, mainly diarrhoea, are the main causes of infant deaths. Together they account for approximately three-quarters of child mortality (50 and 22 per cent respectively). Perinatal causes, primarily birth trauma, constitute 11 per cent of all infant deaths, infections 6 per cent and others 11 per cent. These statistics correspond only to infant deaths that have taken place in health care institutions. Although they should be considered with caution, they certainly suggest that pneumonia represents the largest single cause of early-age mortality. A study, conducted in 1988, based on a sample of children below three years of age attending creches in Ulaanbaatar, shows a morbidity rate for pneumonia of 92.3 cases per thousand children and a rate for diarrhoea of 25.5 cases per thousand children (UNICEF/Ministry of Health 1990).

**Table 2**  
**Indicators of economic and social development for selected countries**

Country	Under-five mortality rate	GNP per capita	Real GDP per capita <sup>a</sup>	Adult literacy		Gross secondary enrolment ratio		Female labour force participation <sup>b</sup>	Persons per doctor (thousands)	One-year olds immunized <sup>c</sup>
				Male	Female	Male	Female			
	1987	1987	1987	1985		1986-1988		1988	1984	1987
Afghanistan	300	-	1000	39	8	10	5	8.4	-	27
Kampuchea	199	-	1000	85	65	45	20	39.2	-	47
Nepal	197	160	722	39	12	35	11	33.8	32.7	71
Bangladesh	188	160	883	43	22	24	11	7.1	6.7	18
Pakistan	166	350	1585	40	19	26	11	12.1	2.9	65
Laos	159	170	1000	92	76	23	16	44.7	1.4	20
India	149	300	1053	57	29	50	27	25.6	2.5	63
Mongolia	136	760	2000	95	87	88	96	46.4	2.7	67
Indonesia	119	450	1660	83	65	-	-	31.2	9.5	71
Myanmar	95	200	752	85	57	-	-	37.4	3.7	24
Vietnam	88	-	1000	88	80	44	41	46.9	1.0	58
Philippines	73	590	1878	86	85	66	66	31.6	6.7	82
Thailand	49	850	2576	94	88	-	-	45.1	1.5	79
Sri Lanka	43	400	2053	91	83	63	69	26.8	5.5	79
China	43	290	2124	82	56	50	37	43.2	1.0	96
Albania	34	540	2000	-	-	80	71	41.1	-	95
Korea, R.	33	2690	4832	96	91	91	86	33.9	1.2	89
Korea, Dem.	33	470	2000	-	-	-	-	45.9	-	59
USSR	32	4550	6000	98	97	-	-	48.1	-	83
Cuba	18	860	2500	96	96	85	92	42.0	-	93

Author's calculations for under-five mortality rate in Mongolia.

State Statistical Office of Mongolia (1991) for GNP per capita and people per doctor in Mongolia.

Notes <sup>a</sup> The real GDP per capita is a purchasing-power-adjusted GDP estimate developed in the International Price Comparison Project, a collaborative effort of the UN Statistical Office, the World Bank, EUROSTAT, OECD, ECE and ESCAP (see UNDP 1990:13).

<sup>b</sup> As a percentage of total labour force.

<sup>c</sup> Average of the vaccination coverages of children under one year of age for the four antigens used in the Universal Child Immunization Programme (UCI).

### **Socio-economic changes, the health system and early-age mortality**

Several classifications of the factors affecting infant and child mortality in the developing countries have been proposed by different authors. These classifications permit a distinction between the broad categories of socio-economic factors on the one hand, and medical and health factors on the other (United Nations 1973). The purpose of this section is to demonstrate that the levels and trends in infant and child mortality in Mongolia are surprisingly high considering the performance of several socio-economic variables and the degree of development of its public health care system.

Table 2 locates Mongolia's early-age mortality level, as well as its economic and social situations, with respect to Asian and other selected countries. The former USSR was included because of its influence in the development of the Mongolian health system and Albania and Cuba because of both past socio-political affinities with Mongolia and a similar degree of development.

A rapid examination of Table 2 reveals that the level of early-age mortality in Mongolia is not consistent with the values exhibited by the other variables included in the table. The under-five mortality rate in Mongolia is certainly not among the highest in Asia but it is much higher than that observed in some countries in which the indicators included in the table suggest a lower degree of economic development and more limited social progress. Much of the discussion that follows concentrates on this issue.

### ***Socio-economic changes and improvements in the standard of living***

Some analysts have pointed out that the rapid decline in mortality in developing countries during the past decades has been largely independent of socio-economic conditions (United Nations 1973; Preston 1975, 1980). The declines have rather been attributed to technological advances in the prevention and control of diseases and the growth and expansion of public health and medical services. However, as mentioned above, there appears to be a ceiling on the improvement in infant and child mortality that could be achieved by an extensive health care system without a parallel process of socio-economic development and improvements in the standard of living.

Per capita gross national product and real per capita gross domestic product are crucial indicators of socio-economic development although the former is a better indicator of living standards, since it is a purchasing-power-adjusted measure. Mongolia can be classified as a medium-income country according to their values in these variables (see Table 2). However, its early-age mortality record is inferior to that exhibited by several countries with lower GNP and real GDP per capita. For example, Mongolia has the same, or a similar, per capita real GDP as Albania, China, the Democratic Republic of Korea, the Philippines and Sri Lanka, but all these countries have much lower under-five mortality rates.

It is important to mention that the relationship between per capita income levels and early-age mortality is usually explained by the fact that increases in income result in a greater availability of material resources and hence in higher economic living standards. As a result of higher income or wealth, individuals and families improve their access to a list of goods, services and assets that are essential for child survival, such as food, housing, clothing, and sickness care (Mosley and Chen 1984). However, indicators of development based on average per capita income may conceal substantial inequalities in the access to the benefits of development. This is not the case with Mongolia. Economic growth, based on industrialization and the modernization of the agricultural sector, was accompanied by the creation of an extensive network of social services. Moreover, socio-economic disparity was

kept to a minimum by a system of near-universal entitlement. These supports allowed the existence of a relatively stable and egalitarian society and the absence of social groups affected by problems of absolute or relative poverty for an extended period of years (Bawden 1989). Cross-national comparisons of infant mortality yield the conclusion that better records are found in countries where social policies and health systems would suggest greater equity (Roemer 1985). Clearly, economic and social progress was not spectacular in Mongolia, but at least not as modest as to have prevented a substantial improvement in the socio-economic situation of the population conducive to a more significant decline of infant and child mortality.

### **Maternal education**

Another relevant factor in the analysis of infant and child mortality is maternal education. Data from several countries show a negative relationship between the extent of women's education and the level of early-age mortality (Behm 1979; Caldwell 1979, 1986; Caldwell and McDonald, 1981; Cochrane, Leslie and O'Hara 1982; Farah and Preston 1982; Haines and Avery 1982; Hobcraft, McDonald and Rutstein 1984; Vallin and Lopez 1985). Although declines in illiteracy rates and increases in school attendance are associated with socio-economic development, these factors appear to determine infant mortality in their own right. Caldwell (1979) has argued that the link between increased maternal education and reduced child mortality is that education gives women the power and determination to take decision-making into their own hands. Three factors are important in this regard: first, disagreement with traditional patterns of illness acceptance, such as fatalism, and adoption of the therapeutic patterns of modern medicine; second, a greater capability in manipulating the world such as knowing where facilities are, getting the attention of doctors and nurses and understanding their explanations; and third, a change in the traditional balance of family relationships that shifts the focus of power away from the father and grandparents and ensures that a greater share of available resources is directed to children.

According to Table 2, almost 90 per cent of Mongolian adult women are literate, a percentage similar to or higher than that observed in countries with significantly lower under-five mortality rates. Not only is the illiteracy rate of the female population in Mongolia noticeably low, but also female school enrolment is high (see Table 2), as well as the number of years of formal education: more than one-third of women have completed secondary education and on average, women have eight years of formal education (State Statistical Office 1991). In addition, the status of women both in the society and within the family has been traditionally high. In the Mongolian traditional nomad society women played an important decision-making role within the family regarding different aspects of life including those related to production. They were never restricted from assuming roles outside the house; on the contrary, they played an active part in all the activities related to animal husbandry (Montagu 1956; Worden and Savada 1991; Cooper and Gelezhamtsin 1993). This position has not changed in modern Mongolia, as suggested by a substantial participation in the labour force and a high school enrolment level (see Table 2). Women's position has actually been improved by an official policy of strengthening gender equality.

### **The development of the modern health care system**

Among the countries presented in Table 2, Mongolia has a low ratio of population to physician and the percentage of one-year-olds immunized is comparatively high. These statistics do not provide sufficient indication of quality, utilization and distribution of health services but can provide a crude indication of the general current level in the development of health services.

The idea of societal responsibility for the health of the population was adopted at the time of independence in Mongolia. The improvement of population health, especially of women and children, was defined as a priority by the government (Ibragimov and Denberel 1977; Academy of Sciences of the MPR 1991). The first civil hospital started functioning in 1925, and in 1927-28 the first specialized hospitals for expectant and nursing mothers and children were set up. Some provincial and rural medical facilities were opened between 1925 and 1930. From 1926 to 1938 five Soviet medical care, medical research and development expeditions worked in Mongolia to render medical services and promote the formation of the country's public health network. In 1933 the first medical vocational school was created: this was a first step in training national medical personnel. In 1935 the country had only 56 medical posts in provincial areas; this number increased to 157 in 1940. Between 1940 and 1960 a nationwide system of unified medical services was established and by 1960 almost one-quarter of all *somon* (rural districts) had health facilities, including several general and specialized *inter-somon* hospitals. In 1978 a comprehensive Health Law was established, designed to expand and further improve the national health service. This law provided the current structure of the health-care delivery system.

The Mongolian health-care organization comprises a five-step referral system based on the administrative units within the administrative structure of the country: rural posts, *somon*, *inter-somon* hospitals, provincial hospitals, and national hospitals. All the services provided by the health-care system are free of charge except for drugs prescribed for children over three years of age and adults outside hospital.

The resources allocated to health services increased 5.7 times between 1960 and 1987, and today account for 8 to 9 per cent of the state budget expenditure (State Statistical Office 1991). The country has approximately 27 physicians and more than 80 health workers per 10,000 population. The number of hospital beds is more than 100 per 10,000 population. Recent data show that there are 1.5 gynaecologists and 5.2 pediatricians, with 14.9 gynaecological hospital beds and 2.9 hospital beds for children, per 10,000 population. Immunization coverage for children under one year is high: for example, coverage for poliomyelitis (third dose) is 70 per cent and BCG 87 per cent. Coverage for measles is 90 per cent and it is 81 per cent for DPT (third dose) (UNICEF/Ministry of Health 1990).

The health service of Mongolia is well staffed with both medical and paramedical personnel and adequately adapted to the needs of the country. Mongolia never reached a degree of socio-economic development able to sustain a health system similar to those existing in industrialized Western countries. However, the primary health care system, with its extensive network of dispensaries and clinics throughout the country, which seems to reach nearly all children, could have reduced early-age mortality more rapidly and significantly than in fact occurred. In addition, since independence the emphasis of the health policy has been the health of high-risk groups such as pregnant women and children.

A simple exercise was conducted to provide additional support to the proposition that the level of infant mortality in Mongolia is not consistent with its degree of social development and the standard of living of its population. With data from the 130 countries included in the United Nations *Human Development Report* (1990), a multiple regression equation was computed using under-five mortality as the dependent variable and the logarithms of real GDP per capita, percentage of literacy among the female population and population per doctor as independent variables. These variables are significantly related as indicated by a multiple correlation coefficient of 0.84. Using this equation, the early-age mortality rate of Mongolia was calculated and the value obtained was 73, against a real value of 136. This multiple regression analysis, and the data from Table 2, provide a general indication of an infant and child mortality in Mongolia in excess of the levels that its income ranking, women's education and density of medical practitioners would lead one to expect. Additional explanations presented in this section regarding a highly equitable distribution of the benefits

of development, substantial inputs into the health care system, universal access to social services including education and health, and considerable female autonomy, certainly confirm that infant and child mortality in Mongolia are unexpectedly high.

### **Obstacles to early-age mortality decline**

A major determinant of the difference in infant and child mortality between the less developed and the more developed countries is that the former are still beset by infectious diseases not yet brought fully under control (United Nations 1990). As shown, Mongolia is not an exception. However, the peculiarity is that the two main causes of infant mortality in the country, pneumonia and diarrhoea, could have been effectively managed at the community level using control strategies that are not difficult to carry out within a primary health care system such as the one developed by Mongolia. The high educational level of the female population, especially the low illiteracy rates, could have also contributed substantially to the success of such interventions. Nevertheless, there appear to be factors that may have inhibited the beneficial effect on infant and child mortality of the extensive network of health care services. The purpose of this section is to suggest and discuss two of those factors.

#### ***Climate and housing***

Mongolia has a hyper-continental climate, with low precipitation, long winters, with average temperatures below freezing for seven months of the year, and intense solar radiation. More than half of the country is underlaid with permafrost. The average altitude is 1,580 metres above sea level, the lowest point lying at an altitude of 532 metres. In order to cope with this harsh environment and to conduct nomad pastoralism, Mongolians have developed simple but effective technologies during the centuries. Transportable shelters are essential to a pastoral way of life and, in the freezing cold of Mongolia, are a matter of survival: the Mongolian *gerh* or *yurt* is superbly adapted to this. *Gerh* are demountable and portable single-room round tents, usually made of felt, which can accommodate a family of four to eight. A stove, located in the centre of the tent, is used for cooking and to provide heating; animal dung, wood or coal is used as fuel.

The rapid population growth of urban areas, as a result of both natural increase and internal migration, boosted the demand for housing. In all urban localities physical expansion was rigorously planned. Dwellings consist mainly of four to twelve-storey apartment blocks with full services, including central heating. Nevertheless, demand for housing outstripped supply in spite of the fact that the State treated housing as a highly subsidized social service like health and education. The problem was solved by using the *gerh* in urban areas. Cities are usually surrounded by encampments of *gerh*: in some cities, as much as 70 per cent of the population lives in this type of housing (Habitat 1992). All categories of human settlements in Mongolia exhibit the typical pattern generated by the division between the highly differentiated morphologies of the formal government housing and the *gerh* encampments.

The use of *gerh* in urban areas is not defined by most government officials as a social problem in spite of the fact that *gerh* encampments do not have the normal level of public services such as piped water, sewerage, electricity, and central heating. To some extent *gerh* areas in cities resemble the shanty towns of other Third World cities. However, the vast majority of their residents have formal employment in the urban economy and have access to the available social services such as education and health care. In addition, occupiers represent a cross-section of income and occupational groups. *Gerh* areas, especially in the largest cities and provincial capitals, are officially designated by the municipal government,

which exercise some degree of control and supervision of the plot layouts. The use of the land, however, is rent-free.

As mentioned, the *gerh* is a dwelling well adapted to the long and cold winters but conditions are excellent for the transmission of airborne bacteria, particularly in winter months when ventilation inside the tent is reduced because of the extremely low outside temperatures. This problem, plus crowding and poor sanitary conditions existing in most *gerh* areas, may help to explain the high incidence of acute respiratory infections and gastro-intestinal diseases. One of the few epidemiological studies available in Mongolia shows some evidence regarding differential morbidity among children under five years of age living in *gerh* areas and in formal housing in Ulaanbaatar (UNICEF/Ministry of Health 1990). In winter, the morbidity rate for pneumonia among those children who live in *gerh* areas is 80 cases per thousand children and for those living in formal housing 36 per thousand. In summer, these rates decline to less than 10 per thousand in both cases. On the other hand, in summer, the rates for diarrhoea among children living in *gerh* areas is 85 per thousand and for those living in formal housing only 28 per thousand.

While housing and sanitary conditions for a large sector of the urban population are unsatisfactory, there is no reason for believing that those in rural places are much superior. *Gerh* are almost universally used in rural areas and the sanitary problems resulting from living in this type of dwelling seem also be present, although problems of water pollution, rubbish disposal and crowding may be less serious than in the urban *gerh* encampments. Unfortunately, data to compare early-age mortality between the rural population and the urban population living in *gerh* are not available.

In any case, there is little doubt that the severity of the climate combined with a particular model of housing is a major determinant of the high degree of prevalence of acute respiratory infections, gastro-intestinal diseases and probably other conditions, which are the main causes of early-age mortality. However, considering that Mongolia has developed a social services infrastructure that has made health services accessible to nearly everyone, the health system might have been expected to be able to control these major diseases and to promote programs or interventions to reduce prevalence rates.

### ***The weaknesses of the health system***

An issue that would need further discussion is the quality of the services provided by the Mongolian health care system, especially deficiencies in case management, inaccurate diagnoses, inappropriate treatments and availability of equipment to treat severe cases in remote areas (for example, oxygen-delivery capability in *somon* and *inter-somon* hospitals). Information regarding these aspects of the health services is not available. However, the examination of official documents that describe the characteristics of the Mongolian health system and also statistics regarding its activities reveal two major drawbacks: limited preventive and promotional efforts and absence of community participation (Ibragimov and Denberel 1977; Academy of Sciences 1991; Ministry of Health 1992). In the Mongolian health care system the concept of preventive medicine seems quite limited and rather confusing. Basic preventive interventions such as compulsory immunization for children or quarantine measures are practised, but there are almost no preventive tools such as sanitary hygiene or nutritional education, campaigns to control selected diseases, promotion of public health measures, community or environmental health programs, and epidemiological surveillance measures. The idea of preventive medicine found in official documents mainly refers to preventive inspection of the population, which has been practised in the past. Typically, mobile medical teams would visit working places and schools where people were compulsorily examined, with the aim of controlling epidemic diseases. However, the effectiveness of this type of intervention is quite limited, especially in terms of controlling

pneumonia, the main cause of child deaths in Mongolia. According to Rosen (1974), this idea of mandatory examinations was rather authoritarian and paternalistic, and was framed within the notion of 'medical police' adopted by the former Soviet Union, whose health care system Mongolia embraced. Poor development of health preventive work has been frequently mentioned as a major limitation of the Soviet health system (Schepin, Semenov and Sheiman 1992).

Efforts to promote community self-reliance and participation in the planning, organization, operation and control of the health care system were never made in Mongolia. Budgetary policies, and in particular expenditure allocations, administrative and operational policies, even for the rural clinics, were designed and directed by the central government (Ibragimov and Denberel 1977). Mongolia never attempted to infuse political ideology into the health system, for example, through participatory support by the community or through the participation and activism of individuals and community representatives in management and decision-making control. Decisions about implementation of directives, resources and administration were made only by health care providers following central commands. In other words, the health system was not responsive at all to public demands. A number of authors agree that the key to the success of the post-revolutionary Chinese health system did not lie in the area of technical and operational innovations, but in the high degree of community involvement in local health services (New and New 1977; Kane 1985; Caldwell 1986; Tuan and Yu 1990). This involvement was ideological and political and supported by the central government. Similar efforts of community involvement were made in other socialist Third World countries such as Cuba (Danielson 1979) and Vietnam (Ladinsky and Levine 1985).

Although the sanitation problems faced by *gerh* encampments in urban areas have been recognized by Mongolian health officials (Habitat 1992), there have never been campaigns, interventions or programs to solve problems of provision of basic sanitation, adequate supply of safe water, and rubbish disposal in these sections of the cities. Nor have special health programs been implemented, considering the higher health hazards experienced by the people living in these areas. No attempts have ever been made to organize tenants in order to improve the sanitary conditions. Clinics and health posts are noticeably lacking in *gerh* encampments. Integrated health promotion programs, involving different sectors such as housing, education and agriculture, have never existed in Mongolia.

### **Towards an explanation**

It is important to begin this section by mentioning that until 1921, health practices in Mongolia were based exclusively on Buddhist-Tibetan traditions, with lamas as the main health practitioners. Use of traditional medicine ended at the same time as the complete suppression of all religious activity in the 1930s (Ministry of Health 1992); at that time, a modern health delivery system was established in the country. As mentioned before, this system was a clone of the model set up in the former Soviet Union; it was initially implemented by Russian practitioners and later by Mongolian professionals trained in the USSR.

Palloni (1981) has argued that when health policies do not take into account traditional health practices, a vacuum may result. The introduction of modern health systems in Third World countries may result in populations living in the worst of two worlds, where the traditional practices and knowledge of self-care have been lost and most people have difficulties internalizing or even understanding the new system. Studies among low-income population sectors in Brazil (Woortmann 1978) and among Canadian Inuits (Hobart 1975) confirm this argument. It has been proposed that the implementation of a modern health system in a traditional society registers better records in terms of service utilization,

acceptance and following of treatments when it takes into consideration ideas and concepts of the traditional system (Foster and Anderson 1978; Pelto and Pelto 1983; Mosley 1985).

As in other Third World nations that imported modern medical technology from more developed countries, morbidity and mortality improvements during the first half of the present century appear to have been quite impressive in Mongolia. However, the fact that early-age mortality has not continued declining appears to be related to the previous argument.

In Mongolia, the rapid and drastic move from traditional health practices to an externally imposed modern health service delivery based on the provision of almost exclusively curative services, limited implementation of preventive and promotional health programs and absence of community participation had two major consequences: most of the population has not internalized health preservation practices consistent with the modern health system, and, at the same time, has problems in adopting its therapeutic patterns.

Inadequate nutritional habits are probably among the most important indicators of limited internalization of modern practices of health protection and maintenance. In a study on maternal mortality in Mongolia, based on extensive interviews with a small sample of women, it was found that most of them, including those with secondary education, have little knowledge of the relationship between a balanced diet and health (Cariceo 1994). As in most traditional societies, adequate diets among Mongolian women tend to be thought of in terms of quantity, not quality, of sufficient staple foods, not a balance of many foods.

These findings are consistent with the results of a national survey conducted among children from 0 to 4 years of age in 1992 by the Mongolian Nutrition Research Centre with assistance from UNICEF (cited in Government of Mongolia 1993). Severe protein-energy malnutrition was found in 2.4 per cent of the children's sample. Low weight-for-age was found in 12.3 per cent of the children. Iodine-deficiency disorders, vitamin D deficiency or rickets, and iron deficiency anaemia were also detected. These problems should not be present in a country where the state has genuinely assumed the societal responsibility of providing families with sufficient economic resources to have access to adequate quantities of food. The explanation of these nutritional deficiencies appears to be related, not to limited food availability in the society or within the household, but to a lack of variety in the available foods and inadequate nutritional practices. Because of geographical and climate constraints, the variety of food produced in Mongolia is quite limited. However, at least during the 1970s and 1980s, the country was always in a position to finance massive imports from its own exports or from additional aid provided by the former Soviet Union and other countries of Eastern Europe (see Milne et al. 1991). In spite of this possibility, the government never carried out a food supply program to make available a larger variety of food to improve the diet of the population.

A household survey of breastfeeding practices was conducted in 1992 by the agencies mentioned above (cited in Government of Mongolia 1993). It included a national sample of mothers with children of ages 0 to 24 months. It measured a continued breastfeeding rate of 81 per cent at one year and 61 per cent at 2 years: these figures suggest that breastfeeding is a general practice. The proportion of infants aged 0 to 6 months fed only with breastmilk was found to be only 47 per cent; this proportion decreased to approximately 10 per cent among infants 6 to 9 months. The problem here is that complementary feeding consists mainly of powdered milk, which greatly increases the risk of infection, in particular diarrhoeal diseases. Another food supplement given to infants is the *bantan*, a traditional soup of mutton and wheat flour. *Bantan* has a good potential as a supplementary food but, 'to make it more digestible for infants' it is usually 'thinned' by adding more water and using less meat. The amount of calories and nutrients in this food supplement is quite meagre. In the previously mentioned nutritional survey it was found that 18.3 per cent of the children aged 13 - 24 months were found to have low weight-for-age compared to 4.1 per cent for infants under six

months and 12.8 per cent for infants 6 - 10 months. This trend is certainly related to the replacement of breastmilk by less nutritious food as infants grow older.

Health care is effective only if people follow instructions carefully and persist with recommended treatments: this arises primarily from an understanding and adoption of the therapeutic patterns of the modern health system. In Mongolia, according to a survey conducted in 1992 by the Ministry of Health and the World Health Organization (cited in Government of Mongolia 1993), 70 per cent of parents and other carers had some knowledge of oral rehydration therapy and its importance in treating diarrhoea. Nevertheless, fewer than half of those using ORS prepared the solution correctly, and fewer than 10 per cent gave it in the proper amounts. The same survey showed a marked overuse of drugs in the treatment of diarrhoea: in almost 50 per cent of the cases, children were treated only with drugs in spite of the fact that ORS was also prescribed.

Another example of the slight understanding of modern concepts of health preservation among the Mongolian population and, at the same time, of the poor preventive role of the health system is the universal practice of tightly swaddling small children almost all the time especially in winter. It not only deprives them of sunlight but it is also conducive to acute respiratory infections. Swaddling is so tight that it limits lung compliance and no layer of air is allowed as insulator. Instead of enabling them to get warm, the practice may cause hypothermia. This practice does not appear to have been discouraged by health education.

The health care system appears to have done very little to improve situations like those described above through, for example, campaigns directed to eradicate harmful traditional health practices, or nutritional education campaigns based on knowledge of parents' food beliefs and practices and actual food availability. The lack of health prevention and promotion activities as well as the lack of community participation in the development of the health system in Mongolia have resulted in a situation in which the people have continued to believe in traditional therapeutic patterns and self-care. Most Mongolians were faced with a health care system that they did not fully understand, and made use of its services mainly because they did not have any alternative, or because of coercion rather than a conviction based on the learning and internalization of its basic principles and rules. In other words, being externally imposed, the establishment and development of the Mongolian health care delivery system failed to take into account the specific characteristics of the Mongolian culture.

The limited concern and knowledge of the Mongolian population regarding modern treatments and health preservation practices could be related to a lack of awareness and knowledge of the scientific basis of diseases. This factor has been mentioned in the literature as an important determinant of the effectiveness of health care programs (Mosley 1985; Preston 1985). The study on maternal mortality in Mongolia mentioned above (Cariceo 1994) reports that for most women the idea of germs as a cause of disease is unfamiliar or not considered relevant in terms of health preservation. The prevalent idea is that health prevails when certain elements of the body are in balance appropriate to the age and condition of the individual in his natural and social environment. When the equilibrium is disturbed, illness results. The evidence previously presented regarding nutritional practices and failure to follow prescribed treatments also suggests poor knowledge of modern disease theory among the Mongolian population. However, in the case of Mongolia, what seems more important than any understanding of disease-causation ideas is the limited identification of the people with the whole modern health system. Its excessive orientation toward curative medicine appears to have resulted in people perceiving the modern system exclusively in curative terms and not with regard to health preservation and disease prevention. When it comes to practices and ideas of child care, preservation of health, or even medication, people seem to identify more with the traditional system. Under these circumstances, parents are not likely to change traditional patterns of child care, including adopting more adequate nutritional practices.

This interpretation may also explain why increases in female literacy and school attendance have made only a limited improvement in early-age mortality records in Mongolia. Formal education probably provided mothers with more cultural autonomy as well as with the ability and capacity to accept more easily modern disease prevention practices and to understand therapeutic methods. However, it seems that the health system was so centred in curative care that it never promoted such practices or disseminated health information to make future mothers become more sensitive to the nutritional status of children and strive to improve hygienic conditions in the household. Nor did the health system develop promotional programs jointly with the educational sector. In other words, there was no source of health preservation practices other than the traditional disease theory.

One last issue that needs to be addressed here is the fact that the health system of Mongolia provided very limited family planning services until the late 1980s. Before the reform movement of 1989, the government had a policy of encouraging childbearing. Financial incentives were given to encourage births, special taxes were levied on single adults and childless families, and women of reproductive age were called on to do their patriotic duty. Contraception, sterilization and abortion were prohibited by strict laws. In 1987 the government loosened some pronatalist measures, and in 1989 there was a major shift in favour of family planning since it was considered that the earlier policy undermined attempts to reduce maternal and infant mortality rates (Neupert 1994). It seems too soon to evaluate the direct impact of the change of policy on early-age mortality. However, it is important to note that the existence of family planning services in the past might have had a significant effect on improving the use of health services and changing traditional concepts of health care, especially if it had been integrated with other maternal and child health services.

### **Policy implications**

As mentioned before, throughout the present decade, Mongolia has been experiencing the worst economic crisis of its recent history. During the last three years production has declined dramatically. For example, total agricultural output fell by 7.4 per cent and industrial output by 11.7 per cent from 1990 to 1991. The level of unemployment, virtually non-existent in the past, reached 6.5 per cent by the end of 1992. The consumer price index for basic commodities has increased more than four times between 1990 and 1992. During the same period, the real income of the population has decreased by 40 per cent. In January 1992 there were indicators in which the indicators included in the table suggest a lower degree of economic development and more limited social progress. Severe food shortages have also been a major economic and social problem (Government of Mongolia 1993).

The health system has also been affected seriously by the economic crisis. To begin with, it is undergoing a difficult period of structural transformations, adjusting to new social policies and the realities of a market economy. This difficult situation is further aggravated by the extreme shortage of essential drugs, equipment, instruments, ambulances, spare parts, fuel, and personnel (Asian Development Bank 1992; Government of Mongolia 1993).

During the transition period the public health sector will continue to provide free services to the whole population, but the government is encouraging private and co-operative practice by doctors. The plan is to develop a phased program to move from the current system of free access to one based on a health insurance system. This plan was supposed to start by 1993 but institutional problems, mainly management expertise and co-ordination, have prevented significant progress. In any case, the government plans to maintain a public health sector aimed mainly at providing free medical services to children, pregnant women, the elderly and other vulnerable groups in the population.

The results of these transformations are difficult to predict, especially regarding the coverage of the public health sector and the quality of the services. In any case, throughout

the present decade, and probably during the next, the country will have limited financial resources to improve and expand the health care system, especially its technical capabilities. Even improvements regarding housing and environmental sanitation would be hard to achieve because of economic constraints. These facts, together with only marginal or no progress in the economic situation of the population, call for health policy interventions based on a more rational use of the limited resources available.

The key to attaining a substantial infant and child mortality decline with the available resources in Mongolia is that the medical system takes into consideration the specific characteristics of today's Mongolian culture and economy. The base of the policy in the past was to extend curative medicine services throughout the country by making modern health technologies widely accessible. Taking into account the discussion previously presented, it is unlikely that investments of the scarce internal resources or those provided by the international donor community in this type of policy will have the expected results. The recovery of the health care system and its eventual further quantitative expansion does not seem to be the solution.

More substantial health and mortality improvements will require families to feel more identified with the health system, its therapeutic patterns and health preservation practices. It is within the family that the modern health system interacts with the traditional system and that most health interventions succeed or fail (Mosley 1984). Therefore, the basis of a new public health policy should be education concerning prevailing health problems and the methods of preventing and controlling them; awareness regarding the relationship between food and health as well as promotion of food supply; and internalization of better hygienic habits based on the dissemination of modern concepts of disease prevention. These interventions should not only involve the health system itself but also include grass-roots organizations, the formal education system, and other sectors.

A general policy based on the ideas presented above will encounter major difficulty. In general, Mongolian policy-makers have a unidimensional approach to dealing with public health issues: they still favour a health strategy implemented from above, based on a quantitative expansion and technical modernization of the existing facilities. In general, there is little understanding of the importance of developing a sound public health program based on educational campaigns and community health programs. In a study previously mentioned on maternal mortality in Mongolia (Cariceo 1994), a question regarding the most important changes necessary in the health care system was asked of a small sample of health workers. All of them agree that technical modernization, mainly in terms of equipment, would be the most relevant modification. Nobody mentioned the need to develop preventive and health promotion programs. Also, the government is considering importing technology to strengthen the domestic drug manufacturing industry; the viability of this type of approach needs careful evaluation (Asian Development Bank 1992). Bell (1985) suggests a possible explanation for the lack of concern for public health and disease prevention in most developing countries: in general, those who control health policies and budgets are urban-based and middle-class oriented and favour an allocation of health resources that replicates the hospital based care patterns and the highly technical medical education of industrialized countries. This type of attitude is present in most Mongolian policy-makers, especially after the reform movement of 1989, when social policies from Western and Asian developed countries began to be increasingly perceived as attractive.

At present, Mongolia is receiving considerable emergency foreign aid from donor countries and international agencies geared to the health sector. It is important that this support be directed to social and community health programs, offered in accordance with community preferences that could be more widely accepted; such support should not only be used to acquire sophisticated medical infrastructure.

It is precisely on the crucial interaction between the modern and traditional health systems that policy-relevant research is needed in Mongolia. For example, one of the most interesting issues regarding infant and child mortality in Mongolia is women's high level of education. A research priority would be to examine why the formal educational system was unable to introduce changes in the traditional perspectives on child care and health among the population. The main challenge seems to be, however, to study the traditional disease theory in terms of both its beneficial components and those aspects that have prevented a more adequate and efficient use of the modern health system. The contribution of this knowledge would be of much help in designing more effective public health interventions.

In order to monitor and to evaluate programs and interventions, substantial efforts should be made to improve the system of data collection on infant and child mortality both in general and by cause of death, and on morbidity. Conventional international definitions and practices should be adopted in this respect. An adequate vital events collection system exists in the country and the statistical section of the Ministry of Health also has the institutional and physical capability to expand and improve the quality of the health data that it has been collecting. Efforts in this direction do not appear to be costly or involve major institutional changes and the benefits would be quite considerable.

## **Conclusions**

A major issue that needs to be addressed here is whether or not Mongolia is merely one case of a wider phenomenon found in some other former socialist countries. The much better early-age mortality records of other socialist Third World countries such as Albania, China, Cuba and Vietnam indicate that Mongolia's high infant and child mortality levels are not related to its political and economic system. The evidence discussed in the previous section suggests that the problem in Mongolia is associated with limitations regarding preventive and promotional health programs and absence of community participation in the development of the health system which, in turn, have made it difficult for the population to adopt modern health prevention practices and accept modern therapeutic patterns.

In the particular case of Mongolia, these limitations appear to be quite relevant because of the complete elimination of the traditional medical system and also because of the rapidity of the socio-economic and cultural transformation experienced by the country during the present century. From a simple subsistence, pastoral and nomad society it moved to an industrial-agricultural one. An increasing part of the population began to settle in urban areas and became engaged in non-agricultural economic activities. The rest of the population continued a semi-nomadic life-style but this time in bureaucratically organized state co-operatives and farms. However, this transition, labelled by Lattimore (1962) one of 'nomads and commissars', did not change many aspects of the Mongolian culture. One example is the persistence of traditional health-preservation and therapeutic ideas which were not consistent with the modern health care system and with the socio-economic and cultural transformations that the country was experiencing. The result was a substantial initial decline in early-age mortality followed by a noticeable stagnation. It seems that there was a limit to the mortality decline, caused by the lack of preventive and health promotion interventions.

There is abundant literature regarding strategies, programs and interventions that developing countries should include in their social policy in general, and health policy in particular, to improve infant and child mortality levels (see, for example, Wallace and Giri 1990). During the past 70 years social and health policies in Mongolia appear to have created the right conditions for substantial improvements in early-age mortality and morbidity. However, absence of community involvement in the development of the health system, and limitations in preventive and promotional health programs, have resulted in a virtual stagnation of infant and child mortality during the past two decades.

The future perspective does not appear optimistic. An economic crisis whose end is nowhere in sight, emergent social inequalities, a vague health insurance model with unclear financing sources, and a lack of concern by most policy-makers in strengthening the preventive component of the health system, are not positive factors for substantial infant and child mortality improvements in the near future. A clear advantage is, however, the fact that there is a wide space for major improvement with existing internal and external resources. Perhaps the single most important need is for informed, expert, local analysis of the situation of the country and for constructive proposals for policies and programs. In this sense, the objectives of this paper seem to have been accomplished. Despite the limited information, the main possible determinants of early-age mortality in Mongolia were identified, the respective policy implications were discussed and policy-oriented research priorities were suggested.

## **Methodological appendix**

Mongolia has, in general, a well-developed system of population data collection. Seven censuses have been conducted in the country and a civil registration-vital statistics system has been in existence since 1951. From the 1960s on, the degree of completeness of the registration of vital events has, in general, been high (Neupert 1992). The exception, however, is the registration of early-age deaths.

According to the present Mongolian legislation, parents must register the birth of a child within one month of its occurrence. However, as in other countries, frequently parents may consider it futile to register both the birth and the death of a child who died at a very early age. Therefore, it is likely that many infant deaths that occur before the child is one month old may never be registered. Even if the child died after a month and the birth has been registered, parents can fail to register the death. This seems to be specially the case in rural areas where ties with the government administration are weaker and burial permits are, most of the time, not necessary.

Considering a probably significant underregistration of infant and child deaths, the Palloni and Heligman (1985) version of the original Brass indirect technique for infant and child mortality estimation was used in this study to obtain more accurate estimates than those provided by vital statistics. The data required, the mean number of children ever born and the proportion of children surviving, were obtained from the 1989 Mongolian population census. The estimates were performed with the procedure CEBCS of the program MORTPAK (United Nations 1988). Although censuses have been taken in Mongolia since 1935, earlier censuses do not provide the information necessary for the application of indirect techniques.

The indirect estimates of early-age mortality presented in Table 1 were obtained through the Palloni-Heligman technique. This method of infant and child mortality estimation is based on the use of the United Nations model life tables for less developed countries. The selection of the particular pattern or family among the five available (Latin American, Chilean, South Asian, Far East, and General) should be based on the knowledge of which pattern fits better the specific mortality pattern existing in the country. In the case of Mongolia, the South Asian Pattern was selected. The selection of the South Asian pattern was based on a comparison between observed and model life tables. The observed life tables correspond to 1979-84 and 1984-89. The procedure COMPAR from the program MORTPAK, previously cited, was used for this analysis. This pattern is typified by extremely high mortality under age five and relatively high mortality at older ages. Correspondingly, mortality during the prime adult ages is relatively low.

Table 3 shows the direct estimates of early-age mortality. They were computed from registered death statistics. The values of early-age mortality estimated from census data with indirect methods (Table 1) are much higher than those calculated directly from registration data. This fact suggests that there are serious problems of underregistration. These problems were identified not only in the age group 0 to 1 year, but also in the group 1 to 4 years of age.

**Table 3**  
**Mongolia: probabilities of dying between ages 0 and 1 and between ages 1 and 4 computed directly from vital statistics**

	1970-74	1975-79	1980-84	1985-89
<b>Male</b>				
<b>(1)Q(0)</b>	0.08564	0.08141	0.07721	0.06955
<b>(4)Q(1)</b>	0.04358	0.03893	0.05476	0.04027
<b>Female</b>				
<b>(1)Q(0)</b>	0.07195	0.06816	0.06472	0.05813
<b>(4)Q(1)</b>	0.03934	0.03887	0.05415	0.03778
<b>Total</b>				
<b>(1)Q(0)</b>	0.07871	0.07479	0.07102	0.06390
<b>(4)Q(1)</b>	0.04149	0.03890	0.05448	0.03905

Source: Author's calculations based on vital statistics

In order to examine the consistency of the indirect estimates obtained, an additional independent analysis was performed. Using the indirect estimates of early-age mortality already computed and adult mortality computed directly from registered death statistics, life tables were constructed for the four five-year periods under consideration. The values of  $(n)Q(x)$ , or probability of dying, corresponding to adult mortality were graduated in order to smooth the respective age patterns. The life tables were constructed by using the demographic software PAS (Arriaga and Associates 1992). The graduation of the probabilities of dying was performed with the procedure UNABR from the package MORTPAK previously cited. Adult mortality was computed by a direct method since underregistration of adult deaths appears quite low, as revealed in a study where underregistration of vital events was evaluated (Neupert 1992).

As mentioned, the model life table that better fits the mortality experience of the Mongolian population is the South Asian Model from the United Nations model life tables for less developed countries. Using observed adult  $(n)Q(x)$  and the South Asian model life tables, early-age  $(n)Q(x)$  were obtained. Any  $(n)Q(x)$  uniquely determines a life table within the system once a family of models has been selected (in this case the South Asian). Thus each  $(n)Q(x)$  implies a life table. An expected early-age  $(n)Q(x)$  can be established by adopting the life table implied by a given adult  $(n)Q(x)$ . For example, the expected probability of dying between birth and one year of age for the period 1985-89 can be obtained from the model life table that, within the South Asian pattern, corresponds to the observed  $(5)Q(20)$ . It is important to mention that death statistics on the adult population are not affected by serious problems of underregistration. The completeness of adult death registration was estimated using the Bennett and Horiuchi (1981) technique. This technique evaluates adult death statistics based on the population age distribution from two censuses and registered deaths by age groups for the intercensal period. For the purposes of this study, the adult deaths registered between 1970 and 1979 were evaluated using the age distributions of the 1969 and 1979 censuses. The adult deaths registered between 1980 and 1989 were evaluated with the 1979 and 1989 censuses. The procedure BENHR from the demographic computer program MORTPAK was used for this purpose. The application of this technique to the data suggests that, in fact, underregistration of adult deaths is almost negligible.

Through the procedure described above, several estimates of expected infant and child mortality were established, each corresponding to the model life table consistent with

different adult probabilities of dying. The results are presented in Table 4 where the expected probabilities of dying in early infancy are compared with those obtained from registration data and from indirect estimates for the period 1985-89. The procedure MATCH from the computer program MORTPAK was used to perform this analysis.

**Table 4**  
**Mongolia: comparison among expected, observed and indirectly estimated probabilities of dying between ages 0 and 1 and between ages 1 and 4, 1989**

	Male		Female	
	(1)Q(0)	(4)Q(1)	(1)Q(0)	(4)Q(1)
Expected				
20	0.10257	0.05694	0.08158	0.04178
30	0.10823	0.06206	0.08866	0.04850
40	0.10681	0.06076	0.10368	0.06421
50	0.10752	0.06141	0.10096	0.06122
60	0.12356	0.07675	0.07814	0.03868
Observed	0.06955	0.04027	0.05813	0.03778
Indirect	0.09992	0.05083	0.08352	0.04769

Almost all the expected probabilities of dying corresponding to life tables consistent with adult mortality at different ages are not only much higher than the directly estimated infant and child probabilities of dying but also those estimated through indirect methods. This exercise was also done for the previous three five-year periods and almost identical results were obtained. This analysis suggests that the values obtained by the indirect technique do not overestimate early-age mortality and that, in fact, the values calculated directly from death registration statistics are affected by serious problems of underreporting.

It is necessary to clarify that, in spite of the results presented in Table 4, the accuracy of the indirect estimates presented in Table 1 is still subject to discussion. An independent source of data, such as a demographic survey, would be necessary to substantiate the figures estimated here or to obtain more exact estimates. Nevertheless, there is little doubt that infant and child mortality are high in Mongolia and that little progress has been made during the past 20 years.

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## Old-age mortality in Israel: analysis of variation and change\*



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### Abstract

**This study analyses differentials in life expectancy and cause-specific death rates among the elderly Jewish population in Israel in the early 1970s and early 1980s. We find substantial inequality in old-age mortality levels across subpopulations in geographic units and show that this inequality increased between the two periods. Much of the variation in old-age mortality is explained by differences in economic and social status, ethnicity and religiosity. The importance of religiosity is of particular interest in the context of Israeli society.**

Inequalities in longevity across population subgroups characterize every society. This study analyses such differentials in life expectancy and cause-specific death rates among the elderly Jewish population in Israel. It covers a period of five years around the 1983 census, with comparisons to a similar period around the 1972 census. The analysis is restricted to the Jewish population because the socio-economic and cultural characteristics, as well as the quality of data, differ greatly between the Jewish and the Arab populations. Indeed, the quality of vital records as well as census data of the Arab population is problematic and raises difficulties both in analysis and in interpretation.

The units of analysis in this study are defined by geographic divisions based on census statistical areas. We show that old-age mortality levels are subject to very significant differences among subpopulations in geographic units, whether these are towns and cities, or smaller divisions. It is also shown that inequality across geographic units in life expectancy tended to increase between the early 1970s and the early 1980s. Our major aim is to analyse and explain old-age mortality differences among such population units, with respect to socio-economic and culture explanatory variables. Israel has extensive welfare programs including comprehensive and highly subsidized health schemes, covering almost the entire range of medical services. Nevertheless, there are differences in life expectancies across localities of up to eight years at age 65. Differences across the smaller divisions are even larger. How can such variations, under conditions of extensive welfare and health programs, be explained? A major hypothesis is that variations among population units in economic and social status, ethnicity, religiosity, and proximity to leading specialized medical centres, as well as some

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\* This project was sponsored by the Basic Research Foundation of the Israel Academy of Sciences and Humanities, for which the authors are grateful. We are also grateful to the JOINT (JDC) Israel, and the Brookdale Institute of Gerontology and Adult Human Development in Israel, for support in the final stages of this project. We wish to express our appreciation for the skilful assistance provided by Orly Sivan, Carole Feldmann, Yifat Klopstock and Hagit Weiss. We express our thanks to Barbara Okun for very helpful comments and suggestions.

other characteristics, are associated among the elderly with cause-specific death rates and therefore with life expectancies.

### **Previous studies**

The interrelationship between mortality levels and socio-economic variables is not a new research issue. Ecological interrelationships between socio-economic variables and mortality had already been studied in the nineteenth century, for example in London, as well as in some other regions and countries (Antonovsky 1967). Several ecological analyses of mortality differentials for more recent periods can be traced in the literature. Notable were a series of projects undertaken at the University of Chicago focusing on ecological relationships in the Chicago area between 1930 and 1960. More modern studies, using ecological relationships to analyse mortality patterns, have been conducted for the United States (Silver 1972), Japan (Sakai 1986) and some other countries. The most important common finding of these studies is the existence of socio-economic status differences in mortality. Indeed, some studies with historical perspectives indicate that socio-economic status tends to increase in importance over time as an explanation of life expectancy differentials (Preston and van de Walle 1978; Friedlander et al. 1985; Mosk and Johansson 1986). The analysis presented here is distinct in that it deals specifically with old-age mortality, and in that it employs a relatively large number of explanatory variables. Additionally, the analyses are based on a large number of units with relatively small populations, probably smaller than most studies of its kind.

Previous research on life expectancy levels and their socio-economic determinants in Israel is very limited. Several studies of differential mortality undertaken in the 1960s and 1970s dealt mainly with the effects of ethnicity and duration in Israel as potential explanations (Muhsam 1966; Peritz et al. 1973). Anson (1988) analysed standardized death rates for about 70 localities in Israel. He discovered significant differences and established interrelationships with welfare variables.

An important long-term project undertaken by the Unit for the Study of Health Services, at the Chaim Sheba Medical Center, Tel Aviv University, deals with different aspects of infant mortality among localities in Israel. Significant socio-economic and ethnic differences in infant mortality rates were discovered (Barell, Wax and Ruder 1988). Another study by this unit focused on adult mortality differences among the metropolitan areas of Tel Aviv (Lusky, Gurvitz and Barell 1992).

In a very detailed individual level study, Peritz and his associates measured the impact of birthplace (Europe, Middle Eastern countries in Asia, North Africa, and Israel), controlling for duration in the country. Their most interesting finding concerns the convergence patterns of mortality levels of recent migrants from these different origins with those who migrated earlier. In a follow up study (Peritz et al. 1983), comparisons among these different groups were made to document the changing patterns of differentials in cause-specific mortality levels. It was shown that during 1969-1973 differences in cause-specific mortality levels still prevailed. This finding is most relevant to the present study. We analyse cause-specific death rates by ethnicity among geographic units for 1972 and 1983. One of our objectives is to ascertain whether there are still significant ethnic effects after socio-economic status variables are controlled for.

### **Immigration, socio-economic differentiation and mortality trends**

Life expectancy at age 65 increased by one-and-a-half years between the early 1970s and the early 1980s and by another year during the 1980s, while it was almost constant during the two decades before 1970. Hence, while there has been a strong and continuous decline in overall mortality since the massive immigration in the late 1940s and early 1950s, the decline in old-

age mortality is a recent phenomenon. This raises an important analytic question. Under what conditions and circumstances are current life expectancies at age 65 high, and under what conditions are they likely to increase rapidly? It will be shown that socio-economic status, ethnicity and religiosity are key variables explaining both the variation and the change in life expectancy.

Israel is a country of immigration with ethnic and socio-economic diversity. Its Jewish population has grown and developed mainly as a result of extensive wave-like immigration during the present century. The 'mass immigration' wave following the foundation of the state in 1948 was most conspicuous in its enormous volume. It was not only variation in the volume of immigration but also the changing ethnic composition of immigrants over time which shaped Israel's socio-economic structure. Up to the foundation of the State in 1948, immigrants came predominantly from European countries. This group of veterans and their Israeli-born descendants now form a major part of Israel's higher-status population. Israel's ethnic structure changed radically with the wave of mass immigration when increasing proportions of immigrants came from African or Asian countries, a tendency which became even more pronounced during 1952-67. Another feature of the immigration waves was that the immigration from Asian and from African countries was not equally distributed over time either. While immigration from Asian countries was concentrated in the early years of statehood, immigration from North African countries was spread over a longer period — up to 1967. Subsequently, it was again European migration which dominated. While origin or ethnicity indicates the initial socio-economic and demographic characteristics at time of immigration, duration in Israel represents exposure to the new conditions in Israel. Hence, immigration patterns have created an extremely heterogeneous society. Indeed, Israel's Jewish population is differentiated not only by ethnicity, but also by socio-economic status levels. The historical patterns of immigration, particularly origins and time of arrival, have contributed towards a long-term association between ethnicity and socio-economic status. Considering immigrants from European, Asian and African origins as well as their respective descendants, their status levels from high to low can be ranked in that order (see Eisenstadt, Lissak and Nahon 1993). Many studies have demonstrated the existence of differentiation, in many social and demographic aspects, by both ethnicity and length of stay in Israel. The studies of differential mortality by Peritz and his associates (1973, 1983) have, indeed, shown that life expectancy at various adult ages was differentiated by these two factors. It has been demonstrated in these studies that Israeli-born (with no regard to their parents' origin) had the highest life expectancies, followed by Asian and by European-born, while African-born had significantly lower life expectancies. Although these differences tended to diminish over time, even in very recent years immigrants of African origins show higher mortality at adult ages compared with other ethnic groups (e.g., State of Israel 1992:149). However, because ethnicity and socio-economic status levels are so tightly interrelated, a question of major importance is whether ethnic differences in mortality still persist after controlling for socio-economic status. The analysis in this paper attempts to answer this question.

## **Data and variables**

### ***Units of analysis***

This study employs geographic aggregated data from the 1972 and the 1983 censuses and death registration data for five years centred on these Census years to explain variation in old-age mortality levels at each period. The basic geographic divisions consist of standard statistical areas defined by the Central Bureau of Statistics. These range mostly between population sizes of several hundred and a few thousand and are the smallest areas for which

census returns as well as death statistics can be manipulated. However, our analysis is based on aggregates of these standard statistical areas — small local areas — whenever the population sizes of standard statistical areas are small. In all, some 580 small local areas are used in the analyses of life expectancies. These units range mostly between 2500 and 7000. The analysis of cause-specific mortality rates forced us to use larger aggregates, i.e. localities, because of data limitations. There are 65 units in these analyses, ranging mostly between 10,000 and 90,000. Some more details on the aggregation procedures are discussed in Appendix A.

Both vital registration records and census data, for the Jewish population, are considered to be of high quality. No burial can take place unless a death certificate has been signed by an authorized official. Both place of residence and place of death are registered, which is of particular importance in the analysis of old age mortality.

### **Age structures**

Many of the population aged 65 and over are former immigrants who arrived in Israel with the mass immigration of 1948-1951. Their current reported ages as well as their age at death still depends, to a large extent, on the ages immigrants reported at arrival. There was a suspicion that among migrants from Asian and African countries, ages were overstated, which is a well known problem in age statistics (see Carrier and Farrag 1959). One implication would be that life tables as well as cause-specific death rates based on such age structures could produce biased estimates at the older ages. Appendix B discusses the ways in which age structures have been examined to detect such possible age overstatements. The conclusion is that serious age overstatement among these populations is unlikely.

### **Dependent variables**

The major dependent variable in this study is life expectancy at age 65,  $e_{65}$ . Additional dependent variables are cause-specific (and for wider age groups age-standardized) death rates at age 65 and over, using five major cause-of-death categories:

$M_{in,x}$ : The age-standardized or age-specific death rate of infectious diseases.

$M_{hc,x}$ : The age-standardized or age-specific death rate of heart and circulatory diseases, excluding cerebrovascular diseases.

$M_{cva,x}$ : The age-standardized or age-specific death rates of cerebrovascular diseases.

$M_{ca,x}$ : The age-standardized or age-specific death rate of all cancer diseases.

$M_{ot,x}$ : The age-standardized or age specific death rate of all other causes.

These dependent variables are analysed with respect to several explanatory variables.

### **Explanatory variables**

The explanatory variables in the analyses are: economic status; social status measured in terms of educational attainment; ethnicity; religiosity; proximity to locations with specialized medical services; loneliness in terms of marital status; industry and employment status. Some of these variables can be defined in alternative ways. For example, social status is represented by the proportion of the population with at least nine years of formal education among the population aged 60 and over. This variable is preferred to the proportion with at least 13 years of education, which is used in many studies, because the general educational levels of these older population cohorts are relatively low. The explanatory variables are defined below.

EC90: Proportion of all wage earners in the geographic unit whose earnings are within the upper decile range of the national income distribution. This is the economic status variable.

ED<sub>9,60</sub>: Proportion with at least nine years of formal education among the population aged 60 years and over. This is considered as the social status variable.

ETAF: Proportion born in North African countries or their Israeli-born children, in the total population of the geographic unit. This is considered as the African ethnicity variable.

REL: Proportion of the total adult population who voted for religious political parties during the general elections of 1984. Three major religious parties participated in these elections. Two are ultra-religious parties, one dominated by people of European ethnicity, the 'Agudah', and the other dominated by people of Asian-African ethnicity, the 'Shas' party. The third, the 'National Religious Party', is a more modern religious party, has no clear ethnic identification, and is nationalistic. Altogether they formed over 15 per cent of the total electorate in 1983. The percentage of all three religious parties in a geographic unit is taken as the religiosity variable.

PROX: Proximity to locations with major specialized medical centres. This is the road distance from the geographic unit to the nearest of the three major cities in the country: Haifa, Tel-Aviv and Jerusalem.

LON<sub>65</sub>: The 'loneliness' variable, calculated as the ratio of the number of never-married and divorced persons to the total number of persons in the 65-74 age-group. The widow category is not included in this variable, neither in the nominator nor in the denominator, to eliminate the representation of a mortality element on both sides of the regression equation. As the widow and widower subgroups are so important in the old-age population, their inevitable omission from the analysis is a shortcoming.

IND: Proportion of the male labour force engaged in industry. It is considered as a rough proxy for the exposure to pollution.

WLF<sub>55</sub> and MLF<sub>55</sub>: Proportion of women or men participating in the labour force in the 55-64 age group.

### **The inequality in old-age mortality**

Variations in life expectancy at infancy or at age 65 among populations in geographic units are high, regardless of the kind of geographic divisions that are considered. Differentiation and inequality are present among small local areas or localities. Moreover, the inequality in life expectancy increased during the period 1972 to 1983. While in the present section we illustrate the inter-locality inequality in life expectancies, in a following section we attempt to provide explanation and interpretation.

We begin our examination of life expectancies with some comparisons. Whereas the 1972 life expectancy at age 65 was 13.4 for males and 14.5 for females in the country as a whole, localities range between 10.6 and 16.5 for males, and between 10.7 and 17 for females. In 1983 life expectancy at age 65 was 14.5 for males and 15.3 for females in the country as a whole, while localities range between 11.5 and 18 for males, and between 11.5 and 20.8 for females. While life expectancy at birth in 1972 was nearly 72 years for the entire Jewish population of Israel, individual localities range between 68 and 76 years. In 1983 life expectancy at birth was 75 years for the entire population, while individual localities range between 69 and 81 years.

Table 1 suggests that localities of low socio-economic status, particularly 'new towns' that were established to settle new immigrants after the early 1950s, have much lower life expectancies than average in 1983 (see the upper section in this Table). Table 1 also suggests that almost all localities with high life expectancies, such as Hod Hasharon or Raanana, were established before independence and are characterized by high economic status. An illustration of differences in life expectancies at age 65 (for males) between localities of low and of high socio-economic levels, may be taken as between Dimona, a low socio-economic status locality, and Raanana, a high socio-economic status locality. Life expectancy at age 65

in Dimona was 12.5 years in 1983, with lower and upper 95 per cent confidence limits of 10.7 and 14.2 respectively. In comparison, life expectancy at 65 for males in Raanana was 17.6 years, with lower and upper confidence limits of 15.6 and 19.5 years respectively. Similar patterns, though less extreme, can be found for 1972. Such differences in longevity are recorded among many units. These are explained and interpreted in a following section. Table 1 also presents standardized death rates at ages 65-79 from heart and circulatory diseases. Like life expectancies, these death rates are much lower for high-status localities than for those of low socio-economic status presented in the upper part of Table 1.

If life expectancies of smaller units, such as the small local areas, are compared, the range between extreme life expectancies either at age 65 or at birth is much larger, although significance declines. Comparison of these smaller areas shows large variations among different neighbourhoods in larger cities. For example, while a large number of neighbourhoods in Tel-Aviv are ranked at the top in their life expectancies, there are quite a few neighbourhoods ranked at the bottom.

**Table 1**  
**Life expectancies and standardized death rates from heart and circulatory diseases: selected localities, 1983**

Locality	Life expectancy at age 65		Life expectancy at birth		Standardized death rate at age 65-79 from heart and circulatory diseases	
	Males	Females	Males	Females	Males	Females
Localities of low socio-economic status						
Dimona	12.5	13.1	69.2	72.4	29.9	31.6
Tirat Karmel	12.8	12.7	69.8	72.9	29.1	30.5
Kiryat Malachi	13.0	13.4	72.2	72.7	23.2	28.8
Kiryat Shmona	13.6	14.4	69.4	73.0	21.2	22.1
Ramla	13.8	14.6	70.8	75.0	26.4	24.8
Or Yehuda	13.9	15.0	70.5	75.8	25.7	19.5
Bet Shemesh	14.1	14.2	70.6	73.2	32.7	27.4
Localities of high socio-economic status						
Rehovot	15.8	17.3	74.8	77.5	19.3	14.5
Givatayim	16.1	18.1	75.4	78.6	18.1	12.7
Ramat Gan	16.1	17.7	74.7	78.3	19.1	13.8
Ramat Hasharon	16.2	15.9	74.7	76.5	23.3	20.6
Kiryat Ono	16.4	16.5	74.9	77.3	16.0	12.9
Hod Hasharon	16.8	22.9	73.9	81.4	20.9	13.6
Raanana	17.6	20.8	77.3	80.8	18.9	18.3

Table 2 presents several parameters describing the amount of differentiation among localities in life expectancies at age 65 for both 1972 and for 1983. The table shows that along with the overall increase in life expectancies between 1972 and 1983, there was an increase in inequality among localities. This is clearly seen from comparisons of the standard deviations, the quartile deviations and the various ranges shown for 1972 and 1983. Moreover, the table shows that in the lower range of life expectancies the increase in life expectancies between 1972 and 1983 was small. In the upper range of life expectancies, on the other hand, the increase between 1972 and 1983 was quite large. This pattern is particularly conspicuous for females relative to males. For example, while the lower quartile

of life expectancy at age 65 increased from 12.68 in 1972 to 13.54 in 1983 for males, these values are 13.86 and 13.82 for females. On the other hand, the upper quartile for males is 14.20 in 1972 and 15.40 in 1983 and for females 15.38 and 16.54.

**Table 2**  
**Means, standard deviations and percentiles of life expectancy at age 65 (e<sub>65</sub>) by sex, 1983 and 1972**

Year	Both sexes		Males		Females	
	1983	1972	1983	1972	1983	1972
Mean ( $\bar{X}$ )	14.83	13.96	14.45	13.44	15.30	14.54
Standard deviation(s)	1.44	1.02	1.42	1.11	1.86	1.30
$\bar{X} - 2.5 s$	11.23	11.41	10.90	10.66	10.65	11.29
$\bar{X} + 2.5 s$	18.43	16.51	18.20	16.22	19.95	17.79
Minimum value	11.50	11.44	11.50	10.55	11.48	10.66
Maximum value	19.26	15.55	18.04	16.50	20.82	16.85
Range	7.76	4.11	6.54	5.95	9.34	6.19
Median	14.79	14.11	14.44	13.62	15.22	14.57
Lower quartile (Q <sub>1</sub> )	13.95	13.20	13.54	12.68	13.82	13.86
Upper quartile (Q <sub>3</sub> )	15.92	14.73	15.40	14.20	16.54	15.38
Interquartile range	1.97	1.53	1.86	1.57	2.72	1.52
Lower decile (P10)	12.90	12.56	12.56	11.90	13.18	12.57
Upper decile (P90)	16.62	15.28	16.29	14.67	17.70	16.35
(P90) - (P10)	3.72	2.72	3.73	2.77	4.52	3.78

Three observations are suggested by the tables. First, socio-economic differentiation in life expectancies appears to be substantial. Second, among localities of low socio-economic status (and therefore relatively low life expectancies), there was little increase in life expectancy between 1972 and 1983, while large increases were experienced in localities of relatively high socio-economic status levels, which were already characterized by relatively high life expectancies. This means that socio-economic inequality in life expectancies, which was already alarmingly large in the early 1970s, has further increased up to the early 1980s. Third, the pattern of increasing inequality in life expectancy among localities, was more conspicuous for women than for men. While the first and the second observations are subject to analysis in the present article, the third will be analysed in a forthcoming paper.

Can we be sure that our seemingly large socio-economic life-expectation differentials are not simply a consequence of different degrees of death under-registration, of misreporting of locality of residence or other such errors? Could misreporting account for errors that would increase mortality differentials among the localities? There can, of course, be no certainty about the precision of any vital registration system. However, Israel's census data are considered reasonably accurate by international standards, and the possibility of a significant effect of age misreporting by Asian or African migrants has been shown to be minimal (see the section on data and Appendix B). As for the death registration system, it should be noted that no burial can take place without registration, independent of the type of locality. Place of residence, not place of death, is recorded so that the effect of major hospitals being located mostly in large places is unlikely to be serious. We have also attempted to make comparisons of inter-locality differential mortality with other studies of geographic variations. However, no study dealing with such small divisions as those employed in this study could be found in the literature. One study for France uses 'small' divisions of two million on average, half of

Israel's total Jewish population, while another study, for Spain, used divisions of similar size. For these divisions, the differences in life expectancies were around four years (Higueras Arnal 1991; Chauvire 1991; Thumerelle 1991). When we aggregate Israel's population into ten divisions with mean populations of about 400,000, we also have smaller differences of about five years. Allowing for the smaller size of our divisions, the mortality inequalities we find might exist in many other countries.

Table 3 illustrates old-age mortality differentials for several explanatory variables, for 1972 and for 1983. It presents selected characteristics for aggregated units characterized by lower and upper quartiles of life expectancy, both at birth and at age 65. Whereas among the low life-expectancy areas the mean percentages of high income (i.e., EC90) were between 6.0 and 7.0, these percentages for high life-expectancy areas were over 12. Likewise, the table shows that areas of high life expectancies are characterized by large percentages of higher education, large percentages of the labour force in high-status occupations, and high levels of women's participation in the labour force. Religiosity is a complex variable: its effect on life expectancy cannot be seen clearly through these bivariate illustrations and it is excluded from this table. However, the multivariate analyses show that its effect on life expectancy is very significant.

**Table 3**  
**Mean values of selected socio-economic variables for aggregated populations belonging to quartile ranges in life expectancies, 1983 and 1972**

Socio-economic variables	All areas	Areas within quartile range of $e_0$		Areas within quartile range of $e_{65}$	
		Lower quartile (1)	Upper quartile (2)	Lower quartile (3)	Upper quartile (4)
<b>1983</b>					
Mean percentage income within Israel upper decile	10.4	5.7	14.1	6.3	13.4
Mean percentage with 13+ years of formal education at 25-34 age group	36.5	23.8	48.4	22.7	46.6
Mean percentage with 9+ years of formal education at 60-69 age group	42.4	28.8	54.3	28.3	52.8
Mean percentage males with high status occupations	26.2	17.8	33.3	17.6	32.5
Mean percentage women in labour force at age 55-64	31.7	25.5	38.6	24.8	37.2
Mean percentage born in Africa	9.3	14.9	5.4	15.7	6.0
<b>1972</b>					
Mean percentage income within Israel upper decile	10.2	8.6	12.3	7.4	12.2
Mean percentage with 13+ years of formal education at 25-34 age group	19.8	12.3	27.0	11.0	27.0
Mean percentage with 9+ years of formal education at 60-69 age group	28.9	17.3	37.6	15.7	37.8
Mean percentage males with high status occupations	17.2	11.3	23.1	10.9	23.0
Mean percentage women in labour force at age 55-64	20.6	19.0	21.7	16.3	22.1

Mean percentage born in Africa	16.0	31.2	7.5	30.0	7.9
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It can be concluded that socio-economic status, ethnicity, and old-age participation in the labour force, as well as some other variables, reveal associations with old-age mortality. However, these associations are not controlled by other explanatory variables and are re-examined through multivariate analyses.

### **The framework**

The framework for the analyses is illustrated in Figure 1. Primarily, the focus of interest is on the relationship between life expectancy at age 65 — the dependent variable — and socio-cultural explanatory variables. The effects of these explanatory variables on old-age mortality may be assumed to operate through intermediate variables, mainly ‘behavioural’. Food consumption and diets, the amount of smoking, exercise, the rational use of medical facilities, are just a few examples of such variables. Another category of intermediate variables is biological factors, which might intervene, for instance, between ethnicity and mortality. Hence, the socio-economic and culture variables affect, through behaviour characteristics, the cause-specific death rates which in turn determine old-age life expectancies.

While we do have data to express the more important socio-cultural variables, the cause-specific death rate variables and life expectancy at the older ages, we have no information on the intermediate behaviour or biological variables. Hence, the empirical analyses of the interrelationships cannot include explicitly the intermediate variables of the system proposed above. These have been included in Figure 1 just in order to present our analysis in a proper perspective.

**Figure 1**  
**Interrelationships among the major variables**

## **Old-age mortality variations: hypotheses and explanation**

We now attempt to evaluate hypotheses concerning the interrelationships between old-age mortality and the explanatory variables in the system described. Some of these hypotheses are based on previous studies mentioned above. Additionally, in formulating our hypotheses we make use of findings in various socio-demographic studies of Israel's population. Such studies have consistently shown significant interrelationships of demographic processes, not only with socio-economic status, but also with culture variables such as ethnicity and religiosity (e.g., Friedlander and Feldmann 1993).

Do variables such as socio-economic status, ethnicity, and religiosity affect cause-specific mortality and life expectancy at the older ages? The analyses in Tables 4 and 5 present t-statistics of multiple regression coefficients, and multiple correlation coefficients ( $R^2$ ) for 1983 and 1972 respectively, for both males and females. Each line in these tables contains the coefficients of one equation relating to an age group within a cause-of-death category.

A brief glance at these tables provides a summary of their detailed content. There is a high concentration of significant effects on old-age mortality involving a small number of explanatory variables. These include economic and social status, ethnicity and religiosity, which are strongly related to death rates from heart and circulatory and from cerebrovascular diseases. All other explanatory variables are of much less importance in their explanatory power. The mortality patterns related to each explanatory variable are evaluated for 1983, with comparisons to 1972.

### ***The effects of economic and social status levels***

High educational levels in a population may increase consciousness regarding healthier consumption patterns and behaviour in general. Individuals in such populations may refrain from smoking, from consuming high-cholesterol food, or from heavy drinking; the result may be increased life expectancy. Similarly, the consciousness among high-status populations concerning lack of exercise and its effect on heart and circulatory diseases, may lead to change in behaviour and hence to reduced mortality from these causes. On the other hand, such high-status populations have the potential for more consumption in general, including unhealthy consumption.

Another behavioural aspect depending on the levels of socio-economic status, which may affect mortality rates, is the extent to which health services are consumed in a rational manner. It is well known that the use of private medical services has increased substantially in recent years, as the public services can no longer cope effectively with increasing demand. The costs of these private services, particularly of the more sophisticated procedures, which are often used at old ages, have increased exponentially. Such services can be used more extensively by high-status populations which could in turn lead to additional years of life expectancy. Such relationships with overall mortality have been explored in previous studies (McMichael 1985; Pagnanelli 1991; Powell-Griner and Rosenberg 1991).

To test the validity of the status hypothesis we attempt to find out whether and to what extent socio-economic status levels are negatively related to old-age mortality and positively related to life expectancy at age 65. One problem in this analysis arises from the interdependence between economic and social status which is in some instances quite strong. Indeed, in some analyses in the present study such interdependence prevents the simultaneous inclusion of these two explanatory variables in the same analysis.

**Table 4a**

**t- statistic of regressions of various explanatory variables on cause standardized death rates and life expectancy at age 65, males 1983<sup>a</sup>**

Dependent variables: life expectancy and causes of death by age		Explanatory variables								
		Economic status	Social status (education)	Ethnicity (Africa)	Religiosity	Labour participation	Proximity	Loneliness	Industry	R <sup>2</sup>
Life expectancy at age 65		3.993***		-4.022***	4.606***					0.588
Heart and circulatory	65-69			2.167***	-2.581***					0.133
	70-74	-1.631*			-3.915***					0.192
	75-79			2.521***	-2.302***					0.138
	80 + b	-2.942***	Not in model		-3.065***			1.730**		0.292
	65-79b	-2.203***			-4.165***					0.219
	65+b	-3.776***			-4.720***					0.301
Cerebro-vascular	65-69	-2.431***								0.083
	70-74		-1.914**			-3.209***		-1.550*		0.412
	75-79		-2.649***	1.959**						0.332
	80 + b	-1.656***		2.281***		Not in model		3.735***		0.376
	65-79b		-3.099***			-2.039***			2.064***	0.517
	65+b		-2.332***	3.210***				2.413***		0.565
Cancer	65-69			1.916**	-2.111***					0.100
	70-74	-1.541*			-2.736***					0.109
	75-79									c
	80 + b									c
	65-79b				-2.735***			2.171***		0.162
	65+b		Not in model		-2.727***			1.764**		0.143
Infectious	65-79b			1.609*	-1.477*	-1.965**	Not in model		Not in model	0.203
Others	65-79b		-2.436***	4.638***		-1.998***				0.674

<sup>a</sup> Significance: \*\*\*=5%; \*\*=10%; \*=15% <sup>b</sup> Standardized <sup>c</sup> No equation

**Table 4b**

**t- statistic of regressions of various explanatory variables on cause standardized death rates and life expectancy at age 65, males 1972<sup>a</sup>**

Dependent variables: life expectancy and causes of death by age		Explanatory variables							R <sup>2</sup>
		Economic status	Social status (education)	Ethnicity (Africa)	Religiosity	Labour participation	Proximity	Loneliness	
Life expectancy at age 65			1.715**	-5.973***					0.658
Heart and circulatory	65-69	Not in model						1.468*	0.113
	70-74								0.078
	75-79								0.052
	80 + b		-1.801***						c
	65-79b			1.843**	-2.621***				0.130
	65+b	Not in model		2.363***	-2.647***				0.156
Cerebro-vascular	65-69	-2.246***	Not in model	3.578***					0.179
	70-74			3.373***	-1.672**				0.306
	75-79			1.688**					0.046
	80 + b		-2.319***		Not in model		1.914**	0.117	
	65-79b			5.279***					0.322
65+b			5.747***					0.364	
Cancer	65-69								c
	70-74				-1.745**	Not in model			0.049
	75-79								c
	80 + b								c
	65-79b				-2.720***				0.113
65+b				-2.150***				0.074	
Infectious	65-79b	-2.138***							0.071
Others	65-79b		-3.664***		-1.931**	-3.131***			0.421

<sup>a</sup> Significance: \*\*\*=5%; \*\*=10%; \*=15% <sup>b</sup> Standardized <sup>c</sup> No equation

**Table 5a**

**t- statistic of regressions of various explanatory variables on cause standardized death rates and life expectancy at age 65, Females 1983<sup>a</sup>**

Dependent variables: life expectancy and causes of death by age		Explanatory variables								
		Economic status	Social status (education)	Ethnicity (Africa)	Religiosity	Labour participation	Proximity	Loneliness	Industry	R <sup>2</sup>
Life expectancy at age 65		2.511***	2.596***	-2.232***	4.078***					0.629
Heart and circulatory	65-69			4.390***	-1.525*					0.241
	70-74	-1.828**	-1.791**	1.528*	-2.110***					0.438
	75-79		-4.275***							0.220
	80 + b	-4.219***			-3.197***					0.248
	65-79b		-3.402***	1.932**	-1.643*					0.418
	65+b	-2.349***	-2.173***		-2.412***			-1.468*		0.424
Cerebro-vascular	65-69		-2.065***			-1.493*	1.791**			0.334
	70-74			5.262***				2.078***		0.463
	75-79	Not in model	-2.936***	2.075***	-2.278***					0.391
	80 + b		-2.373***	2.650***	-1.634*					0.385
	65-79b		-2.302***	3.531***	-1.693*	-1.762*		-1.544*		0.594
	65+b		-2.589***	3.284***	-2.329***	-1.516*				0.565
Cancer	65-69				-1.921**	3.585***				0.245
	70-74				-2.171***					0.067
	75-79			-2.114***	-2.029***					0.136
	80 + b									c
	65-79b									c
	65+b				-3.537***	1.885**	-1.724**			0.301
Infectious	65-79b		-1.561*			1.958*	2.138***			0.364
Others	65-79b	-3.324***		2.345***			2.605***	-1.512*		0.642

<sup>a</sup> Significance: \*\*\*=5%; \*\*=10%; \*=15% <sup>b</sup> Standardized <sup>c</sup> No equation

**Table 5b**

**t- statistic of regressions of various explanatory variables on cause standardized death rates and life expectancy at age 65, Females 1972<sup>a</sup>**

Dependent variables: life expectancy and causes of death by age		Explanatory variables							R <sup>2</sup>
		Economic status	Social status (education)	Ethnicity (Africa)	Religiosity	Labour participation	Proximity	Loneliness	
Life expectancy at age 65			2.424***	-4.295***					0.573
Heart and circulatory	65-69		Not in model	4.229***		Not in model		-2.258***	0.354
	70-74			2.649***		Not in model			0.111
	75-79		-1.679***						0.048
	80 + b								c
	65-79 <sup>b</sup>			3.341***				-2.233***	0.282
	65+ <sup>b</sup>			3.259***				-2.245***	0.276
Cerebro-vascular	65-69			5.098***		-1.485*			0.463
	70-74	-1.930***		4.982***					0.434
	75-79		-2.595***				-1.790***		0.219
	80 + b			2.216***					0.080
	65-79 <sup>b</sup>		-2.701***	3.652***					0.535
65+ <sup>b</sup>		-2.824***	4.167***					0.581	
Cancer	65-69								c
	70-74			-1.802***					0.054
	75-79								c
	80 + b								c
	65-79 <sup>b</sup>								c
65+ <sup>b</sup>								c	
Infectious	65-79 <sup>b</sup>	-2.387***				Not in model			0.094
Others	65-79 <sup>b</sup>	-2.204***		4.025***			-1.925**	Not in model	0.453

<sup>a</sup> Significance: \*\*\*=5%; \*\*=10%; \*=15% <sup>b</sup> Standardized <sup>c</sup> No equation

Considering first the 1983 patterns, we find that status variables have significant explanatory power in the analysis of death rates from heart and circulatory diseases, from cerebrovascular and all other causes, for both males and females (see Tables 4-5). More specifically, for both the 65-79 and the 80 and over age groups, the economic status and the social-status variables affect these death rates negatively. Moreover, there is a negative effect of economic or social status on male death rates from cancer at the 70-74 age group, which however is not highly significant; and there are significant effects of status on death rates from all 'other causes'. Finally, our analysis shows that the effect of economic status is significant and positive in the equation of life expectancy at age 65 for males, while for females, both the economic and the social-status variables are significant. Hence, there is strong evidence to support the hypothesis that economic and social-status levels are negatively associated with death rates at the older ages and positively associated with life expectancies at age 65. The interrelationship between status and death rates from heart and circulatory diseases is of particular importance since this category by itself accounts for about half of old age mortality: the status inequalities in society play an important role in its mortality patterns.

Comparison to 1972 shows some similarity, particularly in the effects of status on death rates from heart and circulatory as well as from cerebrovascular diseases. It can be seen however that status was not as dominant in explaining death rates and life expectancy in 1972 as it was in 1983. Tables 4 and 5 suggest that during the period 1972-1983 there was a shift in the explanation of death rates and life expectancy from ethnicity to socio-economic status.

### ***The effect of ethnicity on old-age mortality***

The ethnic composition of a community may affect death rates and life expectancy even when other major variables, particularly socio-economic status, are controlled; ethnicity may have an impact on survivorship through various intermediate biological and behavioural variables. For example, genetic factors associated with the susceptibility to some diseases may be associated with ethnicity. Ethnicity may imply cultural characteristics connected with diets, and other activities or modes of behaviour, which may be related directly or indirectly to the risk of mortality from specific causes. Some evidence to the effect of ethnicity on mortality can be found in the literature (e.g. Keith and Smith 1988; Powles 1989).

It was stated in a previous section that micro-level analyses of ethnic differences in mortality have been undertaken in the past, although socio-economic variables could not be controlled (Peritz et al. 1973, 1983). The analyses have shown that North African ethnicity is negatively related with survivorship at most ages; on the other hand, Asian ethnicity has no such effect. Our analytic question is whether, and to what extent, these ethnicity variables affect old-age mortality, when socio-economic variables are controlled. The regressions for 1983 in Tables 4 and 5 show that African ethnicity affects life expectancy negatively through significantly higher death rates from heart and circulatory diseases, and in particular from cerebrovascular and 'other' causes at the oldest age groups, for both males and females. As mentioned earlier, the association of African ethnicity with mortality from cerebrovascular diseases was hypothesized to have a genetic explanation, but the present study cannot contribute towards its validation.

Tables 4 and 5 present similar regression coefficients for 1972. It has been argued that ethnicity, as defined by Asian, African or European origin, has been a major determinant of mortality, as well as of other demographic processes, since the early 1950s. However, with the increased exposure of Asian and African immigrants to Israeli society the importance of ethnicity as a determinant of mortality has declined. In particular, evidence from several sources has shown that the negative impact of Asian origin on life expectancy has decreased significantly since the early 1950s, and our analysis shows that it was virtually eliminated by

the early 1970s. In contrast, the negative association between African origin and life expectancy has remained, although a decline is noticeable during the 1970s, while status and religiosity variables became increasingly influential. Hence, as was found by Peritz and colleagues (1973; 1983) ethnicity still has a significant independent effect on old-age mortality. Our data are insufficient for further interpretation of these results.

### ***The effect of religiosity on old-age mortality***

Is religiosity likely to affect survivorship at the older ages, when social and economic status variables are controlled? The existence of such an effect has been established among Jews in the United States (Idler and Kasl 1992). A negative relationship between religiosity and the incidence of myocardial infarction has been observed in Israel (Snyder et al. 1978). The interrelationship between religiosity and survivorship operates through intermediate behavioural variables. Religiosity involves behaviour and life style, which include a variety of familial as well as community activities, particularly at the older ages. Frequent visits to the synagogue for various religious activities, work with communal mutual aid organizations, and other voluntary activities may be assumed to provide purpose and moral strength at old age, which may contribute to higher life expectancies. While such extrafamilial activities are more frequent for males, females' activity is more concentrated around the wider family and the household. It would indeed be interesting to find out whether the positive effect of community activities, such as can be found among religious groups, on life expectancy, is valid in general, when other variables are controlled. Unfortunately, this cannot be done in the present study.

The relationship between religiosity and life expectancy at the older ages is somewhat complex. On the one hand, it is inversely related with both economic and educational levels, which in turn are positively related with life expectancy. On the other hand, religiosity levels are positively related with life expectancy, through life-style characteristics, which we are unable to measure (see also the section on recursive models).

It can be seen in Tables 4 and 5 that, for males, the religiosity variable is consistently negative, particularly for heart and circulatory diseases, but also for cancer and infectious diseases. Among females, religiosity also affects negatively the death rates from heart and circulatory diseases and from cancer; however, unlike the regression for males, religiosity also affects negatively the death rates from cerebrovascular diseases. Moreover, religiosity has the highest T value in the life expectancy equation (at age 65) for both males and females.

Can we find similar religiosity effects on old-age mortality in 1972? These tables provide comparisons to 1983, and suggest that such effect was not as systematic for males, and was not significant at all for females. However, we cannot offer an interpretation to the change in this effect during the period 1972-1983. Nevertheless, by the evidence of the data presented, we accept the religiosity hypothesis and consider its interrelationship as one of the more interesting observations in this study.

### ***Old-age mortality and other variables***

We are left with the remaining three variables, loneliness (defined in terms of marital status), industry and participation in the labour force. We deal with all these three variables in this section because their interrelationships with old-age mortality are less consistent than the variables in the previous hypotheses.

The loneliness hypothesis has been considered in previous studies. It has been repeatedly observed that non-married persons, that is, those of single, divorced, or widowed status, have higher probabilities of dying compared with the married. Part of the explanation is

'selectivity' while part is 'protective' (Spiegelman 1968: 91-92; Hu and Goldman 1990; Powell-Griner and Rosenberg 1991).

Our aggregate level analyses in Tables 4 and 5 suggest that the hypothesis that life expectancy at age 65 is negatively related with this variable, is not supported for males at either period; however, the loneliness variable for females shows some consistent relationships with mortality. But a more appropriate individual-level analysis published recently, which is partly consistent with our findings, shows that unmarried persons are disadvantaged in life expectancy in Israel in general: particularly widowers (Eisenbach 1994).

Another hypothesis is concerned with the relationship of old-age mortality, particularly from cancer, with the industry variable. A positive relationship should be expected. Table 4 suggests that such expected relationships are significant for males and only in some cause-of-death and age categories. For example, the industry variable has a significant positive effect on the male death rate from cancer at the 65-79 age group, which is consistent with expectation. The industry variable also affects the death rate from heart and circulatory diseases at the 80-and-over age group, and the death rate from cerebrovascular diseases. This interrelationship seems to be a new phenomenon, as we do not find it for 1972; it may reflect an increase over time in environment problems.

Our last hypothesis is concerned with the rate of old-age participation in the labour force. This variable was considered to represent a proxy for extrafamilial activity at the older ages, but has also an income effect. It is hypothesized to have a positive effect on life expectancy and negative effects on cause-specific death rates. It has in addition a qualification that healthier people tend to be more active economically. Table 4 suggests that this variable is negatively related with the death rate from cerebrovascular diseases among both sexes, and from infectious and 'other' diseases at the 65-79 age group for males, while its other coefficients are positive and contrary to the hypothesis. We must conclude, therefore, that this hypothesis has little support in this study.

Another hypothesis which was considered at the early stages of this project is concerned with the geographic proximity of place of residence to major units of specialized medical services. The three major cities in the country offer such specialized medical services: the distance from each locality to the closest of these cities was considered as a proxy variable for the accessibility of the population to such medical services. Controlling for status and ethnicity variables is of critical importance in testing this hypothesis because these explanatory variables tend to be associated with distance from the three major cities.

We expected strong positive relationships between proximity and the cause-specific death rates, particularly heart diseases for which distance and time are critical. However, our analysis shows that the effect of proximity was insignificant whenever status and ethnicity were controlled.

### **The increase in life expectancy 1972-1983: different patterns**

In the discussion concerning the inequality in old-age mortality (see Table 2), it was suggested that an increase in inter-locality differentiation in life expectancy at age 65 occurred in the period 1972-1983. In particular, localities with relatively low life expectancies in 1972 seemed to have experienced only slight increases in life expectancies, if any, particularly among women. Table 6 provides the interpretation for that pattern. It shows unequivocally that when other variables are controlled, the increase in life expectancy 1972-1983 is inversely related with its initial level and with African ethnicity, while it is positively related with status and religiosity. Hence, localities with small proportions of high income earners or with high proportions of population of African ethnicity, experienced small increases in life expectancy during 1972-1983, despite being located at the lower part of the 1972 life expectancy distribution. Almost all these localities are new towns, as shown in the

lower part of Table 2. This pattern explains the increase in the inequality in life expectancy during that period.

**Table 6**  
**t statistics of regression coefficients of various explanatory variables on differences in life expectancies 1972-1983, at age 65**

Explanatory variables	Males		Females	
	t	Significance	t	Significance
Initial life expectancy $e_{65}$ , 1972	-4.261	.0001	-2.958	.0047
Religiosity	+2.665	.0103	+3.343	.0016
African ethnicity	-1.919	.0605	-2.190	.0330
Social status (education levels)	+2.508	.0153	+1.776	.0819
$R^2$		0.325		0.316

### The analysis of life expectancy at age 65 through a recursive model

We now propose to explore more complex interrelationships, through a system of structural equations using recursive models. Such models may provide a clearer interpretation of the interrelationship structure among the dependent and the explanatory variables. They enable the distinction between direct and indirect effects of the explanatory variables on the dependent variable, life expectancy, under the assumptions specified below. For example, the observation that the population of African ethnicity has experienced higher mortality levels for many years, was interpreted in terms of a possible ethnic-genetic factor (see Tables 3-5; Peritz et al. 1973, 1983). On the other hand, it has also been shown that socio-economic status has a dominant negative effect on life-expectancy levels. The analytic question we pose is whether, and to what extent, the higher 'African mortality' is related to the direct ethnic effect, or to the lower level of socio-economic status among this ethnic group: the indirect effect.

These models are estimated under the assumption that the variables in the system can be arranged hierarchically in terms of their causal priorities. This assumption implies that ethnicity and religiosity may affect all other variables in the system, but these cannot affect ethnicity and religiosity. Education may affect life expectancy, but this cannot affect education, or other variables in the system. In addition, it is assumed that the error terms of the equations are uncorrelated. These assumptions allow the estimation of the regression coefficients of the proposed model through ordinary least square methods (e.g., Wonnacott and Wonnacott 1970; Blalock 1971; Johnston 1987). Since the present analysis does not use information on cause of death it is possible to use the 600 smaller units.

The following structural equations are estimated under these assumptions, and describe the hypothesized interrelationship system between life expectancy at age 65 and the explanatory variables among men and women:

$$ED_{9.60} = A_{ed} + B_{ed,et}ETAF + B_{ed,re}REL + e_{ed}$$

$$E_{65} = A_e + B_{e,et}ETAF + B_{e,re}REL + B_{e,ed}ED_{9.60} + B_{e,lo}LON_{70} + e_e$$

where  $A_{ed}$ ,  $B_{ed,et}$ ,  $B_{ed,re}$ , and  $e_{ed}$ , denote the constant term, the regression coefficients of ethnicity and of religiosity, and the residual error term, respectively, of the education dependent variable  $ED_{9.60}$ .  $A_e$ ,  $B_{e,et}$ ,  $B_{e,re}$ ,  $B_{e,ed}$ ,  $B_{e,lo}$ , and  $e_e$  denote the constant term, the regression coefficients of ethnicity religiosity and of loneliness, and the residual error term, respectively, of the life-expectancy dependent variable at age 65,  $E_{65}$ .  $ETAF$ ,  $REL$ ,

ED<sub>9,60</sub>, and LON<sub>70</sub> are the explanatory variables of these equations as defined above. The structural equations for women are similar.

Figures 2 and 3 show the main results of these analyses for men and women respectively. The numerical values above each arrow in these figures represent the t statistics of the appropriate regression coefficient.

Beginning with the analysis for men, it can be seen that African ethnicity affects life expectancy both directly, and indirectly. The indirect effect of African ethnicity on life expectancy operates through the educational level: social status. African ethnicity affects the social status variable negatively, and social status affects life expectancy positively. African ethnicity has, therefore, a negative indirect effect on life expectancy through the status variable. Furthermore, the direct effect of African ethnicity on life expectancy is also negative. This is the ethnicity effect discussed in an earlier section, which might be genetic, as hypothesized in a previous study (Peritz et al. 1973, 1983), or behavioural, or both. The structural equations enable the calculation of the relative strength of the direct and the indirect effects of African ethnicity. For example, a difference of ten per cent in African ethnicity between localities implies a difference of about ten months in life expectancy at age 65. About eight and a half months of these are due to the direct effect.

As for the religiosity variable for men, its indirect effect on life expectancy is negative, but quite small. This may be referred to as the socio-economic effect of religiosity on life expectancy at age 65. However, the direct effect of religiosity on life expectancy is positive. This may be interpreted as the religious 'life-style' effect that has been discussed above. Again, the relative strength of the direct and the indirect effects of religiosity can be calculated. For example, a difference of ten per cent in religiosity between localities implies a difference of about two and a half months in life expectancy at age 65. While the direct effect is positive and amounts to almost three months, the indirect effect is negative and small.

**Figure 2**  
**Recursive model: male life expectancy at age 65 ('t' statistic for variables in structural equations shown above arrows)**

Figure 3 presents the regression coefficients of the recursive model for women. Again, both the indirect (socio-economic) and the direct ethnicity effects are negative. Religiosity, on the other hand, has an indirect negative effect on life expectancy through education, and a positive direct effect. In contrast with the analysis for men, the indirect effects of both ethnicity and religiosity are stronger than the direct effects. For example, a difference of ten per cent in African ethnicity between localities implies a difference of about 14 months in life expectancy at age 65. About nine months of these are due to the indirect (socio-economic) effect. A difference of ten per cent in religiosity between localities implies a difference of one month in life expectancy at age 65. This difference is the result of a negative indirect effect of two months and a positive direct effect of one month. One interpretation for the strong negative socio-economic effect of ethnicity on women's life expectancy may be a low level of consciousness regarding their health condition. The finding of a strong indirect socio-economic effect of religiosity on women's life expectancy is consistent with the hypothesis that women benefit less than men from the advantages of a religious lifestyle.

**Figure 3**  
**Recursive model: female life expectancy at age 65 ('t' statistic for variables in structural equations shown above arrows)**

## **Summary and conclusion**

The decline in old-age mortality is a new demographic process. Indeed, up to the 1970s there was hardly any increase in life expectancy at age 65 in the country as a whole. Old-age mortality data for other developed countries show a similar pattern.

Our analysis has documented very large differences among geographic areas in both overall and old-age mortality levels. These mortality inequalities, across subpopulations in a country with highly subsidized health services, with relatively small numbers of homeless or hungry, led us to attempt to explain inter-locality variations in cause-specific death rates and life expectancies at age 65.

A comparison of old-age mortality from the early 1970s to the early 1980s shows an overall increase in life expectancy. However, while life expectancy increases in localities characterized by high status levels, mostly with high initial life expectancies, were relatively large, increases for localities with low socio-economic status, mostly with relatively low initial life expectancies, were small. Hence, the socio-economic inequality in longevity increased during that period in general, even more strongly among women.

Death rates from heart and circulatory diseases account for about half of old-age mortality. Our analysis suggests that large proportions of people with high socio-economic status, high proportions of religious people and low proportions of population of African ethnicity are associated with low death rates from these diseases. Contrary to expectations, close proximity to major medical centres was not found to be a significant determinant of low mortality levels from heart and circulatory diseases, when socio-economic status and ethnicity are controlled.

Cancer makes a much smaller contribution to old-age mortality, less than 20 per cent, and its explanation, in general, is not as good as for heart and circulatory diseases. Indeed, the analysis for women, in particular, provided poor explanation. However, for men, high levels of socio-economic status and large proportions of religious people are associated with low rates of cancer mortality, while high proportions of the labour force in industries are associated with high cancer mortality in localities.

Hence, viewing the overall patterns of our results, we can confirm that socio-economic status, African ethnicity and religiosity are the major variables explaining inter-locality differences in old-age mortality. Among these, the socio-economic status levels are the most important, especially at the more advanced ages.

Localities with high proportions of population of African ethnicity have relatively low life expectancies both due to lower socio-economic levels, and because this ethnic group has a specific negative effect on life expectancy, genetic or behavioural. In contrast, it is interesting to note that Asian ethnicity has no direct or indirect negative effect on life expectancy at the older ages.

Our analyses suggest that localities with relatively high proportions of religious people are subject to two forces operating in opposite directions on life expectancy levels. The negative force is due to the relatively lower socio-economic status among the religious section of the population. The positive force is connected with the life style of the religious population.

Is there a lesson that can be drawn from these findings? Can these be a basis for a policy to increase the life expectancy of the society at large? It is obviously impossible to equalize socio-economic status levels among ethnic groups or among other kinds of population subgroups. Equally, the population at large cannot be expected to adopt a religious life style which could, according to our analysis, lead to increased life expectancy. These rather naive statements are made to draw attention to the structure of the initial framework discussed earlier in this paper. What is needed is research that can shed light on the intermediate variables between socio-economic and cultural variables on the one hand, and old-age

mortality from the different causes of death, on the other. Indeed, a contribution might be made by a better understanding of the mechanisms under which variables such as ethnicity, the level of social or economic status and the life style of religious people affect the death rates from major causes. This could make it possible to design policies that will lead to increases in overall life expectancies without inconceivable revolutionary changes in the structure of society.

### **Appendix A: constructing life tables in small local areas**

Estimates of life table functions may be inaccurate for small populations, such as those in statistical areas. Hence, the smaller statistical areas were aggregated. These aggregates are referred to as small local areas.

The full enumeration of both the 1983 and the 1972 Population Censuses provided the mid-year populations by age and sex. The distribution of deaths by age and sex was extracted from vital registration data for five years.

Statistical areas were aggregated into small local areas under the constraint that sub-quarter borders were not crossed, and with a preference for joining areas with similar socio-economic characteristics. Small settlements such as *kibbutzim* and *moshavim* were aggregated within subdistricts (*nafoth*) by type of settlement.

Using the population data from the full enumeration of the Census and the number of deaths from registration data we computed age-specific mortality rates. We used the Reed-Merrell method of life table construction (Shryock and Siegel 1973:443-444).

### **Appendix B: the accuracy of the reported age structure**

Birth registration in the State of Israel is considered to be accurate and complete. However, a possible source for deviations from the true age structure of death rates may be the incorrect registration of the age of new immigrants upon their arrival.

Many Israelis were born in countries in Asia and Africa. It is common in less developed countries for the elderly to overstate their ages: consequently, mortality levels may be underestimated among the elderly. The purpose of this appendix is to detect the presence of age-overstatement.

If the real age of a cohort is less than its reported age, we would expect the cohort's mortality level to be relatively low over time. Thus, we should be able to observe a cohort effect on mortality due to the initial age-overstatement; for real cohort effects see for instance Preston and van de Walle (1978); Anderson and Silver (1989); Caselli and Capocaccia (1989).

We assume that the people born in Europe or America tend to report correct ages compared with those born in Africa or Asia. Hence, we used ratios of the age-specific mortality rates for African and Asian Jews relative to those for European and American Jews for each age group above age 40 to detect age-overstatement. Our comparison reveals that mortality patterns among Asian men are closest to those of Europeans and Americans, followed by Asian women, African men and African women, in that order.

If age-overstatement were common, we would expect these ratios to decline with age. Ratios for older men and women born in Africa, however, show no such decline. Hence, we found no evidence of age-overstatement among Asian or African Jews. Thus, old-age mortality is unlikely to have been underestimated. The rising ratios of African mortality rates relative to those of Europeans and Americans are consistent with the findings in this paper regarding the effect of ethnicity.

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## **The negotiating strategies determining coitus in stable heterosexual relationships\***



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### **Abstract**

**Heterosexual behaviour is a complex subject and one which is aggravated by confounding variables. Few studies have investigated the way in which one variable, namely coitus, is initiated and negotiated in stable marital relationships. As the HIV/AIDS pandemic spreads in sub-Saharan Africa, the subject of marital coitus becomes of increasing concern. This study tests a methodology of semi-structured interviews and diary-keeping techniques to investigate how the activity is initiated and negotiated. A research team monitored the study and evaluated the research techniques. The study concluded that the HIV/AIDS pandemic is affecting the initiation and negotiation of coitus between marital partners and that the partners wish to renegotiate the relationship, but the mechanisms for renegotiation are not at present available.**

In the second decade of the HIV/AIDS pandemic certain trends have become noticeable. In developed countries the main HIV high-risk groups are intravenous drug users and homosexuals, while in developing countries, particularly sub-Saharan Africa, the main transmission routes are through perinatal and heterosexual activity. Heterosexual behaviour has been recognized as a transmission route since 1987 and studies which investigated it have tended to focus upon prostitution. Sexual networking has also been investigated in West Africa and it is an important determinant in the transmission of the virus (Caldwell et al. 1993). But these approaches tend to ignore heterosexual behaviour between couples in stable relationships, and as the pandemic continues to spread in sub-Saharan Africa, this is an area which is increasingly worthy of investigation.

Heterosexual behaviour is a complex subject, but one which can be investigated despite its complexity. Part of the complexity stems from the number of variables involved and this study seeks to isolate one specific variable, namely coitus, and focus upon the way in which it is initiated and negotiated between marital partners.

A qualitative methodology which uses semi-structured interviews and diary-keeping techniques, as complementary research instruments, is worthy of evaluation. Using this methodology the fieldwork is described and the findings discussed. With a better understanding of how coitus is initiated and negotiated it is possible to design intervention programs which will give marital partners new interpersonal skills, and, it is hoped, an increased sense of control.

The subject of sexual behaviour is not well understood, partly because of its complexity. Part of the complexity stems from the number of variables which include social, biological,

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\* The authors gratefully acknowledge the grant provided by the Network of AIDS Researchers in Eastern and Southern Africa (NARESA) which made this study possible.

economic and psychological factors that act independently, or in combination, and compound attempts to understand it. This study isolates one specific variable of the complicated mosaic, namely coitus, because its importance is a major transmission route in the AIDS pandemic.

It is estimated that 80 per cent of the world's HIV/AIDS cases live in sub-Saharan Africa (AIDSTECH 1991) where the main route of HIV infection is heterosexual activity; it is estimated that 80 per cent of infections occur in this way (Piot et al. 1988). Kenya, with a population of 24 million, is typical of the subcontinent and is the country selected for this study; it has a strong epidemic of recent origins with an eight per cent seropositivity rate (Way and Stanecki 1994). The epidemic has now been recognized as a nationwide concern and it has been written into the national development program. The two most common transmission routes are perinatal and heterosexual activity and both of these are associated with high-risk sexual behaviour.

Nairobi, which is the specific site for this investigation, is the capital of Kenya and has a population of approximately one-and-a-half million; the population has grown as people leave the rural areas for the urban centres in the search for paid employment. It is a multi-ethnic city, although some people have been resident for so long they no longer acknowledge their ethnic origins; indeed, some regard themselves as Kenyan rather than having any ethnic affiliation, and tribal origin is no longer an accurate predictor of social behaviour. To date, investigations in the region have tended to concentrate upon the commercial sex industry which includes high-risk groups such as prostitutes, lorry drivers and military personnel (Ngugi, Plummer and Simonsen 1988; Bwayo et al. 1991; Winsbury 1992). Commercial sex is invariably negotiated around the price, which is largely determined by risk. Prostitutes can bargain for a higher price when the risks are greater, for example, when the customer does not want to wear a condom. The costs and benefits are known, the negotiating behaviour is open and accessible. However, non-commercial sex is becoming increasingly important as a transmission route, particularly between marital partners. It is generally accepted that behaviour change is the most effective means of combating the spread of AIDS and also the virulence of the virus (Ewald 1993).

There is a popular belief that sexual activity in sub-Saharan Africa is the domain of the man, who expects coitus to be available on demand (Gwede and McDermott 1992). While this belief exists, there is little documentation to substantiate it, and it may be somewhat simplistic; indeed, in West Africa studies have found that the behaviour of women who engage in extramarital sex is largely condoned (Caldwell, Orubuloye and Caldwell 1991). The belief is further complicated by the fact that coitus is ubiquitous, highly conditioned by tradition, and particularly private (Smith, Helitzer-Allen and Obetsebi-Lamprey 1990). These factors confound attempts to investigate coitus; the strategies which marital partners use to initiate and negotiate it have not been clearly identified, and because the subject is essentially private it is not normally discussed (Balmer 1991). Studies which have investigated conversations between marital partners have found that sexual behaviour, fertility and contraception were not included (Makomva, Falala and Johnston 1991).

The literature concerning the initiation and negotiation of coitus is rather sparse. Some general surveys of sexual behaviour have been completed, most of which have relied upon questionnaires (Kinsey, Pomeroy and Martin 1948; Masters and Johnson 1970). The same approach has been used in AIDS surveys in sub-Saharan Africa (Carael et al. 1991; Cleland et al. 1992), although some studies have supplemented questionnaires with interviews (Orubuloye, Caldwell and Caldwell 1991). Anonymous questionnaires are useful in gaining sensitive data, but are best used once the variables have been identified, and while they have the advantage of anonymity and can be administered to large sample sizes, they have the possible disadvantage of obscuring individual differences. What seems to be missing from the data is any in-depth study of how heterosexual behaviour is initiated and negotiated between stable heterosexual partners in the privacy of their homes. Privacy appears to be another

factor which is difficult to surmount and so far studies have concentrated upon public behaviour.

Some specific studies of sexual behaviour have used techniques such as story completion: romantic vignettes were given to college students and they were asked to complete the sketch (Perper and Weis 1987). This technique depends upon a rational response and is somewhat hypothetical. It tends to ignore that two people actively participate and that sexual behaviour can be irrational, impulsive and dominated by emotional feelings which are difficult to control. Observational methods have also been used, but these have been restricted to courtship behaviour in social settings (Moore 1985) and much of the information generated concerned non-verbal behaviour. However, there was no attempt to discover if the courtship behaviour ended in coitus. This observational method would be inappropriate for this study.

At this preliminary stage of investigation into heterosexual behaviour between people in stable relationships there seems to be merit in an idiographic approach based upon qualitative methods: the methods chosen for this study are semi-structured interviews and diary-keeping techniques. The techniques have proved to be effective: semi-structured interviews have been commonly used in qualitative studies (Hammersley and Atkinson 1983), and diary-keeping techniques have been used in medical settings (Robinson 1971). Diary-keeping affords the possibility of gaining access to naturally occurring sequences of sexual behaviour which are otherwise covert (Coxon 1988). Diaries have been shown to be more effective than questionnaires (Conrath and Higgins 1983), while using both diaries and interviews has provided the most reliable and accurate data (Zimmerman and Wielder 1977).

## **Methodology**

Because the methodology adopted is qualitative and experimental, it was decided to restrict the sample to ten men and ten women. It is accepted that the small sample size limits the generalizability of the results, but this was tolerated for logistical reasons. The sample was drawn from the population of people in stable marital relationships which had lasted for more than one year. The sample was drawn from family planning clinics, social service centres and health centres in Nairobi. People who presented at the centres were referred and the aims and methodology were outlined and discussed. The prospective subjects were advised that the study would run for three months and that they would be required to keep a diary of their sexual activities, also to participate in one-hour weekly semi-structured interviews, which would be tape recorded. They were further advised that a payment of approximately US\$2 would be made each session to cover transport and any other incidental expenses incurred. The payment was obviously an inducement, but given their transport costs they were unlikely to make a financial return. There is no indication that it unduly affected the research process and indeed the participants who dropped out were unemployed and in greatest financial need.

If the candidates wished to participate they were asked to return one week later to be enrolled. Then guarantees of confidentiality and anonymity were given. The place for the study was a family planning clinic and access was from a busy main street where people could enter without attracting attention. Thirty three people were interviewed to draw a sample of 20. Of the 13 who refused the following reasons were given: the fieldwork was scheduled during working hours and this was not convenient; some people were highly mobile, travelling constantly between urban centres and rural areas, and regular attendance could not be guaranteed; two people said that the study was too intrusive. The sample consisted of men and women aged 23 - 47 years (mean 31), who had been married to their present partners for 1 - 15 years (mean 6.5), and all had children. They were mainly from lower socio-economic groups. Given the precariousness of employment and the absence of career paths it is difficult to generalize about the participants' social class and whether it had any implications for behaviour. The participants had all benefited from primary school

education and one third had been educated at secondary school, so it was possible to infer a reasonable standard of literacy. Only four were in permanent employment, five had casual jobs and the rest were either housewives or active in roadside kiosks. No formal data were collected about participants' spouses.

Four facilitators were used, two male and two female: one social worker, one medical educator and two university researchers. The facilitators were selected on the basis of present employment, maturity, and the ability to form relationships characterized by genuineness, empathy and warmth. The facilitators were trained in the research techniques to standardize the intervention. The subjects were randomly assigned to one of the male or female facilitators on the basis of sex and number; the facilitators had a sample of opposite and same-sex participants to control for gender bias, as in the following table.

<b>Facilitator</b>	<b>Participants</b>
1 Male	3 Males and 2 Females
1 Male	2 Males and 3 Females
1 Female	3 Males and 2 Females
1 Female	2 Males and 3 Females

Once a participant had been assigned to a facilitator the arrangement was not altered; this worked well and confidential and trusting relationships were soon established. Participants were given convenient weekly appointments which were maintained throughout the three months of the study. On a few occasions participants turned up at the wrong time but in these cases they were seen by the co-ordinator; it was emphasized that they should keep to the appointed times. There was no perceptible difference in the relationships where the sexes were mixed between participants and facilitators; the information which was disclosed was generally similar and therefore it was concluded that there was no gender bias. Attendance was good but some participants missed sessions. Occasionally it became apparent during a session that the participants would not be able to make the following session, and an arrangement was made for an alternative time. Engaging the participants in the decision appeared to encourage a greater degree of commitment. Where absence was unavoidable the participant was encouraged to complete the diary for two weeks and submit both diaries the following session. Only three of the sample dropped out during the three months and there did not appear to be a definite reason. The process began when they missed sessions; although when their absence was mentioned at the following session they gave assurances of continued interest and participation, the number of absences increased until they failed to attend at all.

A research team, comprising a co-ordinator, research assistant, the four facilitators, a sex therapist and a secretary, was constituted to monitor and evaluate the study: this was done through the process of triangulation and respondent validation. Triangulation refers to the comparison of data relating to the same phenomenon, but derived from different sources (Adelman 1977). In this analysis the phenomenon was the initiating and negotiating strategies and the different sources were the participants and the members of the research team; this process has been used in a variety of settings (Maticka-Tyndale 1990). The process of respondent validation (Bloor 1978) is the test as to whether the participants, whose beliefs, attitudes, opinions and conclusions the research team purported to represent, recognized the validity of their findings. The research team met weekly and minutes were kept. The minutes served as a method of enabling retrospective analysis and provided a qualitative data base from which conclusions could be drawn.

## **Findings**

During the first meetings the participants were reminded of the aims and methodology of the study and the guarantee of confidentiality and anonymity was repeated. They were advised that they could have access to their diaries or the tape transcripts at any time. From the beginning the tape recorders did not seem to inhibit the participants.

Normally, meetings began with a discussion about sexual activities and how they had been initiated and negotiated. The participants were encouraged to narrate how different situations developed. The discussions focused upon the normal range of sexual activities, but also included unsought sexual advances, use of condoms, sexual affairs outside the relationship, lack of privacy, and other issues drawn from the semi-structured interviews and the diaries. The facilitators gave as much direction as they thought necessary, but generally left the participants to select topics. It was clear from the outset that many participants were nervous and found it difficult to verbalize their sexual behaviour. The most reticent were young women and the interviews tended to be question and answer sessions.

The discussion then focused upon the diary. The diary was a record of the participant's sexual activity during the previous week. The participants were given advice on how the diary should be kept and were encouraged to record all of their sexual activities, although they were not given any training and the method had not been pre-tested. They were advised that the diaries were sensitive documents and needed to be treated with circumspection. Although there was no hesitation in revealing information, participants were unsure whether they were writing about the appropriate topics. They were assured that the diaries were personal records and whatever they decided to record was valid. The diaries were surrendered each week and replacements provided. Some of the participants were reluctant to disclose to their partners that they were keeping a diary, thinking that it might create conflicts. Where partners were told, it did not seem to be a contentious issue, and in one instance the husband offered to write the week's comments on behalf of his wife.

The initial information generated confirmed the popular belief that coitus was a male preserve and was often initiated in response to a physical need. Most women seemed to accept that it was a male prerogative and submitted to their partners' demands; sometimes they had no alternative. One male participant, who worked in the armed forces, insisted that coitus was his right and that his wife had to comply with his demands. 'I am the lion of the house and she does not have the right to say no', he insisted. Coitus was a regular and routine activity and it generally took place three times a week. If it occurred less, the women became worried that their partners were engaging in extramarital affairs and some women who wished to withhold sex as a form of punishment, also worried that their husbands would have affairs. There was little variation of sexual positions and most preferred the missionary position. Women did not feel that they could verbalize their need for coitus or suggest a particular position. This was partly cultural, because if a woman did this, it would be assumed that she had gained her knowledge through extramarital affairs.

External factors also played a part in the ability of the couple to negotiate. There was often little privacy: sometimes a family shared the same bedroom and spaces were divided by a curtain. Noise during coitus became a primary concern and it generally took place in the late evening or early morning. One man welcomed the rain because the sound drowned out the noise and he could make love vigorously. One woman reported that she submitted against her will because she did not want the arguments to be heard by the neighbours.

There was an implicit assumption that married couples would be monogamous and condoms were unnecessary: this may account for the fact that the poorest knowledge of condoms occurs in sub-Saharan Africa (Goldberg et al. 1989). Wives treated the subject as taboo and had no strategies for persuading their husbands to use them; men were reticent and resisted attempts to introduce the topic. Previous studies show that condom negotiation is

facilitated when there is a feeling of sexual equality between the partners; when it is possible to acknowledge sexual relations with other partners; when the sexual relationship has a commercial basis; and when sex exists for women as an activity in its own right and not as an avenue to motherhood (Worth 1989). None of these conditions appear to apply to the women in this study. Participants were guarded on the subject of condoms and did not show any interest in discussing them. Family planning was reviewed as a routine activity at this stage; the issue was raised by a number of women and it was clear that their knowledge was meagre. Pregnancy was a matter of concern; some women did not wish to become pregnant and used contraceptive methods without the knowledge of their husbands. There was no mention of extramarital affairs.

As the facilitator-participant relationship developed the level of disclosure moved to greater psychological depth. Both men and women disclosed that there was more negotiation than was at first admitted. It was conceded by the men that their partners did have the right to reject their overtures; however, they asserted that the rejection was time-limited. The 'lion of the house' conceded that his wife could reject his advances, but only, he maintained, 'for a day or two'. When they now returned to the issue of family planning, one woman with seven children said she wanted a tubal ligation, but her husband was opposed to the idea and refused to give his consent for the operation. In another case a woman was interested in learning more about family planning, but her husband was opposed to the issue. She confided that she had sought information and she had secretly resorted to injections as a method of preventing pregnancy. Another woman desperately wanted to become pregnant, but because her husband insisted upon protection she lost all interest in coitus.

One man who worked in Nairobi had four children who lived with his wife in the rural area. He commented:

My wife insists on using natural family planning method, but I think it has a high failure rate. She wants more children and I'm worried that she will trap me into having another child.

His infrequent visits home made the effectiveness of natural planning somewhat improbable. One man suspected that his wife was deliberately trying to become pregnant; this caused suspicion and identified one area where men felt insecure. One preventive method was condoms, but generally men did not choose this option. However, they would use them for other reasons. One man admitted:

The week before Easter I had sex with a woman, then over Easter I was back at home and had sex every day with my wife. I used condoms but was still always worried she might get an STD.

The issue of family planning was generally sorted out between couples where there seemed to be complete trust; where there were hints of ulterior motivation this led to mistrust. A male participant said that the use of family planning by his wife would lead her into having loose morals. Extramarital sexual behaviour was now admitted. One attitude expressed was that as long as a wife and children were cared for, the man was free to explore different sexual behaviour with other women: 'A man is not a *panga* (large knife) that cuts with only one side'. Extramarital relationships could place a further strain upon sexual relationships:

I make arguments with my wife to avoid sex after moving [having coitus] with someone else, till I'm sure that I'm not infected.

Men were invariably suspicious of their wives: ‘Women take advantage when men go to work’. Some men became violent and beat their wives who were understandably afraid. If a husband returned home drunk he would sometimes demand sex and his wife had to acquiesce.

Even when my husband comes in late after having had sex with another woman somewhere he can still want it with me. I have to give in, even with the knowledge of AIDS, and I just pray to God that I don’t get infected.

One man used to sleep with other women, but has since refrained following the death of a friend from AIDS. Given the amount of extramarital sex that the men engaged in it seemed that a psychological defence mechanism prevented them from imagining that their wives might be involved with somebody else. Many men had stopped having extramarital affairs because of fear of HIV/AIDS and wished to negotiate a monogamous relationship with their wives. They accepted that there should be a reciprocal responsibility and they recognized that monogamy implied that partners should be able to ask each other for coitus. However, they found this difficult to discuss because there was no tradition of dialogue.

The semi-structured interviews included taboo subjects chosen by the research team, and introduced when the facilitators judged that the participants were ready to self-disclose to the necessary psychological depth. These subjects included sexual preferences, such as oral and anal intercourse, which they all maintained were culturally taboo. By this time the relationships between participants and facilitators were based upon trust and confidentiality. Some of the participants were grateful for the opportunity to disclose their emotions and found the process therapeutic; others welcomed the chance to explore and discuss topics which they had never consciously thought about. Disclosure was frank and open and the ‘lion of the house’ now admitted that on occasions his wife’s rejection was final: ‘If she doesn’t want sex she pinches the baby and makes her cry. Then she picks her up and brings her into bed’. He was aware of his wife’s strategy, but he never confronted her about it.

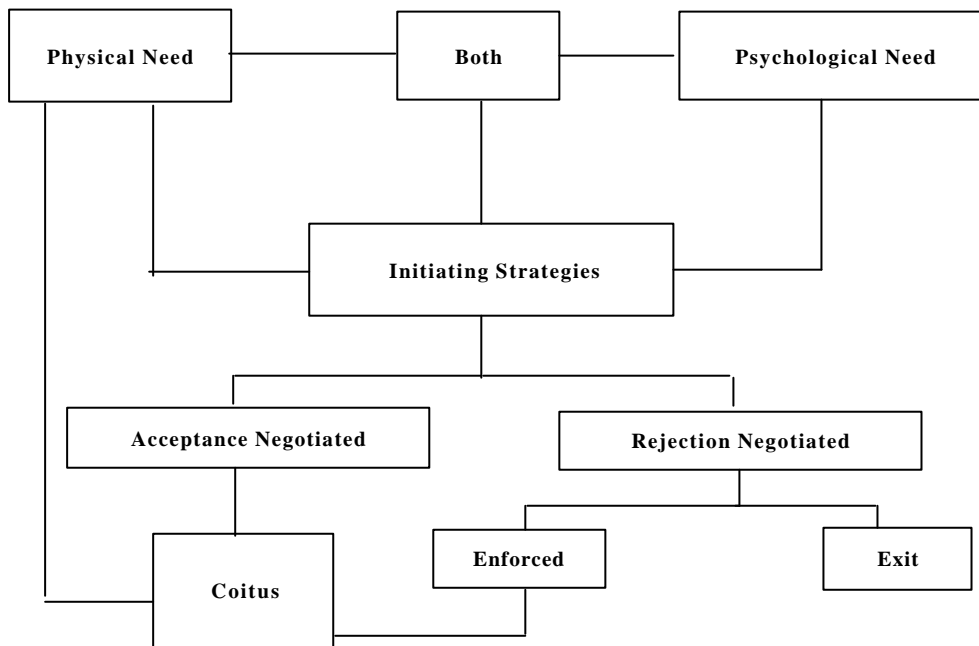
When the three months were over the following strategies had been identified. The process appeared to move from a recognition of a conscious need, to initiation behaviour which was either accepted or rejected. If accepted it proceeded to coitus, but if rejected, two options were open: either the initiator gave up, or coitus was forced by the man.

<b>Initiating strategies used by women</b>	<b>Initiating strategies used by men</b>
Cook a favourite meal	Bring a gift home
Put children to bed early	Come home early
Wear a particular nightdress	Show love for children
Give a romantic glance or a coy smile	Touch and caress partner
Touch partner’s thigh, chest, genitals	Take partner out for drink or a meal
Lean on his shoulder	Give a romantic glance or look
Choose a particular topic of conversation to discuss in bed	Give compliments
Place legs over partner’s	Use pet name
Kiss, caress, hug	Display caring
Prepare bath for partner	Encourage romantic talk
Keep partner company when eating late	Ask
Lie closely and face partner when in bed	Move physically closer in bed
Invite partner to touch and hold close	Kiss and hug

Rejecting strategies used by women	Rejecting strategies used by men
Lie away from partner	Pick a quarrel
Avoid eye contact	Put pyjamas on
Lie in a different bed	Complain of tiredness
Pick a quarrel	Give negative verbal comments
Use children in some way to make coitus impossible	Say no
Menstrual periods	Physically reject with force
Complain of sickness, tiredness or exhaustion	Talk suspiciously
Not play any active part	
Say no	
Avoid intimate situations	

Both sets of strategies depended upon both physical and psychological needs. The process is outlined in Figure 1.

**Figure 1**



The model outlines the initiating and negotiating processes and shows that they are motivated by either physical or psychological needs, or both. Physical needs were common to both sexes. The husbands sometimes found physical needs so pressing they demanded coitus irrespective of their partners' feelings, and without negotiation. Then the rest of the process was bypassed, for example, when the husband had been drinking. Women sometimes expressed an urgent physical need, for example, when their menstrual period had finished, although women could not use physical force. The psychological needs were also common to both partners and arose from a variety of feelings. Men had to be sexually dominant and to be certain that their sexual technique satisfied their wives. Sometimes the men bypassed the negotiation, forcing the women to coitus, which was tantamount to rape. The psychological needs of women correlated with the amount of caring they perceived in their partners, and

also with their wish for emotional security. Women also wanted benefits which lay outside coitus, namely physical protection and social status. The recognition of needs led to the initiation strategies listed above, which were largely non-verbal. The range of strategies demonstrated that the desire for coitus could commence during the day. It would prompt a husband to buy a present or to return home early, or a wife to prepare a favourite meal. Other signals had evolved during the relationship and were unique to one couple; definite signals were to wear a particular nightdress or bring a chicken home.

The initiative behaviour was either accepted or rejected. If it was accepted, the time interval between acceptance and coitus was generally short; if it was rejected then the partner normally retired from the process. The husbands had the option of physical force. Women had a range of rejection strategies; they were often limited in effectiveness, but occasionally they seemed to work. Enforced coitus did take place and in some of these cases the husband was violent and beat his wife. One woman referred to herself as a sex prisoner: her husband demanded coitus each night and she did not enjoy it, except occasionally after her menstrual period. When she did attempt to reject his advances he accused her of being unfaithful. Women who were forced into coitus relied upon non-verbal behaviour to show that they objected, and they became passive actors. However, women were afraid that their husbands might take a second wife, which was both culturally and legally permitted. Although women do have some power, this must be used subtly, discreetly and indirectly: consequently their behaviour appeared to be shrewd and cunning to the point of deviousness.

One of the principal difficulties in investigating the subject is that commonly recognized signals were renegotiated in private: each couple evolved its own set of signals. This tends to reinforce existing taboos; most initiating and negotiating strategies were acquired unconsciously and people found difficulty in talking about them. Because sexual behaviour is primarily non-verbal, couples were not used to talking about it, therefore it was difficult to negotiate. This is exacerbated by the limitations of vocabulary: the medical vocabulary emphasizes the clinical aspects while the alternative vocabulary tends to be crude and abusive. Some couples did have a private vocabulary, but this focused upon genital parts rather than encouraging a discussion of responsibility or fidelity. Women were reluctant to verbalize their feelings or opinions and this reluctance increased the significance of non-verbal communication. It was difficult to explore non-verbal strategies without talking about them, and other methods should be found. Men thought that more sex education in schools would help women to talk about sex.

Some of the participants mentioned that the study had changed their attitudes. Women were traditionally not supposed to be interested in sex, and if a woman asked for sex, or suggested a different coital position, it would be assumed that she was having extramarital sexual relations. The study seemed to empower some of the women to broach the subject with their husbands. One male participant expressed the hope that because of the sessions he would find a way of getting his wife to initiate coitus. This was an example of men realizing that if they were to be monogamous then their wives also had to be monogamous and they needed to talk about the matter to reach a consensual agreement. However, starting to talk was the problem. One woman said:

My sex life has progressed since the program started. I discuss it with my partner and we think about it much more seriously and discuss it more often.

## Conclusions

The methodology proved effective; the semi-structured interviews were a successful way of gaining sensitive information. The interviews needed to be focused, otherwise the participants tended to ramble repetitively about inconsequential matters. Many of the participants commented that the study had caused them to think about their sex lives, which had improved because they had started to discuss the matter openly with their partners.

The information contained in the diaries was variable. Some diaries were full, but the information was not relevant; others were relevant, but superficial. Generally they had not considered the factors that affected the negotiation of coitus; literacy level was also a contributing factor and the entry was sometimes difficult to understand. Diaries are very personal records of activities, and some instruction or pre-testing might have improved their effectiveness.

The research team meetings were successful in allowing the study to be monitored and evaluated. The meetings generated substantive explanations regarding coitus through the process of triangulation, which terminated in a set of conclusions discussed with the participants for their validation. The conclusions were amended in the light of their comments.

At present, the status of women is inferior in terms of negotiating power, but some men are prepared to sacrifice power in return for the guarantee of safe sex; they are prepared to give up the excitement of extramarital sex, but want to find the same excitement with their wives. They also want women to express their preferences more readily; in return, they accept that the negotiating powers should be more equal. There is now more distrust and suspicion surrounding coitus; this has been caused by the fear of AIDS. To avoid the risk of infection with HIV married couples wish to have a monogamous relationship, and recognize that this is only feasible if both partners agree, and if they wish to re-negotiate the relationship.

In this crucial and sensitive area, there is a need for programs such as the one described here. These programs should improve interpersonal skills; they would also increase self-esteem and help to develop a suitable vocabulary and negotiating strategies which would allow marital partners to re-negotiate the sexual contract.

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## **The East African AIDS epidemic and the absence of male circumcision: what is the link?**



### **Using circumcision to prevent HIV infection in sub-Saharan Africa: the view of an African**

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There are now two schools of thought about the link between lack of circumcision and HIV infection in Africa. One school is that of Bongaarts et al. (1989), Moses et al. (n.d.) and Caldwell and Caldwell (1994) who use geographical distribution evidence to argue that the association between lack of circumcision and a high level of HIV infection in Africa is so convincing that the likelihood of a link should be recognized and taken into account where possible in the battle against AIDS. Moses et al. (n.d.) have gone further to recommend circumcision interventions for Africa. In contrast, De Vincenzi and Mertens (1994) argue that the evidence for an association, at least from small-scale surveys, is doubtful and hence not conclusive enough to qualify circumcision as an intervention.

My view is twofold. First, as scientists we should look at the existing evidence for and against the hypothesis that lack of circumcision is positively related to HIV infection. Although many studies have shown that there is a significant association between the two variables (Bongaarts et al. 1989; Moses et al. 1990; Caldwell and Caldwell 1994), there is no evidence of a causal relationship between the two. Caldwell and Caldwell (1994) pointed out that 'Positive association does not necessarily show a direct causal relationship'.

De Vincenzi and Mertens (1994) make the salient point that most of the quoted studies were not designed to test a hypothesis about circumcision and did not report their methodological details for evaluation. They claim there is no evidence that enough statistical rigour was applied to the data and where, in small-scale studies, this was done by controlling for several variables like age, number of partners, contact with prostitutes, ethnic origin and birthplace, the results lost statistical significance (Greenblatt et al. 1988). Either those findings that did not fit into the conventional thinking of the hypothesis were rejected by the journals as not interesting, or the researchers did not submit them for publication for fear of rejection.

As in the study by Serwadda et al. (1992), recent work on data from the 1987/88 National Survey of Uganda assumed Muslims to be circumcised and non-Muslim Ugandans not to be circumcised. This was a fair assumption since the cultural groups that circumcise were not included in the National Survey. The study shows an association at the bivariate analysis which disappears at the multivariate level (Tusingwire 1995). Perhaps the fact that the Muslims are more polygynous than other groups eliminates their circumcision advantage.

Another set of Ugandan data that can be used is one based on our recent study of the impact of AIDS on families in six districts of Uganda. One of the six districts, Mbale, is dominated by the Bagisu, the largest of the few cultural groups in Uganda that circumcise boys before they are accepted as men in the society. Other circumcision groups are the

Bakonjo, Sebei and Bamba in order of population size. Preliminary analysis of the logistic regression on the Bagisu data indicates that the Bagisu are less likely to be AIDS victims than the other six ethnic groups. Other cultural groups with similar results to those of the Bagisu are the Bakiga of the extreme southwest and the Banyoro of western Uganda. In contrast, the Baganda, Banyankore, Banyarwada and Basoga were more likely to be AIDS victims than the other groups combined. It is difficult to attribute these findings to circumcision levels in the cultural groups because the Bakiga and Banyoro in the former category do not have many circumcised people while a large proportion of the Basoga in the latter group are Muslims and circumcised. A more plausible explanation of the pattern is that the Bagisu, Bakiga and Banyoro are farther from the epicentre of the Ugandan epidemic than the other four ethnic groups. At this stage, it is therefore difficult for researchers to use the available evidence and comfortably recommend circumcision as a policy in combating HIV infection.

On the other hand my second view is based on practical public policy arguments. As an African who has seen Africans perish from AIDS, it is my opinion that any measure which has a chance to succeed in curing AIDS, reducing the suffering of the people from the disease and preventing the infection of HIV should be tried. I believe that it was in this spirit that several drugs including Kemron and AZT were tried on many African patients, despite their known serious side effects. Hence, there is an urgent need to carry out controlled experiments in Africa on the hypothesis of circumcision.

However, I do not agree with Caldwell and Caldwell (1994) when they claim that sexual behaviour is not changing fast, and the use of condoms is not adequate. It is unrealistic to expect the highly traditional societies of sub-Saharan Africa to change their cultures by abandoning their dangerous sexual customs and practices and accepting the alien condom faster than has so far been demonstrated. Brunborg, Fylkesness and Msiska (1993) have found that in less than a decade since the advent of AIDS, Zambian societies have either stopped or modified their centuries-old funeral rite of a brother of the deceased having sexual relations with all the widows.

Secondly, while in 1988/89 the Uganda Demographic Survey reported less than one per cent of national condom use (Kaijuka et al. 1989), Konde-Lule (1992) found that 15 per cent of adolescents in Rakai district used the method, a multiplication by fifteen in a couple of years.

More recently, our national study of focus group discussions in six districts (Ntozi and Mukiza-Gapere 1992) found that elders and youths reported that the previous customary practices for marriage and death that are now considered dangerous because of AIDS are being abandoned or modified to suit the circumstances. It was found that, in contrast to the past situation where wives were shared by brothers among the Banyankore of southwest Uganda (Ntozi et al. 1991, study done in 1984), this custom has disappeared fast over less than a decade. Widow inheritance, previously common to most societies in Uganda, is now a thing of the past for fear of AIDS. The excesses in sexual activities practised by the Baganda of central Uganda during funeral rites and by the Bagisu of east Uganda during circumcision ceremonies, have been considerably reduced. I think the Africans deserve more credit for these fast socio-cultural changes than Caldwell and Caldwell (1994) have given them.

It is important that, while circumcision interventions are being planned, several points must be considered carefully. If the experiment fails, Africans are likely to feel abused and exploited by scientists who recommended the circumcision policy. In a region highly sensitive to previous colonial exploitation and suspicious of the biological warfare origin of the virus, failure of circumcision is likely to be a big issue. Those recommending it should know how to handle the political implications.

A second public concern will be the expenditure involved in conducting circumcision. If it is on a large scale, some international donors may divert funds earmarked for other social services to this exercise. It will also be the fear of the African governments that in the middle

of this exercise some donors may withdraw their funds for political reasons or not be able to pay for the whole exercise including effective follow-up of the circumcision campaigns to ensure no side-effects are left unattended. The reluctance of external donors to pay fully for family planning activities and hence leaving many acceptors with side-effects untreated is fresh in African memories. Governments would therefore not like to start an exercise involving people's suffering that would not succeed with clear benefits to the public.

Thirdly, in some societies of Uganda such as the Bakiga and Banyankore, a circumcised person (*owempari*) is culturally stigmatized. For instance, circumcised people or those with the foreskin not completely covering the penis are believed to be hot-tempered and unsocial. Sayings such as *Kunotabuka nk'owempari* ('You are as hot tempered as one circumcised') are common in these ethnic groups. It is considered a bad omen for parents to have a child with a penis half covered by the foreskin. This is perhaps why only a tiny proportion of the Banyankore and Bakiga, less than one per cent, is Muslim (Republic of Uganda 1992). Caldwell and Caldwell (1994) suspect that it was difficult for Islam to be accepted by most ethnic groups that did not circumcise because it was considered unnatural to circumcise. This cultural resentment, added to the health issues described by De Vincenzi and Mertens (1994), may make some African governments reluctant to agree to participate in or allow the adoption of a policy of circumcision. It will, therefore, be important for governments in the region to spend a lot of money on educational campaigns before they take the political risk of mass circumcision. Since most African countries have strained economies, it will be difficult to find the necessary funds.

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## **Male circumcision and the AIDS epidemic in Africa\***

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Two papers were published in 1994 reviewing the literature on the association between male circumcision and risk for HIV infection. The results of these reviews are summarized and discussed. In an attempt to assess the potential impact of circumcision as an intervention to reduce HIV transmission, a model is developed in which HIV is simultaneously introduced into two populations, one in which male circumcision is universally practised, and one in which it is not. Ten years after introduction, the HIV prevalence in the population in which male circumcision is practised is shown to be over ten times lower. It is concluded that male circumcision could be an effective intervention for reducing HIV transmission.

Evidence implicating lack of male circumcision as a potential risk factor for HIV acquisition was first reported from observational studies conducted in Kenya in the late 1980s (Greenblatt et al. 1988; Simonsen et al. 1988; Cameron et al. 1989). Since then, numerous clinical and ecological studies have examined the association between male circumcision and risk for HIV acquisition. Recently, two analytical reviews of the relevant literature were performed (Moses et al. 1994; De Vincenzi and Mertens 1994).

Moses et al. identified 30 epidemiological studies (26 cross-sectional, two prospective and two ecological) which have investigated the association. Fifteen were published as papers and 15 as conference abstracts. Of the 26 cross-sectional studies, 18 from six countries (five African countries and the USA) found a statistically significant association on univariate or multivariate analysis between the presence of the foreskin and risk for HIV infection. In four others, trends towards an association were found. In four studies (from Rwanda and Tanzania) no association was demonstrated. The two prospective studies (both from Kenya) and the two ecological studies from Africa both found positive associations.

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\*This work was supported in part by a grant from the World Health Organization and by Special Programme Grant number SP27 from the Medical Research Council of Canada. Francis A. Plummer is the recipient of a Medical Research Council of Canada scientist award.

In those studies in which statistically significant associations between lack of male circumcision and risk for HIV infection was demonstrated, odds ratios or relative risks ranged from 1.5 to 8.4. Of 14 studies in which multivariate analysis was conducted, eleven found a statistically significant association between the presence of the foreskin and susceptibility to HIV infection. Of these eleven, there were nine in which data from univariate analysis were also reported. In eight of these, the adjusted multivariate odds ratios or relative risks were equal to or higher than the univariate ones.

The authors of the review discussed potential sources of error, including possible confounding factors such as sexual behaviour, religion, urban-rural location, misclassification and the presence of other sexually transmitted diseases. However, in examining Hill's (1965) criteria for making causal inferences from epidemiological studies, most appeared to be met. Explanations were offered for why some studies may not have observed an association. After examining further research needs, including intervention studies, the conclusion drawn was that male circumcision should be given serious consideration as a potentially effective intervention to reduce HIV transmission.

De Vincenzi and Mertens in their review adopted a more cautious approach, concluding that stronger evidence from observational studies is required before public health interventions or even intervention studies should be undertaken. They reviewed 23 published reports linking circumcision status to HIV infection, and classified them into four groups: six retrospective partner studies, twelve other retrospective studies, two cross-sectional sero-surveys, one longitudinal study and two ecological studies. They reported positive associations from three of the partner studies, six of the other retrospective studies, one of the sero-surveys, the longitudinal study and the ecological studies. The main reason for the discrepancies between the two review papers is that, although there was considerable overlap in the studies identified in them, there were also many discordancies, due presumably to differences in the search methodologies and the time periods for the studies reviewed (the paper by Moses et al. was published later).

De Vincenzi and Mertens discussed several potential confounding factors, the most important of which is sexual behaviour. It is possible, for example, that uncircumcised men engage in 'riskier' sexual behaviour than circumcised men. But, as Caldwell has noted, the main AIDS-non-circumcision belt in east-central Africa (Moses et al. 1990) cuts across patrilineal and matrilineal societies and across Gluckman's father-right societies and their opposite, and it would be difficult to argue that they could all be identified with an atypical kind of sexuality (Caldwell, Caldwell and Orubuloye 1992). Other potential confounders identified by De Vincenzi and Mertens were the presence of other sexually transmitted diseases (particularly genital ulcer disease) and hygienic practices. However, as Moses et al. (1994) have noted, if genital ulcer disease is a risk factor for HIV acquisition, and if lack of circumcision is a risk factor for genital ulcer acquisition (for which there is considerable evidence), then lack of circumcision is also a risk factor for HIV acquisition, independent of any direct effect. Whether the mechanism of increased risk is primarily direct or indirect is important only in that, if the latter were the case, then an intervention to increase the practice of male circumcision would affect HIV transmission primarily in areas where those STDs were prevalent. Similar reasoning would apply to poor genital hygiene.

In determining how vigorously to pursue the circumcision issue, either in terms of conducting more observational studies, undertaking an intervention trial or adopting circumcision as an HIV control strategy, it is useful to consider what the population attributable risk for HIV infection of a factor such as lack of circumcision might be. If the relative risk of lack of circumcision were two, which is at the low end of estimates obtained from many studies, and if circumcision were not practised by 20 per cent of the male population, which is roughly the case in Kenya, then the population-attributable risk for HIV infection would be about 17 per cent. If circumcision were not practised by 80 per cent of the

population, which is in the lower range for countries such as Uganda, Zambia, Malawi and Zimbabwe, then the population attributable risk for HIV infection would be about 44 per cent. A relative risk of three would make the population attributable risks approximately 29 per cent and 61 per cent respectively. These attributable risks are considerable, but may in fact underestimate the potential contribution of lack of circumcision to the AIDS epidemic because of the exponential growth of HIV infection in populations, at least during the early stages of an epidemic. Thus, even a small increase in transmission efficiency conferred by a factor which is highly prevalent in a population, such as male non-circumcision may be, can result in a large increase in population seroprevalence over a period of years.

**Figure 1**  
**Development of HIV epidemics in model African populations where male circumcision is and is not practised**

Figure 1 shows the results of a modelling exercise which was undertaken to explore the potential impact of male circumcision in leading to a reduced prevalence of HIV infection in a population over time. We used May and Anderson's (1987) model of HIV transmission, and hypothetically introduced the virus simultaneously into two distinct populations, one in which male circumcision was universally practised, and one in which it was not. We assumed that at time 0, the prevalence of infection in both populations was 0.1 per cent. We also assumed a fixed duration of five years of infectivity, based on recent data from Kenya (Anzala et al. 1995). In the population in which male circumcision was not practised, a doubling time of infection of two years was assumed, which is typical for many African countries in the early stages of an HIV epidemic. In the population where male circumcision was practised, it was assumed that the efficiency of female-to-male transmission was three times less,

corresponding to a relative risk of one-third. This resulted in a doubling time of infection in that population of approximately 3.5 years. We ignored saturation effects, which would reduce the prevalences somewhat, as well as demographic effects: that is, we assumed that people dying of HIV infection were replaced by uninfected individuals. After ten years, the prevalence of HIV infection was 0.74 per cent in the model population in which male circumcision was practised, compared to a prevalence of 14.8 per cent in the population in which circumcision was not practised. This projected difference in HIV prevalence approximately a decade after introduction of the virus is roughly comparable to the difference observed between Nigeria, where circumcision is almost universally practised, and countries such as Zambia or Malawi, where circumcision is rarely practised.

Although this model is based on simple assumptions, it appears that the reduction in transmission efficiency achieved by eliminating this risk factor could over time lead to significantly reduced HIV transmission. The effect of eliminating the risk factor on the equilibrium HIV prevalence is more difficult to predict, as this prevalence depends on more factors than the basic reproductive rate of infection. It is likely, though, that the effect of circumcision, as with most interventions to control HIV transmission, would be to slow the course of the epidemic until more definitive solutions could be effected. With few effective medical interventions on the horizon, and with significant behavioural change an elusive and probably long-term proposition, other interventions which might slow the course of the AIDS epidemic are urgently needed.

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## **Sexually transmitted diseases, genital hygiene and male circumcision may be associated: a working hypothesis for HIV prevention\***

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The concept of confounding is tricky. To illustrate it Leon (1993) recently imagined an epidemiological study which found that people who carry matches have an increased risk of lung cancer. Apart from its value as an academic concept, it is not very useful for public health decisions. In this paper we shall not concentrate on the reasons why there is a 'lurid' epidemic in Africa (Caldwell and Caldwell 1995: 19), but rather on the question of whether an observed association between HIV serological status and male circumcision can effectively be translated into a research and action agenda. Full understanding of the dynamics of the HIV epidemics in different regions of the world is only likely in the medium-to-long term as the research agenda encompasses a broad spectrum of issues. These issues include the need for a better understanding of sexual mixing patterns, the potential role of the demographic structure of the population as a potential modifier of the contraction or expansion of regional epidemics, shifts of transmission to younger age groups, the contribution of HIV genetic variability to infectiveness and transmission, the variability of infectiveness at different times after HIV infection, as well as the role of potential risk factors for transmission, such as other sexually transmitted disease or circumcision status (Mertens et al. 1994).

Regarding the role of male circumcision in relation to HIV infection, we are pleased to share with Caldwell and Caldwell the same concerns, namely 'a better understanding of the disease' (Caldwell and Caldwell 1995: 14) and the search for 'a genuine mechanism [through which lack of male circumcision could facilitate HIV transmission, and which] offers the possibility of effective intervention' (Caldwell and Caldwell 1995: 16).

### **Correlations put into perspective**

For the last few decades, epidemiological research has been concerned with scrutinizing and tracking levels of physiological, environmental or behavioural characteristics, which are perceived to be potential perils to communities and individuals. In this endeavour, researchers whose studies show 'no effect' either do not submit their results, or find it difficult to get them accepted for publication (Koren and Klein 1991). In spite of this, enthusiasm prevails with, as testimony, the sheer number of monthly publications discovering new associations between risk factors and disease, for consumption by the medical community and the general public, with the hope that rapid modification of these factors will lead to a better life. With increasing quantity some of the quality has gone, and it has become standard practice to neglect the methods section as a black box and scan swiftly the study results and conclusions. This is unfortunate since the validity of the study conclusions crucially depends on the

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\* This article and its views are those of the authors solely.

methods of measurement (Mertens 1993). Once an association between a factor and a disease process is observed, the question of public health interest is: what can be done about it? In the case of the matchbox, if the association is causal, then its removal will have an effect on disease occurrence.

Similarly the observation of an association between HIV infection and lack of male circumcision may represent a causal effect or may be due, wholly or partly, to the influence of confounding or intermediate variables. On an epidemiological basis, it is first possible that circumcised men have different sexual behaviours, or different penile hygiene, from uncircumcised men, which in turn may influence their susceptibility to HIV infection. Secondly, it is possible that circumcised men differ from uncircumcised men in their reporting patterns to health facilities for genital problems. Thirdly, as mentioned by Caldwell and Caldwell, it is also possible that the same level of washing or other hygienic measures would ensure a lower level of genital cleanliness among uncircumcised men because of the penile foreskin (Caldwell and Caldwell 1995: 16); that is, genital cleanliness lies on the causal pathway between circumcision status and HIV or other sexually transmitted diseases (STD). Finally, uncircumcised men may be at increased risk of HIV because they may be more susceptible to other STD than circumcised men (e.g. Nsanze et al. 1981); other STD being potential risk factors for HIV transmission. It must be noted that these possibilities are not mutually exclusive, but each of them has different implications for public health intervention. On a strictly biological basis, two recently published papers reviewed extensively the potential mechanisms through which lack of male circumcision could increase susceptibility or infectivity for both STD (Cook, Koutsky and Holmes 1994) and STD/HIV (De Vincenzi and Mertens 1994). Both papers concluded that, although there were several plausible mechanisms, more research was needed to determine which were operating in different cases.

#### **Have the possibilities for HIV prevention been fully explored in relation to the association with male circumcision?**

To illustrate the possibility that the association between circumcision and HIV might be confounded by penile hygiene, but not that genital cleanliness lies on the causal pathway to HIV infection, a situation was considered in a recent paper where one man in ten has irregular, or usually poor, penile hygiene. The magnitude of this association is half of that observed when failing to subdivide the data on the basis of genital hygiene behaviour. A study failing to take account of penile hygiene and other potential confounders is likely to overestimate the magnitude of the true association between lack of circumcision and HIV infection (Mertens 1993).

To adjust successfully for confounders the instruments to measure them should be perfect. In practice, both sexual and hygiene behaviour are likely to be variable over time and between different individuals, making an accurate assessment of their 'usual levels' extremely difficult. In addition, it is likely that the quality of the assessment of those recording the levels of confounders will also vary (within- and between-observer bias). Finally it is easy to imagine that the respondents themselves may provide inaccurate answers about their personal practices. Using the same example, if 50 per cent of men with 'non-regular' penile hygiene were classified as having 'regular' penile hygiene, and five per cent of those with 'regular' hygiene were misclassified as having 'poor' penile hygiene, the results would lead to a serious overestimate of the true association between lack of circumcision and HIV infection even though we may believe that we have 'controlled' for a confounding variable (Mertens 1993). The results of such a study may mislead both researchers and policy makers with the certainty that circumcision status is 'independently' associated with HIV

status: hence the proposal that male newborn or adult circumcision might be undertaken on a wide scale for the control of HIV (Fink 1987; Marx 1989).

However, introducing male circumcision as a public health intervention — in contrast to maintaining the practice where it already exists — has major implications, and therefore, should not be embarked upon lightly.

Male circumcision is not without medical side-effects; with regard to newborn circumcision, septic complications may occur in poor hygienic settings, although to our knowledge no systematic data have been collected. Complications are likely to be even more problematic in adolescent and adult circumcision, possibly causing pain, haemorrhage, and problems of healing. Thus, adult and, in some settings, newborn circumcision may generate more harm than benefit. The onus is therefore to produce adequate evidence of safety before a supposedly protective intervention is implemented (Rose 1985).

Besides potential benefits to be obtained and the safety of a public health intervention, it is important not only to examine its acceptability and feasibility, but also to compare these characteristics with those of alternative interventions. The acceptability of a new practice on the male reproductive tract is likely to be problematic in settings where the religious and socio-cultural context usually outweighs public health considerations. Behavioural changes, at least as important as those required for the adoption of condoms, and a general shift in social norms will clearly be required to introduce male circumcision as a new general practice. Furthermore, operational requirements needed to introduce neonatal, adolescent or adult circumcision are likely to be considerable. In many cases, such an undertaking will require mass communication programs for public education, training of overburdened health-care personnel, and supplies necessary for the surgical procedure. If it is assumed that there is an association between circumcision and sexually acquired diseases, and given limited public health resources, the ratio of benefits and costs and the range of culturally acceptable alternative interventions such as condom promotion for the control of HIV and STD have to be considered in each setting (De Vincenzi and Mertens 1994).

In this respect, the outcome of another public health debate, that of the interaction between HIV and other sexually transmitted diseases, is illustrative. There, the potential benefit of initiating widespread control of STD through the primary health care system was beneficial in its own right, without any associated harm, and regardless of whether it would also prevent HIV transmission. The recommendation was, therefore, to launch expanded STD control programs as early as possible with the additional objective to examine their impact on HIV spread (Mertens, Hayes and Smith 1990).

The possibilities that penile hygiene or that genital cleanliness, with a given level of hygiene, may play a role in facilitating transmission of STD/HIV among uncircumcised men have not been examined carefully to date. To our knowledge no systematic data have been collected on the latter in order to establish possible differences between circumcised and uncircumcised men. We know of only one study which gathered some evidence that there were differences between circumcised and uncircumcised men in genital cleanliness and the presence of inguinal adenopathy (Seed et al. 1995). A proposal for soap and water prophylaxis to limit genital ulcer disease and HIV infection has also been put forward (O'Farrell 1993). In spite of the difficulties associated with such studies, if it proved feasible to implement effective behavioural changes related to genital hygiene, this might be an important addition to the limited range of interventions that can at present be deployed against HIV: hence the focus prompted in that direction by De Vincenzi and Mertens: 'Studies of the association between circumcision status and sexual and [genital] hygienic behaviours in different populations, using both quantitative and qualitative methods, should highlight the strength of potential confounding effects' (De Vincenzi and Mertens 1994: 158). It is unfortunate that Caldwell and Caldwell misinterpreted the proposal as a 'desperate suggestion' namely, that the level of general hygiene as indicated by 'the weighted life

expectancy and other mortality measures' (Caldwell and Caldwell 1995: 16) needed further study. Some level of bad faith must have been required for such misinterpretation since in the introduction De Vincenzi and Mertens already set the problem quite clearly:

if circumcision reduces the transmission of genital infections, either by improving local hygiene or by accelerating the healing of otherwise subpreputial lesions, circumcision may also delay HIV transmission. Therefore, potential associations between the lack of circumcision and STD, other than HIV, are also of interest (De Vincenzi and Mertens 1994: 153).

Furthermore, De Vincenzi and Mertens also developed the hypothesis that among the sexually acquired diseases which need further study of their potential association with circumcision, priority should be given to genital ulcer disease (GUD), of which chancroid is one of the main causes, for several reasons. First, previous studies provide more arguments for an association between the lack of circumcision and GUD than between the lack of circumcision and urethritis. Secondly, a potential association between the lack of circumcision and duration of genital symptoms might be stronger for GUD than for urethritis. Thirdly, one of the mechanisms through which a potential association between the lack of circumcision and HIV infection could operate is the suspected association between GUD and HIV infection. The assessment of an indirect effect requires the assessment of the two underlying direct effects (lack of circumcision → GUD, and GUD → HIV). Simultaneously obtaining both assessments within the same study would most likely be difficult. For example, in a recent study, the relationship between circumcision, history of GUD and non-ulcerative STD, and HIV was complex (Seed et al. 1995). Eleven per cent of circumcisions had been performed for treatment of sequelae of STD and these participants were excluded from the analyses. Uncircumcised men were also having less risky behaviours than circumcised men but were more likely to have had a history of genital ulcer (Seed et al. 1995). Fourthly, GUDs are more common than HIV infection in some parts of the world: recruitment of cases may therefore be easier. Finally, the date and the source of infection are easier to determine for GUDs than for HIV infection (De Vincenzi and Mertens 1994). We therefore agree with the statement that 'it may be almost as important to discover the determinants of chancroid as of HIV infection' (Caldwell and Caldwell 1995: 13).

### **Conclusion**

Programs targeting diagnosis and treatment of GUD as an HIV/AIDS prevention strategy are now being implemented. An important question for the development of future prevention strategies is whether lack of male circumcision confers risk of HIV that is independent of the risk attributable to sexual behaviour, genital hygiene or cleanliness, and that attributable to GUD. The available evidence shows that circumcision status is strongly related with all these factors and that these relationships are important to examine when examining the relationship between circumcision status and HIV (Seed et al. 1995). Unfortunately, ecological correlations, while important to generate hypotheses, are unable to examine these relationships in any detail. Therefore, a variety of other methods need to be used and have been proposed elsewhere (e.g. De Vincenzi and Mertens, 1994).

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## **Regional HIV prevalence and ritual circumcision in Africa\***

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The hypothesis that the cultural practice of male circumcision in Africa correlates regionally with human immunodeficiency virus (HIV) prevalence rates needs refining and further testing. Several 'confounding factors' (De Vincenzi and Mertens 1994) such as changing patterns of sexual behaviour, experiences of famine, migration, wars, and wage labouring may well have changed cultural circumcision practices and hence confused a spatial correlation with prevalence rates and the AIDS epidemic. A way is suggested here for creating a contemporary relevance index for evaluating ethnographic data on male circumcision and other cultural practices. This is important because despite the uncertainties involved, some authors are now suggesting male circumcision 'as an effective intervention to reduce HIV transmission' (Moses et al. 1994: 209). The employment of a contemporary relevance index should help sharpen tests of the hypothesis that HIV+ is lower among societies or cultures which 'traditionally', that is, ritually, circumcise males than it is among populations which do not. Some greater assurance is needed than has been offered thus far of

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\* Grateful acknowledgement is made for editorial and substantive commentaries by J. Bongaarts, V. Conant, J. Jones, P. Porter, P. Reining, and P. Way. Any errors in fact or interpretation are the author's own.

the value of regional correlations of ethnographic data and HIV prevalence rates for purposes of arriving at possible strategies for intervention, or for 'historical' reconstruction of HIV origins.

The prophylactic value of male circumcision in Africa is based in large part on surveys at clinics where sexually transmitted diseases (STDs) are treated (Hira et al. 1990; US Bureau of Census 1994; Moses et al. 1994). Fewer circumcised than uncircumcised patients are found with genital ulcers and/or cancer. This is a repeated clinical finding of at least 30 years' standing (Dodge and Kaviti 1965). More recent correlations have been found between chancroid and testing positive for HIV (see Plummer et al. 1983; Piot et al. 1988; Simonsen et al. 1988). Many of these STD clinics are in urban surroundings or are associated with sentinel health centres in provincial settings. Data from these clinics and centres are used in estimating HIV prevalence rates over wider areas.

Several attempts have been made to relate area prevalence rates to mapped distributions of cultural circumcision practices. I took part in one of the first such attempts (Bongaarts et al. 1989) which found statistically significant correlations between HIV prevalence rates for regions in which circumcision is a 'cultural' practice and those in which it is not. A second 'ecological' study found positive correlations between 'discrete HIV seroprevalence points' and 'variations in circumcision status' (Moses et al. 1990: 696). And most recently Caldwell and Caldwell (1995: 12) identify 'a large, contiguous population where no males are circumcised, found wholly within the major AIDS belt' and, in addition, these authors speculate on a possible origin area for the virus.

All three of these studies, including the one to which I contributed, could benefit by a more critical approach to the ethnographic data, including a closer look at accounts of circumcision rituals, and at the mapping procedures by which ethnographic information is displayed and correlations sought with HIV prevalence levels.

### **A more critical approach**

We need a 'contemporary relevance index' for ethnographic and other source materials to reflect something of the way the data were originally gathered as well as their present value in the light of the sometimes tumultuous changes taking place in Africa during the past 100 or more years. I have in mind in particular information abstracted from the Human Relations Area Files, Murdock's (1967) 'ethnographic atlas', his reconstruction of African history (1959) and the earlier (1958) summaries of African cultures on 5x8 file cards. These and other sources such as the International African Institute's long-running series of volumes in the *Ethnographic Survey of Africa* are important resources. But no matter how current they may have been at one time, if the people being described have been bombarded with imperialist wars, the imposition of colonial policies, tourism, economic development, political upheaval, local conflicts, famines, epidemics, to say nothing of the creation of infrastructural facilities such as roads, railways, markets, expanding systems of health care, education, and communication, then surely older source materials must be evaluated in terms of their present relevance to contemporary problems such as the AIDS epidemic. In analytic cartography the handling of possible 'source errors' (Clarke 1990) is an important topic and has been for some years; see, for example, Porter (1957) on the relative reliability of demographic data, and Conklin (1980) on mapping ethnographic information.

In my own thinking (Conant 1988) I have suggested using such factors as the scale of the original research, the kind of methodology used in fieldwork and later analysis, and the amount of time and number and kind of events which have taken place since the original observations were made in order to arrive at the equivalent of a contemporary relevance index. To fail to take such possibly 'confounding' factors into account amounts to assuming that the African countryside and its peoples are in some way immune to change and that

cultural practices such as circumcision (or no circumcision) and degrees of sexual permissiveness are fixed for all time. Such a view of rural populations is not too different from assuming that the populations of the African countryside beat to a kind of heart of darkness:

So fundamental are the beliefs in circumcision or its lack that nearly all ethnic groups are either fully circumcised or uncircumcised, and, with the special exception of the Akan of Ghana, the evidence seems to be that there has been no fundamental change since the 1950s (Caldwell and Caldwell 1995: 15).

What is the authority for such an assertion? Or for imagining 'an original epicentre in Rwanda, southwest Uganda or northeast Zaire' (Caldwell and Caldwell 1995: 10) as though these populations were out of touch with the rest of Africa:

It is just conceivable that, somewhere unnoticed by the colonial medical regimes, perhaps in an isolated part of Middle Africa, the disease could have smouldered (Caldwell and Caldwell 1995: 19).

Vansina (1990) directly disputes the notion that Equatorial Africa was a cultural island, isolated from surrounding areas and their populations. Archaeological, linguistic, ethnographic and historical data are adduced to show the interpenetration of the cultures inside and outside the central African rain forests. Note in particular Vansina's own mappings, including No.1.3 which reflects the quality of the original data. In another approach, Kopytoff (1987) has edited a series of essays on the establishment, maintenance and permeability of African cultural and political frontiers in West, Central and East Africa. In the context of the search for the putative African origin of HIV perhaps the notion of an incubating 'island' (Caldwell and Caldwell 1995: 19) needs to be re-examined in the light of the work of Vansina and Kopytoff.

### **Examine the ritual itself**

A second suggestion for refining the circumcision hypothesis is to take a hard look at the variability inherent in the operation itself. I was a participant as sponsor of initiates in Northern Nigeria in 1957 and witnessed male and female circumcision rituals in Northwest Kenya in 1962 and 1978: my retrospective impressions are of variability in the degree of foreskin removal; in the age range of initiates, from about 10 to 30 years; and in the degrees of sexual experience of the initiates; of the uncertain intervals between circumcision rituals; and of the often large difference between verbal accounts offered by key informants (the 'ideal' ritual), and behaviour as witnessed by the ethnographer or other observer (the 'real').

While my fieldnotes record some of the above, their significance did not become evident in a major way until this, the age of AIDS and the debate over the potential prophylactic value of male circumcision as an intervention strategy. A report is being prepared on these direct observations of circumcision rituals, and perhaps it will elicit from others further comment on the variability in the performance of ritual circumcision. If even before independence in the 1960s circumcision rituals were being adapted to new circumstances, how much more variability might be associated with all the events that have happened since in African countries? How 'constant' can rituals have remained that were recorded by direct or indirect means many, many years ago, and subsequently encoded in the Human Relations Area Files and Murdock's (1967) ethnographic 'atlas'? Simply because circumcision is reported in the literature, and thereafter summarized as present or absent, it should not be assumed of males that they lack sexual experience before the ritual or that the operation

involves total removal of the foreskin and therefore uniformly offers a measure of protection from STDs and HIV.

### **More meaningful maps**

The foregoing leads to the third step needed to refine the circumcision and other, regionally based hypotheses relating to AIDS and HIV prevalence levels. We surely and urgently need to improve the mapping process by taking advantage of the analytic procedures developed in geographic information systems and which are now readily available (e.g. Eastman and McKendry 1991; Eastman 1993; Monmonier 1991, 1993; Jones 1993, 1994). Methods of spatial analysis have been around for some time but their application, with rare exceptions (Conklin 1980) seems to have been neglected in the social sciences. Murdock's ethnographic map of Africa (1959, end map) presents the entire continent as though exclusively and totally occupied by hundreds of cultural groups (with the exception of two 'uninhabited' areas of the Western and Central Sahara, where, in fact, there are important oasis populations). While this is partly a function of scale the presentation is misleading in that the viewer is given no sense of the way in which different African cultures often share the same resources within the same ecozone or zones. A prime example in East Africa would be the Pokot who circumcise and the Turkana who do not, and the way in which two subsistence systems, farming and free-range herding, so often treated as antithetical to each other in the ethnographic literature, are in fact integrated within the same social unit (Conant 1965).

This kind of interpenetration complicates the geography of circumcision and the certainty of inferences to be drawn from oversimplified spatial distributions. Trait distributions do not always exhaust geographic space, a lesson learned many years ago in the attempts to map first *kulturkreis* and later the culture areas of Africa.

At the very least published maps should include estimates of spatial error and some summary statistic of the contemporary relevance of the ethnographic materials on which the map is based, the contemporary relevance index mentioned at the outset of this comment. To do less is to run the risk of perpetuating myths about Africans, much as the non-existent Kong Mountains were perpetuated in maps of West Africa (Bassett and Porter 1991).

Finally I should like to make a plea for a less strident tone in the arguments about HIV prevalence rates and circumcision. It seems not to be an open-and-shut case, pro or con, and there are many competing and promising leads to be investigated; see, for example, Gould (1993) on prevalence rates and the location of airports, and Shannon, Pyle and Bashshur (1991) on migration. If there is uncertainty about the prophylactic value of circumcision in a 'developed nation' (Donovan, Basset and Bodsworth 1994) why should there not be some uncertainty in all the many nations and urban areas of Africa? And might not some of this uncertainty arise from the response of Africans, reflected in their circumcision rituals, to a full 100 years of outside influences, interference, and exploitation, and, previous millennia of internally generated political expansions, trade, conquests, migrations and retreats? Is it even thinkable that rituals, attitudes, and behaviours would not or could not change? A recent report (Green, Zokwe and Dupree 1993) quotes a 'traditional healer' on the topic of cultural resistance to circumcision in non-circumcising societies: 'When tradition and the health of our people are in conflict, it is tradition we must sacrifice'. If this is true in today's times, why not ritual change throughout Africa's yesterdays?

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## **Lack of male circumcision and AIDS in sub-Saharan Africa: resolving the conflict**

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I have been author or co-author of three papers arguing the likelihood that lack of male circumcision is a risk factor for HIV transmission and that the location of the main AIDS belt in East and Southern Africa (Uganda, Rwanda, Burundi, a limited part of eastern Zaire, western Kenya, western Tanzania, Zambia, Malawi, Zimbabwe and Botswana) was determined by the fact that the peoples living in that belt did not practise male circumcision. The first paper (Caldwell and Caldwell 1993a) examined a range of hypotheses which we had researched and had rejected as disproved, and then drew on Bongaarts et al. (1989) and Moses et al. (1990) to argue that lack of male circumcision neatly explained the strange geographical distribution of the populations with the highest incidence of the disease and that the epidemiological evidence was probably irrefutable. The second paper (Caldwell and Caldwell 1993b) examined and attempted to evaluate the methodology and data employed by Bongaarts et al. (1989) and Moses et al. (1990) to decide if they were sufficiently flawed to weaken fatally their hypothesis. The third paper (Caldwell 1994) devoted attention to the distribution of the disease among the general population rather than the high-risk population, using the latest data at that time (US Bureau of the Census 1993). It also criticized an Editorial Review in the journal *AIDS* (De Vincenzi and Mertens 1994) for what I considered an almost cavalier disregard for the importance of the epidemiological evidence and a perhaps careless failure to state that case properly<sup>1</sup>.

The argument of these three papers can be summarized as follows.

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<sup>1</sup> To stimulate discussion among the contributors to this Forum and to identify some of the issues, the invitations were accompanied by mimeographed versions of the second and third papers. At that time, the second paper (Caldwell and Caldwell 1993b) was available only in the form in which it had been presented at an IUSSP workshop in Annecy, France in December, 1993, but it is now available as Caldwell and Caldwell 1994. The third paper (Caldwell 1994) was available only in the form of an address to the September 1994 Annual Conference of the British Population Society in Durham, England. There were no plans for publication, but, as Mertens and Cara'l refer to it in this Forum, in order that their paper can be fully followed, it is reproduced as Caldwell and Caldwell 1995.

(1) The geographical correlation between the areas where males are not circumcised and those with the highest incidence of HIV/AIDS is so high that it cannot be explained as accidental, but must demonstrate either direct or indirect causation or both, with the proviso that the methodologies and data of Bongaarts et al. (1989) and Moses et al. (1990) were adequate. These two papers met all of Bradford Hill's (1965) criteria for the demonstration of causation. Caldwell and Caldwell (1993a) forecast, at a time when there was little surveillance evidence for the proposition, that Botswana was at risk of a major epidemic, a prediction that has subsequently proved correct. There was small-scale clinic and survey evidence from Kenya and Uganda which supported the hypothesis (Cameron et al. 1989; Berkley et al. 1989; Plummer et al. 1991; Moses et al. in this Forum), although admittedly there was other survey evidence (which we assessed as having insufficiently presented data) which did not support the hypothesis.

(2) We assessed the methodology and data employed by Bongaarts et al. and Moses et al. as adequate. Their methodologies differed but sufficed for the purpose. The HIV surveillance estimates vary greatly in quality and adequacy of documentation but the overall pattern is sufficiently free of major discrepancies in measures carried out over a short time or small geographical distances to be usable. The data on male circumcision status is on an ethnic-group basis and is drawn largely from Murdock (1967a,b), with later supplementation. Murdock in turn drew on published anthropological descriptions of individual ethnic groups for this and a great deal of other information. There are gaps in the circumcision status data, and doubtless some information was wrong at the time and some other information has since become outdated (De Vincenzi and Mertens 1994; Conant in this Forum). We have attempted to test the circumcision data in three ways. First, we examined one of the large sets of collected reports from which Murdock drew his conclusions (the set in the library of Northwestern University, Evanston, Illinois). Murdock's conclusions with regard to circumcision status seemed to us to be better supported than some of the other information in his *Ethnographic Atlas*, partly because most of the anthropologists from whose research the conclusions were drawn were males in a position to deal with male matters, and partly because the research was carried out largely at a time when traditional African religion was more coherent and when the holding of circumcision camps was still common. Second, we examined as many contemporary ethnographic accounts as possible to ascertain currently reported circumcision status. This was not very rewarding as anthropologists' interests have changed, partly because of the decline to near-extinction of circumcision camps (without a similar decline in circumcision which is now often carried out by doctors, frequently in infancy). Third, we used the opportunity of visits, lectures and seminars across sub-Saharan Africa to raise the question of the current circumcision status of ethnic groups with as many people from different ethnicities as possible. This may not be a very scientific procedure but it may be — as far as we can determine from the literature on the subject — the best current assessment of the situation. Our tentative conclusion is that Murdock's listings were largely correct and that, with relatively few exceptions, they still describe the situation. There are exceptions: the Zulu, alone among the Southern Bantu, gave up circumcision on the orders of Shaka the Great (but, in any case, they are listed by Murdock as not circumcising); small ethnic groups in northwest Botswana, adjacent to larger non-circumcising groups, have given up circumcising; the Akan of southwest Ghana, forming an island in the sea of circumcising peoples of West Africa, have, with the exception of chiefs and their advisers, largely begun circumcising this century; small numbers of the elites have moved in each direction with regard to their infant sons. Much more contemporary documentation on the subject is urgently needed from anthropologists and others, as it is also on clitoridectomy. Nevertheless, the work we have been able to accomplish suggests that it is highly unlikely that there will be any substantial change in the picture drawn from Murdock and others: there is a belt of population stretching from southern Sudan through Uganda, Rwanda, Burundi, part of eastern

Zaire, western Kenya, western Tanzania, Zambia, Malawi, Zimbabwe, Botswana and southern Namibia, approximately 6000 kilometres long and 1000 kilometres wide, the home of almost 100 million people or one-sixth of sub-Saharan Africans, where the vast majority of males are not circumcised; and it is surrounded by populations that do circumcise males. Furthermore, it is probable that, apart from Abidjan and less certainly the rest of C<sup>TM</sup>te d'Ivoire, this belt, plus the outside cities to which its emigrants go (Nairobi, Mombasa, Tanga, Dar es Salaam, Kinshasa and others), will continue to record the highest HIV surveillance levels in the general population. There have been great changes in the age at which circumcision is carried out (with increasing infant circumcision) and in the circumstances (much more often by doctors), but HIV-transmission risk appears to depend on adult circumcision status and not on the age of circumcision.

(3) The papers did not claim that lack of male circumcision was alone the major determinant of high societal levels of AIDS, but rather that it tipped the balance in circumstances where a whole set of factors came close to permitting an epidemic. In homosexual or drug-taking communities in the West, the high risk of HIV transmission associated with anal sexual intercourse or intravenous injections is sufficient to explain the epidemic. These two behaviours almost certainly play some role in the epidemics in the West Indies and Thailand. But the sub-Saharan African AIDS epidemic — apart from secondary infection in the form of blood transfusion or vertical transmission from mother to child — appears to be almost entirely a heterosexual epidemic even among high-risk core groups. Because of the low risk of HIV transmission between otherwise healthy partners in heterosexual intercourse, purely heterosexual HIV/AIDS epidemics are unusual and depend on a number of concomitant factors. Factors militating against an epidemic in sub-Saharan Africa are the very low level of anal intercourse and of intravenous drug use, a situation fairly definitely established by researchers. Factors favouring an epidemic are levels of premarital and extramarital sexual relations, which, while not above those of the contemporary West (Michael et al. 1994; Wellings et al. 1994), are almost certainly higher than among the peasant societies of North Africa, the Middle East, South Asia and China; and male indulgence in commercial sex, which, while probably not at a higher level than in Thailand, is probably above the levels in much of the world. An important factor making HIV transmission more likely than elsewhere is probably the world's highest regional level of sexually transmitted diseases, at least partly caused by lack of treatment arising from the world's lowest level of health services (World Bank 1994). High levels of chancroid, other genital ulcerating diseases and other STDs mean that HIV transmission can be readily catalysed. The important point is that research to date does not demonstrate that the main AIDS belt is very different from the rest of sub-Saharan Africa by most of these criteria. Indeed, the high-sterility zone of Middle Africa to the westward almost certainly has higher STD levels. What distinguishes the main AIDS belt, and what is almost certainly the factor tipping the balance towards making a high-level sustainable AIDS epidemic possible, is the lack of male circumcision. It might be noted that in other parts of sub-Saharan Africa the epidemic is sustainable among high-risk groups even though the men are circumcised. The explanation is doubtless atypically high levels of sexual partners and untreated STDs. But these restricted epidemics do not spread rapidly through the general population as is the case in the main AIDS belt. Two other factors might be noted. First, because women are farmers rather than traders in East and Southern Africa, in contrast to the West African situation, many of the cities in the East and South have a large surplus of males built up by a predominantly male rural-urban migration stream (Larson 1989). In West Africa this is the case only in Abidjan which receives most of its migrants from the inland savannah where women have less independence than on the coast. The surplus of unattached males undoubtedly means a greater demand for commercial sex. Nevertheless, this situation does not define the main AIDS belt (although it may aggravate the situation in parts of it), because

it is characteristic of only part of it. The Ugandan situation, for example even in Kampala, is one of near-parity in the numbers of the sexes. Second, there is a possibility, which is yet to be confirmed by adequate information on the distribution of STDs in sub-Saharan Africa, that the main AIDS belt might coincide with the major chancroid belt. If so, the explanation is likely to be that lack of circumcision also predisposes males to being infected by chancroid. Finally, it might be noted that the epidemiological demonstration of an association between lack of circumcision and a greater propensity for AIDS infection is not a demonstration of causal mechanisms. It does not demonstrate that lack of circumcision predisposes sexual partners to greater chances of direct infection by HIV; it may predispose them to a greater chance of being infected by chancroid or other genital ulcerating diseases and that in turn may make HIV infection more likely. It does suggest that there is a mechanism, probably biological, that in sub-Saharan African conditions renders societies that practise male circumcision less likely to suffer from a major AIDS epidemic and may render circumcised males in any society less likely to become infected.

(4) The papers also assumed — perhaps because they were written by social scientists rather than medical scientists — that the demonstration of a link between lack of male circumcision and HIV infection was worthwhile even if no practicable intervention program could at the time be envisaged. It was realized that in the main AIDS belt there might prove to be problems in presenting circumcision as an intervention because of the extent to which circumcision or lack of circumcision was connected to traditional culture and religion and its identification with ethnicity. Male circumcision status has long been a divisive force in Kenya. Nevertheless the acceptance of a link between lack of circumcision and a greater likelihood of HIV infection might assist biomedical research, might suggest some public health interventions, and might indicate the relative emphasis that should be placed on interventions throughout the community in contrast to those directed at the high-risk groups. It would also allow elites, or perhaps wider communities, to choose the option of circumcision for themselves or their children. That this is not impossible is shown by the Zulu and Akan experiences. It might allow a more accurate assessment of the risk of epidemics in other parts of the Third World.

### **Towards agreement**

Those responsible for the original epidemiological studies are still convinced of their soundness, and one group is represented in this Forum<sup>2</sup>. The most important aspect of this Forum is, however, the paper by Mertens and Carael, which appears to me to be an important contribution in that it almost brings the debate to a close by assuming that it is likely that the epidemiological case for an association between lack of male circumcision and greater likelihood of HIV infection is correct, and suggesting that the emphasis now should be on cautiously searching for acceptable interventions in this area and stimulating better survey and biomedical research. The paper seems to me to be a balanced appraisal in contrast to De Vincenzi and Mertens (1994) which seemed to do less than justice to the epidemiological evidence. I have little to debate in the detail of their paper<sup>3</sup>, but I hope the World Health Organization can move to the position of saying that there is sufficient evidence of the

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<sup>2</sup> I.e. the group consisting of Moses, Bradley, Nagelkerke, Ronald, Ndinya-Achola and Plummer. From the other group, Bongaarts, Reining, Way and Conant, the last author also appears in this Forum. Bongaarts is in agreement with our three papers cited here; he has done no further work in this area, at least partly because he regarded the epidemiological studies as conclusive.

<sup>3</sup> Carael and Mertens note my use of the word 'lurid' to describe AIDS epidemics as intense as that in the main AIDS belt. If this word seems extreme, it is because I wished to convey to the Durham audience the horror of that epidemic, to which much of the world seems insufficiently responsive.

likelihood of some connection between lack of circumcision and a higher risk of HIV infection for this to be taken into account when organizing interventions and for governments to inform their citizens of this possibility so that they can adopt informed choices. A recent field visit to southwestern Tanzania has taught me that changed circumcision behaviour is more likely than I previously thought and that local populations are ahead of medical researchers in their conclusions. Apparently solely from the observation that circumcising populations have lower levels of AIDS than adjacent non-circumcising ones, increasing numbers of men from the latter groups are presenting themselves and their sons at small rural hospitals for circumcision, and circumcision advertisements are appearing in some Tanzanian newspapers offering a protection from AIDS.

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## **Book reviews**



**The Impact of Structural Adjustment on the Population of Africa: The Implications for Education, Health and Employment. Edited by Aderanti Adepoju. New York: UNFPA in association with Heinemann, Portsmouth (N.H.) and James Currey (London), 1993. viii + 148 pp. Hardback £35. Paperback £9.95.**

In discussing the factors affecting the health and well-being of Africa, observers are as likely to refer to the impact of SAP as they are to the scourge of HIV/AIDS or malaria. Yet SAP is not an illness at all but rather the acronym for the structural adjustment programs initiated and designed by the International Monetary Fund and the World Bank. These programs have been implemented to overcome the stagnant growth that has characterized African economies in recent years.

For its supporters SAP, at least initially, was expected to open the way to the dramatic economic growth that has characterized many Asian countries in recent years; for its opponents SAP has destroyed the productive capital already in place by cutting protection and reducing subsidies. The most controversial aspect of SAP, however, has been reductions in government expenditure and investment, and the subsequent impact on key government programs in areas such as health and education.

The volume under review here consists of case studies of nine sub-Saharan countries focusing on the impact of SAP on education, health and employment.

The tone of the introduction, by the editor Aderanti Adepoju, and some but not all of the individual chapters, is set by the book's dedication to Africa's poor who have suffered as a result of government cuts in social expenditure. Adepoju argues that economic reform programs have failed to overcome the roots of Africa's economic failure, and indeed have added to Africa's woes by reducing formal sector employment and undermining Africa's already weak health and education systems. In sum, what gains Africa had achieved since independence have been summarily disposed of in the name of economic rationalism with nothing to replace them. Furthermore, Adepoju suggests the losses have disproportionately hurt the poor, the weak and the defenceless. The implication is that the Bretton Woods agencies have failed to meet Africa's true needs because their actions have been guided by their own ideologically based models of economic development and have ignored the realities of Africa's situation.

It is hard not to feel sympathy with Adepoju's concerns when foreign 'experts', apparently often with little more than superficial acquaintance with the countries concerned, lecture Africans on their problems and the solutions to those problems. To be fair though, the World Bank and the International Monetary Fund have in recent years tried to be more introspective and to enter into more genuine dialogue, not least in recognition that their attempted cure of Africa's economic ills has not always had the results anticipated.

Nevertheless, granting that the supposed experts of the international agencies may at times have been arrogant, this volume fails to answer two critical questions. The first is whether the cuts in social expenditure and reductions in formal employment are primarily due

to structural adjustment or to the economic failures they were designed to cure. The second is whether there was a viable alternative to structural adjustment.

All the authors of this volume acknowledge that Africa's pre-existing economic problems were deep and radical change was necessary; economies were badly distorted, inwardly turned and increasingly unable to compete internationally. Heavy handed government involvement in economic policy was a particular problem, having, in Adepaju's words, 'developed into bottlenecks to development, as many public sector enterprises, riddled with inefficiency and corruption, consumed more and more scarce resources' (Introduction, p. 1).

In the years immediately after independence in the early 1960s African countries had comparatively open economies with, in comparison to their contemporary Asian counterparts, large export sectors. The dynamic parts of their economies had been the primary sectors, especially of plantation products such as cocoa, coffee, tea and copra, though some were also important exporters of minerals, notably copper in Zambia, gold in Ghana and increasingly oil in Nigeria.

Influenced by the fashionable economic concepts of the time, such as Rostow's concept of economic take off, governments attempted to use what they perceived to be agrarian surpluses to promote industrialization, rather on the model of Stalinist Russia's forced industrialization. At first the economic programs had some apparent success with manufacturing industry supplying an increasing proportion of the local market, but in the long run they turned out to be unsustainable, and, given their deleterious effect on the vital primary export sector, ultimately disastrous.

A case in point is that of Ghana following independence: the regime of Kwame Nkrumah used taxation revenues from agricultural exports in combination with import restrictions to build up a government-dominated manufacturing sector and greatly improved infrastructure. The result was, as noted by Nii Kwaku Sowa (Chapter 2, p. 8), that manufacturing increased from two to nine per cent of Gross Domestic Product, a growth rate of ten per cent per annum. The share of government consumption in GDP rose from ten to 18 per cent. While Nkrumah's rule brought some genuine benefits, notably a massive increase in schooling, his overall economic policies were ultimately disastrous. Agriculture stagnated as investment collapsed, and the volume and value of Ghana's major export, cocoa, precipitously declined with nothing to replace it. Manufacturing also collapsed because, far from increasing Ghana's self-sufficiency, it depended on the import of raw materials, itself dependent on the export revenues of cocoa. The governments that followed Nkrumah failed to make the necessary adjustments, in particular by refusing to devalue the currency. Sowa notes that

as goods became scarce, the government resorted to price controls, introducing further distortions, and bringing in its wake unprecedented levels of corruption. *Kalabule*, a system wherein the 'haves' took advantage of scarcities and exploited the 'have-nots', became the order of the day and reached its height in the early 1980s (p.8).

Among the consequences of the economic decay were increasing hunger, declining health standards, and a flight of Ghana's greatest asset, its educated class, over a million to Nigeria alone before their summary expulsion from that country.

This description refers specifically to Ghana, but the general characteristics are largely applicable to the other case studies in this book. Ghana's case, however, is of particular interest in that it has been the World Bank's African model for structural adjustment. Ghana in 1983 implemented an IMF/World Bank sponsored Economic Recovery Program, which according to Sowa seemingly salvaged Ghana's economy from near-bankruptcy: economic growth recovered from being negative to registering over the next few years an average annual growth of five per cent (p.12).

Sowa argues that this success is to some extent illusory or at least has not equally benefited all elements of society. Some, at least, of the growth of Gross Domestic Product can be attributed not so much to the structural adjustment policies as to the external funds provided by the multilateral agencies themselves. But according to a recent World Bank study, external assistance linked to SAP programs, including that in Ghana, has been of marginal importance compared to the impact of the policy changes themselves (Hussain 1994: 8).

Sowa's major criticism is that the Economic Recovery Program has resulted in lop-sided development to the benefit of the least productive sector of the economy, the service sector. The manufacturing sector, in contrast, has suffered. Furthermore, while it has benefited the export-dependent cocoa farmers, growers of food crops have received little benefit. The difficulty with this criticism is twofold: first, any economic restructuring will inevitably invoke winners and losers; secondly, the concept of some sectors of the economy being more valuable than others is questionable. After all, Sowa himself makes the point that Ghana's manufacturing industry, far from being productive, was actually creating highly priced goods using imported products. Similarly, the comparative success of the cocoa farmers resulting from a more rational exchange rate is a function of Ghana's comparative advantage.

The benefits of adjustment cannot be equal; the more important question is whether the benefits justify the pain. A problem throughout the book is that little attempt is made to meaningfully evaluate the real benefits and losses of restructuring. Formal employment has been affected by cuts to the public sector workforce, but the impact of structural adjustment on non-formal employment is often unclear. In theory the overall economic benefits of structural adjustment should lead to an overall expansion of employment that more than compensates for cuts in formal employment. The poorly developed state of statistical services in Africa means that there is little conclusive evidence on this point.

The impact of structural adjustment on health and education is equally unclear. A number of the book's contributors criticize cuts in health and education budgets as being shortsighted and inimical to long-term development and the well-being of the African people. Yet education and health budgets were already suffering as a consequence of budget pressures brought about by collapsing economies and the costs of poorly managed state sectors. Furthermore, if the measures introduced under structural adjustment lead to more efficient services, budget cuts need not necessarily be inimical to good health and education. Unfortunately there is a lack of evidence of the impact of structural adjustment on these sectors. The rapid increase in education characteristic of the post-independence years may have slowed down but in general education rates have not significantly declined, though education quality may have suffered, in particular through large class sizes. Similarly, health services have been cut, but it is not clear that African mortality and morbidity rates have suffered as a result. While more clinics may be short of drugs, much health expenditure was previously badly directed. Many health budgets were concentrated on the big-budget hospitals of the capitals and larger towns. Furthermore, while government health budgets may have diminished, the effect has been partly counteracted by the contributions of external agencies.

Whatever the cause, it is nevertheless fair to say that health and education budgets have been cut, often to protect more politically sensitive expenditure such as that on the military. It is also true that where cuts have been made they have not necessarily been accompanied by measures designed to improve the efficiency of the health and education services. Indeed, many governments may well prefer to protect jobs, including administrative jobs, while cutting back on service provision. It is less clear whether there was any alternative to the structural adjustment programs as designed by the international agencies, a question which the book does not address. A number of the early programs were undoubtedly too short-term to address fundamental economic problems such as shortages of trained personnel and poorly

maintained infrastructure, but the two international agencies have recognized shortcomings in their programs and made adjustments in their subsequent programs.

Nevertheless, there is a question as to whether Africa's problems are more fundamental than can be easily overcome in an economic reform program. Asian countries have enjoyed a comparative economic success over Africa not because they have discovered any particular economic panacea. Indeed, they are characterized by a diversity of economic policies, many of which do not conform with IMF or World Bank economic prescriptions. What they have in contrast to Africa is a certain economic conservatism and a greater respect for due processes. Government decision-making is more consistent and less subject to arbitrary changes. Importantly, while Asian governments are not necessarily democratic, the various interest groups in society have more influence on government policy. For example, the concerns of farmers or entrepreneurs cannot be ignored in Asia as has often been the case in Africa. Consequently, there is less evidence of minority groups prospering at the expense of the majority, and greater reward for effort, skills and entrepreneurship.

In other words, economic policy in Asia has reflected the interests of a broad constituency. African economic policy has failed to do so and Africa has suffered as a consequence. Structural reform programs, however, will not lead to more consistent and representative economic policy-making if they do not lead to a more inclusive political process. Unless those involved feel that they own the political process and are involved in decision-making, they will have little faith in the political and economic order. No matter how correct the act of imposing economic reform may be, it does little to further this process.

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**An Introduction to the Medical History of Ethiopia. By Richard Pankhurst, with a Postscript by Asrat Waldeyes. Trenton: Red Sea Press, 1990. 288 pages. Hardback US\$45.**

**The Ecology of Health and Disease in Ethiopia. Edited by Helmut Kloos and Zein Ahmed Zein. Boulder: Westview Press, 1993. xix + 540 pages. Hardback US\$71.**

*An Introduction to the Medical History of Ethiopia* is based on a collection of Pankhurst's published papers on the medical history of Ethiopia. The book is an attempt at an historical account of the pervasive droughts, famines, epidemics and wars that have characterized much of Ethiopia's history, and the consequent human slaughters and tragedies. Parallel to these accounts it describes what traditional medicine did to cope with diseases and affliction, and the introduction and expansion of Western medicine. The material draws heavily on the accounts and writings of travellers, missionaries, diplomatic delegations and physicians. Pankhurst covers Ethiopia's medical history from the twelfth century till 1940, that is up to the

Italian invasion and occupation of the country. The period of modern public health-service development, called the post-liberation period, 1941-1973, is described by Professor Asrat Waldeyes, the first Ethiopian medical surgeon. The book is divided into three parts according to historical periods: the first deals with epidemics, diseases and traditional approaches to medicine, the second deals with modern medicine, and the third part is the 'postscript' by Waldeyes. There are three pages of bibliographic notes and a 20-page index.

The introduction considers some factors affecting health; climate and droughts leading to crop failures and epidemics. The Ethiopian royal chronicles and travel literature recorded 42 famines between 1540 and 1929. Other factors of high morbidity and mortality were fasting and diet habits, very poor personal hygiene and sanitation, poor sanitation and water supplies in towns and army camps, and warfare. The epidemics that afflicted Ethiopians were mostly unidentified and identification only began from the eighteenth century onwards. Pankhurst gives an account of the early unidentified epidemics in which the people attributed the calamities and great tribulations to God's anger and punishment for the wrong-doings of kings, priests and people. Smallpox and cholera were the great killer epidemics in Ethiopia, which usually followed droughts and famines: outbreaks continued till the early part of this century. Pankhurst gives a separate historical account of each of the great epidemics: smallpox and cholera followed by typhus and influenza and their consequent high mortality, treatment, and when the outbreaks were controlled. Pankhurst notes that syphilis was pervasive in Ethiopia following European contact in the sixteenth century. He claims that Ethiopia has suffered from a high prevalence of leprosy since time immemorial.

Part 2 of the book deals with modern medicine. Pankhurst begins with the coming of the first foreign medical practitioners as early as the sixteenth century, mentioning them by name and reporting their account of the diseases prevalent at the time and how they treated them. This is followed by a section on Western medicine in the early nineteenth century, which made significant advances, and for the first time provided statistics on the type of diseases treated by the British diplomatic mission of 1841-42, when syphilis was the leading disease treated. In a following section, Pankhurst describes the further advances made by Western medicine in the second half of the nineteenth century during the reigns of two successive emperors, when the emperors as well as the people were described as receptive to Western medicine. This period saw the use and importation of Western drugs, smallpox vaccination, drugs for treating malaria, and mercury preparations for treatment of syphilis. The section on Emperor Menelik's era of innovation, 1865-1913, gives a detailed account of the establishment of health facilities, pharmacies, hospitals, clinics, the coming of medical missions, medical diplomacy, visiting doctors, substantial advances in vaccination, the dispatch of students for medical studies abroad, the coming of resident foreign doctors, and the founding of planned modern towns. This section concludes with statistics on the number of cases and types of diseases treated by the Russian Red Cross Mission of 1896 in two towns, Harar and Addis Ababa, and the age, sex and ethnic composition of those treated. The next to last section describes how the modernization of health services that began during Emperor Menelik's reign were consolidated and accelerated during Emperor Haile Selassie's reign as regent and emperor from 1916 to 1936. The last section of Part 2 considers health service development during the Italian invasion and occupation of the country from 1936 to 1940, which contributed to the establishment of hospitals and clinics in Addis Ababa and in five provincial towns, the treatment and control of venereal diseases and the considerable expansion of vaccination.

The postscript covers the period 1914-1973, that is from the end of Italian occupation till the overthrow of Emperor Haile Selassie by the military government, the *Dergue*, in 1974. This part describes the development and organization of public health services, development of medical services, the expansion of basic health services through health centres and health stations linked with existing hospital services, the passing of proclamations on how to guide

the practice of traditional medicine, the implementation of specific health projects and activities in the mid-1960s; chief among them were the malaria eradication and control program, the smallpox eradication program, the leprosy control project and the establishment of the All Africa Leprosy and Rehabilitation Centre and the tuberculosis control program. This postscript also traces the development of institutions to train nurses and other health personnel, the founding of the Public Health College to train executive staff for the health centres in the country and the establishment of the Medical School in Addis Ababa University; it ends with a history and appraisal of administrative and health manpower support.

Pankhurst's book makes an interesting and valuable contribution to the historical understanding of the diseases and epidemics that have long plagued Ethiopia, the extent of human loss during great epidemics, the social perceptions of diseases, and how traditional medicine understood and treated diseases. It gives an excellent account of the introduction and development of modern medicine and the modern development of the public health service. A reading of Pankhurst's book clearly demonstrates that the now very familiar droughts, famines and epidemics of modern Ethiopia are not new after all.

*The Ecology of Health and Disease in Ethiopia* is the first comprehensive work on Ethiopia relating to health, epidemiology and ecology and their interrelationships. The book comprises 40 chapters organized into four parts. Part 1 consists of eight chapters dealing with the physical and socio-economic environment, population, nutrition and diseases. Topics of interest here are the physical and biotic environment; food, diet and nutrition; famine and malnutrition; and the health impacts of war. Part 2, with 14 chapters, deals with health services and with sexually-transmitted and other non-vector-borne diseases. Part 3 deals with vector-borne diseases in chapters on malaria, trypanosomiasis, onchocerciasis, leishmaniasis, yellow fever, relapsing fever, typhus and other rickettsial diseases, and schistosomiasis. Part 4 in ten chapters covers chronic non-infectious diseases, injuries, mental health, and other health problems.

This book benefited from an interdisciplinary approach, as it successfully brought together the expertise of 47 medical, biological and social-science professionals as well as public-health experts who competently addressed the multidimensional health and disease problems of Ethiopia. All analyses were undertaken with an ecological perspective of health and disease problems. Another distinguishing feature of the book is its incorporation in the analysis of all available quantitative data and research to date, which resulted in a comprehensive knowledge of the aetiology of Ethiopia's major diseases and health problems, their spatial distribution and prevalence rates and trends. Furthermore, many of the studies show the poor health and nutritional status, and high mortality, of the Ethiopian population, as well as the prevalence of major communicable and infectious diseases further aggravated by war, drought and famine-driven epidemics and the increasing diversion of the already low health resources to the war effort.

The spatial analyses of major diseases strongly demonstrate the close relationship between the types of diseases and their distribution according to altitude-dependent climatic zones. Ethiopia's three climatic zones are the hot lowlands zone below 1500 metres, the temperate highlands zone between 1500 and 2400 metres, and the cool humid highlands zone above 2400 metres. For example, malaria is moderate to highly endemic in the lowlands and is absent in the temperate and cold zones above 2000 metres, where the majority of Ethiopia's population lives. Leprosy, which has a long recorded history as an endemic disease in Ethiopia, is concentrated in the densely populated highlands, particularly in central and northern Ethiopia. The distribution of elephantiasis shows concentration in highland areas with underlying basalt rock.

The various contributors also showed that the transmission, morbidity and mortality from particular diseases were heightened by wrong and misdirected government policies,

ideologies and programs; for example irrigation schemes, massive resettlement programs, villagization, and alienation of pastoralists' fertile watered lands for large-scale agricultural developments. The book's consideration of the health effects of war is significant in recognizing war as an important influence on population health. An up-to-date report on the AIDS epidemic contributes to an understanding of the gravity of the emerging major health problem in Ethiopia.

The value of all the chapters on major diseases and health problems is enhanced by their conclusions, which provide suggestions on needed future health policies and programs to reduce and control the prevalence of diseases, and on the need for comprehensive health and mortality data and research to monitor the control of diseases.

The quality of most of the chapters is good: the only ones that seemed weak are the chapter on population, where mortality and fertility were treated lightly in four pages, without a literature review; and the concluding three-page chapter by the editors. Their conclusion identified three population groups: the elderly, the high-risk occupational groups and the pastoralists, neglected by past health-care provisions; it was suggested that their needs should be given priority. With the exception of the pastoralists, this suggestion is misdirected in view of the overall poor health status of the Ethiopian population, and the very high infant and child mortality.

This book constitutes a valuable and comprehensive reference work on all aspects of disease and health problems in Ethiopia seen in their ecological context and the challenges they pose to raise the health status of the population. I strongly recommend the book to medical and social-science professionals interested in health research and public health-care policies and programs addressing major health problems such as those prevailing in Ethiopia. I also recommend Richard Pankhurst's *Introduction to the Medical History of Ethiopia* (reviewed in this issue) as a background to put in historical perspective many of the issues covered in *The Ecology of Health and Disease in Ethiopia*.

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**The Benefits of Famine: a Political-Economy of Famine and Relief in Southwestern Sudan, 1983-1989. By David Keen. Princeton: Princeton University Press, 1994. xiv + 289 pp. Hardback US\$47.**

This is an interesting book but in many ways also an exasperating one.

Its strength is that it provides a detailed examination of the 1983-1989 famine in southwestern Sudan. It documents the extent to which the distress and horrors of that crisis were man-made. It analyses the problems and errors of the relief agencies.

The infuriating weakness of the book is the attempt to convert this historical analysis into a global theory and to oppose it against books which probably are closer to the general situation like that by Dr•ze and Sen, *Hunger and Public Action*. The author has two basic theses. The first is that these other authors, and most of the rest of us, place too much emphasis on famine mortality rather than non-fatal distress and change in material circumstances. The second is that many people achieve their aims through famine either by dispossessing the distressed or by diverting some of the relief aid.

In arguing the case for the second point, and attempting to make it the central force in generating crisis conditions, Keen is forced to seek often not very relevant parallels from world wars and mediaeval Europe, among other exotic sources.

Many of us pointed out in the African famines of the 1970s that drought and resultant famine were not solely physical phenomena, but that good government, with the interests of the whole population at heart, could do much to mitigate the situation, and that bad governments could convert what should have been minor crises into major disasters. I also noted the conversion of Sahelian governments from regarding the famine as a natural phenomenon that affected some sectors of the population in a way that had been their experience for aeons, to a crusade where foreign governments were loudly appealed to; and that this conversion received at least some of its impetus from the realization that there would be spin-offs to them from an international effort.

The truth of the matter is that Keen's description applies only to exceptionally bad governments which do not regard themselves as representing the whole country and even then mostly in conditions of warfare. There were parallels in Ethiopia and Mozambique, and now in Rwanda. But, even in Africa, most administrations and situations are better than this and Dr•ze and Sen are probably far more justified in making their generalizations than is Keen.

I have no doubt that he fairly correctly describes the situation of most of the donor organizations in Sudan, but he is much less adept at explaining what they should have done. Would it have helped if they had withdrawn or could they have persuaded the United States and other Western governments to allow famine relief to dictate their whole foreign policies?

David Keen has part of the truth. It is a shame that he attempted to make it the whole truth. It is even dangerous to down-grade the fact that death is worse and more final than the other disasters that befall unfortunates in southwestern Sudan and elsewhere. The major title of his book is also a little too smart and somewhat unfortunate.

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