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HOUSEHOLD AMENITIES AND OWNERSHIP OF CONSUMER DURABLES IN THE NORTHERN REGIONS OF THE SUDAN

(Based on Data From the 1979 Sudan Fertility Survey)

Department of Statistics
Ministry of Finance and Economic Planning
Democratic Republic of the Sudan

in collaboration with

Integrated Population and Development Planning Project
Research Triangle Institute
Research Triangle Park, North Carolina
United States of America

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EXECUTIVE SUMMARY

At the request of the Department of Statistics, Democratic Republic of the Sudan, the Integrated Population and Development Planning Project (USAID centrally funded project #AID/DSPE-C-0062) of the Research Triangle Institute, North Carolina, USA, prepared a report on household amenities and ownership of consumer durables in the northern regions of the Sudan, using data from the 1979 Sudan Fertility Survey. The Sudanese government has among its basic goals raising levels of living overall for the population and decreasing existing disparities among the regions and between rural and urban areas. The report describes the situation in the Sudan with particular emphasis on regional, rural-urban and other differences in order to provide data for use in planning.

Data from the 1979 Sudan Fertility Survey allows for examination of two sets of household characteristics. One set deals with ownership of consumer durables. Although the government does not endorse conspicuous consumption, it is highly likely that the level and distribution of consumer goods in the population reflect both the distribution of wealth and income and to some extent the distribution of infrastructure such as roads. The study also examines relationship between the ownership of consumer goods and fertility to see whether people may be increasing their material possessions where available, rather than their numbers of children.

The second set of characteristics deals with household amenities including water supply, toilet facilities, fuel for cooking, source of lighting and number of persons per room. These amenities are examined both in the context of their distribution within the population and in the context of their relationship to levels of recent infant and child mortality.

The report discusses the relationship between each set of characteristics and the region of the country and the rural versus urban nature of the place of residence. Relationships are also determined between the sets of characteristics and the educational attainment of the head of the household, sex and age of the head of the household, and the number of persons in the household.

Levels of ownership of consumer durables and of household amenities in general are quite low. The data indicate that there are marked differences among regions and between rural and urban areas in ownership of consumer durables and in household amenities. For most measures Kordofan and Darfur are disadvantaged relative to other regions. Within any region rural areas are disadvantaged relative to urban areas, and furthermore the rural areas of a relatively disadvantaged region are more disadvantaged compared to other rural areas. For the most part, there are differences according to the educational attainment of the head of the household. In the same region and type of place, households headed by persons with higher educational attainment have better conditions than those households whose heads have less education. At the same time, regional and rural-urban disparities persist even within the same levels of educational attainment. These findings are not surprising and

support government contentions that some areas will require heavy expenditures in order to bring them up to the level of more advantaged places.

The findings concerning infant and child mortality suggest that with respect to certain household amenities, the consequences of deprivation are not merely a matter of less comfort or convenience but are actually a question of survival. With respect to the relationship between fertility and ownership of consumer durables, the data suggest that there may be a tendency for some couples, in areas where consumer goods are available, to invest in these goods rather than in additional children.

Throughout this report, findings are often qualified or followed by possible explanations for which analyses were not carried out. Testing many of the important hypotheses requires carrying out multivariate analyses in which the relative effects of a number of factors can be determined. It also requires carrying out analyses one step at a time so that each step in the analysis evolves from preceding steps. Since the data were not available to us in machine-readable form, it was not possible to conduct work in this manner. It is hoped that in the future more in-depth analysis will be carried out than was possible for this report.

HOUSEHOLD AMENITIES AND OWNERSHIP OF CONSUMER DURABLES IN THE NORTHERN REGIONS OF THE SUDAN (1979)

Introduction

The Sudan, like other Third World countries, is striving for economic development. While such measures as GDP or GNP per capita can provide some indication of the economic development in a country, there has been a growing consensus that disparities in the distribution of wealth and goods and services and the extent to which certain basic needs are being met are important to consider in looking at economic development. The government of the Democratic Republic of the Sudan shares these concerns as evidenced, for example, by the 1977/78-1982/83 Six Year Plan for Economic and Social Development.

The Sudanese government has among its basic goals raising levels of living for the population and decreasing existing disparities among the regions and between rural and urban areas. The provision of information concerning both the absolute and relative living conditions can assist governments in their efforts to achieve their goals. This report seeks to describe the situation in the Sudan with particular emphasis on regional, rural-urban and other differences in order to provide data for use in planning.

The data in this monograph were collected as part of the 1979 Sudan Fertility Survey carried out by the Department of Statistics, as part of the World Fertility Survey (WFS). Because the Principal Report (WFS and DOS, 1982) had not been published at the time the work was carried out, IPDP did not have access to the data in machine readable form and the analysis was carried out using hard copy. Thus an in-depth analysis of the data was necessarily precluded.

Background

Economic Development

In approaching questions of economic development it is now usual for governments of countries as well as institutions such as the UN and the World Bank to look beyond overall measures such as GNP per capita to measures of levels of living and to the distribution of goods and services among a population. The UN Interregional Seminar on Organization and Administration of Development Planning Agencies, for example, stated "Foremost...is the need to pay increasing attention to such indicators of development as the reduction of unemployment, the reduction of disparities in income distribution, and the volume of material growth, particularly in such fundamental, non-luxury spheres as housing, community facilities, food, clothing, medical services, education, transportation, etc., in addition to the currently accepted over-all indicators of GNP" (quoted in UN, 1976, p. 8). And from Robert McNamara, former president of the World Bank, "...the entire concept of development must be broadened. It must be broadened beyond the simple goal of gross national product. Such growth is a necessary condition of development. But it is not a sufficient one. What is the essential condition of development is that it should encompass the basic needs of the two billion people of the developing world: adequate nutrition, meaningful employment, a more equitable distribution of income, decent chance to improve one's lot in life." (Quoted in First Session of the Joint Conference of African Planners, Statisticians and Demographers. Addis Ababa, 24 March--2 April 1980, United Nations, Economic and Social Council, Economic Commission for Africa page 1.)

In its 1976/77-1982/83 Six Year Plan and the 18 Year Perspective Plan, the government of the Sudan indicates that it looks beyond GNP per capita to the quality of life of its people and to distributional aspects. "Principally, the Plan aims to achieve an accelerated and balanced growth in the Sudanese economy combining development with social equity. The social equity objective is considered extremely important since it implies development and progress in all regions and for all peoples" (Ministry of National Planning, 1977, p. 31). "The objectives of economic development are not simply limited to increased production and the provision of and kind of goods and services, but extend ultimately to the raising of standards of living and the provision of basic needs for the individual and the family" (Ministry of National Planning, 1977, p. 115). This theme was echoed at the Second National Conference on Population which also stressed the need for research and for data in order to make informed decisions. The Plan recognizes problems of levels of living overall and also disparities between rural and urban areas, among regions and among individuals within each of these areas, and seeks to redress imbalances as well as to improve conditions overall. There is an emphasis on regional development and on providing resources to areas which have not benefited as much as others from improvements.

Among the specific objectives of the Six Year Plan are the eradication of illiteracy and the provision of "...suitable housing for each family in a healthy environment where minimum standards of living prevail: [to] give more attention to backward areas and [to] provide them with their need for public utilities and basic services" (Ministry of National Planning, 1977, p. 109).

To move forward effectively with this orientation toward development, it is necessary to have information which will show what the living conditions are and to what extent needs are being met both in the country as a whole and among different groups. It is also useful to see what the relationships among certain characteristics such as educational attainment and other measures of well-being may be.

Data from the 1979 Sudan Fertility Survey allow examination of two sets of characteristics of households which provide some measures of well-being or living conditions and of the distribution of goods and services among the population. One set deals with ownership of consumer durables. While the government does not endorse conspicuous consumption, it is nevertheless likely that the level and distribution of consumer goods in the population reflect the distribution of wealth and income and, to some extent, the distribution of such physical infrastructure as roads. The Second National Conference on Population indicated that the Sudan Fertility Survey data should be examined to shed further light on some of the factors related to fertility. In the context of this report one can study the relationship between ownership of such goods and fertility to see whether, in areas where they are available, people may be increasing their material possessions rather than their numbers of children.

The other set of characteristics deals with household amenities: water supply, toilet facilities, fuel for cooking, source of lighting and number of persons per room. These will be examined both (1) in the context of their distribution within the population and (2) in the context of their relationship to levels of recent infant and child mortality. With respect to the latter the UN Statistical Office (UN

Statistical Office, 1980) states "...there is a further range of information that is essentially of a social indicator nature, for example, measures of the quality of living, working and environmental conditions not expressable as components of income or consumption. In this group should be included not only factors affecting levels of living, but also those affecting the level of dying--infant mortality, average length of life and morbidity" (p. 10). In fact, survival rates of children and infants both reflect levels of living and are a measure of quality of life in itself.

The Sudan

Disparities among regions and between rural and urban settings have marked the distribution of both the population and the economic and social benefits of development in the Sudan. Geographically the country is vast, the largest in Africa, with a population estimated in 1981 to be about 19 million (WFS and DOS, 1982). The annual rate of population growth between 1970 and 1979 was about 2.6% (World Bank, 1980, p. 166), with urban areas growing more rapidly, at an annual rate of 6.8% between 1970 and 1980 (World Bank, 1980, p. 172). The urban population increased by 1.2 million from 1969-1976 (Ministry of National Planning, 1977, p. 84). In 1980, 25% of the population was living in urban areas, with 31% of that population in Khartoum province (World Bank, 1980, p. 172).

Overall the Sudan is a relatively poor country which is striving to improve conditions for all of its people. GNP per capita is estimated at US $370. Life expectancy at birth in 1979 was 47 years (World Bank, 1980) and infant mortality has been estimated recently between 135 and 145 per thousand (UNFPA, 1979). Of the total population above ten years

of age, 31% was found to be literate in the 1973 Census (Hill, 1981, p. 18). It has been reported that one-third of the population has access to safe water (AID, 1981, p. 7) which is generally "...limited to towns, certain development schemes and that from deep-bore wells" (Ministry of Health, 1980, p. 14) and about one-fourth of the dwellings in the Sudan are reported to have electricity (AID, 1981, p. 7).

Based on the 1973 census, population density was lowest in the north western parts of the country and the highest densities were in Khartoum, Gezira, White Nile and South Kordofan provinces. In the rural areas, population distribution is strongly related to such physical characteristics of the country as availability of water (Hill, 1981, p. 10).

The Sudan is a geographically mobile country. Apart from the nomadic population, there is a considerable amount of rural-urban migration as well as rural-rural migration. Some of this migration is seasonal though much of it is not. Rural-rural migration pulls people from poorer rural areas into the agricultural schemes where they receive cash wages. There is, in addition, the expected rural-urban migration. Khartoum, Blue Nile and Kassala provinces tend to be receiving areas with the west, south and far north as sending areas (WFS and DOS, 1982).

Prior studies in the Sudan have found that there are great regional differences in many of the measures of economic development, well-being or standard of living. The south is generally disadvantaged in comparison to the north; however, since the SFS did not include the south, it is not usually included in this discussion.

There has been a marked regional concentration of agricultural and, industrial development. It is reported that about 90% of all irrigated

land is in Kassala and Blue Nile provinces along with 90% of the mechanized farming. In addition, most of the industrial development has been in Khartoum Province. About 75% of the manufacturing industry establishments were in Khartoum Province in 1970-71 (ILO, 1976, p. 289).

Goods, services and income have also been unevenly distributed, which can be accounted for in part by problems of transport in so vast and sparsely populated a country but which has also been due in the past to unequal per capita expenditures among the regions and concentration of investments in the more prosperous areas. On the whole, the west has been poorer than the east and urban areas have tended to be better off than rural areas. The 1967-68 Household Budget survey found that Kordofan and Darfur, which were relatively rural, had lower mean household incomes than the eastern provinces. Northern province also had a low average income (ILO, 1976, p. 18-19). Looking at household expenditure rather than income also showed, within rural areas, that Darfur, Kordofan and Northern provinces were lowest (ILO, 1976, p. 506). With respect to education, student enrollment rates in urban areas have been much higher than in rural areas and enrollment rates in the north and east were three times as high as those in the west (ILO, 1976, p. 128). At the time of the ILO report, one half of the physicians in the Sudan were in Khartoum and Gezira provinces (ILO, 1976, p. 141). Not only are these differences in earnings, expenditures and living conditions found among regions and rural and urban areas, but they are also prevalent among individuals and households within these settings.

This brief description of findings of previous studies indicates that the general level of living is not high and that the distribution of goods and services, investments, income and wealth has been quite

uneven. The data reported in this monograph are quite recent, 1979, and it is hoped that they will be useful to planners as they continue in their efforts to raise the overall standard of living and to redress imbalances that have existed.

The Data and Analysis

The data for this report come from the Sudan Fertility Survey which was carried out by the Department of Statistics, Democratic Republic of the Sudan between December 1978 and April 1979 among the non-nomadic population in the six northern regions. The study included a household level survey and a survey of a subset of the women in these households. This report uses the information collected in the household survey. The Sudan Fertility Survey is a part of the World Fertility Survey which "...is an international program of fertility research undertaken by the International Statistical Institute (ISI) with the collaboration of the United Nations and in co-operation with the International Union for the Scientific Study of Population" (WFS and DOS, 1982, p. 11).

Household level interview schedules were administered to 12,028 households. Because of the relative distribution of the population between rural and urban areas, urban areas were oversampled. In order to have the data reflect the actual rural versus urban distribution of households, in the analysis of the data appropriate weights were assigned. The data reported here are from the weighted observations. The household level questionnaire collected information on the members of the household, including age, education, marital status and number of children as well as the number of children who had died. In addition, questions were asked about household amenities and ownership of consumer durables.

It is important to keep in mind that the survey did not include the South or nomadic peoples and that observed contrasts would probably be even stronger if these groups had been included.

The analysis reported here is cross-tabular, showing the relationships between two and sometimes three characteristics. The primary focus is on differences among regions and between rural and urban areas. Multivariate analyses, which take into account the effects of several variables on another at one time, await further work. Such analyses will be important in trying to sort out the relative importance of numerous characteristics which may be thought to affect a variable of interest, such as mortality, as well as in helping to determine the mechanism through which an observed relationship may arise.

The regional divisions used are as follows: Khartoum; Northern, including Northern and Nile provinces; Eastern, including Kassala and Red Sea provinces; Central, including Blue Nile, White Nile and Gezira provinces; Kordofan, including North Kordofan and South Kordofan provinces; and Darfur, including North Darfur and South Darfur provinces. The classification of type of place (rural or urban) follows the 1973 Department of Statistics classification which takes into account characteristics which reflect the administrative and commercial importance of a place as well as its size (WFS and DOS, 1982, p. 31).

Basic Distributions

This section describes some basic distributions of characteristics in the sample. They show strong regional and rural/urban differences. Some characteristics such as educational attainment, sex and age of household head and size of household, are expected to show relationships to ownership of consumer durables and to living conditions. In the case

of education this is in part because it can be seen as a measure of income or wealth. In fact for much of the analysis it would be preferable to have a measure of income; however, the SFS did not collect this information. Therefore, in some cases education is being used in place of income. In other cases it is expected that education itself is important.

Some researchers have suggested that households which are headed by women and by older people will tend to be less economically advantaged than households headed by men and younger people. The mechanism through which these relationships may operate could have to do with lower educational attainment of women and older people leading to reduced earning opportunities as well as the limited opportunities for earnings for women in many settings.

The relationship between the size of the household and ownership of consumer durables and living conditions is a complex one and there could be offsetting forces, the untangling of which will need to be done in later analyses. On the one hand, larger households may have more earners leading to an ability to purchase consumer durables and to live where conditions are better, or they might begin with more resources and thus be more likely to have relatives and friends staying with them on a temporary or permanent basis. On the other hand, larger households may have a higher dependency burden (i.e., the number of dependents per adult of working age).

For the northern regions of the Sudan the average number of persons per household was estimated to be 5.30, with a mean of 5.05 for rural areas and 6.05 for urban areas (Table 1). This is similar to the overall and rural/urban levels reported by the Ministry of Health and WHO

Table 1

Average Number of Persons in Household by Region and Type of Place of Residence

Region	Type of Place			Number of Households
	Urban	Rural	All	
Khartoum	6.31	5.73	6.18	1,373
Northern	6.24	5.40	5.56	962
Eastern	5.17	4.68	4.88	1,891
Central	7.18	5.53	5.75	3,322
Kordofan	6.00	4.85	4.99	1,758
Darfur	5.68	4.57	4.70	2,613
All	6.05	5.05	5.30	
Number of Households	2,997	8,923		11,919

(1981) for their survey areas. The rural/urban differences exist for each region with the largest difference in the Central region. The larger households in urban areas may reflect the nature of the physical structure of dwellings (MOH and WHO, 1981), migrants temporarily residing there, housing shortages or other factors.

The ratio of males to females within age groups is shown for rural and urban areas within each region in Table 2. The general excess of males 15 years and older over females in the urban areas is probably a result of male rural-urban migration, which is also reflected in the lower male to female ratio in the rural areas of some of the regions. The low male to female ratio in the age group 25-34 for all of this part of Sudan may be related to external migration.

The sex and age of heads of households for each region and type of place can be seen in Tables 3 and 4. Kordofan, Darfur and the rural areas of Northern Region show the highest proportion of female headed households. While this may be related to male migration out of these areas, the current analysis does not lend itself to addressing this issue. Where there are differences, a higher proportion of heads of households in rural areas is 45 or older than in urban areas. To the extent that females and older people may be disadvantaged relative to males and somewhat younger people, areas with older and female household heads may show relative deprivation beyond what would be expected on the basis of other characteristics, such as levels of expenditures for services or investments.

As was indicated earlier, there have been considerable differences in educational opportunity and achievement: there have been regional differences, differences between urban and rural areas, and differences

Table 2

Sex Ratio by Age, Region and Type of Place of Residence

Age	Khartoum		Northern		Eastern		Central		Kordofan		Darfur		All
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	
0-14	94	100	90	105	114	111	98	99	110	99	108	102	98
15-24	110	94	126	85	98	82	111	87	74	88	132	82	93
25-34	119	84	90	68	109	85	110	92	95	70	91	65	86
35-44	131	98	167	90	161	130	126	113	111	92	126	99	113
45+	121	146	131	99	137	156	123	127	107	114	136	116	123

Table 3

Sex of Head of Household by Region and Type of Place of Residence
(Percent Female)

Region	Type of Place			Number of Households
	Urban	Rural	All	
Khartoum	8%	5%	7%	1,385
Northern	6%	16%	14%	966
Eastern	9%	8%	9%	1,894
Central	6%	9%	9%	3,346
Kordofan	12%	15%	15%	1,765
Darfur	14%	16%	16%	2,620
All	9%	12%	12%	
Number of Households	3,009	8,968		11,976

Table 4

Age of Head of Household by Region and Type of Place of Residence
(Percent in Age Group)

	Type of Place									
	Urban					Rural				
	Age					Age				
Region	<25	25-34	35-44	45+	Number of Households	<25	25-34	35-44	45+	Number of Households
Khartoum	4%	23%	32%	42%	1,090	6%	20%	26%	48%	293
Northern	4%	21%	31%	45%	182	3%	17%	26%	54%	784
Eastern	3%	27%	33%	37%	772	4%	21%	26%	48%	1,118
Central	3%	15%	33%	48%	433	5%	22%	28%	45%	2,910
Kordofan	2%	22%	31%	44%	223	4%	17%	25%	54%	1,544
Darfur	4%	18%	37%	41%	304	3%	20%	29%	48%	2,315

between males and females. Tables 5 and 6 show that this was true among the population 15 years of age and over and among heads of households at the time of the Sudan Fertility Survey. Among regions Darfur and Kordofan have the highest level of illiteracy; people in rural areas have higher levels of illiteracy than those in urban areas; and higher proportions of women than men are illiterate.

Consumer Durables

This section reports on ownership of consumer durables among the population as a measure both of ability to afford such goods and of the availability of the goods or services such as electricity. Then it examines the relationship between ownership of consumer durables and number of children ever born to women in the sample.

Table 7 shows the proportion of households reported to own each of the consumer durables for rural and urban areas within regions. We note first that the level of ownership is low overall. With the exception of a radio, which is possessed by over one-third of the households, no more than 7% of them reports owning any of the goods. The table shows that within each region, urban households are more likely to possess these goods than rural households and that among urban areas, households in Khartoum, Northern and Central regions are more likely to have them than those in Eastern, Kordofan or Darfur regions.

Earlier we indicated that certain characteristics of households such as education of the head of the household, especially as an indicator of income, might be related to ownership of consumer durables and housing amenities. While the question as to what extent the difference in ownership may reflect differences in income and to what extent it reflects availability cannot be answered with the SFS data, the relation-

Table 5

Percent of Population 15 Years and Over Which Has Attended School and Is Literate by Sex, Region and Type of Place of Residence

	Type of Place					
	Urban		Rural		All	
Region	Female	Male	Female	Male	Female	Male
Khartoum	51% (1,940)*	74% (2,293)	28% (437)	42% (455)	46% (2,377)	68% (2,748)
Northern	50% (320)	74% (391)	29% (1,344)	54% (1,161)	33% (1,664)	59% (1,552)
Eastern	33% (1,084)	55% (1,284)	12% (1,391)	32% (1,510	22% (2,475)	57% (2,794)
Central	50% (876)	74% (1,014)	22% (4,381)	44% (4,461)	27% (5,257)	50% (5,475)
Kordofan	38% (368)	58% (343)	10% (2,236)	26% (2,049)	13% (2,604)	31% (2,392)
Darfur	30% (428)	62% (513)	8% (3,142)	24% (2,796)	10% (3,570)	30% (3,309)
All	44% (5,016)	68% (5,838)	16% (12,931)	36% (12,432)	24% (17,947)	46% (18,270)

*Numbers in parentheses are the number of observations on which percentages are based.

Table 6

Education of Head of Household by Region and Type of Place of Residence

	Type of Place									
	Urban					Rural				
Region	Illiterate, No School	Incomplete Primary	Primary	Above Primary	Number of Households	Illiterate, No School	Incomplete Primary	Primary	Above Primary	Number of Households
Khartoum	42%	13%	16%	28%	1,088	76%	12%	8%	4%	293
Northern	42%	10%	20%	28%	182	73%	8%	13%	7%	784
Eastern	60%	9%	17%	15%	772	78%	9%	10%	3%	1,119
Central	51%	19%	15%	16%	433	76%	11%	7%	6%	2,912
Kordofan	59%	24%	9%	8%	223	87%	7%	5%	1%	1,545
Darfur	61%	12%	8%	19%	303	88%	7%	3%	2%	2,316
Number of Households	1,529	399	454	621	3,003	7,271	791	588	318	8,969

Table 6a

Education of Head of Household by Region

Region	Education				
	Illiterate, No School	Incomplete Primary	Primary	Above Primary	Number of Households
Khartoum	49%	13%	15%	23%	1,381
Northern	67%	8%	14%	11%	966
Eastern	71%	9%	12%	8%	1,892
Central	73%	12%	8%	7%	3,345
Kordofan	84%	9%	5%	2%	1,768
Darfur	85%	7%	4%	4%	2,620
All	74%	10%	9%	8%	11,972

Table 7

Ownership of Consumer Durables by Region
and Type of Place of Residence
(Percent of Households Owning Item)

Region	Consumer Durable: Car, Urban	Car, Rural	Motorcycle, Urban	Motorcycle, Rural
Khartoum	15% (1,092)*	2% (293)	1%	--
Northern	6% (182)	1% (784)	1%	--
Eastern	6% (773)	--** (1,121)	1%	--
Central	7% (434)	1% (2,912)	1%	--
Kordofan	4% (223)	-- (1,542)	--	--
Darfur	6% (304)	-- (2,316)	--	--

	Bicycle, Urban	Bicycle, Rural	Refrigerator, Urban	Refrigerator, Rural
Khartoum	12%	2%	37%	1%
Northern	25%	--	30%	1%
Eastern	15%	1%	13%	--
Central	20%	4%	26%	2%
Kordofan	7%	2%	6%	--
Darfur	4%	1%	12%	--

	Washing Machine, Urban	Washing Machine, Rural	Radio, Urban	Radio, Rural
Khartoum	4%	--	77%	51%
Northern	1%	1%	73%	51%
Eastern	1%	--	52%	22%
Central	2%	--	72%	38%
Kordofan	--	--	48%	15%
Darfur	1%	--	47%	16%

Table 7 (continued)

Ownership of Consumer Durables by Region
and Type of Place of Residence
(Percent of Households Owning Item)

	Consumer Durable			
	Television		Sewing Machine	
Region	Urban	Rural	Urban	Rural
Khartoum	35%	--	23%	5%
Northern	27%	1%	23%	7%
Eastern	10%	--	9%	1%
Central	22%	1%	15%	2%
Kordofan	5%	--	10%	2%
Darfur	12%	--	7%	2%

	Telephone	
	Urban	Rural
Khartoum	10%	--
Northern	6%	1%
Eastern	1%	--
Central	2%	--
Kordofan	1%	--
Darfur	5%	--

Table 7 (continued)

Ownership of Consumer Durables by Region
and Type of Place of Residence
(Percent of Households Owning Item)

Consumer Durables for All Sample Areas	
Car	3%
Motorcycle	--
Bicycle	5%
Refrigerator	7%
Washing Machine	1%
Radio	37%
Television	6%
Sewing Machine	6%
Telephone	--
Total Number of Households	11,976

*Numbers in parentheses are the numbers of households in each region and type of place of residence. The number of missing observations varies slightly among the types of consumer durables.

**-- indicates less than 1%.

ship between ownership and education of household head can be examined (Table 8). Some goods have been omitted because so few households own them, and for the remaining goods, the numbers of households in rural areas which own them are sometimes very small. On the whole there is a relationship between education and ownership such that the higher the educational attainment of the head of the household the more likely it is to have a particular item. Nevertheless the relationships between ownership and type of place and, for the most part, region remain.

In general, female headed households are less likely to possess consumer durables than households headed by males. Likewise, where there are patterns of difference in ownership of consumer durables by the age of the household head, those with quite old and quite young heads are less likely to possess them. The extent to which this may be accounted for by the tendency of female headed households and those headed by old or young people to be located in areas of relative disadvantage will have to await further analysis. With respect to the number of persons in the household, when there are differences, those with more persons are consistently more likely to report owning the goods. This is true even when examining the relationship within region and type of place of residence. Future analysis may be able to determine the mechanism of this relationship. It would be of interest to determine whether, for example, in rural areas the larger households have larger numbers of children while in urban areas these larger households actually include more wage earners.

Ownership of Consumer Durables and Number of Children

Economic theories of fertility have suggested that, other things being equal, as the income of a family increases so will its number of

Table 8

Ownership of Consumer Durables by Education of Head of Household, Region and Type of Place of Residence
(Percent of Households Owning Item)

Consumer Durable and Region	Type of Place					
	Urban			Rural		
	Education			Education		
	None	Incomplete Primary	Primary +	None	Incomplete Primary	Primary +
Car						
Khartoum	5% (451)*	9% (140)	25% (494)	2% (222)	--** (35)	4% (34)
Northern	4% (76)	7% (19)	6% (88)	-- (568)	-- (60)	2% (153)
Eastern	3% (461)	6% (68)	11% (241)	-- (875)	2% (101)	2% (143)
Central	4% (218)	5% (80)	14% (132)	-- (2,206)	2% (326)	3% (372)
Kordofan	1% (133)	5% (52)	15% (38)	-- (1,342)	1% (108)	6% (91)
Darfur	2% (184)	12% (37)	13% (83)	-- (2,043)	1% (158)	2% (114)
Bicycle						
Khartoum	8%	11%	15%	1%	11%	--
Northern	29%	13%	24%	--	--	--
Eastern	11%	16%	23%	--	1%	2%
Central	13%	22%	30%	3%	3%	8%
Kordofan	7%	8%	7%	1%	7%	8%
Darfur	1%	7%	9%	--	1%	4%

Table 8 (continued)

Ownership of Consumer Durables by Education of Head of Household, Region and Type of Place of Residence (Percent of Households Owning Item)

Consumer Durable and Region	Type of Place					
	Urban			Rural		
	Education			Education		
	None	Incomplete Primary	Primary +	None	Incomplete Primary	Primary +
Refrigerator						
Khartoum	17%	29%	58%	--	--	4%
Northern	9%	30%	47%	--	--	3%
Eastern	8%	5%	26%	--	--	3%
Central	13%	25%	46%	1%	3%	6%
Kordofan	1%	8%	20%	--	--	4%
Darfur	2%	19%	29%	--	2%	4%
Radio						
Khartoum	65%	80%	87%	46%	64%	67%
Northern	63%	60%	84%	41%	71%	78%
Eastern	41%	58%	73%	17%	26%	51%
Central	63%	78%	85%	31%	50%	66%
Kordofan	37%	55%	73%	11%	34%	52%
Darfur	30%	54%	80%	11%	39%	63%
Television						
Khartoum	17%	28%	53%	1%	--	--
Northern	7%	40%	41%	1%	--	2%
Eastern	5%	1%	21%	--	--	1%
Central	12%	18%	41%	--	3%	6%
Kordofan	1%	7%	17%	--	--	--
Darfur	3%	17%	30%	--	1%	1%

Table 8 (continued)

Ownership of Consumer Durables by Education of Head of Household, Region and Type of Place of Residence
(Percent of Households Owning Item)

Consumer Durable and Region	Type of Place					
	Urban			Rural		
	Education			Education		
	None	Incomplete Primary	Primary +	None	Incomplete Primary	Primary +
Sewing Machine						
Khartoum	11%	18%	34%	2%	18%	11%
Northern	8%	23%	36%	4%	15%	12%
Eastern	6%	8%	15%	1%	1%	4%
Central	10%	11%	27%	1%	2%	5%
Kordofan	6%	7%	27%	1%	3%	15%
Darfur	3%	8%	16%	1%	6%	7%
Telephone						
Khartoum	4%	4%	18%	1%	--	--
Northern	3%	7%	8%	1%	2%	1%
Eastern	1%	--	2%	--	1%	2%
Central	1%	2%	6%	--	1%	1%
Kordofan	--	2%	3%	--	--	1%
Darfur	3%	7%	9%	--	2%	3%

*Numbers in parentheses are the number of households in each region, type of place of residence and education group. The number of missing observations varies slightly among the types of consumer durables.

**-- indicates less than 1%.

Washing machine and motorcycle omitted due to small number of households in any category responding yes.

Table 8a

Ownership of Consumer Durables
by Education of Head of Household
(Percent of Households Owning Item)

	Education		
Consumer Durable	None	Incomplete Primary	Primary +
Car	1%	3%	11%
Bicycle	3%	6%	12%
Refrigerator	2%	8%	26%
Radio	27%	53%	74%
Television	2%	7%	23%
Sewing Machine	2%	8%	18%
Telephone	1%	2%	6%
Number of Households	8,779	1,184	1,977

children since a family will tend to have as many children as it can afford. It is, however, hardly ever true that "other things" are equal and one of the factors that might result in the lack of a positive relationship between income and the number of children in a family is the availability of consumer durables. This could act in two ways. First, a couple with higher income might decide that it was preferable to provide each child that it had with more goods such as a radio, television, bicycle and other items rather than to have more children and to provide each child with fewer goods. Second, the couple might find a lifestyle which included the comforts provided by many consumer durables to be preferable to one which included more children and fewer such comforts. Whatever the motivation of the couple, researchers have advanced the argument that, where consumer durables are available, ownership of such goods will be negatively related to fertility, net of other factors. Previous research and the data in the current study suggest that consumer durables are not readily available in rural areas in the Sudan. Therefore the question of substitution of these goods for additional children would not arise.

The present analysis looks at the relationship between the number of children born to women in urban areas and ownership of selected consumer durables. [A discussion of cumulative fertility, marital fertility, current fertility and fertility trends will be found in The Sudan Fertility Survey, 1979, Principal Report Volume 1 (DOS and WFS, 1982).] Some items have been excluded from the analysis because they are owned by such a small proportion of households. The results of such an analysis may be confounded by a number of factors including errors of reporting births (see DOS and WFS, 1982), effects of educational attainment of

wives and husbands, and labor force participation of wives to name a few. In order to control for differences in levels of fertility and in part for reporting errors, the results are shown for five-year age groups as well as for the group as a whole.

Table 9 shows the mean number of children ever born by whether the household reports owning each of six consumer durables--automobile, bicycle, refrigerator, radio, television and sewing machine. Contrary to expectations, for the entire group of urban women, where there are differences in mean number of children according to ownership of goods, those who own them show higher fertility than those who do not. Since, however, we found that households with quite young heads and those with quite old heads were less likely to own certain consumer goods and since we also know that the number of children born is related to the age of the woman, it is reasonable to look at the relationship between ownership of goods and number of children within age groups of the women. The picture here is less clear and does not necessarily contradict initial expectations. In the cases of owning an automobile, a television or a refrigerator, within age groups women who report having them often have lower fertility than those who do not own them. The situation is more mixed with respect to the other goods with only ownership of a bicycle tending to show the same relationship within age groups as for all urban women. These results suggest that there may be a tendency for some couples, in areas where consumer goods are available, to invest in these goods rather than in additional children.

Amenities

Like ownership of consumer durables, the amenities of a household reflect its income. In addition, to a large extent, they are indicators

Table 9

Mean Number of Children Born by Ownership of Consumer Durables and Age of Woman (Urban Areas Only)

	Type of Consumer Durable				
	Car			Bicycle	
Age Group	Yes	No	Number of Women*	Yes	No
15-19 yrs.	[1.00]**	.98	161	[.85]	.99
20-24 yrs.	2.08	2.26	381	2.41	2.56
25-29 yrs.	3.12	3.61	599	4.04	3.48
30-34 yrs.	4.49	5.37	397	5.90	5.13
35-39 yrs.	5.98	6.13	440	6.52	6.02
40-44 yrs.	6.36	6.68	231	8.20	6.43
45-49 yrs.	[7.12]	6.87	213	8.36	6.85
All	4.50	4.51	2,422	5.42	4.43

	Refrigerator		Radio	
	Yes	No	Yes	No
15-19 yrs.	[.56]	.99	.97	.98
20-24 yrs.	2.29	2.22	2.21	2.34
25-29 yrs.	3.22	3.67	3.55	3.59
30-34 yrs.	4.98	5.35	5.29	5.07
35-39 yrs.	5.77	6.25	6.16	5.92
40-44 yrs.	6.64	6.59	6.92	5.65
45-49 yrs.	6.84	6.99	6.97	7.08
All	4.66	4.44	4.57	4.34

Table 9 (continued)

Mean Number of Children Born by Ownership of
Consumer Durables and Age of Woman
(Urban Areas Only)

	Type of Consumer Durable			
	Television		Sewing Machine	
Age Group	Yes	No	Yes	No
15-19 yrs.	[.71]	.99	[.75]	.97
20-24 yrs.	2.17	2.25	2.48	2.21
25-29 yrs.	3.43	3.59	3.24	3.57
30-34 yrs.	4.96	5.31	5.09	5.19
35-39 yrs.	5.74	6.14	5.46	6.16
40-44 yrs.	6.71	6.59	7.55	6.38
45-49 yrs.	6.70	7.01	7.84	6.92
All	4.62	4.44	5.07	3.56

*Number of missing observations varies only slightly among consumer durables.

**Brackets indicate that the number of women in the group is less than 30.

of the level of services available in an area and to particular groups. Unlike ownership of consumer durables which may reflect unproductive investment and conspicuous consumption, household amenities such as inside taps for drinking water and sanitary toilet facilities are considered to be important factors in protecting the health of a population and represent improvements in living standards. In this section we examine the distribution of amenities within the population. We look at differences between rural and urban areas and among regions, between those with higher and lower levels of educational attainment and briefly between female and male headed households, larger and smaller households, and older and younger household heads. Examination of these differences points out areas and groups that might be targeted for priority action. Then we go on to a preliminary analysis of recent infant and childhood mortality and its relationship to household amenities.

As part of the household level questionnaire, respondents were asked the source of lighting, the type of fuel used for cooking, the source of water supply, the type of toilet facilities and the number of rooms used by the household. Table 10 shows the percentage distributions (averages are shown for persons per room) for various amenities for the sample as a whole and for rural and urban areas in the six regions. Overall, (Table 10F) the survey results indicate that only a small proportion of households is using electricity for lighting and an even smaller proportion is using electricity, kerosene or gas for cooking fuel. The large proportion of households using firewood for fuel could become a problem as it has in other countries where deforestation is serious. Somewhat under half of the survey households uses tap water

Table 10

Household Amenities by Region and Type of Place of Residence

A. Source of Light

	Type of Place							
	Urban				Rural			
	Source of Lighting				Source of Lighting			
Region	Electricity	Gas, Kerosene	Other	Number of Households*	Electricity	Gas, Kerosene	Other	Number of Households*
Khartoum	66%	32%	1%	1,070	1%	98%	1%	288
Northern	55%	45%	--**	181	--	100%	--	774
Eastern	20%	63%	17%	762	1%	88%	12%	1,108
Central	69%	31%	1%	429	9%	84%	7%	2,860
Kordofan	7%	85%	8%	222	--	55%	45%	1,541
Darfur	23%	67%	10%	304	--	22%	78%	2,307

B. Type of Cooking Fuel

	Type of Place					
	Urban			Rural		
Region	Electricity, Gas, Kerosene	Charcoal	Firewood, Other	Electricity, Gas, Kerosene	Charcoal	Firewood, Other
Khartoum	18%	77%	4%	1%	53%	47%
Northern	11%	83%	6%	1%	26%	73%
Eastern	13%	78%	8%	3%	26%	71%
Central	4%	87%	9%	1%	51%	48%
Kordofan	1%	81%	18%	1%	13%	86%
Darfur	2%	44%	54%	1%	4%	95%

Table 10 (continued)

Household Amenities by Region and Type of Place of Residence

C. Source of Drinking Water

	Type of Place							
	Urban				Rural			
	Source of Water				Source of Water			
Region	Tap In	Tap Out	Well	River, Streams, Rain, Other	Tap In	Tap Out	Well	River, Streams, Rain, Other
Khartoum	77%	21%	--	2%	1%	16%	82%	2%
Northern	56%	33%	8%	4%	32%	11%	42%	15%
Eastern	50%	41%	--	9%	3%	17%	15%	64%
Central	81%	18%	--	1%	19%	18%	14%	48%
Kordofan	20%	66%	14%	--	--	15%	53%	31%
Darfur	34%	29%	30%	8%	--	11%	67%	22%

D. Type of Toilet Facility

	Type of Place					
	Urban			Rural		
	Type of Toilet			Type of Toilet		
Region	Private: Flush	Private: Pitlet	Other	Private: Flush	Private: Pitlet	Other
Khartoum	15%	74%	11%	2%	63%	35%
Northern	7%	69%	24%	1%	55%	45%
Eastern	6%	42%	53%	1%	8%	91%
Central	4%	86%	11%	--	32%	68%
Kordofan	1%	52%	48%	--	13%	87%
Darfur	4%	69%	27%	--	20%	80%

Table 10 (continued)

Household Amenities by Region and Type of Place of Residence

E. Mean Number of Persons per Room

Region	Type of Place	
	Urban	Rural
Khartoum	3.05	3.09
Northern	2.85	2.18
Eastern	3.34	2.98
Central	3.27	3.15
Kordofan	2.83	2.47
Darfur	2.76	2.47

Table 10 (continued)

Household Amenities by Region and Type of Place of Residence

F. Amenities for All Sample Areas	
Light	
Electricity	14%
Gas, Kerosene	61
Other	25
Cooking Fuel	
Electricity, Gas, Kerosene	4%
Charcoal	39
Firewood, Others	57
Drinking Water	
Tap In	22%
Tap Out	19
Well	31
River, Stream, Rain, Other	28
Toilet	
Private: Flush	2%
Private: Pitlet	35
Other	62
Density	
Average Persons/Room	2.84

*The number of missing ob ervations varies only slightly among the amenities.

**-- indicates that less than 1% of responses falls in that category.

as a source of drinking water, and only 22% has a tap inside the dwelling. Sixty-two percent of the households does not report having private toilet facilities.

As was the case for ownership of consumer durables, there are marked differences by region and by rural and urban areas within regions with respect to the amenities of the household, although not with respect to density of habitation of the home. Except for the number of persons per room, urban areas show better conditions than rural areas within regions. Among the regions, for both their rural and urban areas, Khartoum, Northern and Central regions tend to have superior conditions overall, as they did for ownership of consumer durables. With few exceptions, Darfur and Kordofan are disadvantaged as compared to the other regions.

Tables 11-15 show the relationships between educational attainment of the heads of households and these measures of living conditions for rural and urban areas in each region. (Table 16 shows the relationships for the country as a whole.) In some cases a particular amenity is available to a very small proportion of households. In addition, as Table 6 showed, the number of household heads who have attended school is often quite small, meaning that any calculations on these groups must be treated with caution. Nevertheless, the overall pattern is as one would expect. Households headed by persons with more education are relatively advantaged with respect to amenities; they are more likely to light with electricity, less likely to cook with firewood, more likely to have a water tap in the dwelling, and more likely to have some toilet facilities. Nevertheless, differences among regions and between rural and urban areas exist even when one compares households whose heads have similar levels of education. This suggests that although income (as

Table 11

Source of Lighting by Education of Head of Household, Region and Type of Place of Residence
(Percent of Each Education Group Using Each Source of Light)

Region and Source of Light	Type of Place					
	Urban			Rural		
	Education			Education		
	None	Incomplete Primary	Primary +	None	Incomplete Primary	Primary +
Khartoum						
Electricity	47%	66%	84%	--*	--	8%
Gas, Kerosene	51	32	16	98	100	92
Others	2	1	1	2	--	--
Number of Households	(447)**	(136)	(488)	(222)	(35)	(31)
Northern						
Electricity	28%	60%	78%	--	--	--
Gas, Kerosene	72	40	22	99	100	99
Others	--	--	--	--	--	--
Number of Households	(75)	(19)	(87)	(563)	(58)	(153)
Eastern						
Electricity	12%	10%	37%	--	--	3%
Gas, Kerosene	67	73	54	88	94	86
Others	21	17	9	12	6	12
Number of Households	(453)	(68)	(241)	(869)	(99)	(139)

Table 11 (continued)

Source of Lighting by Education of Head of Household, Region and Type of Place of Residence
(Percent of Each Education Group Using Each Source of Light)

Region and Source of Light	Type of Place					
	Urban			Rural		
	Education			Education		
	None	Incomplete Primary	Primary +	None	Incomplete Primary	Primary +
Central						
Electricity	56%	74%	86%	5%	15%	27%
Gas, Kerosene	43	25	13	88	78	72
Others	1	1	1	8	6	1
Number of Households	(217)	(81)	(131)	(2,165)	(326)	(369)
Kordofan						
Electricity	1%	12%	20%	--	--	--
Gas, Kerosene	88	88	72	51	74	88
Others	11	--	8	49	26	12
Number of Households	(132)	(53)	(38)	(1,341)	(109)	(91)
Darfur						
Electricity	5%	24%	61%	--	1%	3%
Gas, Kerosene	81	68	36	17	47	74
Others	14	8	3	83	52	23
Number of Households	(184)	(37)	(83)	(2,037)	(156)	(114)

*--indicates less than 1%.

**The number of households for which information on amenities is missing varies only slightly among amenities. Therefore, the number of observations is not repeated in the following tables.

Table 12

Cooking Fuel by Education of Head of Household, Region and Type of Place of Residence
(Percent of Each Education Group Using Each Source of Fuel)

Region and Type of Fuel	Type of Place					
	Urban			Rural		
	Education			Education		
	None	Incomplete Primary	Primary +	None	Incomplete Primary	Primary +
Khartoum						
Electricity, Gas, Kerosene	6%	10%	31%	1%	4%	--
Charcoal	85	90	66	50	57	67
Firewood, Other	8	--*	3	50	39	33
Northern						
Electricity, Gas, Kerosene	7%	27%	12%	1%	--	4%
Charcoal	81	73	87	20	35	43
Firewood, Other	13	--	2	9	65	54
Eastern						
Electricity, Gas, Kerosene	8%	11%	25%	1%	6%	10%
Charcoal	81	83	72	22	38	42
Firewood, Other	11	6	4	76	56	48

Table 12 (continued)

Cooking Fuel by Education of Head of Household, Region and Type of Place of Residence
(Percent of Each Education Group Using Each Source of Fuel)

Region and Type of Fuel	Type of Place					
	Urban			Rural		
	Education			Education		
	None	Incomplete Primary	Primary +	None	Incomplete Primary	Primary +
Central						
Electricity, Gas, Kerosene	2%	1%	11%	1%	2%	2%
Charcoal	85	98	84	45	62	73
Firewood, Other	13	2	5	54	37	26
Kordofan						
Electricity, Gas, Kerosene	1%	--	3%	1%	--	3%
Charcoal	71	95	93	10	28	40
Firewood, Other	28	5	3	89	72	58
Darfur						
Electricity, Gas, Kerosene	1%	--	5%	1%	1%	--
Charcoal	28	56	76	3	14	16
Firewood, Other	71	44	18	97	85	84

*-- indicates less than 1%.

Table 13

Source of Drinking Water by Education of Head of Household, Region and Type of Place of Residence
(Percent of Each Group Using Each Source of Drinking Water)

Region and Source of Water	Type of Place					
	Urban			Rural		
	Education			Education		
	None	Incomplete Primary	Primary +	None	Incomplete Primary	Primary +
Khartoum						
Tap In	62%	82%	88%	--*	--	--
Tap Out	35	16	11	18	15	--
Well	--	--	--	80	81	100
River, Stream, Rain, Others	2	2	1	2	4	--
Northern						
Tap In	32%	60%	75%	23%	45%	57%
Tap Out	52	23	18	14	4	2
Well	13	13	3	49	49	16
River, Stream, Rain, Others	3	3	4	14	2	25

Table 13 (continued)

Source of Drinking Water by Education of Head of Household, Region and Type of Place of Residence
(Percent of Each Group Using Each Source of Drinking Water)

Region and Source of Water	Type of Place					
	Urban			Rural		
	Education			Education		
	None	Incomplete Primary	Primary +	None	Incomplete Primary	Primary +
Eastern						
Tap In	38%	44%	75%	2%	5%	9%
Tap Out	51	52	18	18	14	14
Well	--	--	--	12	31	24
River, Stream, Rain, Others	11	4	8	68	50	54
Central						
Tap In	78%	80%	88%	13%	33%	43%
Tap Out	22	19	10	18	14	22
Well	--	--	--	16	14	3
River, Stream, Rain, Others	--	1	1	52	40	32

Table 13 (continued)

Source of Drinking Water by Education of Head of Household, Region and Type of Place of Residence
(Percent of Each Group Using Each Source of Drinking Water)

Region and Source of Water	Type of Place					
	Urban			Rural		
	Education			Education		
	None	Incomplete Primary	Primary +	None	Incomplete Primary	Primary +
Kordofan						
Tap In	15%	26%	28%	--	--	1%
Tap Out	63	71	70	13	27	32
Well	22	4	2	54	48	56
River, Stream, Rain, Others	--	--	--	33	26	11
Darfur						
Tap In	11%	51%	75%	--	--	2%
Tap Out	37	22	14	9	21	30
Well	43	20	4	67	65	63
River, Stream, Rain, Others	9	7	6	23	14	6

*-- indicates less than 1%.

Table 14

Type of Toilet Facility by Education of Head of Household, Region and Type of Place of Residence
(Percent of Each Education Group Having Each Type of Facility)

Region and Type of Facility	Type of Place					
	Urban			Rural		
	Education			Education		
	None	Incomplete Primary	Primary +	None	Incomplete Primary	Primary +
Khartoum						
Private: Flush	9%	12%	22%	3%	--*	--
Private: Pitlet	72	80	74	59	70	82
Other	19	8	4	38	30	18
Northern						
Private: Flush	3%	3%	11%	1%	--	--
Private: Pitlet	54	80	79	47	69	76
Other	43	17	10	52	31	24
Eastern						
Private: Flush	3%	8%	9%	1%	--	4%
Private: Pitlet	33	41	60	4	12	27
Other	63	51	32	96	88	69

Table 14 (continued)

Type of Toilet Facility by Education of Head of Household, Region and Type of Place of Residence
(Percent of Each Education Group Having Each Type of Facility)

Region and Type of Facility	Type of Place					
	Urban			Rural		
	Education			Education		
	None	Incomplete Primary	Primary +	None	Incomplete Primary	Primary +
Central						
Private: Flush	1%	5%	8%	--	1%	--
Private: Pitlet	84	86	88	26	41	60
Other	15	9	4	74	58	40
Kordofan						
Private: Flush	--	--	3%	--	--	--
Private: Pitlet	38	68	77	9	31	51
Other	62	32	20	91	69	49
Darfur						
Private: Flush	1%	5%	11%	--	2%	1%
Private: Pitlet	60	81	84	15	50	66
Other	39	14	5	85	48	33

*-- indicates less than 1%.

Table 15

Average Number of Persons Per Room by Education of Head of Household, Region and Type of Place of Residence

	Type of Place					
	Urban			Rural		
	Education			Education		
Region	None	Incomplete Primary	Primary +	None	Incomplete Primary	Primary +
Khartoum	3.32	3.14	2.77	3.23	2.70	2.62
Northern	3.08	2.97	2.64	2.19	2.09	2.16
Eastern	3.47	3.45	3.05	2.96	3.24	2.94
Central	3.37	3.25	3.12	3.13	3.22	3.22
Kordofan	2.86	2.69	2.91	2.41	3.17	2.52
Darfur	2.81	2.79	2.62	2.46	2.60	2.47

Table 16

Household Amenities by Education of Head of Household

Household Amenity	Education		
	None	Incomplete Primary	Primary +
Source of Light			
Electricity	6%	20%	43%
Gas, Kerosene	62	67	53
Others	32	13	4
Type of Fuel			
Electricity, Gas, Kerosene	2%	3%	14%
Charcoal	31	57	64
Firewood, Other	67	39	22
Source of Water			
Tap In	13%	33%	57%
Tap Out	19	21	17
Well	36	25	12
River, Stream, Rain, Others	32	20	14
Type of Toilet Facility			
Private: Flush	1%	3%	8%
Private: Pitlet	26	52	66
Other	73	45	25
Total Number of Households	8,704	1,175	1,960

partially measured by education) has an effect on amenities of the household, so does the place in which one lives. Looked at in another way, the data also show that those who are advantaged by having an education are also advantaged in the conditions of their households. The relationship between housing density and education is not straightforward and any interpretation awaits further analysis.

With respect to other groups that might be relatively disadvantaged, the situation is much the same as was described for ownership of consumer durables.

(1) Female-headed households tend to be disadvantaged, but because of the small number of such households comparisons within region and type of place of residence were not made.

(2) Overall, larger households have superior conditions and this relationship remains within region and type of place of residence. To the extent that it is simply an artifact of definition of a dwelling unit in particular areas, it is not a policy relevant finding; however, the mechanism through which this may be operating cannot be determined in the current analysis.

(3) The relationship of amenities to the age of the head of the household is not strong or consistent.

Thus the data from this survey show that there are marked differences among the regions and between rural and urban areas in the amenities of households. They show further that individual differences, in particular in educational attainment, are also related to these measures of levels of living. The governments therefore have the task of alleviating both areal and individual differences in access to these services.

Infant and Child Mortality

Although estimates of infant and child mortality in the Sudan vary, there is agreement that the level is quite high and some investigators have indicated that it is not falling at the expected rate (Farah and Preston, 1981; DOS and WHO, 1981). Previous reports based on data from

the 1973 Census suggest that there are sizeable differences in infant and child mortality by region, educational attainment of father and mother and by type of house construction (partially a measure of income). Each of these effects exists even when the other factors are taken into account (Farah and Preston, 1981). Expected rural-urban differences are also observed (MOH and WHO, 1981).

Infant and child mortality can be attributed to a number of types of factors including: demographic factors, for example the age and parity of the mother at the time of the birth; socioeconomic factors both of the individual household and of the region or type of area in which the household is located; and environmental factors such as the level of diseases like malaria. (See for example Anker and Knowles, 1980 and Meegama, 1980. The latter study uses data from the Sri Lanka Fertility Survey.)

Statistics on health in the Sudan have serious limitations; however, MOH and WHO (1981) report that "The diseases that remain prevalent are those which result from nutritional deficiencies and generally unsanitary environmental conditions, aggravated by climatological factors. The chief determinants of morbidity and mortality among children are diseases of the respiratory system, malnutrition and diarrheal disease, followed by measles, whooping cough, malaria and tuberculosis from the group of infective and parasitic diseases." "...diarrheal disease is the most important cause of ill health and death among children in the Sudan and one which flourishes where sanitation is poor and knowledge of hygiene limited" (p. 43). Thus it is to be expected that each of the types of factors listed in the preceding paragraph would play a role in levels of infant and child mortality.

The Sudan Fertility Survey offers an opportunity to examine some of the factors related to infant and child mortality. This section presents the results of a preliminary analysis of mortality differentials. It not only looks at differences by region, type of place of residence and mother's education but also examines the relationship between infant and child mortality and some of the amenities of the household: source of lighting, type of cooking fuel, source of water, and type of toilet facilities.

Each of these household characteristics represents to some extent the economic level of the household and thus may be measuring such factors as access to medical care and nutrition which can be expected to influence mortality. Source of water and toilet facilities, however, may in addition be expected to have direct effects on health, since, for example, gastrointestinal diseases are for the most part water-borne. Mother's education may also in part be measuring income as well as having an effect on mortality through improved knowledge of nutrition, sanitation and health care.

Region and type of place of residence represent a number of factors including income, education, disease level in the area, conditions of sanitation and availability of health care facilities; analyses in earlier sections and prior research have shown rural areas to be disadvantaged as compared to urban areas and some of the regions to be less advantaged than others.

The present analysis will not allow us to identify the mechanisms through which observed relationships may be operating. We will however separate rural and urban women when looking at relationships with other variables, thus controlling for some environmental and socio-economic

factors. The characteristics whose relationships to mortality are examined are region, type of place of residence, education of mother, and household amenities.

For this analysis all women in the sample households who had borne at least one child and who were 25 years of age or younger at the time of the survey were selected. (The total number of women meeting these criteria is 2,884 weighted cases, with 7,742 births and 1,047 deaths.) Then the proportion of their children born alive which subsequently died was calculated for each of the groups of interest. It would be preferable to include women throughout the childbearing period; but it is also necessary to have some assurance that the deaths took place under the living conditions described. Since the dates of birth and death of children were not obtained in the household level questionnaire, and since the number of women in any age group in the individual level survey which could be expected to have borne a child in the recent past is too small for the type of cross-tabular analysis carried out, this selection was made. This selection provides a reasonable probability that the conditions of the household will be contemporaneous with the infancy and early childhood of the children as well as providing acceptable group size.

Problems of reporting births and deaths typically exist in survey data though they may be expected to be more severe with events in the distant past. The births and deaths reported here are generally recent which should make it less of a problem. Women may, however, tend to underreport births which ended in the death of a child even if these births are recent. Moreover, there may be regional and/or other differences in errors in reporting (DOS and WFS, 1982). Since we did not

carry out an evaluation of the magnitude of possible reporting errors, the results reported here should be viewed as preliminary and tentative. There is an additional problem of the small size of some of the groups, which means that the results for them may be somewhat unstable.

Table 17 shows the proportion of children which has died for rural and urban areas within each region as well as for each region and for urban areas as a whole and for rural areas as a whole. For the women in this analysis the proportion of children which has died is .135, with rural areas showing a higher proportion of deaths than urban areas as would be expected. Among the regions, Khartoum and Northern show the lowest proportion and Central the highest proportion of deaths. Four of the six regions show rural-urban differences as expected. We cannot tell from this analysis what the reasons might be in Northern and Eastern regions for the reversal of the expected relationship or whether it may be due to the small sample size.

Turning next to the question of the relationship between infant and child mortality and mother's education, the data indicate that the higher the level of education the lower the proportion that has died (Table 18). There is likely to be some difficulty caused by the relationships among age, education and the length of exposure of children to the risk of death. Women with more education may begin childbearing at a later age and so their children will have less time to be at risk of death. Future analysis which makes use of multivariate techniques may be able to sort this problem out.

Table 19 shows that differences in mortality between children of mothers with some education and those with none are evident within rural areas and urban areas. Still rural-urban differences exist. Children of rural mothers with no formal education are more likely to die than

Table 17

Proportion of Children Dead by Region and Type of Place of Residence
(Women 25 Years of Age or Younger)

Region	Type of Place of Residence: Urban	Type of Place of Residence: Rural	Total	Number of Mothers
Khartoum	.101 (687)*	.129 (204)	.107	338
Northern	.154 (134)	.090 (396)	.105	199
Eastern	.142 (433)	.132 (750)	.135	444
Central	.128 (274)	.163 (2,200)	.159	871
Kordofan	.117 (177)	.130 (898)	.128	388
Darfur	.098 (153)	.132 (1,436)	.129	644
TOTAL	.119 (1,859)	.140 (5,883)	.135	2,884

*Numbers in parentheses are the number of children ever born.

Table 18

Proportion of Children Dead by
Educational Attainment of Mother
(Women 25 Years of Age or Younger)

Education	Proportion Dead	Number of Mothers
None and Illiterate	.143	2240
Incomplete Primary	.120	343
Primary	.103	210
Preparatory	.058	56
Secondary and Higher	.060	34

Table 19

Proportion of Children Dead by
Educational Attainment of Mother
and Type of Place of Residence
(Women 25 Years of Age or Younger)

	Type of Place of Residence		
Education	Urban	Rural	Total
None	.134	.144	.143
Some	.096	.117	.108

children of urban mothers without education. This rural-urban difference is even stronger for children of mothers with some education. However, this may be due to higher educational attainment among urban women who have attended school than among rural women with some education. The number of observations in different levels of education is too small to explore this possibility in this type of analysis.

Tables 20-A and 20-B show the proportion of children which has died according to the source of lighting for the household and type of fuel used by the household in cooking. While these characteristics may not directly affect the health of children, they represent a number of factors which do. As would be expected, for the group as a whole the better the source of lighting and fuel, the smaller the proportion of children that has died. Since these household characteristics have been seen to be different depending on type of place of residence and since rural and urban areas differ from each other in many other ways which may affect mortality, the relationships between infant and child deaths and amenities are shown separately for rural and urban areas. Because the number of observations in each of these subgroups is quite small it is important to exercise caution in interpretation. Within rural and urban areas better conditions are, with one exception, associated with lower mortality. Furthermore, on the whole, the advantage of urban areas over rural areas with respect to mortality (observed in Table 17) seems to be diminished within levels of household amenities. This suggests that, as one would expect, income and other characteristics may account for part of the rural-urban differential.

Sanitary toilet facilities and source of drinking water are expected both to have a direct effect on mortality through level of exposure to

Table 20

Proportion of Children Dead by
Amenities of the Household
and Type of Place of Residence
(Women 25 Years of Age or Younger)

A. Type of Lighting

Lighting	Type of Place of Residence		
	Urban	Rural	Total
Electric	.094	.105	.096
Gas, Kerosene	.130	.142	.139
Others	[.187]*	.144	.146

B. Type of Cooking Fuel

Cooking Fuel	Type of Place of Residence		
	Urban	Rural	Total
Electricity, Gas or Kerosene	.068	.060	.065
Charcoal	.123	.126	.126
Wood and Others	.093	.148	.145

*Number of children born in this group less than 100.

Table 20 (continued)

Proportion of Children Dead by
Amenities of the Household
and Type of Place of Residence
(Women 25 Years of Age or Younger)

C. Type of Toilet Facilities

Toilet Facilities	Type of Place of Residence		
	Urban	Rural	Total
Private: Flush Toilet	.095	[.167]*	.111
Private: Pitlet	.112	.118	.115
Other (Including None)	.148	.147	.147

D. Source of Drinking Water

Source of Water	Type of Place of Residence		
	Urban	Rural	Total
Pipe in Home	.105	.097	.102
Pipe Outside	.148	.126	.136
Well	[.101]*	.148	.146
River, Rain, Other	[.098]*	.149	.148

*Number of children born in this group less than 100.

health hazards and to represent other factors related to mortality. The relationships are shown in Tables 20c and 20d. For the group as a whole, having any type of sanitary toilet facility is associated with lower levels of infant and child mortality. Next we look at the relationship for rural and urban areas separately. The proportion of deaths is higher than expected for the rural groups with flush toilets but there were only 37 births in the group. For the rest, however, the relationship is as expected. The more sanitary the facilities, the lower the mortality. Further, as was the case with other household amenities, rural-urban differences in mortality are diminished when one takes into account differences in type of toilet facilities.

Source of drinking water is also related to infant and child mortality, with those with a water pipe in the house having the lowest proportion of deaths followed by those with a pipe outside. The data do not show a clear difference between a well and river, stream, rain, or other. Once again there are very few observations in some of the categories when we look at rural and urban areas separately, and categories with fewer than 100 observations should be viewed with great caution. For the remaining groups, the relationships are as expected. It is of interest that where piped water is available the rural areas now show an advantage over urban areas. That is, among those with a water pipe in the home, the proportion of deaths in the rural areas is actually lower than that in the urban areas. The same is true for those who have a pipe outside the house as their source of drinking water. Because the number of observations is small, even in these groups, we must be cautious. Nevertheless the results suggest that sanitary facilities, or something related to them, are able to decrease the disadvantage of

rural places with respect to infant and child mortality. In order to determine with confidence the policy implications it is preferable to try to determine what other factors may be responsible for this observation. This will have to await later analyses.

Conclusion

The data indicate, as expected, that there are considerable differences among regions and between rural and urban areas in ownership of consumer durables and in household amenities. On the whole, rural areas are disadvantaged relative to urban areas and for most measures Kordofan and Darfur are disadvantaged relative to other regions. Furthermore, within any region rural areas are disadvantaged relative to urban areas and the rural areas of a relatively disadvantaged region are disadvantaged compared to other rural areas. These findings support government contentions that some areas will require heavy expenditures in order to bring them up to the level of more advantaged places. Furthermore, the findings with respect to infant and child mortality indicate that at least with respect to certain household amenities, the consequences of deprivation are not merely a matter of comfort or convenience but are actually affecting survival.

Throughout this report, findings have often been qualified or followed by possible explanations for which analyses were not carried out. ɜting many of the important hypotheses requires carrying out multivariate analyses in which the relative effects of a number of factors can be determined. It also requires carrying out analyses one step at a time so that each step in the analysis is informed by and builds on preceding steps. Since we did not have the data available to us in machine readable form, we were not able to work in this manner.

Thus many findings must be regarded as tentative until further analysis can be carried out. One example of a finding that bears further analysis and that cannot be interpreted without it is the positive relationship between the number of persons in a household and both ownership of consumer durables and household amenities. It will be important to determine the actual composition of the household and also to take into account such factors as the age of the head of the household and level of education in looking at the relationship.

Nevertheless, some relationships are both intuitive and supported by the data. In these cases, we believe that the basic conclusions reached will hold when multivariate analysis is performed. We believe that the relationships between the measures of levels of living used here and region and type of place of residence will remain when additional analysis is carried out. We also believe that findings concerning infant and child mortality, particularly with respect to sanitary facilities, will hold under further scrutiny. Even in these circumstances, however, multivariate analysis can often help in understanding how certain relationships come about, the mechanism through which relationships operate and special circumstances under which relationships may be weaker or stronger. This increased understanding often enhances the ability to deal effectively with existing problems.

REFERENCES

Agency for International Development
1981 Sudan: Country Development Strategy Statement, FY 83. United States International Development Cooperation Agency, Washington, D.C.

Anker, Richard and James C. Knowles
1980 "An Empirical Analysis of Mortality Differentials in Kenya at the Macro and and Micro Levels." Economic Development and Cultural Change 29(1):165-185. October.

Farah, Abdul-Aziz and Samuel H. Preston
1981 "Child Mortality Differentials in Sudan." African Demography Program, Working Paper Number 7, Population Studies Center, University of Pennsylvania.

Hill, Robin L.
1981 "Migration to Juba: A Case Study." Research Paper Number 2, Population and Manpower Unit, University of Juba, Juba.

International Labour Office/United Nations Development Program Mission
1976 Growth, Employment and Equity: A Comprehensive Strategy for the Sudan. International Labour Office, Geneva.

Joint Conference of African Planners, Statisticians and Demographers
1980 United Nations, Economic and Social Council, Economic Commission for Africa, Addis Ababa.

Meegama, S. A.
1980 "Socio-economic Determinants of Infant and Child Mortality in Sri Lanka: An Analysis of Post-War Experience." Scientific Report Number 8. International Statistical Institute and World Fertility Survey.

Ministry of Health
1980 Country Statement on Health for All by the Year 2000. Ministry of Health, Khartoum.

Ministry of Health and World Health Organization
1981 Infant and Early Childhood Mortality in Relation to Fertility Patterns: Report on an Ad-Hoc Survey in Greater Khartoum and in the Blue Nile, Kassala and Kordofan Provinces, 1974-1976. Ministry of Health, Khartoum and World Health Organization, Geneva.

Ministry of National Planning
1977 The Six Year Plan of Economic and Social Development: 1977/78-1982/83. The Democratic Republic of the Sudan, Khartoum.

United Nations Department of Economic and Social Affairs
1976 Housing Policy Guidelines for Developing Countries. United Nations, New York.

United Nations Fund for Population Activities
1979 Sudan: Report of Mission on Needs Assessment for Population Assistance. United Nations Fund for Population Activities, New York.

United Nations Statistical Office
1980 "Towards More Effective Measurement of Levels of Living, and Review of Work of the United Nations Statistical Office (UNSO) Related to Statistics of Levels of Living." LSMS Working Paper Number 4, The World Bank, Washington, D.C.

World Bank
1981 World Development Report 1981. Oxford University Press, New York. Published for the World Bank.

World Fertility Survey (International Statistical Institute) and Department of Statistics, Ministry of National Planning, the Democratic Republic of the Sudan
1982 The Sudan Fertility Survey, 1979: Prinicpal Report. Department of Statistics, Khartoum.