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DHS and Conflict in Africa: Findings from a Comparative Study and Recommendations for Improving the Utility of DHS as a Survey Vehicle in Conflict Settings

Draft Working Paper

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LIST OF ACRONYMS

ACC/SCN	United Nations Administrative Committee on Coordination - Subcommittee on Nutrition
AIDS	Acquired Immune Deficiency Syndrome
ANC	Antenatal Care
ARI	Acute Respiratory Infection
BMI	Body Mass Index
CAR	Central African Republic
CDC	Centers for Disease Control and Prevention
CE	Complex Emergency
CEB	Children Ever Born
CED	Chronic Energy Deficiency
CMR	Child Mortality Rate
CPR	Contraceptive Prevalence Rate
DFR	Desired Fertility Rate
DHS	Demographic and Health Surveys
DPT3	Diphtheria, Pertussis, and Tetanus Vaccine (three doses)
EBF	Exclusive Breast-Feeding
ELF	Eritrean Liberation Front
EPLF	Eritrean Peoples' Liberation Front
FHH	Female Headed Household
FRELIMO	Liberation Front of Mozambique
HIC	High Intensity Conflict
HIV	Human Immunodeficiency Virus
HPN	Health, Population, and Nutrition
IDP	Internally Displaced Person
IMR	Infant Mortality Rate
LIC	Low Intensity Conflict
LSMS	Living Standards Measurement Survey
MICS	Multi-Indicator Cluster Survey
NCHS	National Center for Health Statistics
ORA	Armed Organization of the Resistance (Niger)
ORT	Oral Rehydration Therapy
RENAMO	Mozambican National Resistance
SAM	Service Availability Module
SES	Socioeconomic Status
SSA	Sub-Saharan Africa
TFR	Total Fertility Rate
TT	Tetanus Toxoid Vaccine
U5MR	Under Five Mortality Rate
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USCR	United States Committee for Refugees
USD	United States Dollars
WFP	United Nations World Food Program

Introduction

Since the end of the Cold War in the late 1980s the nature of conflict in the world has changed markedly. The wars of the past two decades have been largely internal ones, fueled by regional politics and with cross-border implications. During the 1990s, almost the entire region of sub-Saharan Africa (SSA) was involved in violent conflict. Over thirty conflicts have taken place in Africa in the past three decades (Figures 1 & 2) causing tens of millions to flee their homes and resulting in mortality levels estimated in the millions (Table 1). As of January 1999, internally displaced persons (IDPs) and refugees of concern to UNHCR in Africa were conservatively estimated to equal 6.3 million, comprising over one-third of an estimated 21.5 million IDPs and refugees worldwide. These figures include 3.3 million refugees, 1.6 million IDPs, and 1.3 million former refugees who have recently returned home (UNHCR 1999). Countries that have experienced recent and widespread violent conflict include Rwanda, Mozambique, Ethiopia, Eritrea, Somalia, Angola, Burundi, Sierra Leone, Chad, Liberia, the Democratic Republic of Congo (formerly Zaire), and the Republic of Congo. Other countries, such as the Sudan, Mali, Niger, and Uganda, have been affected by more regionalized problems, while others teeter on the brink of chaos as economic and political instability begin to wear down the fragile social infrastructure.

Table 1: Populations affected by conflict in sub-Saharan Africa, 1975-Present

Country	Conflict timeline	# Refugees	# IDPs	% Population dislocated	Total estimated mortality
Angola	75 - Present	3,600,000	1,500,000	35.0	800,000
Burundi	93 - 97	300,000	550,000	15.0	350,000
Cameroon	96 - 97	…	…	…	…
Central African Republic	97	…	70,000	2.0	…
Chad	65 - 97	213,000	…	5.0	100,000
Dem. Republic of Congo	97 - Present	135,000	500,000	25.0	…
Djibouti	91 - Present	18,000	80,000	…	…
Eritrea	62 - 91	750,000	300,000	30.0	150,000
Eritrea	98 - Present	…	…	…	…
Ethiopia	62 - 91	1,000,000	700,000	5.0	400,000
Ethiopia	98 - Present	…	…	…	…
Ghana	94 - 95	…	192,000	1.0	…
Guinea-Bissau	98 - Present	10,000	300,000	25.0	…
Kenya	96 - 98	…	120,000	0.5	1500
Liberia	89 - 96	700,000	1,500,000	70.0	150,000
Mauritania	89 - 91	75,000	…	2.5	…
Mali	90 - 94	150,000	100,000	3.0	…
Mozambique	76 - 92	1,700,000	4,000,000	35.0	1,500,000
Namibia	98	2,500	…	0.2	…
Niger	91 - 95	10,000	…	0.1	…
Nigeria	96 - 98	30,000	…	0.1	…
Republic of Congo	97-99	200,000	600,000	30.0	…
Rwanda	90 - 94	1,700,000	650,000	50.0	1,000,000
Senegal	89 - 97	40,000	…	0.5	…
Sierra Leone	91 - Present	500,000	1,000,000	30.0	50,000
Somalia	88 - Present	800,000	2,000,000	40.0	500,000
South Africa	84 - 94	…	…	…	…
Sudan	83 - Present	380,000	4,000,000	15.0	1,900,000
Togo	91	150,000	…	3.0	…
Uganda	71 - 86	…	…	…	400,000
Uganda	86 - Present	…	400,000	1.5	10,000

Sources: UNHCR 1999; USCR 1999; Norwegian Refugee Council 1998; Smith 1997.

Destructive conflicts in so many countries of SSA have contributed to a continent with limited resources to create and nurture opportunities for development. A number of reasons exist as to why development has been hindered. These include conflict over basic resources, such as water, access to and control over rich minerals, and various political agendas. Other root causes of conflict include the establishment of artificial boundaries by colonial rulers, the pervasive poverty of SSA, emerging corporate interests, and the proliferation of small arms in the region following the end of the Cold War. Thus, many of the most severe threats to African peace and stability do not arise from conflicts between major political entities. Instead, these threats evolve from increased discord within states, societies, and civilizations along ethnic, racial, religious, or caste/class lines (Macrae and Zwi 1994).

The pervasive landscape of violent conflict in SSA has important implications for health, population, and nutrition programming in the region. Conflict may affect health, population, and nutritional status both directly and indirectly. Direct effects include high civilian mortality, the destruction of human and physical infrastructure for social services, the emergence of war economies, high levels of forced migration, physical and psychological trauma, and increased destitution. In countries that have experienced more localized conflict, indirect effects may be due to depleted economic assets, changes in migration patterns, or perceived vulnerability to violence.

In addition to the traditional problems that health, population, and nutrition programs address, which in themselves may be more severe in the wake of violent conflict, several other constraints on health exist. These may include destitution, emergent household structures that are handicapped by a shortage of able- bodied workers or adults in general, problems associated with resettlement, mental health issues, and increased levels of physical disabilities. Social services infrastructure, both physical and human, may be severely compromised or destroyed. Evidence also exists indicating that populations may revert to traditional remedies during periods of conflict, which would require unique approaches to the design of primary health care programs in post-conflict environments. Although little epidemiologic data are available, the interaction between conflict and the spread of HIV is likely to be significant in many parts of Africa. Conflict has been associated with increased levels of sexual violence, and it is well known that the African military represent a core group for the spread of HIV (Machel 1996). Large scale forced migration, often a feature of conflict, may result in other changes in the ecology of epidemic/parasitic diseases. At present, however, very little is known about the infections/parasitic disease distributions in African countries affected by conflict.

In response to these problems, post-conflict “transition” or recovery programs are needed. These include programs aimed at improving nutrition through food aid, mental health programs to address psychological trauma, livelihood oriented programs aimed at eliminating destitution, infrastructure programs to rebuild health, environmental and social services, landmine awareness and reduction (demining) programs, and campaigns to fill the gap of need for basic health services in the absence of an infrastructure.

Population-representative data on health status and its determinants are a critical need in the post-conflict context. In several of the largest countries in Africa (Mozambique, Ethiopia, Somalia, Angola, Democratic Republic of Congo) no national health survey

data have been available for several decades. In countries such as Rwanda, which had an excellent population information base prior to the genocide of 1994, the population devastation was so severe that the ecology of health, population, and nutrition is likely to be very different today. Liberia, Sierra Leone, and Burundi present similar challenges.

The Demographic and Health Surveys (DHS) program, originally designed for relatively stable populations, is the most important cross-nationally comparable data collection vehicle available for health, population, and nutrition (HPN) programming in the African region. Although the World Bank-sponsored Living Standards Measurement Survey (LSMS) program and the UNICEF Multi-Indicator Cluster Survey (MICS) programs are also actively used in the region, DHS has several important advantages that make it particularly useful as a programming tool in post-conflict environments. First, the DHS program has been applied extensively in SSA, and in several countries, multiple rounds of data collection are permitting the use of the survey for trend analysis and even program impact evaluation. DHS also is designed to produce cross-national comparability of data. This feature is important in the post-conflict context where coordinated data collection between two or more countries may be needed to develop cross-border strategies and programs to address the consequences of conflict. Cross-national data also are important for policy research related to the demographic and health effects of conflicts. In the post-conflict environment, the DHS program is particularly appealing because countries often are not prepared to undertake censuses immediately and therefore can utilize the DHS program as a tool for demographic analysis in addition to its other applications for HPN sector programming.

However, experience in the application of the DHS program to countries affected by conflict in SSA is limited. DHS has been implemented in only four countries that have experienced severe and generalized violent conflict and in only a handful of countries that have ongoing regional or localized problems. In none of these countries has the DHS protocol been adapted to address the unique problems of post-conflict contexts. On the other hand, the DHS program remains the most important source of population, health, and nutrition data in the region. These data permit the comparison of HPN outcomes among countries experiencing differing levels of conflict. In addition, by examining the different internal data structures of countries that are conflict-affected in comparison with those that are not, insights might be gained into the nature of risk factors and the response of populations to interventions in conflict-affected countries. Finally, the fact that conflict (and its consequences) spills over national boundaries is well understood by the international community. The extensive coverage of the DHS program, together with its methodologic standardization, permits some examination of the cross-border character of HPN status and its determinants.

The purpose of this paper is to review the utility of the DHS program as a programming tool in the post-conflict context. In section II of this paper, we will present an analysis of DHS data according to the conflict status of countries in SSA, and in section III identify lessons learned for policies and programs to address the needs of populations affected by conflict. In section IV, we discuss ways in which the DHS protocol might be adapted to increase its utility in the post-conflict context.

Analysis of DHS surveys using conflict as an antecedent grouping variable

A. Typology of conflict as used in this paper

"Conflict" is a term used loosely by the development community, usually intended to denote violent conflict. In fact, conflict is a normal part of human existence, and even violent conflict may be a positive event, for example in some wars of secession. What has distinguished conflict in SSA as such a significant social and development problem is the wide-scale violation of human rights that has accompanied conflict in Africa. These violations have resulted in civilian victimization and the deliberate destruction of the social infrastructure.

Box 1 contains a review of terminology commonly associated with armed or violent conflict and war. For the purposes of this paper, we have defined conflicts in terms of both 1) intensity of violence and 2) geographic spread. The literature typically defines conflict intensity in terms of the number of fatalities per year (Jongman and Schmid 1998). High intensity conflicts (HIC) are those that result in more than 1000 fatalities per year, and low intensity conflicts (LIC) are those that result in between 100 and 1000 deaths. Conflict that has taken place at the national level or higher is defined as "generalized." Those at the sub-national level, but involving a significant percentage of the population (5% or more), are termed "regional" conflicts, and relatively circumscribed problems are termed "localized" conflicts.

Finally, in the African context, generalized or regional high intensity conflicts have often resulted in Complex Emergencies (CEs), characterized by state collapse, large scale migration, often forced migration, and high levels of civilian mortality (Jongman and Schmid 1998). Formally, a CE is defined as a major humanitarian crisis of a multi-causal nature that requires a system of wide response (UN 1993). Sierra Leone, Guinea-Bissau, Rwanda, Liberia, Angola, Mozambique, Burundi, Ethiopia, Eritrea, Southern Sudan, and Somalia are all countries that have recently experienced CEs. Table 1 illustrates the nature of the demographic impact of these emergencies, though available information is only somewhat better than anecdotal. In each of these cases, a substantial percentage of the population was dislocated, and estimated mortality figures may surpass 10% of the population in some instances. Outside of Africa, CEs may not necessarily be defined by mortality levels, but rather by the risk of mortality associated with large-scale population movements, such as in the case of Eastern Europe and Indonesia. In these cases, mortality associated with conflict was not necessarily high; however, a large percentage of the affected population actually migrated in search of safety.

Low intensity regionalized conflicts are also occurring, or have recently occurred, in several African countries. The Sahelian countries of Niger and Mali have erupted into conflict several times during the past few decades as the result of ethnic rivalries between the Tamashak peoples and the black majority ethnic groups. Similarly, in Senegal, ethnic conflict occurs in the southern region of Casmance. Uganda emerged from a civil war in 1986, but conflict still exists in its northern regions. These localized conflicts also are characterized by human rights violations, population dislocation, and excess mortality, though information usually is particularly difficult to obtain. Still other

countries, such as Nigeria and Zimbabwe, teeter on the brink of state collapse and potential widespread consequences.

Box 1: Typology of conflicts

Intensity of Violence

Complex Emergency: A large-scale conflict characterized by state collapse, large-scale migration, and high levels of civilian mortality.

War or High Intensity Conflict: Violence characterized by fatality rates averaging >1000/year, or extensive (>5%) population dislocation, or both.

- **Civil war:** An armed conflict between groups within the same country where the warring factions each control territory, have a functioning government, identifiable regular armed forces, and the allegiance of a significant portion of the nation's citizens.
- **Revolutionary war:** A sustained military conflict between insurgents and central governments aimed at displacing the regime.
- **Counterrevolution:** The overthrowing of a revolution and the return to the social order that preceded it.
- **Secessionist war:** Violent conflict in which a regionally based ethnic group attempts to secede from an existing state.

Low Intensity Conflict: Violence characterized by fatality levels <1000/year, or mild (<5%) population dislocation, or both.

- **Insurgency:** An organized movement aimed at the overthrow of a constituted government through use of subversion and armed conflict.
- **Rebellion:** A concerted campaign of violent action used by organizations claiming to represent an ethnic (or other) group to make claims against the state.
- **Protracted social (or ethno-political) conflict:** Ongoing conflict centered on religious, cultural, or ethnic communal identity.

Geographic Spread of Conflict

- **General:** Fighting is widespread with broad geographic coverage.
- **Regional:** Fighting is compartmentalized within few regional zones.
- **Localized:** Fighting is highly concentrated within relatively few areas.

Source: Payson Conflict Study Group 1999.

B. Demographic and Health Surveys (DHS) program in Africa

The Demographic and Health Surveys (DHS) program, funded by the United States Agency for International Development (USAID), is the flagship household survey program that provides cross-national probability samples in SSA. The DHS program has been in place since 1984, with four different funding phases (DHS I, II, III, IV). DHS is most prevalent in SSA, as this is the region that requires the greatest external investment to achieve national survey samples. In total, 32 countries in SSA have implemented one or more rounds of the DHS.

However, the remaining countries in SSA have never been surveyed, leaving a large geographical area of the continent with no population-based data. This area extends from Angola eastward, including the Democratic Republic of Congo and continuing

through southern Sudan, Ethiopia, and Somalia (Figures 3 & 4). Countries not surveyed include those that either have had long periods of chronic conflict or have not been of particular interest to the donor community.

Some countries participated in a DHS prior to the outbreak of widespread violence (Figure 5). This is the case in Liberia and Rwanda where surveys were conducted in 1986 and 1992, respectively. In these two cases, it will be possible to utilize a DHS to assess the magnitude of social and demographic change associated with the conflict period and the impact of conflict on demographic and health outcomes and behaviors. Rwanda recently conducted another survey, fielded in May 2000, with data and results expected to be available later this year.

Other countries, such as Uganda and Sudan, have completed surveys in relatively stable areas of the country during periods of active conflict (Figure 5). In Uganda, violence prevented the inclusion of nine districts in 1988, and one district in 1995, representing approximately 20% of the population and 5% of the population, respectively. Six regions of southern Sudan, representing approximately 20% of the population (5 million people), were omitted during the 1989/1990 DHS. In these countries, it is evident that large segments of the population have never been surveyed. When peace eventually prevails, it is quite likely that the conflict-affected populations will have very different demographic and health profiles than those inhabiting more stable areas.

Peaceful resolution of chronic conflict provides an opportunity to conduct a DHS, as has been the case recently in Eritrea and Mozambique. In these countries DHS data may provide the only population-representative national level information currently available for conflict-affected countries.

It is important to note, however, that the DHS program, including its survey instruments, was developed for relatively stable populations and not those experiencing active conflict. For this reason, important information relevant to the planning of HPN sectoral interventions in conflict-affected settings may be missing. For example, refugee camps and temporary settlements are not included in the DHS sampling frame, even though temporary settlements may represent a significant percentage of the population (for example in Guinea) and despite the fact that temporary settlements may persist for years. As local resources are often used to provide health, population, and nutrition services to these populations, their inclusion in the sampling frame, where they represent a significant population group, may be helpful.

Other important opportunities to gain a better understanding of the demographic impact of conflict also may be missed. The DHS questionnaire contains very limited information on the migration status of households, even though conventional wisdom and the research reported below suggest that migration status is an important predictor of child health outcomes in post-conflict environments. Health related problems resulting from conflict, such as physical and psychological trauma, are not included among those assessed by DHS. Although some information related to adult mortality is collected, only maternal mortality is the focus of questions regarding cause of death. Finally, in the post-conflict environment, families may lack the means of livelihood, such as access to land, or they may be heavily in debt as they begin to establish their livelihood *de novo*. These socioeconomic realities may dictate their ability to produce good health within their households. Although these are all important limitations of the survey, in the

following section, we use DHS data to explore the demographic and health status of populations affected by varying levels of exposure to conflict, in an attempt to identify lessons learned for programming in conflict-affected countries.

C. Selection of countries and study methodology

The following analysis examines the health, population, and nutritional profiles of countries stratified according to conflict status. Health, demographic and nutritional outcome indicators are assessed, and where available, trends in these are compared. Additionally, socio-demographic, health/sanitation service access, and behavioral correlates of key outcomes are examined to identify differences according to the conflict status of countries. The purpose of this descriptive study, where only one cross-sectional survey is available in most cases, is to compare and contrast characteristics of populations affected in varying ways by conflict and to identify findings that may have implications for HPN programming in conflict-affected countries.

For the purpose of this analysis, fourteen SSA countries were selected (Table 2), based on several criteria. First, those countries that experienced conflict (Box 2), and for which a DHS was conducted within five years of active fighting, were identified. Two of these countries, Eritrea and Mozambique, were emerging from chronic and generalized conflict characterized by periodic CEs. These are perhaps the countries of most interest, as their conflict experience has been the most profound. Sudan and Chad are countries that have recently experienced regionally circumscribed conflict. The Sudanese conflict is fairly large-scale, affecting several million people, but fighting is limited, for the most part, to the southern portion of the country. Chad, too, has been recently affected by regional conflict, although the country has had a history of episodic and widespread conflict for over three decades. Uganda is currently experiencing localized conflict, though the country has passed through years of more general and widespread fighting, including a civil war which ended in 1986. Mali, Niger and Senegal were also included in this study as examples of countries recently affected by localized conflicts.

Identifying countries to include in the non-conflict strata is difficult for a few reasons. It is, in fact, quite difficult to identify African countries that are not in some way affected by conflict. Even those countries considered to be stable may be engaged in or affected by cross-border activities. An important current example is Zimbabwe, where economic engagement in the problems of the Democratic Republic of Congo and the Great Lakes Region has had a significant, and possibly destabilizing, effect. Also, the goal of constructing these strata is to identify countries that are as similar as possible in other respects except conflict status. This is difficult to do, as the SES of countries varies widely. In addition, conflict is often an antecedent of poverty.

Table 2: Classification of conflict status for countries in sub-Saharan Africa, at time of DHS fieldwork

Conflict status	Country	Intensity/nature	Scope	Date of fieldwork	Sample size
Conflict-affected	Eritrea	CE, HIC	General	1995	5,054
	Mozambique	CE, HIC	General	1997	8,779
	Sudan	CE, HIC	Regional	1990	5,860
	Chad	HIC	Regional	1995	7,454
	Mali	LIC	Localized	1995/96	9,704
	Niger	LIC	Localized	1992	6,503
	Senegal	LIC	Localized	1992/93	6,310
	Uganda	LIC	Localized	1995	7,070
Non-conflict	Cameroon	NA	NA	1991	3,871
	Central African Republic			1994/95	5,884
	Kenya			1993	7,540
	Tanzania			1991/92	9,238
	Zambia			1996	8,021
	Zimbabwe			1994	6,128

Nevertheless, neighboring countries that did not experience notable violent conflict prior to a DHS were identified. From this group, those that had a survey conducted after 1990 were included in the study. In some cases, countries that are considered here as relatively stable, such as Cameroon, the Central African Republic, and Kenya, have experienced localized conflict subsequent to the DHS, but are classified according to their status at the time of the DHS. In the case of Zimbabwe, although recent events threaten its stability, the country was considered relatively stable at the time of the survey. In the Sahelian region, no countries were without some localized conflict, resulting in comparisons being drawn across countries with differing levels of conflict experiences.

Data used in this study were compiled from DHS country reports and the standard recode files (household, individual, child) available from MACRO International. Countries were first compared on basic background to health outcome variables using univariate techniques. Then correlates of outcomes were examined utilizing bivariate and multivariate techniques.

A more in-depth analysis was performed using multiple logistic regression. Childhood mortality as measured by the survival status of children born in the five years preceding the survey, stunting and wasting status among children 6-36 months, and maternal chronic energy deficiency (CED) were each considered as dependent variables. Final regression models were developed using STATA statistical software to account for the design effect of the cluster sample design.

Another analytic tool utilized in this study was thematic mapping of DHS findings at the sub-national level in order to identify potential cross-national aspects of conflict, and to identify interregional variability within countries. A DHS is usually limited to

disaggregation at the second order administrative unit (usually to the province or state level), and sometimes only to regional groupings of these administrative units. However, the sub-national level information illustrates the importance of both cross-border considerations, as well as intrastate variability among HPN factors in SSA. In this paper, we analyze these two aspects of variability in relation to conflict status, as the extent of variability has important implications for programming.

D. Comparison of socioeconomic and household characteristics

Table 3 illustrates important differentials among countries according to conflict status, especially with respect to household possessions, environmental conditions and dependency ratios. However, certain demographic characteristics, including migration status and female headed households, do not vary dramatically among the countries.

Table 3: Socioeconomic and household characteristics, DHS 1990-1997

Percent distribution of households by possession of durable goods and household characteristics; percentage of households headed by females; dependency ratios; percentage of respondents migrating within five years of the survey; female literacy rates; percentage of respondents with rural residence.

Country	# Possessions[1]			Household characteristics				Household composition				Respondent characteristics		
	0	1-2	3+	Any toilet facility	Piped/ tap water	Well water	Surface water	FHH[2] (Total)	FHH (Urban)	FHH (Rural)	Dependency ratio[3]	Recent migrant (past 5 yrs)	Female literacy (15-49)	% Rural
Conflict-affected														
HIC General														
Eritrea	59.2	40.0	0.8	18.2	21.7	32.0	46.3	30.8	44.2	25.9	114.0	23.5	34.8	67.4
Mozambique	62.2	33.8	4.0	34.3	20.3	49.4	29.3	26.8	20.5	28.2	104.3	20.0	32.8	76.1
HIC Regional														
Chad	65.4	31.2	3.4	27.2	8.7	71.4	19.9	22.0	23.7	21.5	114.6	18.5	15.0	76.9
Sudan	39.1	38.0	22.9	64.6	55.0	19.7	25.3	12.6	13.3	12.1	106.2	30.2	38.4	62.8
LIC Localized														
Mali	24.0	63.8	12.2	69.4	15.6	79.4	5.0	8.3	11.6	7.0	101.0	...	13.0	68.3
Niger	...	...	...	15.6	15.2	75.5	9.3	9.2	15.5	7.9	114.6	17.9	8.2	82.7
Uganda	47.7	47.9	4.4	80.6	7.0	39.3	53.7	24.4	27.7	23.8	122.0	41.4	52.6	85.1
Senegal	...	...	...	60.0	46.8	48.6	4.6	15.8	23.1	10.5	104.1	...	...	58.2
Non-conflict														
Cameroon	27.0	48.5	24.5	85.5	33.6	28.0	38.4	17.9	19.9	16.8	103.0	28.3	53.3	58.0
Central African Republic	50.6	44.0	5.4	66.6	16.3	38.2	45.5	21.0	25.1	18.8	104.1	18.1	33.0	57.4
Kenya	37.4	58.1	4.5	83.2	32.6	21.1	46.3	32.7	21.5	35.3	113.8	15.4	78.1	82.2
Tanzania	48.2	49.2	2.5	84.5	33.5	29.6	37.0	21.8	23.3	21.3	97.0	21.9	62.2	72.6
Zambia	35.5	47.2	17.4	71.7	34.3	47.8	17.9	23.1	20.2	24.8	98.0	31.9	66.5	55.1
Zimbabwe	44.8	40.2	15.0	65.3	43.2	47.3	9.5	32.7	18.6	39.4	99.7	...	85.7	67.8

[1]Possession scale - percent of households possessing 0, 1-2, or 3+ of the following: electricity, a radio, a telephone, a television, a refrigerator, a bicycle, or an automobile.
[2]FHH – female-headed household.
[3]Dependency ratio – defined as the sum of all persons under 15 years or over 64 years, divided by the number of persons age 15-64, multiplied by 100.

Box 2: Historical backgrounds for conflict-affected countries Source: USCR 1999; Norwegian Refugee Council 1998.

Chad

Thirty years of armed insurrection in Chad have resulted in population displacement fed by differences between northern and southern populations on ethnic, religious, and regional grounds. (Decade-long domination has been by President Idris Deby's northern ethnic group.) A peace agreement was reached in 1994 and more than 10,000 Chadian refugees returned home. Continued conflict between insurgents and government troops in southern Chad has resulted in movement of smaller numbers of refugees, and a new peace agreement seeks to repatriate the many Chadian refugees still outside the country.

Eritrea

Eritrea was federated with Ethiopia by a United Nations Charter in 1952. In 1958 the Eritrean Liberation Front (ELF) was formed and in 1961 an armed struggle for independence began. The ELF experienced its own organizational difficulties that resulted in a separation by some members and the formation of the Popular Liberation Forces (the name later changed to the Eritrean People's Liberation Front--EPLF). Between 1972 and 1974 the two independence parties fought their own civil war ending in the military defeat of the ELF. In 1974 Ethiopia experienced a Marxist revolution led by Mengistu Haile Mariam. As a result of the ensuing violence, new recruits were added to the EPLF in their struggle for independence. Between 1980 and 1991 the EPLF slowly pushed back the Ethiopian army and captured the city of Asmara in May 1991 thereby bringing an end to the war. In April 1993 Eritrea was voted into the United Nations and was recognized as a new state in Africa.

Mali

Ethnic unrest concentrated in the northern part of the country emerged in the 1990s, when an ethnic group, the Tauregs, clashed with the central government, claiming marginalization. Hostilities continued through 1991, displacing tens of thousands. Following a national pact between rebel leaders and the government in 1992, sporadic fighting continued until 1994, when an intensification of hostilities diversified to include clashes among different rebel organizations. In 1995, the national pact was re-established, effectively stabilizing the situation.

Mozambique

After Independence in 1975 Mozambique was locked in a civil war between the government troops (FRELIMO) and the rebel faction, the Mozambican National Resistance, or "Renamo." Renamo was known for its brutality in warfare against the civilian population and the country's infrastructure, factories, schools, health clinics, roads, and railways. Up to one million Mozambicans are estimated to have died in the war and more than 5.7 million people (out of a population of 16 million) were said to have been uprooted from their homes. A peace accord was signed in 1992. In 1994 elections were held, with the FRELIMO party winning control of the government, and the United Nations was able to demobilize 80,000 of the government and Renamo soldiers. Refugees and IDPs began returning to their homes almost immediately. At the end of 1996 the UNHCR stated that the conditions that had caused the exodus had ceased to exist and that the 100,000 people who remained out of the country were so due to "economic rather than security" reasons.

Niger

A five-year civil war in northern Niger (1990-95) between Taureg rebels, which was crushed by government forces, compelled many Tauregs (predominantly nomads) to escape to relatively secure areas, or to neighboring countries. A peace agreement between the government and the ORA (Organisation de la Resistance Armee) was signed in 1995.

Senegal

Civil conflict has largely been confined to the southern region of Senegal, Casamance, which claimed prejudicial economic policies on the part of the government, fueling separatist tendencies. The separatist conflict came to a head in the early 1990s, when up to 40,000 people had been displaced by violence. Despite a cease-fire reached in 1993, sporadic incidences of violence continue to be reported.

Sudan

Sudan has been plagued with civil conflict for 30 of the past 40 years, the most recent outbreak of which began in 1983. Often characterized as a civil war between the Islamic north and the Christian or animist south, government forces and the National Islamic Front have been fighting a range of opposition groups, including: the United Democratic Salvation Front, the Sudanese People's Liberation Movement, the South Sudan Independence Group, the Equatoria Defense Force, and the Sudan People's Liberation Army. While the entire country has been transformed by years of war (over 4 million labeled IDPs), most of the fighting has taken place in southern Sudan, where approximately 80% of the estimated population has had to flee their homes.

Uganda

Between 1971 and 1986 Uganda was embroiled in civil war, after which regional armed insurgencies in northern and southwestern Uganda continue to endanger local populations, especially in the north. Approximately 400,000 Ugandans were internally displaced at the end of 1998 due to insurgency attacks or relocation attempts by Ugandan authorities to "protected villages." However, insecure conditions have prevailed for both aid organizations and local populations.

Socioeconomic status is represented by a household possession index, the dependency ratio and female literacy. These indicators illustrate the low level of socioeconomic conditions in the two countries (Eritrea and Mozambique) that have experienced recent and generalized CEs relative to all non-conflict countries, and especially in relation to neighboring countries.

The overall impact of conflict on the economy has been well documented in the literature and confirms the aforementioned findings of depressed SES in conflict settings as determined by the DHS. Recent estimates of annual income per capita for Eritrea and Mozambique are 150 and 100 USD, respectively, both well below the SSA average of 350 USD (Cousin 1997). In fact, levels of absolute poverty in Mozambique rose from 15% in 1980 to over 60% in 1995, making it the poorest country in the world by the time of its peace agreement in 1992. It is estimated that 33-57% of the urban population and nearly 70% of the rural population currently live in absolute poverty in Mozambique (WFP 1997).

According to Machel (1996), great risks to education are typical during conflict. Schools are often targeted during war, especially in rural areas, in part, due to their high profiles. For example, it was estimated that 45% of the primary school networks in Mozambique were destroyed over the course of the war. Teachers may also be targeted, as they are viewed as important community members and are often politicized. During the Rwanda crisis, it was estimated that more than two-thirds of teachers either fled or were killed. Additionally, formal education relies on consistent funding, which is difficult to sustain during periods of conflict. The impact of the destruction of the educational infrastructure and resources represents one of the greatest developmental setbacks for countries affected by conflict. The years of education and training lost will take equivalent years to replace, and, in the meantime, their absence imposes greater vulnerability upon the affected population.

Female literacy differentials are apparent between conflict and non-conflict countries, as presented in Table 3. Among countries affected by conflict, female literacy levels are lower than in neighboring countries. This is particularly true among the countries that have experienced high intensity conflict, such as Eritrea and Mozambique, where literacy rates fell below 35%. This level is nearly half that in neighboring countries such as Kenya and Zambia. The cases of Uganda and Sudan show that the maintenance of educational services during low level conflict, or in areas with reasonable security, may be less difficult. In the Sahel, literacy rates are the lowest in SSA, and may in fact contribute to instability.

It is generally believed by the international community that CEs and conflict give rise to an increase in female-headed households as men are often involved in war, killed or separated from their families, or migrate in search of employment in the aftermath of war. However, the DHS data suggest that female-headed households may not be more prevalent in conflict areas, on average, than regional averages. Great variability does exist in the distribution of female-headed households among and between conflict-affected countries. A unique pattern is seen in Eritrea, where 45% of the urban sample is composed of female-headed households, while only a quarter of the rural households are headed by women. On the other hand, in Mozambique, female-headed households are somewhat more prevalent in rural than in urban areas. Among the Sahelian countries, Chad has particularly high levels of female-headed households, but other Sahelian countries have low percentages of households headed by women (Figure 6). This is consistent with the fact that Chad has been the most significantly affected by war in the

past few decades. Thus, the effect of conflict on household structure appears to vary among conflict affected countries. Although not explore in this analysis, it has been suggested that the lack of young men has prompted a major redistribution of the gender division of labor, placing a much greater burden on women, and creating a labor shortage that remains a major constraint facing vulnerable households, especially those that are female-headed (Cliffe 1994).

Table 3 reflects a large degree of population movement within Africa as a whole. Regardless of conflict status, respondents indicated a high degree of transience within a five-year period prior to the survey. Although the motivation for this migration is not available from DHS data, migrants are likely to be a heterogeneous group. Possible factors in the decision to move may include marriage and pursuit of economic opportunity in addition to flight from insecurity and post-conflict resettlement. Given the levels of poverty, it is not surprising to see a high degree of in-migration from the rural areas to urban centers, whether in search of food, health services, or employment. According to WFP, the urban population of Mozambique was estimated at 13% in 1980, but increased to over 30% by 1997. When migration is due to insecurity or abject poverty, households become extremely vulnerable, often losing all possessions relevant to their livelihoods in the process (Cliffe 1994). Unfortunately, DHS instruments do not solicit reasons for migration, which is particularly important in the case of conflict-affected countries.

Figure 7 suggests the fluidity of migratory patterns in SSA during the 1990s. Mozambique, Zambia, and Cameroon reflect substantial inter-regional variability in recent migration. In contrast, Uganda's high levels of recent migration appeared throughout the country. The display also implies cross border population flows. For example, in border regions of Tanzania and Zambia, migration levels are elevated and similar to those in adjacent regions in Mozambique.

Two of the more unique cases included in the study are Sudan and Uganda. The Sudanese profile indicates somewhat better socioeconomic conditions for this population than for others among the conflict-affected group, although female literacy rates remain lower than those of countries not affected by conflict. In part, this finding might be explained by the fact that northern Sudan is transitional between African and Near Eastern/North African cultural and ethnic characteristics.

Despite its difficult political history, Uganda has relatively high levels of female literacy in relation to the other countries affected by conflict. It is characterized by the highest level of recent migration of all samples included in this study, and its dependency ratios also are highest. The moderate level of literacy (compared to other conflict-affected countries), among other measures of improved socioeconomic status, may be explained by the relatively quick and dramatic improvements brought about by the elected government of President Museveni, highlighting that even the perception of impending stability can improve sociodemographic standing.

E. Comparison of early childhood mortality and nutrition outcomes

Early childhood mortality is one of the key health indicators in SSA, as mortality rates remain elevated in many parts of the region. Child mortality is a function of several proximate determinants that are profoundly affected by armed conflict including

morbidity, nutritional status, and physical trauma (Mosley and Chen 1984). As many of today's conflicts take place in some of the world's poorest countries, where children are already vulnerable to malnutrition and disease, it has been estimated that the onset of conflict may increase the death rate up to 24 times (Cutts 1996). In post-conflict environments some of these threats may persist as a result of impoverishment, continued violence, and destruction of infrastructure.

Maternal and child nutrition status are also indicators of health and development. The nutritional status of women and children are a function of morbidity, behavioral factors and household food access. Again, armed conflict tends to undermine service availability and utilization, and through the loss of land and increased destitution, household food access is generally diminished, and would be expected to persist in post-conflict settings.

E.1 Basic comparison of childhood mortality and nutrition indicators

Table 4 presents mortality and nutritional differentials according to conflict status. In post-conflict settings, the nature and magnitude of IMR and CMR tend to vary. Mozambique exhibited one of the highest IMRs in SSA, estimated at 135 deaths per 1,000 live births, during the period of immediate post-conflict (1993-1997). This magnitude of infant mortality rivals, and indeed surpasses, that of the Sahelian countries, e.g., Niger and Mali, where IMR has been historically high. In contrast, other countries undergoing high intensity conflicts, such as Eritrea, show relatively low IMRs. For example, the IMR for Eritrea during the post-conflict period (1991-1995) was estimated at 72.0 per 1,000. These differences in childhood mortality rates among countries undergoing high-intensity conflicts are perhaps explained by each country's coping capacity. Apparently, during the Eritrean conflict with Ethiopia (1962-1991), the Eritrean People's Liberation Front (EPLF) was able to address the healthcare needs of its people by setting up a health service in 1970. Through the training of "barefoot doctors," clinics were established in settled areas, and mobile teams sent into contested areas (Sabo and Kibridge 1989). Through this mechanism, the EPLF was perhaps able to preserve the health status of the Eritrean people during the war. Childhood mortality rates in Sudan are low due to the fact that surveyed populations were relatively unaffected by conflict.

A notable difference between conflict-affected and non-conflict countries is the relationship between IMR and CMR. In non-conflict countries, childhood mortality tends to drop after the first year of life, and CMR becomes noticeably lower than IMR, with a few exceptions. Among the conflict-affected countries, CMR tends to remain high, in effect mirroring IMR or showing only minor differences, the exception to this being Mozambique. Because IMR and CMR are usually associated with different factors (e.g., antenatal care versus infectious disease and malnutrition), further analysis of these associations in post-conflict situations may be warranted. An understanding of specific factors associated with both infant and child mortality in the post-conflict setting may lead to better policy and program decision-making, rather than reliance on standard relief and rehabilitation/reconstruction programs, which may not address root causes of early childhood mortality.

Table 4: Early childhood mortality and maternal/child nutritional status, DHS 1990-1997

Infant, child, and under-five mortality rates for the four year period preceding surveys; percentage of children 0-35 months who are stunted, wasted, or underweight; percentage of non-pregnant mothers 15-49 below the cutoff points for weight and height.

Country	Childhood mortality rates			Percentage of children classified as:			Percentage of mothers 15-49 with:	
	IMR	CMR	U5MR	Stunted	Wasted	Underweight	BMI < 18.5	Height < 145 cm
Conflict-affected								
HIC General								
Eritrea	72.0	68.0	136.0	38.4	16.4	43.7	40.6	2.3
Mozambique	135.0	77.0	201.0	35.9	7.9	26.1	10.9	4.8
HIC Regional								
Chad	102.6	102.2	194.3	34.8	17.9	39.1	21.1	0.2
Sudan	69.9	57.4	123.4	…	…	…	…	…
LIC Localized								
Mali	122.5	131.1	237.5	30.1	23.3	40.0	16.2	0.4
Niger	123.1	222.6	318.2	34.0	10.3	36.4	19.3	0.5
Senegal	81.3	71.9	147.3	35.4	5.9	26.7	15.1	1.6
Uganda	68.0	68.0	131.4	19.0	10.4	19.5	15.0	0.1
Non-conflict								
Cameroon	65.0	65.6	126.3	20.6	3.8	14.3	…	…
Central African Republic	97.0	67.0	157.0	33.6	7.1	27.3	15.3	2.4
Kenya	61.7	36.7	96.1	30.6	6.7	22.9	10.0	1.0
Tanzania	91.6	54.6	141.2	41.0	6.5	28.7	9.7	3.8
Zambia	108.9	98.4	196.6	38.9	5.4	25.3	9.1	1.2
Zimbabwe	53.0	26.0	77.0	21.4	5.5	15.5	5.0	0.7

Note: Children are classified as malnourished if their z-scores are below minus two standard deviations (-2 SD) from the median of the reference population.
The body mass index (BMI) excludes pregnant women and those who are less than three months postpartum.

Retrospective information from the birth histories provides some insights into mortality effects during periods of active conflict. Figures 8 and 9 illustrate trends in IMR for both conflict and non-conflict countries over a fifteen-year period prior to the survey, based on respondent recall. Mozambique's analysis suggests that during the last years of active conflict, IMR was extraordinarily high, estimated at 161 per 1,000. The estimate for the 10-14 year interval was somewhat lower, probably at least in part due to reporting error. Similarly in Eritrea, IMR during years of active conflict was elevated, estimated at 86 per 1,000 during the final years of the conflict. In both cases of Mozambique and Eritrea, post-conflict estimates of IMR reflect a precipitous decline, falling by 26 and 21 deaths per 1,000 respectively during the most recent five-year interval captured by the surveys. In Uganda, IMR dropped steadily from 97 per 1,000 at the end of its civil war to a recent

estimate of 81 per 1,000, despite continued regional and localized conflict. Chad reflects a similar decline in IMR over the past 15 years, as widespread and generalized conflict has evolved into regionalized and sporadic fighting. Niger's mortality trends are somewhat more problematic. Mortality has been quite recalcitrant to development investment and is sensitive to vicissitudes in food availability. This latter factor probably accounts for the mid-80's increase.

Figure 8: Infant mortality trends in conflict-affected countries

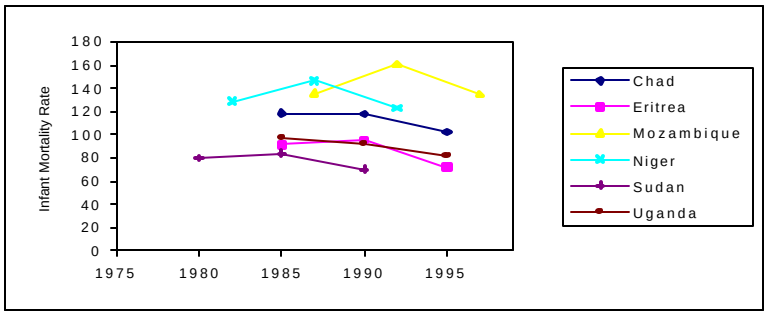
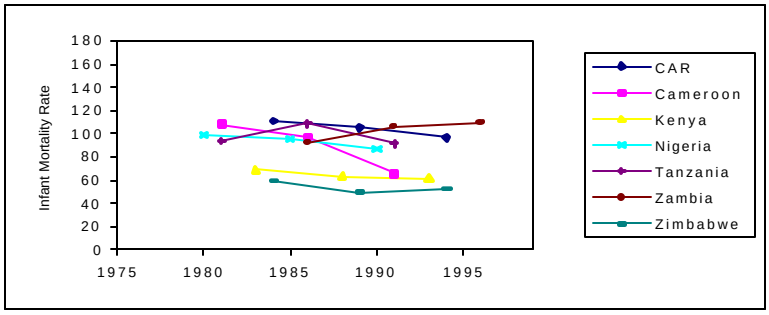


Figure 9: Infant mortality trends in non-conflict countries



By comparison, countries not recently affected by conflict show different patterns of change, generally starting from a lower baseline level of mortality. Countries with IMRs in excess of 100 per 1,000 during the early 1980s have shown gradual improvements in child survival, such as in the Central African Republic and Nigeria, while Cameroon reflects quite a precipitous decline in IMR during the early 1990s. Countries with relatively low mortality, such as Kenya and Zimbabwe, indicate a leveling off of IMR. Zambia and Tanzania have unique patterns. Tanzania exhibits patterns similar to that of Niger, showing high levels of mortality with relatively no decline. Infant mortality has consistently increased in Zambia over the past fifteen years. A plausible explanation for the apparent worsening of the overall health condition among children in Zambia and the sustained high levels of IMR in Tanzania is the impact of pediatric AIDS in this region. According to a report by the ACC/SCN (1993), Tanzania and Zambia ranked #3 and #4 among countries with the highest prevalence rates. It has also been suggested by MacRae and Zwi (1994) that, although the majority of war-related deaths occur within war-ravaged countries and amongst refugees, indirect deaths are also inflicted on people in countries that are forced to incur heavy defense expenditures on their own or their neighbor's behalf. This often results in damage to the absolute level, or the rate of expansion, of basic health services, for which Tanzania is an evident case.

According to Green (1994), the loss of life in Tanzania has resulted primarily from the economic and fiscal burden of its war with Uganda setting back food security, and, more especially, hampering the delivery and expansion of effective primary health services (Green 1994).

Thus, the retrospective pregnancy history data appear to capture patterns of change in IMR over periods of conflict. Differential infant mortality rates over time are consistent with estimates from other sources, e.g. census data, and in general suggest that IMRs were elevated during periods of active conflict, and have improved during the post-conflict period. However, in Mozambique, infant mortality rates remain extremely elevated.

Table 4 also demonstrates the nutritional profiles of countries by conflict status. Surprisingly, the levels of stunting (short stature) among children are similar in both country sets, while the prevalence of wasting (thinness) among children and chronic energy deficiency (CED) among non-pregnant mothers, defined by a BMI < 18.5, is elevated in countries affected by conflict. Eritrea, for example, has levels of wasting nearly double those of neighboring countries. Nearly 40% of mothers are classified with CED, perhaps indicating a severe depletion of assets and low levels of food security. Among the Sahelian countries, maternal nutritional status in Chad is somewhat worse, possibly reflecting its more war-torn past. Levels of wasting and CED are also high in Mali, Niger, and Senegal, although these may merely typify the harsh ecology of the Sahelian environment.

High levels of malnutrition have been well documented during conflict situations and with the assistance of food aid and development programs tend to be corrected relatively quickly. In Mozambique, ACC/SCN (1994) reported wasting levels for IDPs and returning refugees in excess of 20% at war's end in 1992-1993. With large-scale feeding, health, water, and sanitation programs established by 1993, the nutrition and health situation in Mozambique was brought quickly under control. Subsequent surveys by NGOs in 1993 showed a much-improved situation, with wasting levels generally below 10%. In general, the highest levels of malnutrition occurred in areas with the largest numbers of returnees, where poor water and sanitation had led to periodic outbreaks of dysentery and cholera. In the next section of this paper we demonstrate that indeed intrastate variation is quite substantial among conflict-affected countries.

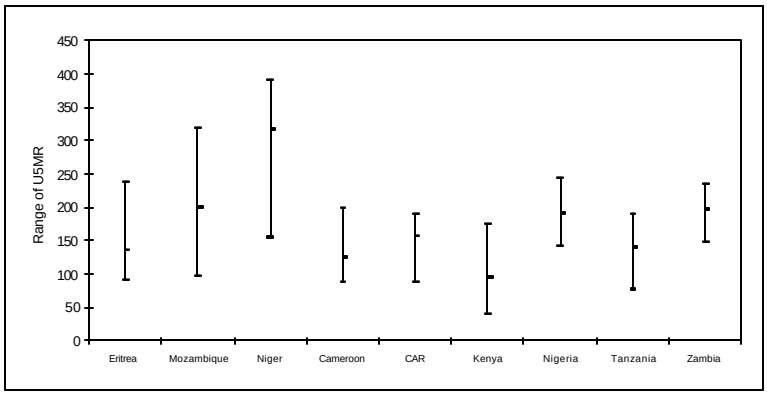
Eritrea, on the other hand, sustains high levels of malnutrition. This may be due to the fact that efforts by Ethiopia to disrupt agricultural production in Eritrea seem to have succeeded. In 1997, only 20% of the national farms remained irrigated. The government estimated that at best, 60% of the nation's food needs could be met, and nearly two-thirds of the population relied on some form of food aid (Cousin 1997). It has been suggested that few died from starvation though, because of food aid and an efficient distribution system developed by the ELPF during the conflict, and continued into the postwar era. However, some evidence suggests that available rations are insufficient to meet minimum requirements, resulting in the sale of available assets, thereby limiting future coping ability (Cliffe 1994). It is unfortunate that time series data are not available regarding nutritional status, so that trends could be assessed.

E.2 Regional variation among early childhood mortality and malnutrition levels

As a result of armed conflict in the past decade, an estimated two million children have been killed, and three times as many have been seriously injured or permanently disabled (Hussain and Herens 1996). It has been suggested that these deaths are primarily the result of the interaction between forced migration, a lack of basic health services, and malnutrition. High levels of mortality tend to be concentrated in areas most affected by conflict (e.g., rural areas of Mozambique), or in recently resettled areas (e.g., Northern Eritrea), and as such, substantial intrastate variability among mortality levels is exhibited.

Within Mozambique and Eritrea, two countries experiencing the most widespread conflict, regional differentials in childhood mortality are quite apparent. For example, a threefold difference exists in both infant mortality (IMR) and child mortality (CMR) rates between the highest and lowest ranked regions within each country (Figures 10 & 11). Among neighboring countries, regional differentials are much narrower, depicting differences up to two times the lowest rate. This suggests that in countries undergoing conflict, pockets may be created that experience heightened mortality risk, due to factors not historically inherent (e.g., poverty). A composite indicator of infant and child mortality, under-five mortality (U5MR), was diagramed in Figure 12 to illustrate the variability in childhood mortality among the regions of conflict-affected countries (also see Figure 13).

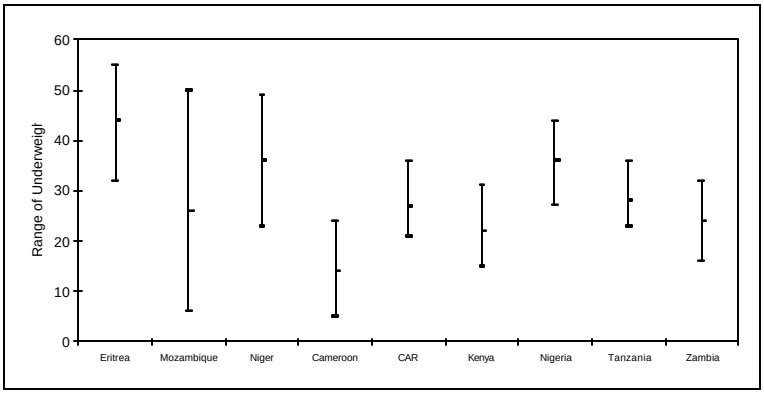
Figure 12: Ranges of regional under-five mortality rates (U5MR) in conflict-affected versus non-conflict countries, DHS 1990-1997



In addition to increased mortality, the factors that cause malnutrition among children during peacetime (e.g., household food security, poor diet, insufficient health services, unsanitary environment, inadequate maternal/child care practices) are often accentuated and exacerbated during armed conflict. Due to varying levels of exposure to these factors amongst the regions, differentials in nutritional status also appear in post-conflict settings. As stated earlier, the prevalence of stunting (chronic malnutrition) was similar among both country sets; yet, intrastate regional comparisons showed stunting levels

varying by up to 350 percent in Mozambique and Eritrea, in comparison to 180 percent among regions of non-conflict countries (Figure 14). Larger differentials were found for wasting (acute malnutrition), as well as underweight status (Figure 15, below), where differences of up to 500 percent were found between regions in conflict-affected countries (also see Figures 16 & 17).

Figure 15: Ranges of regional malnutrition levels (underweight) in conflict-affected versus non-conflict countries, DHS 1990-1997



E.3 Intercorrelations between nutritional status and childhood mortality outcomes

From cross-sectional data it is not possible to correlate nutrition and mortality at the individual level. Rather, analysis was performed at the cluster level, examining the relationship between the prevalence of malnutrition and the proportion of children having died among births during the five years preceding the survey. Rank correlation was used to determine associations between the three forms of malnutrition (stunting, wasting, underweight) and the proportions of children dying within clusters in the five years prior to the survey (see Table 5).

As indicated above, strong associations are present between malnutrition and mortality in relatively stable countries, but not among conflict-affected countries. Stunting (and underweight) shows the expected positive correlation with mortality in non-conflict areas, as it is often indicative of repeated bouts of infectious disease, as well as chronic deficiencies of food intake. The lack of correlation between mortality and malnutrition among the conflict-affected countries is puzzling, and yet not easily explainable with the data at hand. In certain cases, like Eritrea, where stunting is high but childhood mortality is low, the provision of food aid and basic health services through relief efforts may be serving to protect child survival. In other instances, such as in Mozambique, children may not be living long enough to exhibit the signs of chronic malnutrition. Regardless, this suggests some uniqueness to conflict-affected settings, and implies that mechanisms of malnutrition and mortality must be better understood before appropriate policies and programs can be developed.

Table 5: Correlations between percent malnutrition and proportion of children dead among births in the five year period preceding the survey, by cluster, DHS 1990-1997

Country	Stunting			Wasting			Underweight		
Conflict-affected	n[1]	corr	sig	n	corr	sig	n	corr	sig
Chad	247	-.031		247	-.113		247	-.031	
Eritrea	232	-.045		232	-.104		232	-.024	
Mozambique	386	(.029)		386	-.046		386	(.026)	
Niger	298	(.230)	**	298	(.139)	*	298	(.240)	**
Uganda	293	-.048		293	-.017		293	-.011	
Non-conflict									
Cameroon	149	(.221)	**	149	(.228)	**	149	(.266)	**
CAR	229	(.224)	**	229	(.043)		229	(.196)	**
Kenya	517	(.155)	**	517	(.028)		517	(.128)	**
Tanzania	349	(.146)	**	349	-.005		349	(.109)	*
Zambia	312	(.147)	**	312	(.028)		312	(.015)	
Zimbabwe	230	(.040)		230	(.016)		230	(.090)	

n[1] – number of clusters
* ($p < 0.05$); ** ($p < 0.01$)

F. Comparison of health utilization and behavior indicators

F.1 Child feeding practices

Given the extended disruption of health and social services common to conflict settings, health behaviors might be expected to vary according to conflict status. Table 6 illustrates some apparent differences in child feeding practices, particularly exclusive breast-feeding (EBF) and complementary feeding. The seemingly higher rates of EBF among some of the conflict-affected countries (Eritrea, Mozambique, Uganda) may be due to cultural patterns in East Africa, but also may be due to a lack of exposure to media and other information/promotion of alternative infant foods.

By 7-9 months, when all children should be receiving complementary foods in addition to breast milk, the conflict-affected countries lag behind their neighbors. In Eritrea, Mozambique, and Uganda, between 73-87% of children are receiving weaning foods, as compared with 96% in neighboring countries, such as Kenya and Zambia. This suggests that a greater percentage of children in conflict-affected countries may not be receiving complementary foods in a timely fashion, and, therefore, may be at increased risk of dietary insufficiency. This finding may reflect less exposure of households to newer health initiatives aimed at improving complementary feeding practices, or indeed, a lack of access to food in general.

F.2 Prevalence and treatment of childhood morbidity

Childhood morbidity is of particular concern in SSA where recurrent bouts of infectious diseases and nutritional deficiencies are primary causes of childhood deaths. This situation is expected to be worse in countries affected by conflict.

As indicated in Table 7, a comparison of morbidity prevalence yields minor differences according to conflict status. In both country sets, the prevalence of ARI is quite variable, ranging from 10-29%. The prevalence of fever, often indicative of severe ARI, malaria, measles, or other infectious diseases, also appears comparable across the two groups.

Table 6: Child feeding practices, DHS 1990-1997

Percentage of children who were ever-breastfed and the percentage who started breastfeeding within one hour of birth; percent distribution of children exclusively breastfeeding or breast-feeding plus plain water only (full breastfeeding) during the first three months of life; percentage of children breastfeeding plus receiving supplements at 7-9 months.

	Breastfeeding rates			Child feeding practices		
Country	Ever breastfed	Within 1st hour		Exclusive breastfeeding (0-3 months)	Full breastfeeding (0-3 months)	Breastfeeding and complementary foods (7-9 months)
Conflict-affected						
HIC General						
Eritrea	98.4	48.0		65.0	13.5	73.6
Mozambique	94.8	80.9		37.6	35.5	87.3
HIC Regional						
Chad	97.6	23.6		2.0	56.3	83.2
Sudan	…	…		…	…	…
LIC Localized						
Mali	94.8	9.9		12.1	66.2	54.8
Niger	97.6	20.2		1.0	48.0	70.0
Senegal	97.6	11.5		6.6	68.8	65.8
Uganda	98.1	50.8		70.1	4.1	85.6
Non-conflict						
Cameroon	97.2	11.9		7.0	48.0	76.0
Central African Republic	97.4	33.7		4.2	54.3	94.0
Kenya	97.0	54.2		17.4	11.2	96.7
Tanzania	97.6	43.8		32.3	31.7	…
Zambia	98.2	58.1		26.3	42.2	96.3
Zimbabwe	98.7	40.0		16.1	23.9	96.9

Total diarrheal prevalence, on the other hand, is slightly higher among the conflict-affected group; this is especially the case for bloody diarrhea, indicative of dysentery. These findings are consistent with clinic data from other countries experiencing conflict, e.g., Rwanda and Burundi, where dysentery and malaria were the most common forms of childhood morbidity presented at health clinics. According to the CDC (1994), dysentery and malaria accounted for approximately 29% and 28% of health center visits in Burundi following the civil war (January 1994) as compared with 6% and 23% of visits during the 1992-prewar era (1992-1993).

Table 7: Prevalence and treatment of child morbidity, DHS 1990-1997

Among children under 3 years of age, the percentage with ARI, fever, or diarrhea during the two weeks prior to the survey, and among those ill, the percent distribution by type of treatment received.

	Prevalence of childhood morbidity					Treatment of ARI and diarrhea				
Country	ARI[1]	Fever	Diarrhea	Diarrhea/ blood		ARI - clinic	Diarrhea - clinic	Diarrhea- ORT	Diarrhea -no treatment	Diarrhea -traditional remedy
Conflict-affected										
HIC General										
Eritrea	23.0	41.5	23.6	6.2		37.1	28.4	37.6	35.7	35.7
Mozambique	11.8	44.0	20.7	3.2		38.5	34.5	48.6	13.3	70.8
HIC Regional										
Chad	13.9	36.5	25.7	5.6		19.2	20.5	28.5	18.0	26.3
Sudan	19.4	…	29.8[2]	3.7[2]		76.8	53.8	36.4	29.8	…
LIC Localized										
Mali	15.3	38.7	25.3	5.7		21.9	13.3	17.9	22.8	61.9
Niger	12.1	51.0	35.2	7.7		12.7	9.7	10.7	45.1	24.0
Senegal	17.1	45.4	27.0	3.2		29.6	23.2	18.0	…	33.8
Uganda	29.2	48.8	26.7	5.3		61.4	55.1	49.2	12.5	65.8
Non-conflict										
Cameroon	10.4	25.7	22.6	2.6		48.1	22.1	43.3	10.2	16.1
Central African Republic	28.2	34.8	22.6	3.5		41.2	30.0	34.1	9.6	55.2
Kenya	21.2	46.6	19.0	3.1		51.8	40.9	31.6	17.3	36.0
Tanzania	9.8	35.8	17.1	2.0		66.1	60.8	76.4	12.5	20.0
Zambia	14.5	45.6	30.7	4.4		73.0	45.1	56.5	14.2	24.2
Zimbabwe	25.4	39.7	23.5	3.3		52.2	29.7	79.5	9.8	29.7

[1]ARI defined as ill with a cough accompanied by rapid breathing.
[2]Prevalence is based on all children 0-59 months.

In contrast to the relatively small differences in reported morbidity/period prevalence, much larger differences exist in treatment patterns. Children from conflict-affected areas with ARI or diarrhea were generally less likely to receive treatment at a health center or to use oral rehydration therapy (ORT). In fact, for those children with diarrheal disease, a higher percentage received traditional therapies (70% in Mozambique, 66% in Uganda, 36% in Eritrea) or no treatment at all among conflict-affected countries as compared to lower levels (ranging from 16-55%) among the non-conflict group. These findings suggest lower levels of utilization of/access to health care, which will be addressed in the next section of this paper. The persistent use of traditional medicine has been noted in other countries that have experienced protracted conflicts **(**Macrae and Zwi 1994), and may have implications for child-survival programming in these settings.

F.3 Health care utilization

It is well documented that large scale violence has multiple direct and indirect effects on health and disease, often through an overall disruption of health service delivery, at times accompanied by reductions in health care expenditures (Kalipeni 1998; Cliff 1993; Sabo 1989). Health personnel, supplies, and facilities are often targeted by combating forces, which when combined with security threats, leave routine under-five clinics, immunization programs, and prenatal care virtually unavailable. Although limited information is available regarding the impact of conflict upon the Eritrean health care system, it has been estimated that more than 40% of Mozambique's health centers were destroyed during the war (Machel 1996) and immunization programs stopped in many areas (Garenne et al. 1997).

Table 8 illustrates the general level of health care utilization among the comparison groups by conflict status. It details coverage indicators, such as immunization, antenatal care (ANC), and the utilization of health care professionals during the birthing process. Immunization of children and pregnant women is promoted as a particularly effective intervention for improving child survival and reducing childhood morbidity. However, the percentage of children 12-23 months of age who were fully vaccinated in conflict areas was very low, relative to non-conflict countries (Figure 18). In the Sahelian region, full vaccination coverage is in the teens for Chad and Niger, versus nearly 40% in the Central African Republic and Cameroon. In the Eastern and Southern regions, the proportion of children fully vaccinated improved among conflict-affected countries, ranging from 41-51%. Yet by comparison, non-conflict countries in the same geographic areas demonstrated much better coverage rates, ranging from 71-80%.

Table 8 also reflects substantial differences in tetanus coverage according to conflict status. Among non-conflict countries, coverage of pregnant women ranges from 70-90%, while in most conflict-affected countries (except for Senegal and Uganda) coverage is at or below 50%. Together with lower levels of assisted births and ANC, these data suggest that access to care is a significant constraint to health in conflict and post-conflict settings.

F.4 Socioeconomic, demographic and behavioral correlates of health outcomes

Numerous studies suggest that post-conflict societies may vary from those not affected by conflict in several important ways, and these differences may be illuminated by a multivariable analysis. Based on the geographic patterns of risk identified above (that is, the fact that interregional variability appears to be particularly great among conflict affected countries), we would expect that location variables such as region of residence or urban-rural status might be more significantly correlated with risk among conflict-affected countries. The patterns of and motivations for recent migration are likely to be different in post-conflict as opposed to non-conflict countries as more migrants might have been forced to move due to security reasons or abject destitution. Female household headship might be a significant marker for poverty in post-conflict as compared with non-conflict settings, because more women may be widowed, or permanently separated from their spouses and because single parent families in post-conflict settings face greater obstacles to rebuilding household livelihoods. It also is

likely that access to health and environmental services might be more important in the post-conflict environment, given the greater vulnerability of post-conflict populations.

Table 8: Health coverage indicators, DHS 1990-1997

Percentage of children 12-23 months who had received specific vaccines by the time of the survey; percentage of births receiving antenatal care (ANC) or assistance during delivery by a health care professional; percentage of births to mothers receiving at least one tetanus toxoid (TT) injection.

	Immunization coverage				Maternal health care		
Country	Measles	DPT3	All		ANC	Attended birth	TT(1+)
Conflict-affected							
HIC General							
Eritrea	51.0	48.8	41.4		48.9	20.6	33.3
Mozambique	57.5	59.6	47.3		71.4	44.2	33.6
HIC Regional							
Chad	22.8	19.5	11.3		32.4	23.7	30.2
Sudan	61.2	59.7	51.6		70.4	68.5	45.0
LIC Localized							
Mali	50.8	37.5	31.5		46.9	40.0	50.7
Niger	27.8	20.3	17.4		30.1	14.9	23.1
Senegal	57.2	58.8	49.1		73.6	47.2	70.3
Uganda	59.6	61.1	47.4		91.2	37.8	80.0
Non-conflict							
Cameroon	56.0	48.0	40.6		78.8	63.8	69.3
Central African Republic	52.4	47.5	36.6		67.0	45.9	70.0
Kenya	83.8	86.9	78.7		94.9	45.4	89.4
Tanzania	81.2	79.8	71.1		62.2	43.9	89.3
Zambia	86.5	85.7	78.3		95.6	46.5	84.6
Zimbabwe	86.3	85.2	80.1		93.1	69.2	82.1

In the following sections, which are grouped by outcome, we review the bivariate associations between child mortality, stunting, wasting and maternal chronic energy deficiency (CED) and expected correlates of these outcomes. Included in the analysis are variables reflecting the factors mentioned above, together with correlates and risk factors commonly cited in the epidemiologic literature. We have attempted to identify the correlates of risk by first using simple bivariate contingency table analysis (see Appendix 1). Multiple logistic regression analysis was performed secondarily to evaluate the independent contribution of risk markers. Thus, the objectives of the analyses include both hypothesis testing and exploration.

In order to explore potential hypotheses regarding differences between conflict-affected and comparison countries we built the multivariable regression models in stages to 1) explore associations between study variables (migration, household headship, service coverage measures, and place of residence), and 2) to assess potential mechanisms through which these may be operating (see Appendix 2). The final regression models presented in Tables 9-12 are the full models, which include all variables that were identified through the literature or bivariate analyses.

F.4.a Correlates of childhood mortality

Many environmental, socioeconomic, and health-related factors have been linked to child mortality. Such factors, including low socioeconomic status, urban-rural residence, female-household headship, low maternal education, poor access to water/sanitation, poor access to healthcare, and migration have been associated with an increased risk of child morbidity and child mortality (Conteh et al. 1990; Cutts 1996; Robinson et al. 1999).

In this study, risk factors from the literature, as mentioned above, were selected for inclusion in the analysis. Bivariate analysis was performed to determine the relationship between major risk factors and child mortality, and the results are presented in Appendix 1. Using multivariate logistic regression, the adjusted effects of socioeconomic, environmental, household, and access-related factors on child survival were determined. The adjusted odds ratios can be interpreted as indicating the risk of a child death relative to the reference category, when all other factors in the model are held constant, and are presented in Table 9.

1. Results of Bivariate Analysis

As presented in Appendix 1, childhood mortality, as measured by proportions dead of births in the five year period preceding the survey, varies according to urban-rural residence, and illustrates wide interregional variability among the conflict-affected group. Although no distinct pattern emerges according to residence, rural residence is associated with elevated child mortality in Niger and CAR, and urban residence is associated with greater risk in the cases of Eritrea and Tanzania, while other countries indicate no significant urban-rural differentials. Additionally, among the two countries having experienced the most widespread and high-intensity conflict, Eritrea and Mozambique, regional levels of childhood mortality differ substantially, with risk increasing 3 to 4 times depending upon the region of residence.

At least one of the socioeconomic factors, as measured by household possessions, dwelling characteristics, and maternal education (literacy), are associated with child mortality in most countries, with the exceptions of Eritrea and Uganda. The proportions of children dead decreases with increasing numbers of possessions and in households with finished floors, indicating that child mortality occurs disproportionately among poorer households. Among countries showing an association between literacy and mortality, children of illiterate mothers are at a greater risk of dying.

Improved environmental conditions are associated with reduced levels of child mortality in many of the countries being studied. Risk of child mortality is increased in households using surface water as compared to a piped water supply in the countries of CAR, Kenya, Niger, and Zambia. The use of well water is also associated with greater levels of mortality in Mozambique, Niger, Cameroon, and CAR. Sanitation reflects differentials in child mortality primarily among countries affected by conflict. The lack of sanitation is associated with increased risk in Eritrea, Mozambique, Niger, and Uganda, while among the non-conflict group, significant associations are found only in CAR and Kenya.

Maternal characteristics such as age and parity had variable associations across countries, while service utilization/health behavior variables were consistently associated with child mortality. Mortality by mothers' age varied somewhat by conflict status.

Among non-conflict countries, increased levels of child mortality are consistently found among younger women (15-24), although insignificant in Zimbabwe. Yet among the conflict-affected countries there is no discernable pattern. Uganda and Niger reveal patterns similar to non-conflict countries, while Mozambique indicates higher mortality among older women (35-49); Chad and Eritrea do not reveal mortality differentials by mother's age. Mortality differentials are also evident by service utilization. Among all countries but Chad, receiving antenatal care from a professional health worker significantly reduced the risk of child mortality. With regard to the pace of childbearing, as measured by preceding birth interval, all countries (except Zimbabwe) indicated greater risk of child mortality among births with intervals shorter than 24 months.

Male children typically experience higher mortality than female children in the absence of discriminatory allocation of resources and care (Waldron 1987). Therefore, child sex was included as a risk factor of childhood mortality in our study. Among eight of the twelve countries, female children were found to experience significantly lower levels of mortality as compared to males, while in others, the difference was insignificant.

Levels of child mortality vary by household headship and conflict status; migration patterns, on the other hand, are associated with child mortality levels primarily among the conflict-affected group. Children of women who had recently migrated in Eritrea, Mozambique and Uganda had an elevated risk of death. In countries such as Mozambique, Niger, CAR, and Kenya, children of women who had never migrated were also at increased risk of mortality, as compared to those who had migrated sometime in the past (6-35 years prior to the survey). These findings suggest that past migration may in fact have improved chances of child survival, while more recent migration induces the opposite effect, and implies that the reasons behind migration decisions may have been different, i.e. elective vs. forced migration.

2. Results of Multivariate Analysis

Table 9 presents the results of the multivariate analysis of factors associated with the likelihood of child death among births during the five-year period prior to the survey. Reflected are some similarities, as well as differences, in the patterns of correlates among countries grouped by conflict status. Consistent correlates of childhood mortality in both country sets include low socioeconomic status and short preceding birth intervals. Other important factors associated with increased risk of death, albeit less consistent, include poor service utilization (ANC), child sex (male), and surprisingly, urban residence. Environmental factors were relatively insignificant after controlling for the effects of socioeconomic status. Important differences by conflict status include factors such as migration patterns and household headship. Among certain cases of the conflict-affected countries, children of mothers who have recently migrated or in those in female-headed households were at increased risk of mortality.

Low socioeconomic status remains an important determinant of child death in all countries, thus confirming the results of the descriptive analysis; on the other hand, environmental predictors became insignificant in virtually all countries, with the exceptions of Eritrea and Kenya. In these two countries, the presence of any type of toilet facility was associated with a decreased risk of child mortality.

Urban-rural residence is typically used as a proxy for socioeconomic status in a descriptive analysis. In the multivariate model, it becomes clear that wealth and environment are the mechanisms accounting for urban-rural differentials in childhood mortality (see Appendix 2). In some cases, the relationship between urban-rural residence and mortality is strengthened, while in others it is reversed, favoring rural residence in many countries when these factors are held constant.

Of the maternal-related factors, mother's age did not remain an important determinant of childhood mortality, although younger maternal age (15-24) was associated with higher proportions of child death in Chad, Niger, Kenya and Tanzania. On the other hand, health behavior as measured by the pace of childbearing (birth interval) and service utilization (proxied by antenatal care) remained significant covariants of mortality. Among all countries but Zimbabwe, a child born within 24 months of a previous birth was at greater risk of mortality. Alternatively, children born to a mother receiving antenatal care from a trained healthcare professional had significantly improved chances of child survival among eight of the twelve countries in our study. The variable for mother's parity was found to be collinear with maternal age in the multivariate model, and was dropped from the analysis.

Child sex also remained an important correlate of childhood mortality in six of the twelve cases. Multivariate analysis confirmed the findings of the descriptive study, indicating that male children remain at greater risk of early childhood death as compared to females.

Important differences in determinants of childhood mortality by conflict status were found among the migration and household headship variables. Among the conflict-affected group, children of women who had migrated within five years of the survey in Eritrea, Mozambique and Uganda had an elevated risk of death. It has been suggested that heightened odds of childhood mortality from migration may occur from the disruptive effects of the move (for instance, premature termination of breast-feeding, temporary isolation from health facilities, or greater physical demands during pregnancy/early postpartum), or from maladjustment to the new surroundings after migration (for instance, an inability to quickly obtain housing, health services, and income-earning opportunities (Brockerhoff and Hewett 2000). Children in female-headed households also remained at increased risk of mortality in Eritrea, while the bivariate association between female headship and mortality in Mozambique became insignificant in the multivariate model. Among the non-conflict group, Zambia and Tanzania also reflect positive associations between female headship and child mortality.

When region of residence was included in the full model, the above effects did not change considerably. However, several countries had regional variables that were significantly associated with child mortality. This indicates that regional differences were not completely accounted for by the previous factors in the model, and something unique to particular regions further influenced child survival. Regional differentials in child mortality were most notable among conflict-affected countries, particularly Eritrea and Mozambique, where the odds of child death increased by three to four times depending upon region of residence.

F.4.b Correlates of childhood stunting

Nutritional status is often used as an indicator of children's overall health and nutrition. Undernutrition (stunting, wasting, and underweight) often results from the synergistic effects of repeated, improperly treated illnesses, especially diarrhea, and inadequate food intake. It has been established that undernourished children are at greater risk of mortality than well-nourished children (Pelletier et al. 1993), and therefore the assessment of the nutritional status of children in a given population, combined with knowledge of the mortality rate among this age group, can reveal changes in general dynamics of health and nutrition.

Biodemographic, socioeconomic, environmental and service utilization factors have been identified in the literature as having pronounced effects upon children's nutritional status. In this section, we will look at the associations between these factors and stunting, indicated by height-for-age more than two standard deviations (-2SD) below the NCHS reference median. Stunting reflects past or chronic undernutrition and results from inadequate food intake over a long period, and/or repeated episodes of illness. Bivariate analysis of stunting by biodemographic, socioeconomic, environmental, service utilization/behavior, and expected conflict-related risk factors (household headship, migration, and residence) was performed, and the results are presented in Appendix 1. Multivariate analysis was also performed in order to explore important determinants/mechanisms of stunting (see Table 10) among both conflict-affected and non-conflict countries.

1. Results of the Bivariate Analysis

As presented in Appendix 1, there are consistent differences in the levels of stunting among children age 6-35 months between urban and rural areas. Stunting is strongly associated with rural residence in all countries of this study. When stunting levels are examined by region within each country, there appears to be great variability among regions within both country sets regardless of conflict status.

Socioeconomic status of children born in the five years preceding the survey was determined from variables related to household possessions, dwelling characteristics (floor), and mother's education (literacy). Against these socioeconomic factors in all countries, stunting was consistently higher among households where household possessions were few in number, where there was an unfinished (dirt/dung) floor, and where the mother was illiterate, reflecting the overall association between malnutrition and poverty.

Unfavorable environmental conditions as measured by type of water source and absence of a toilet facility were consistently associated with higher levels of stunting. In most countries, an increased risk of childhood stunting was associated with the use of wells and surface water, as compared to piped water sources. Stunting levels were also significantly increased in households where there was no toilet facility. Water source and type of toilet facility, although related to household socioeconomic status, tend to have more of an impact on nutritional status through their relationships with disease. Poor water/sanitation puts infants and young children at risk of increased incidence and duration of illness, particularly diarrhea (Haggerty et al. 1994).

Maternal and child biodemographics are associated with differential levels of childhood stunting. Stunting levels by mother's age vary according to conflict status. Among the conflict-affected countries, specifically Mozambique, Niger, and Uganda, stunting is highest among children of the youngest mothers (15-24), which may indicate these mothers lack the resources for and/or knowledge about proper child care and child feeding. There is no clear pattern by mother's age among the non-conflict countries. The pace of childbearing (birth interval) also reflects an association with stunting, where preceding birth intervals of less than 24 months put children at greater risk in five of the countries. In addition, children of mothers of higher parity (2+) are at increased risk of stunting. Short birth intervals may lead to shortened duration of breast-feeding and/or less maternal time available for child care. Similarly, mothers of high parity have other children to care for, and may lack the time or resources to ensure proper nutrition and adequate health care. Differentials in stunting levels by child's sex occur primarily among the non-conflict countries, where being male and more stunted is reflective of the tendency seen elsewhere for boys to have higher rates of infectious diseases than girls in early childhood (Arnold 1996).

When stunting is examined by service utilization factors, more stunting occurred when the child's mother received antenatal care by non-medically trained personnel or no one at all. While antenatal care can provide mothers with valuable information about child care, health, and nutrition, these associations probably reflect a mother's overall propensity to use modern health care services, which would impact the severity and frequency of childhood illness and consequent health and nutritional status.

Of the hypothesized conflict-related risk factors, household headship was associated with stunting in the two countries most affected by conflict in our study, but migration status showed no clear pattern. In both Eritrea and Mozambique, children in a female-headed household were at greater risk of stunting as compared to those in male-headed households. Among the non-conflict cases, Zambia also indicates increased risk by female headship.

2. Results of the Multivariate Analysis

Table 10 presents the results of the multivariate analysis of factors associated with the likelihood of stunting among children 6-35 months. Factors associated with stunting across all countries include those variables related to low socioeconomic status. Other factors, such as environment and maternal/child bio-demographics remain variable. Correlates of stunting particular to conflict-affected countries include female headship, as in the cases of Eritrea and Mozambique.

In the multivariate model, socioeconomic factors remain perhaps the most important determinant of stunting in most countries. At least one of the socioeconomic variables related to household income – higher number of possessions, finished floor, and maternal literacy – was associated with a reduction in the levels of stunting, except in the cases of Niger and CAR. Upon controlling for socioeconomic status, the urban-rural differential among stunting levels disappears in all countries but Chad.

Differentials in stunting levels by environmental factors (found in the bivariate analysis) became virtually insignificant among the conflict-affected countries, while associations

were variable across the non-conflict group. Poor water and/or sanitation conditions remained positively associated with stunting in Cameroon, Central African Republic, Kenya, and Tanzania. Among the conflict-affected countries, only in Mozambique was water source (well versus piped) associated with an increased risk of childhood stunting.

Among the biodemographic and service utilization factors, the multivariate analysis confirms the findings of the descriptive analysis with regard to mother's age and child spacing (birth interval). Mother's age remains an important covariant of stunting among several of the study countries, with children who are born to young mothers put at heightened risk. Most notably in Mozambique, children born to mothers age 15-24 are two to three times more likely to be stunted as compared to the reference group (25-29). Children born within 24 months of a previous birth are also at increased risk in several of the study countries. Among service utilization factors, antenatal care by a trained health care professional, which was found to be highly significant in the bivariate analysis, became relatively insignificant in the full model.

One important difference among correlates of stunting by conflict status was found when looking at stunting levels by household headship. Even after controlling for socioeconomic factors, female headship remained an important determinant of stunting only in Eritrea and Mozambique, the two post-conflict countries in our study. The magnitude of these associations was, in fact, strengthened in the full multivariate model, and the stepwise analysis suggests socioeconomic mechanisms.

When region of residence was added to the full model, regional differences continue to account for some of the variability in stunting levels among both conflict and non-conflict countries.

F.4.c Correlates of childhood wasting

A similar analysis was performed to look at risk factors of wasting among children 6-35 months. Wasting is indicated by weight-for-height more than two standard deviations (-2SD) below the median of the NCHS reference median, and reflects recent or acute malnutrition. Wasting results from a recent shortage of adequate nutrition and/or recent or current illness. Bivariate analysis of wasting by biodemographic, socioeconomic, environmental, service utilization/behavior, and expected conflict-related risk factors (household headship, migration, and residence) is presented in Appendix 1. Multivariate analysis was also performed to further explore important determinants/mechanisms of wasting (see Table 11).

1. Results of the Bivariate Analysis

For six of the eleven countries where child anthropometry is available, wasting among children is more prevalent in rural than urban areas; among the others, no urban-rural differential is present (see Appendix 1). Within countries, wasting levels exhibit regional variability, with children living within certain regions of Mozambique and Kenya at ten times the risk of children in the reference region.

A relationship between socioeconomic status and childhood wasting is seen among all countries. Wasting levels consistently decrease as the number of household

possessions increase, the only exception being in Tanzania. A finished floor was also associated with lower levels of wasting among most countries. Among illiterate mothers the prevalence of wasting is highest in all countries but CAR and Zimbabwe.

Unfavorable environmental conditions as measured by type of water source and lack of a toilet facility were generally associated with higher levels of wasting. Children from houses with piped water are less likely to be wasted than other children, with a few exceptions. Among the conflict affected countries, specifically Chad, Mozambique and Niger, both well and surface water sources (rivers. lakes, streams, canals, etc.) reflect an increased risk of wasting, as compared to piped water. Uganda showed similar but insignificant results. Among the non-conflict countries, two countries indicate an association between wasting and the use of well water, while two others reveal an association with surface water. With regard to sanitation, the proportion of children classified as wasted tends to be highest among children whose family reported no toilet facility, although this pattern is not observed in all countries.

Wasting levels by maternal biodemographics are variable. Wasting by mother's age and parity reveal no consistent pattern with the proportion of children who are wasted. Nor is there a consistent pattern in the level of wasting by length of the preceding birth interval.

Our service utilization variable, antenatal care by a trained health professional, indicated some association with wasting levels. Six of the eleven countries indicate lower levels of wasting among children whose mothers received antenatal care by a trained health worker, as compared to non-trained personnel or no one at all. As stated earlier, this variable probably reflects a mother's health seeking behavior, and her overall propensity to use modern health care facilities in the management of childhood illness.

Of the conflict-related variables, migration status and household headship, female-headship was associated with an increased risk of childhood wasting in three of the study countries. In Eritrea and Mozambique, children in female-headed households were at 1.5 times the risk of wasting as compared to children in male-headed households. Among the non-conflict countries, Tanzania also indicated increased risk of wasting by female-headship. Zimbabwe was the only country to show reduced levels of wasting among children in households with female heads. Wasting by migration status revealed no consistent pattern.

2. Results of the Multivariate Analysis

Table 11 presents the results of the multivariate analysis of factors associated with the likelihood of wasting among children 6-35 months. Similar correlates of wasting across countries include low socioeconomic status and poor environmental conditions, primarily via household water source. Factors particular to conflict-affected countries are recent migration status and female headship. In Mozambique, child spacing (< 24 months) was also associated with an increased of wasting.

As with stunting, socioeconomic factors remain an important determinant of wasting in most countries. At least one of the socioeconomic variables related to household income – higher number of possessions, finished floor, and maternal literacy – was associated with a reduction in the levels of wasting, except in the cases of Uganda and Tanzania.

Upon controlling for socioeconomic status, the urban-rural differential among wasting levels disappears in all countries but Uganda and Cameroon. In these two countries, an increased risk of wasting among children is associated with urban residence.

Poor environment, as measured by water source and sanitation type, remained a determinant of childhood wasting in six of eleven countries. Among the conflict-affected countries of Mozambique and Uganda, the use of wells (also surface water in Uganda) was associated with an increased risk of wasting, while among the non-conflict countries, the use of surface water was a risk factor in 3 of the 6 countries. This finding may indicate that wells in conflict-affected countries may be in poor condition, due to inadequate servicing of pumps or greater risk of contamination. After controlling for water source, the effect of poor sanitation was a significant factor only in the cases of Cameroon and Tanzania.

Maternal biodemographics remained variable among countries in the multivariate analysis. Wasting levels by mother's age and preceding birth interval revealed no consistent patterns, although short birth intervals (< 24 months) were associated with an increased risk of childhood wasting in Mozambique.

Service utilization (ANC), which was associated with reduced levels of wasting in the bivariate analysis, reflected less importance in the full model. The use of antenatal care by trained health personnel remained associated with reduced risk of wasting in Mozambique, Niger, and Cameroon.

Among the conflict-affected countries, variables such as migration status, household headship, and region of residence remained important factors associated with childhood wasting. Female headship is associated with increased levels of wasting in Eritrea and Mozambique, while recent migration (past five years) is also a risk factor in Eritrea, Mozambique and Niger. When region of residence was included in the model, regional differences were found to account for some of the remaining variability among wasting levels. This indicates that something unique to particular regions further influenced child nutritional status. Regional variability in wasting was most notable among conflict-affected countries, particularly in Mozambique, where the risk of wasting in certain regions was eleven times greater than in the reference region.

F.4.d Correlates of maternal chronic energy malnutrition

A woman's nutritional status is an important determinant of pregnancy outcome for both mother and child, and contributes to morbidity and mortality that may follow a birth. Maternal height is commonly associated with birth weight, child survival, maternal mortality, and pregnancy/birth complications, while prepregnancy weight determines the characteristics of pregnancy, e.g. weight gain, premature birth, etc. (Loaiza 1997). A composite measure of height and weight, the body mass index (BMI), can be used to characterize the nutritional status of women. A BMI < 18.5 indicates chronic energy deficiency (CED), and puts a women at high risk of unfavorable maternal outcome upon becoming pregnant.

The literature identifies several factors associated with maternal nutritional status, including socioeconomic, biodemographic and environmental characteristics. Variables

from the DHS capturing these characteristics along with expected conflict-related risk factors (FHH, migration, and residence) were included in the bivariate (see Appendix 1) and multivariate analyses (Table 12).

1. Results of Bivariate Analysis

There are also consistent differences in the level of maternal malnutrition between urban and rural residence, while regional differences within countries are somewhat more variable. CED is more common in rural areas in all countries except Chad, where CED is an urban phenomenon. Differentials between high-risk regions and low-risk regions (base) were found to vary according to conflict status. In conflict-affected countries such as Chad, Eritrea and Mozambique, certain regions are more susceptible to CED, with up to 6-9 times more CED than that of the base region. By comparison, non-conflict countries reflect smaller risk differentials, with risk increasing up to three-fold in the worst regions.

Socioeconomic status of women with children born in the five years preceding the survey was determined from variables related to household possessions, dwelling characteristics (floor), and mother's education (literacy). In all countries, the higher the level of socioeconomic status as determined by a possession scale, the lower the risk of mothers with CED. Similarly, improved dwelling characteristics show a similar pattern, with the exception of Chad. In Chad, a "finished floor" is actually associated with an increased risk of CED, as may be expected in the only country where urban residence is associated with CED. Mother's education, which is proxied here by female literacy, also is associated with lower levels of CED in most study countries.

Biodemographic variables, or fertility-related variables, include mother's age, parity, and pace of childbearing (birth intervals). Generally BMI increases with age, mainly due to weight gain throughout the reproductive years. Among the conflict-affected countries this pattern holds true, with a greater proportion of younger women exhibiting CED. In contrast, an increased risk of CED appears among older women (35-49) in the non-conflict countries, with the exception of Zimbabwe. Zambia reflects a U-shaped distribution of CED by mother's age, which may be indicative of long-term maternal depletion. As parity is associated with mother's age, a similar pattern of lower CED at higher parity is found across the sample, with a few exceptions. Only in Mozambique was CED associated with a short birth interval.

In general, unfavorable environmental conditions were associated with higher levels of CED. In most countries, an increased risk of CED was associated with the use of wells of surface water, as compared to piped water sources. The presence of any toilet facility, regardless of type, was found to be negatively associated with CED in most cases as well.

Migration patterns and household-headship are generally affected by conflict, and were evaluated for associations with CED. The bivariate analysis does not reveal consistent differences in CED levels by headship, although female-headship is a protective factor in Uganda. Migration status, on the other hand, does indicate an association with CED in certain cases. Among the conflict-affected countries, there is an increased risk of CED among those who have never migrated in Eritrea and Mozambique; in Eritrea, mothers having recently migrated (past 5 years) were also at an increased risk of CED.

2. Results of Multivariate Analysis

The primary objective of the multivariate analysis is to examine the relationship of each variable with maternal chronic energy malnutrition when the effects of other variables are held constant, and to compare the results across countries according to conflict status (Table 12). To further explore mechanisms, variables were entered into the models in a stepwise fashion (see Appendix 2). As with child nutritional status, low socioeconomic status is correlated with poor maternal nutritional status in most countries. Among the conflict-affected countries, other factors such as environment, migration status, household headship, and maternal characteristics are also determinants of CED. Mozambique is a unique case, where additional factors entered into the model such as birth spacing and residence also remained associated with poor maternal nutrition outcomes.

Of the socioeconomic variables, including the possession scale, finished floor, and maternal literacy, all countries had at least one variable significantly explaining the variations in CED, thus confirming the results of the bivariate analysis. In fact, for the non-conflict countries, socioeconomic status is the primary factor determining CED, indicating that poor maternal nutritional status is most prevalent among poorer groups. By contrast, among conflict-affected countries, socioeconomic factors only partially account for the variability in CED, and other factors continue to play a role.

After controlling for socioeconomic status, urban-rural differentials found in the bivariate analysis become relatively unimportant, except in a few cases. Residence remains an important determinant of CED in Mozambique, CAR, and Tanzania, though in Mozambique, urban residence rather than rural is associated with greater risk. Stepwise analysis indicates that the rural correlation found during the bivariate analysis operated primarily through socioeconomic and environmental mechanisms.

Environmental conditions remain important determinants of CED only among the conflict-affected countries. In both Eritrea and Mozambique, the use of surface water is associated with an increased risk of CED as compared to a piped water source. In Mozambique, the use of wells is also associated with increased risk, and further bolsters our hypothesis that wells may be in disrepair or contaminated in this country. Sanitation is also a determinant of CED among conflict-affected countries, with CED most prevalent among mothers in households lacking any type of toilet facility.

Among biodemographic variables, mother's age remains an important determinant of CED among both conflict and non-conflict countries, although among different age groups. Among the conflict-affected countries of Chad, Eritrea, Mozambique, and Uganda, younger mothers (15-24) are most at risk. In the non-conflict countries, either there is no differential by age group, or the older age group (35-49) is most at risk, as in the cases of CAR and Zambia. In terms of CED by previous birth interval, Mozambique was the only country to exhibit significant associations. In Mozambique, mothers with birth intervals shorter than 24 months are at higher risk of CED. Parity was found to be collinear with maternal age, and was dropped from the full model.

Of those variables that we hypothesize to be most affected by conflict – migration status and household headship – both are associated with CED among the conflict-affected group. Interestingly, those having never migrated in Eritrea and Mozambique, and those who have recently migrated in Eritrea, experience higher levels of CED. Household

headship was also a determinant of CED among the conflict-affected countries, where female-headship was in fact a protective factor in the cases of Chad, Mozambique and Uganda.

Table 9: Regression results - likelihood of childhood death in relation to socioeconomic, demographic and environmental variables, DHS 1990-1997

	Conflict-affected Countries						Non-conflict Countries					
	Chad	Eritrea	Mozambique	Niger	Sudan	Uganda	Cameroon	CAR	Kenya	Tanzania	Zambia	Zimbabwe
Region												
High risk	2.26***	4.55***	3.41***	1.66***	1.11	1.38*	2.03***	1.73	1.94	2.33***	1.72*	2.56***
Low risk	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Residence												
Rural	0.80	0.33***	0.61***	1.05	0.80*	0.70*	1.19	0.60**	0.75	0.54***	0.79*	0.94
Migration												
Past 5 years	0.95	1.88***	2.23***	0.98	1.01	1.23*	0.99	1.19	0.96	1.00	0.97	...
6-35 years	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	...
Never	0.84**	1.01	1.39**	1.09	1.26**	1.04	1.16	1.21	1.17	0.78**	0.89	...
Household SES												
Possession scale												
0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1-2	0.71***	0.75**	0.75***	1.13	1.02	0.89	0.73*	0.77	0.87	1.04	0.75***	0.69
3+	0.65*	0.50***	0.37***	0.76**	0.73*	1.03	0.61*	0.70	0.46*	0.44*	0.74**	0.42**
Finished floor	0.87	0.82	1.22	1.19	...	0.58**	1.18	0.84	0.71*	0.51***	0.82	1.16
Female head	0.90	1.59*	1.14	1.41**	...	0.91	0.91	0.94	1.06	1.41***	1.23*	0.77
Education												
Mother literate	0.93	0.94	0.88	0.94	0.80*	1.03	0.28***	0.65*	1.15	0.86	0.86*	0.97
Environment												
Water source												
Pipe/tap	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Well	0.98	1.23	1.18	1.18	0.95	1.14	1.03	1.39	0.83	1.01	0.98	0.86
River/stream	1.21	1.12	0.77	0.98	0.92	1.17	0.86	1.25	0.89	1.09	1.24	0.95
Toilet facility												
Some vs none	0.89	0.46*	0.99	0.88	0.88	1.01	1.03	0.72	0.61***	0.96	1.05	0.78
Mother's Characteristics												
Agegroup												
15-19	1.80**	0.89	0.78	1.94**	0.89	1.19	0.83	1.19	2.11*	1.71*	0.80	1.39
20-24	0.99	0.83	1.25	1.24*	1.18	0.88	1.10	0.85	1.01	0.80	1.27*	1.28
25-29	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30-34	0.90	0.97	1.31*	0.74***	0.97	0.99	1.08	1.13	1.25	1.05	0.97	0.88
35-49	0.97	0.73	0.89	0.94	0.93	0.83	1.04	1.12	1.24	1.17	0.70***	0.82
Maternal Health												
Received ANC	0.78*	0.54***	0.27***	0.64***	0.86	0.61***	0.88	0.80	0.44***	0.75**	0.98	0.65*
Birth interval < 24 m	1.64***	2.78***	2.04***	1.84***	1.81***	1.94***	3.26***	2.15***	1.70***	1.87***	1.61*	1.14
Child's Sex												
Female	0.94	0.67**	0.59***	0.77***	0.74***	1.08	0.98	0.89	1.08	0.80**	0.88	0.68*

Significant at: *p<0.10, **p<0.05, ***p<0.01

Note: Parity was included in the full model, but was dropped due to collinearity.

Table 10: Regression results - likelihood of stunting among children 6-35 months in relation to socioeconomic, demographic and environmental variables, DHS 1990-1997

	Conflict-affected Countries						Non-conflict Countries					
	Chad	Eritrea	Mozambique	Niger	Sudan	Uganda	Cameroon	CAR	Kenya	Tanzania	Zambia	Zimbabwe
Region												
High risk	3.30***	1.78	2.42**	2.73***		1.54**	1.60	1.30	1.40	1.48**	2.21***	1.86
Low risk	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Residence												
Rural	1.53**	0.97	0.97	1.05		1.40	0.96	0.95	1.69*	0.95	0.97	1.15
Migration												
Past 5 years	1.02	1.11	0.87	1.00		1.07	1.00	1.12	1.11	1.04	0.88	…
6-35 years	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	…
Never	0.93	1.34*	1.06	1.28**		1.14	1.21	1.25	1.00	1.06	1.03	…
Household/SES												
Possession scale												
0	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
1-2	0.89	0.63***	0.77*	0.98		0.89	0.97	0.82	0.74**	0.92	0.88	0.91
3+	0.76	0.15***	0.73	1.03		0.93	0.89	0.79	0.31**	0.83	0.67**	0.60**
Finished floor	0.82	1.09	0.34***	0.91		0.55***	0.56***	1.03	0.75*	0.53***	0.70**	0.82
Female head	0.95	1.49**	1.78***	0.94		1.07	1.25	1.12	0.92	1.04	0.92	1.04
Education												
Mother literate	0.63**	0.74	0.85	1.01		0.72***	0.57**	0.87	0.92	0.83*	0.93	0.72*
Environment												
Water source												
Pipe/tap	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Well	0.69*	1.09	1.65***	0.95		0.99	1.80*	1.36	0.96	1.48***	1.05	0.98
River/stream	0.62*	0.97	1.33	1.03		1.19	2.61***	1.90***	0.92	1.49***	1.12	1.21
Toilet facility												
Some vs none	1.06	0.66	0.88	0.85		0.95	0.67*	0.69**	0.70*	1.04	0.90	0.96
Mother's Characteristics												
Agegroup												
15-19	1.52*	1.19	3.17***	1.30		1.80**	1.64	0.82	1.29	0.38***	0.88	1.26
20-24	0.93	1.02	2.06***	1.15		1.38**	1.79**	1.00	1.51**	0.93	1.09	0.89
25-29	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
30-34	0.70**	0.98	0.88	0.93		1.05	0.59**	0.68**	0.80	0.94	0.89	0.62**
35-49	0.76*	1.37*	0.87	0.99		0.86	0.88	0.78	1.10	0.88	0.92	0.82
Maternal Health												
Received ANC	0.84	1.02	0.87	0.71***		1.11	0.94	0.87	0.88	0.91	0.83	0.84
Birth interval < 24 m	1.33**	1.68***	0.98	1.21*		1.19	0.96	1.20	1.11	1.09	1.14	1.84***
Breast-feeding initiation												
Immediately	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
First day	1.13	1.21	0.91	1.41***		1.13	0.74	0.99	0.97	0.90	1.04	1.19
Later	0.94	0.60**	1.64*	1.15		1.55***	0.54**	1.04	1.29	1.09	0.95	1.45*
Child's Sex												
Female	0.99	1.03	1.04	0.96		0.80**	0.76	0.86	0.79**	0.77***	0.84*	0.98

Significant at: *p<0.10, **p<0.05, ***p<0.01

Note: Child anthropometry not collected during Sudan DHS.

Note: Child's age is controlled for in the full model; parity was dropped due to collinearity.

Table 11: Regression results - likelihood of wasting among children 6-35 months in relation to socioeconomic, demographic and environmental variables, DHS 1990-1997

	Conflict-affected Countries						Non-conflict Countries					
	Chad	Eritrea	Mozambique	Niger	Sudan	Uganda	Cameroon	CAR	Kenya	Tanzania	Zambia	Zimbabwe
Region												
High risk	3.03***	3.14***	11.13***	2.06***		2.54***	1.33	1.39	1.53	1.88*	2.38*	2.76**
Low risk	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Residence												
Rural	0.91	0.81	0.64	0.87		0.45**	0.48*	1.28	0.75	1.25	1.18	0.88
Migration												
Past 5 years	1.18	1.33*	1.77**	2.04***		0.66*	1.21	0.88	0.89	1.44*	1.17	…
6-35 years	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	…
Never	1.19	0.99	1.15	1.28		1.02	1.13	1.13	1.06	1.21	1.20	…
Household/SES												
Possession scale												
0	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
1-2	0.69***	0.60**	0.49***	0.89		0.87	0.81	0.63**	0.85	0.98	0.74	0.50**
3+	0.51*	0.16***	0.96	0.70*		0.83	0.34**	0.41*	0.83	0.92	0.80	0.42*
Finished floor	0.97	1.04	0.94	0.80		0.72	1.05	1.03	1.02	1.12	0.87	0.72
Female head	0.74	1.67***	1.71***	0.88		1.07	0.78	1.12	1.04	1.29	0.79	0.40**
Education												
Mother literate	0.88	1.04	0.85	0.65**		0.95	0.98	0.91	0.56***	0.84	0.55***	1.07
Environment												
Water source												
Pipe/tap	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Well	1.08	1.09	2.00***	1.07		2.03*	1.02	0.99	1.24	1.07	1.13	1.11
River/stream	0.99	1.32	1.14	0.88		2.90**	1.13	1.46**	2.31***	1.61**	1.06	0.92
Toilet facility												
Some vs none	1.12	1.04	0.98	0.89		0.94	0.56**	1.16	0.92	0.43***	0.98	0.93
Mother's Characteristics												
Agegroup												
15-19	0.78	0.25***	1.41	1.20		0.78	0.98	1.19	1.82***	0.91	0.89	1.15
20-24	0.70*	0.86	0.92	1.32		0.97	1.12	0.90	1.07	1.04	1.19	1.12
25-29	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
30-34	0.92	1.06	0.84	1.57**		1.15	1.02	1.07	1.02	0.98	1.18	0.86
35-49	1.34*	0.85	1.22	1.39*		1.06	1.14	1.06	1.22	0.95	1.21	0.89
Maternal Health												
Received ANC	0.73	0.94	0.69*	0.74**		1.11	0.55*	0.95	0.87	1.11	1.06	1.03
Birth interval < 24 m	1.09	1.18	2.00***	0.97		1.02	1.02	1.20	1.21	0.99	0.90	1.06
Breast-feeding initiation												
Immediately	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
First day	1.03	0.66**	2.15***	1.20		0.52***	1.45**	0.99	1.10	1.10	1.23	0.90
Later	1.15	1.01	2.60**	1.15		0.79	1.13	1.09	1.85**	1.51*	2.01**	1.56**
Child's Sex												
Female	0.72***	0.68**	1.00	0.73**		0.72*	0.48**	0.70*	0.75	0.83	0.70**	0.41***

Significant at: *p<0.10, **p<0.05, ***p<0.01

Note: Child anthropometry not collected during Sudan DHS.

Note: Child's age is controlled for in the full model; parity was dropped due to collinearity.

Table 12: Regression results – likelihood of CED among non-pregnant mothers age 15-49 in relation to socioeconomic, demographic and environmental variables, DHS 1990-1997

	Conflict-affected Countries						Non-conflict Countries					
	Chad	Eritrea	Mozambique	Niger	Sudan	Uganda	Cameroon	CAR	Kenya	Tanzania	Zambia	Zimbabwe
Region												
High risk	7.66***	3.57***	3.91*			2.03***		2.50***	3.03***	1.67**	4.14***	7.02**
Low risk	1.00	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00
Residence												
Rural	0.84	1.26	0.46***			1.38		1.61**	1.32	1.33*	0.98	1.72
Migration												
Past 5 years	0.95	1.32*	0.92			0.99		1.04	1.28	1.19	0.77**	…
6-35 years	1.00	1.00	1.00			1.00		1.00	1.00	1.00	1.00	…
Never	0.87	1.41***	2.28***			1.21		1.05	1.18	0.87	1.15	…
Household/SES												
Possession scale												
0	1.00	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00
1-2	0.83*	1.05	1.17			1.13		0.98	1.06	0.54***	0.73**	0.68
3+	1.03	0.46**	1.16			0.55*		0.87	0.34***	0.14**	0.55**	0.36*
Finished floor	0.93	0.95	0.95			0.44***		0.84	0.83	0.81	0.76	1.07
Female head	0.75**	1.23	0.64**			0.76*		0.85	0.99	1.15	0.84	0.77
Education												
Mother literate	0.74**	0.72*	0.44***			1.02		0.80	0.50***	0.70***	0.99	1.04
Environment												
Water Source												
Pipe/tap	1.00	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00
Well	1.12	1.06	1.92**			1.11		0.92	0.99	0.84	0.87	0.78
River/stream	1.05	1.33*	2.16**			1.08		1.02	1.05	1.23	0.96	0.71
Toilet facility												
Some vs none	1.10	0.71*	0.38***			0.53***		0.78	0.94	0.99	0.97	1.07
Mother's characteristics												
Agegroup												
15-19	1.11	1.10	2.50***			2.04**		1.22	1.23	1.16	1.18	1.12
20-24	0.63***	1.13	0.83			0.93		1.10	1.06	1.08	1.12	0.93
25-29	1.00	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00
30-34	0.58***	0.78*	0.83			1.21		1.25	1.11	1.00	0.92	0.86
35-49	0.87	0.68**	0.87			1.17		1.79***	1.22	1.04	1.45**	1.02
Maternal Health												
Received ANC	0.94	1.01	0.89			0.99		1.04	0.65**	1.04	0.90	1.03
Birth spacing < 24 m	0.93	0.87	1.82***			0.98		0.84	1.02	0.97	0.99	1.07
Lactating	0.77***	0.81	0.63			0.84		0.94	1.17	0.88	0.97	2.04**

Significant at: *p<0.10, **p<0.05, ***p<0.01

Note: Maternal anthropometry not collected during Sudan DHS; maternal anthropometry not included in standard recode files for Cameroon and Niger.

Note: Parity was included in the full model, but was dropped due to collinearity.

G. Comparison of fertility rates, trends, preferences and regulation

Differentials in fertility patterns according to conflict status suggest that desired fertility and total fertility rates (TFRs) remain elevated in conflict-affected countries in comparison with rates in more stable countries (Table 13; also Figure 19). Desired fertility rates (DFRs) range from 4.7 to 7.1 in conflict-affected countries versus 3.4 to 5.6 in those not affected directly by conflict (also see Figure 20). TFRs are 5 or more in all countries affected by conflict. Of note is the fact that in Mozambique, urban-rural differences in TFRs are modest, which represents an important departure for all countries, with the exception of Chad.

Table 13: Fertility rates and regulation, DHS 1990-1997

Total fertility rate for three-year period preceding individual surveys, mean number children ever-born to women age 40-49; desired fertility rates for three-year period preceding individual surveys; percentage of married women using modern/traditional contraceptive methods.

	Total fertility rate (TFR)			Mean births to women (40-49)			Desired fertility rate (DFR)			Contraceptive prevalence	
Country	TFR	Urban	Rural	Total	Urban	Rural	DFR	Urban	Rural	Modern method	Traditional method
Conflict-affected											
HIC General											
Eritrea	6.1	4.2	7.0	6.2	5.4	6.6	5.7	3.8	6.5	4.0	4.0
Mozambique	5.6	5.1	5.8	5.8	5.9	5.8	4.7	4.1	4.9	5.1	0.1
HIC Regional											
Chad	6.6	6.1	6.8	6.8	6.4	6.9	6.3	5.7	6.5	1.2	2.4
Sudan	5.0	4.1	5.6	7.3	6.8	7.6	5.8	5.3	6.3	5.5	3.1
LIC Localized											
Mali	6.7	5.4	7.3	7.6	7.1	7.8	6.0	4.8	6.6	4.5	1.7
Niger	7.4	5.9	7.9	7.5	7.2	7.6	7.1	6.3	7.3	2.3	2.2
Senegal	6.0	5.1	6.7	7.1	6.7	7.4	5.1	3.8	5.9	4.8	2.7
Uganda	6.9	5.0	7.2	7.3	6.4	7.4	5.6	3.8	5.9	7.8	4.3
Non-conflict											
Cameroon	5.8	5.2	6.3	6.3	5.8	6.4	5.2	4.5	5.7	4.3	11.8
Central African Republic	5.1	4.9	5.2	5.7	5.9	5.6	4.7	4.3	5.0	3.2	11.0
Kenya	5.4	3.4	5.8	7.3	4.7	7.6	3.4	2.5	3.7	27.3	5.5
Tanzania	6.3	5.1	6.6	6.9	6.4	7.1	5.6	4.8	5.9	6.6	3.9
Zambia	6.1	5.1	6.9	7.3	7.1	7.5	5.2	4.1	6.1	14.4	11.5
Zimbabwe	4.3	3.1	4.9	6.3	4.7	6.8	3.5	2.6	3.9	42.2	4.3

Perhaps more interesting is evidence that countries affected by conflict, in general, reflect little evidence of change in fertility over the past few decades. In comparing the mean number of children ever born (CEB) to women at the end of their reproductive years (40-49) with current fertility rates, Eritrea, Mozambique, Chad, and Niger each show little difference. In fact, this may suggest that recent fertility may be increasing over historical patterns. In contrast to these countries, CEB among older women is significantly higher than current fertility rates in countries

that have not been recently affected by conflict, indicating a declining trend in fertility, especially in urban areas.

Although inherent biases in DFR (Kirk and Pillet 1998) exist in countries where infant and child survival rates are low, desired births may in fact exceed total fertility rates. Indeed, where mortality is a salient threat, fertility levels are typically high, as families seek to ensure adequate numbers of surviving children. In addition, high mortality affects fertility through the loss of the contraceptive effect of breast-feeding and the traditional period of postpartum abstinence typical of many SSA populations.

However, modern contraceptive use also is extremely low in countries that have been recently affected by conflict, reflecting, in part, poor access to family planning services. In none of the conflict-affected countries does the modern contraceptive prevalence rate (CPR) exceed eight percent. Even in Uganda, a country that is making a rapid economic recovery, the CPR was only 7.8. Throughout SSA, where CPR rates are low and where DFRs remain relatively high, the CPRs found within the conflict-affected countries are strikingly low.

In general, these findings suggest that an increased emphasis should be placed on family planning programs in the post-conflict context. In the case of Eritrea, infant and child mortality rates are not extraordinary (though still unfortunate) in the SSA context. In these countries, means to improve birth spacing may well be welcomed by women. In addition, the high variability in mortality rates among women living in different regions of Mozambique and in the urban areas of Sahelian countries suggests that geographically targeted programs should also be considered.

Implications for program planning

As might be expected, post-conflict countries or those being affected by regional or local conflict are quite diverse in terms of their health, population, and nutrition profiles, as well as health-related behaviors. Even in countries that have experienced wide-scale and protracted conflicts, such as Eritrea and Mozambique, childhood mortality and nutritional experiences vary. Mozambique is characterized by very early childhood mortality rates but relatively unremarkable levels of undernutrition, while Eritrea seems to show the opposite tendency. These findings suggest the relative importance of attention to health care and food security needs in these two countries, respectively, and point to the need for varying HPN strategies in post-conflict environments. The Eritrean example also demonstrates the importance of examining population coping mechanisms that often evolve in the face of adversity and that may have implications for long-term programming, such as features of the primary health care system that evolved under the EPLF.

Some similarities among conflict-affected countries, particularly those affected by generalized and intense conflict, are noteworthy. Of particular importance is the high level of interregional variability in health and nutrition status found in these countries. This finding is not surprising, given the spatial and temporal variability in the nature of conflict and its sequelae, as well as cross-border interactions between populations from stable and conflict-affected countries. This high variability suggests the need for greater attention to targeting considerations in conflict-affected countries. It also means that DHS surveys should be designed to take into account the importance of the need to disaggregate data.

Another important differential apparent from these contrasts is the lack of correlation among mortality and nutritional indices, suggesting that the ecology of mortality and malnutrition might be somewhat different in conflict-affected as opposed to stable settings. The general nature of the DHS does not permit detailed analysis of the differential determinants of mortality and nutrition.

These findings also make clear the consistent need to rebuild basic health and population services in conflict-affected countries. Indeed, although the absence of an infrastructure can appear to be daunting, the opportunity for profound health sector reform is considerable. When countries have undergone loss of the physical and human infrastructure, it is often possible to promote the rebuilding of those sectors consistent with current best practices. In this way, many of the bureaucratic constraints of stable countries are avoided.

Some of the most striking differences between the conflict-affected countries appear in the variables associated with migration and female-headed households. Migrants and members of female-headed households should be of special interest in the design of interventions in conflict-affected countries, particularly those affected by generalized conflict and complex emergencies. Although this finding might have been expected, it is still significant for planning interventions in post-conflict societies. Among the study countries included in this analysis, women who had recently changed residence are somewhat better off socioeconomically than those who had not moved in the five years prior to the survey. Yet, in the two countries most affected by recent conflict, Eritrea and Mozambique, migration within the past five years was associated with a significant increase in the probability of child death in both urban and rural environments. In the multiple variable analysis, migration status increased in significance when socioeconomic factors were held constant. The analysis also shows that residential fluidity appears to be more common in countries that have experienced widespread conflict, signaling the particular need to address the health problems of these populations. Migration among the destitute appears to be of particular concern.

As the migrant group appears to be diverse in terms of its socioeconomic and health characteristics, it would be helpful to better understand the migration status of households, including reasons for migration. The literature suggests that those who migrate due to loss of land, resettlement after forced migration, or forced resettlement in designated areas (Robinson et al. 1999; Cliffe 1994) are at particular risk of poor health outcomes.

Female household headship is also of particular concern to planning in the post-conflict environment. Although households headed by women were no more likely to experience poor health outcomes in relatively stable African countries, the dynamics of conflict and post-conflict environments appear to differentially affect female-headed households. Our analyses suggest that some of the excess risk is associated with socioeconomic factors, as female-headed households in both urban and rural settings are socioeconomically disadvantaged as compared with households not headed by women. However, even when socioeconomic and environmental factors are controlled in a multivariable regression model, the female-headed household remains significant. Again, the DHS does not collect key information that may explain the nature of the mechanisms for this relationship. Other literature suggests that women may not be eligible for land tenure, for example in the case of Mozambique (Carver 1995). In the post-conflict environment, increased vulnerability among female-headed households may also be due to permanent loss of husbands to the household economy (because they were killed or separated from their families) than is the case in non-conflict-affected countries.

Another finding of interest for program planning and future DHS surveys in conflict-affected countries is that access to social services is particularly important, but may not be well measured by the DHS protocol as it currently stands. In the case of Mozambique, for example, wells seem to remain in disrepair and access to basic health, educational and environmental services is typically variable as recovery interventions are put into place. Currently, DHS protocol includes an optional service availability module, which does not include information that may be particularly important in post-conflict settings. Important service information at the community level includes repair of water systems, schools, roads, existence of functioning markets, and other factors.

Finally, the high levels of "destitution" in conflict-affected countries point to the great need for investment in programs to improve the livelihood of households. The countries in this analysis that have experienced the greatest levels of conflict, Eritrea, Mozambique and Chad, have extreme levels of poverty, as reflected by housing characteristics and a simple possessions scale. In turn, socioeconomic status remains a strong predictor of health outcomes, even in the presence of health services. Safety net programs together with programs aimed at rebuilding household livelihoods are particularly important in the post-conflict environment.

However, the measurement of socioeconomic status used by DHS is also likely to be missing important information. Debt burden, access to land and animals, and the extent of recovery or transition programs are factors that may have a significant impact on the household capacity to rebuild their livelihoods and to create good health but are not covered by DHS. Implications of these findings for implementing DHS in conflict-affected countries are discussed in the next section of the paper.

Improving the utility of the DHS program in conflict-affected settings

DHS is an important data collection vehicle that is being widely used in SSA for a variety of applications. Traditionally, DHS has been used as a national planning and monitoring tool. Health, population, and nutrition information together with basic risk factors are often analyzed in combination with other information to develop sectoral and intersectoral strategies and programs. This application is particularly critical in the post-conflict environment, where population representative data are sparse. Many countries now have multi-year DHS survey rounds planned so that they can track the progress of these indicators. In the post-conflict context, DHS also is important for planning and monitoring health-related programs. With some modification, DHS also can be used to monitor the coverage of programs specifically aimed at improving the recovery of nutrition and health, for example, food aid, livelihood, and mental health programs.

DHS also is being used, at the regional level, for comparative analysis of demographic and health factors, in order to identify countries of particular need and as a basis for health, population, and nutrition sector policy analysis. Given its methodological standardization and wide-scale application in SSA, DHS is a unique program in this respect. In relation to conflict, DHS is one of the only available vehicles for gathering comparative data on the demographic impact of conflict and complex emergencies in SSA.

Additionally, DHS is increasingly being used as an instrument of impact evaluation. Together with advanced statistical techniques, repetitive surveys are being combined with community-level information to isolate the impact of health, population, and nutrition interventions on

demographic and health outcomes. This application might be used in two different situations in post-conflict countries. In the case that DHS might be used to evaluate the impact of a family-planning program or other traditional health program, measuring contextual variables unique to conflict settings may be important to "control" for extraneous variables in a statistical analysis. For example, in the post-conflict setting, community-level factors affecting access might include neighborhood safety. Evaluating the effect of programs on other outcomes, such as childhood mortality, will require community level information on infrastructures, including for example the availability of safe water. DHS also might be used to evaluate the impact of specific transition programs, for example food aid programs that are large-scale recovery programs. The use of food aid for transition programming is an important area in need of solid evaluation research, and the DHS could serve as a vehicle for implementing this research in settings where food aid programs constitute key strategies for recovery, for example in the Horn of Africa.

The regional nature of conflict and its pervasiveness in SSA has implications for all of these applications of DHS. The results of this study reflect the general conclusion that few African countries have been untouched by conflict, either by direct experience or indirect economic and cross-border effects. This situation deserves consideration in the development of strategies to apply the DHS and other cross-national survey programs in the African context. Several suggestions can be made to improve the utility of DHS as a program planning and evaluation instrument. These include:

1. Regional coordination of country or partial country surveys in areas such as the "Great Lakes" region, parts of West Africa, and the Horn.
2. Increased emphasis on geo-referencing DHS data collection and spatial analysis of DHS data.
3. Improved coordination among survey programs, such as the Living Standards Measurement Surveys, the UNICEF Multi-Indicator Cluster Surveys, and other agricultural/socioeconomic surveys to address the information requirements of post-conflict settings.
4. Modifications to the sample design to include temporary settlements in some countries, and to extend criteria for inclusion of households to those headed by children, a common occurrence in some conflict-affected populations.
5. Enhancement of the information content of DHS data collection protocols for optional application in conflict-affected countries.
6. Conducting research to assess the effects of conflict on the accuracy of DHS methodology when applied to post-conflict settings.

It is increasingly apparent that even in SSA, where the communications and transportation infrastructure is poor, many health-related problems have a cross-border dimension to them. This is particularly true in the case of conflict-affected areas, where cross-border population movement is a significant issue, most obviously manifested in the formation of refugee camps and displaced population groups, but it often also affects the flow of economic resources and even the use of health and social services. In the case of conflict, regionally coordinated surveys could greatly enhance the ability to better understand migration patterns associated with conflict and to better predict and monitor the cross-border dimensions to population coping patterns.

Consistent with this recommendation is to design DHS to permit spatial analysis of DHS data. This includes ensuring adequate sample size and geo-referencing cluster level data. In the case of conflict, administrative boundaries appear to be more limiting than in more stable contexts, given the high intra- country variability in health-related outcomes and correlates, together with

the cross-border nature of conflict and its consequences. Our simple thematic mapping exercise demonstrates the potential utility of geographic analysis of DHS data in the post-conflict environment. Cluster mapping and the applications of GIS techniques would greatly enhance the use of DHS for planning and evaluation in the post-conflict context. An example of the feasibility of spatial analysis of DHS data already has been demonstrated for the West African region (Croft et al. 1997). Cluster mapping will also be increasingly important as DHS is used as an instrument of program impact evaluation.

Better coordination among large-scale household survey programs also could result in improved utility of DHS data for post-conflict applications. Three survey programs, sponsored by international donors, are particularly useful for comparative policy analysis and social programming applications in SSA (Table 14). The Living Standards Measurement Surveys (LSMS) is an in-depth longitudinal socioeconomic survey program, supported by the World Bank, that contains a core module that is relatively standard across all participating countries and has additional country-specific information. The LSMS is particularly useful for analyzing the socioeconomic determinants of health status, and the longitudinal component of the program also provides the opportunity to investigate change in these factors. In addition, the sampling frame is not limited to households with women between 15 and 50 years, therefore, making it more representative of the general population. Limitations of the LSMS for planning and evaluation relating to health outcomes are several. The LSMS has only been fielded in a limited number of African countries, including Tanzania, Ivory Coast, Zimbabwe, and Kenya. The survey program is relatively expensive. Health-related information and information related to the proximate determinants of health status are limited. Standardization in the application of survey methodology is somewhat variable across survey programs, and the collection, processing, analysis and dissemination of information is slow, often taking years. To date, LSMS has not been implemented in a post-conflict country, though great need exists for longitudinal information on socioeconomic recovery in post-conflict settings.

Table 14: Internationally supported national probability surveys

Type of information	DHS	MICS	LSMS
Nutrition and health status	Anthropomorphic (child- weight/height, height/age, and mother- BMI) infant/child mortality, vitamin A capsule coverage, sometimes household salt iodization, rarely anemia	Child anthropometry- (weight/age, height/age, weight/height, MUAC), vitamin A capsule coverage, household salt iodization	Sometimes anthropometry of all household members
Care factors	Breastfeeding, complementary feeding, illness management	Breastfeeding, complementary feeding, some illness management	Maternal time allocation
Accessibility of services	Coverage- prenatal care, immunization, FP, water and sanitation	Immunization, water and sanitation, FP	
Household food security			Household consumption
Contextual factors	Maternal literacy, basic socio-demographics	Maternal literacy	Detailed socioeconomic data

The UNICEF Multi-Indicator Cluster Surveys (MICS) are on the other end of the survey spectrum in terms of data intensiveness and coverage. MICS were originally designed to evaluate achievement of goals set during the World Summit on Children in 1990. MICS surveys, like DHS, are now commonly used in the field. Most UNICEF country offices have facilitated one or more MICS. Given the purpose of the survey program, MICS are relatively limited in information content (mostly focused on the direct indicators of the goals) although the MICS2 series, designed to measure achievement of the end of decade goals, has been extended in information content to be more like the DHS instrument. Information collected includes health program coverage, behavioral factors related to HIV and to child survival. Although recent changes have been made in the survey program to strengthen the field methodology employed, MICS are organized and implemented at the country level, with very little external technical assistance. This results in greater variability in data quality and comparability than is typically found in DHS. However, one of the great strengths of the MICS is its cost, which is typically a fraction of that of DHS. In some Asian countries, the MICS is being implemented annually to monitor change in program coverage and outcome measures.

On the other hand, the DHS program is well recognized as the most complete and standardized field survey program addressing health, population, and nutrition sector information needs. Information is collected across a wide variety of health-related outcomes, behaviors, and programmatic areas. Increasingly, the service availability module is being implemented to gather information on community-level characteristics. In so doing, the effects of community-level variables, such as the nature and availability of social services and accessibility of populations can be assessed. Limitations of the DHS include relatively limited measures of socioeconomic characteristics of households and the absence of information on migration of household members. Other information important to the post-conflict setting is discussed further below.

Because of its popularity as a survey vehicle, countries often add numerous modules on to the DHS. Because of the length of the survey in these cases, respondent fatigue may result in survey error. This may be a more important consideration in post-conflict settings if respondents are reticent to participate in survey programs anyway.

All three of these survey programs, however, can provide valuable information for programming and evaluation in the post-conflict context. Closer collaboration among these programs can lead to considerable gains in information and efficiency. A commonly missed opportunity for coordination is sample overlap, which provides the opportunity to link information from two or more surveys at the individual level. In the case of LSMS, for example, socioeconomic and consumption data are extensive in comparison with that in DHS, which contains more extensive data on individual health, nutrition, and fertility status. The ability to link data at the household and individual level across these surveys would result in a great enhancement of socioeconomic information without further burdening the DHS survey protocol. The LSMS also can be used to explore the dynamics of intervention strategies, particularly those that address food security and livelihood, at the household level. Together with DHS, which tends to measure more basic markers of socioeconomic status but more in-depth information on health outcomes, the two survey programs may monitor changes in outcomes while having some confidence in the mechanisms through which interventions are resulting in these changes.

Similarly, DHS and MICS can be coordinated to better facilitate planning and evaluation activities. For example, while DHS might be used to identify regions of the country at particular risk as well as the risk factors to health and nutrition, MICS could be oversampled in these

areas and repetitive survey rounds could be planned even within a one or two year time frame. In this way, MICS could be applied as a monitoring tool to track recovery of population groups particularly affected by conflict. MICS also carry some potential to implement surveys in unstable contexts, which DHS cannot. MICS is sponsored and can be identified with UNICEF, which may, in some cases, be viewed as a well-received organization by most. UNICEF typically maintains field presence during periods of conflict and instability and for this reason is typically well appreciated by local populations. In these cases, MICS and DHS might be coordinated such that MICS are undertaken early during the transition from relief to development activities and DHS implemented somewhat later.

In some countries, such as Uganda, parts of the Democratic Republic of Congo, and Guinea, refugees living in temporary settlements comprise a large population group. Past experience suggests that many "temporary settlements" often persist for more than five years. From a planning perspective, areas that have large refugee populations are important from several standpoints. First, as they often draw upon local social services, it is important to have quantitative data on their health characteristics and behaviors for planning purposes. From an evaluation perspective, international humanitarian assistance standards require that refugees have standards of care and health that are comparable to that of their hosts. In fact, in many cases, refugees have enjoyed higher standards, which should signal a readjustment of resources to ensure that local host populations enjoy similar access to resources. Another important reason for the inclusion of refugees is that no systematic information is currently collected on the demographic and health status of refugees with the exception of ad hoc rapid nutrition, and less often, mortality surveys. As such, little is known about the migration, mortality, health, and nutritional status of these populations, nor is much known about their socioeconomic status. As these population groups represent a substantial segment of the population in some provinces/states in a few countries, their inclusion in the DHS program should be considered.

Child-headed households also represent a considerable population group in some countries, although their extent is not known due to lack of data. UNICEF estimates that more than 12% of households were recently headed by children in Rwanda (Machel 1996). Households headed by children are at particular risk of poor health outcomes and may pose unique challenges to the range of social programs aimed at promoting recovery and social development. Yet this segment of the population is currently excluded from the DHS sampling frame.

Perhaps the most important limitation of DHS in the SSA context is that the information content of the survey does not address the unique character and needs of conflict-affected populations. Conflict affects population health, population, and nutrition through changes in household structure, destitution, and physical and mental trauma. Traditional problems, such as infectious disease threats and poor access to services, are compounded by the new problems associated with violence, trauma, lack of access to land, animals, and basic agricultural inputs to meet basic needs. If violence or distrust, or both of these persist, the propensity to use health and social services may be less than is typically the case in more stable environments. The physical and social infrastructure may be partially or fully destroyed. Services may be functioning, but only at limited capacity. Poor transportation routes and systems also may render population access particularly challenging.

Although current DHS protocol provides useful information for planning and evaluation in conflict-affected settings, much important information is not provided. Table 15 summarizes suggested modifications to DHS information content in post-conflict settings together with the rationale for these modifications. Some changes require only small adjustments to the DHS core

survey or existing modules, but others would require either a "post-conflict module" to be added to the field protocol or a follow-on survey to be conducted, using the DHS sample. An illustrative set of instruments is provided under separate cover.

Finally, little information exists on the nature and magnitude of survey errors resulting from conflict. At least two sources of error exist, including sampling error that may result from faulty sampling frames and reporting bias that may arise from respondent suspicion or other conditioning related to the conflict experience. No published research is available on the nature or magnitude of either of these sources of bias. Both of these are potentially important and should be assessed.

Table 15: Recommended additions of information content to the DHS in post-conflict settings

DHS element	Suggested modifications to information content	Rationale
Community level information (SAM)	• security levels • maintenance of wells • repaired social service facilities • functioning civil society groups • availability and quality of transition programs such as food aid, mental health, livelihood programs • market price data for basic foods	• monitor rehabilitation • important context information for the design and evaluation of HPN programs • important service availability information for evaluating transition programs
DHS core questionnaire	• disabilities questions to household roster	• assess prevalence of conflict-related disabilities for health and safety net programs
Adult mortality module	• cause of death to adult mortality questions	• estimate excess mortality in some situations
Post-conflict module or follow-on survey	• recent migration and mortality history or history following the onset of conflict • livelihood items, including access to land and animals, debt burden, household food access • exposure to violence, trauma and mental health • utilization of transition/recovery programs	• estimate excess mortality associated with conflict • identify risk groups according to migration status • identify risk groups according to livelihood status • identify appropriate livelihood interventions and targeting strategies • design programs that take into account security issues • identify the magnitude of need for mental health interventions

In summary, the DHS program is a very useful tool for planning, evaluating, and monitoring programs in the African-context setting. Recent and historical patterns of adult and child mortality identified by the survey can be useful for estimating excess mortality associated with conflict. Nutritional status and fertility are important population status measures establishing baseline levels for monitoring recovery progress and for identifying priority areas for intervention. On the other hand, the DHS vehicle can be adapted in a variety of ways to strengthen its use in areas affected by conflict, including through sampling design, specific information content and analytical strategies that combine various survey programs.

References

ACC/SCN. 1993. *Second Report on the World Nutrition Situation, Volume II, Country Trends, Methods and Statistics*. Geneva: ACC/SCN.

ACC/SCN. 1994. *Update on the Nutrition Situation, 1994.* Geneva: ACC/SCN.

Arnold, F. 1996. Gender Preferences for Children: Findings from the Demographic and Health Surveys. Paper prepared for the XXIIrd IUSSP General Population Conference, Beijing, China, 11-17 October 1997.

Balépa, Martin, Médard Fotso and Bernard Barrère. 1992. *Enquête Démographique et de Santé, Cameroun 1991.* Columbia, Maryland: Direction National du Deuxiéme Recensement Général de la Population et de l'Habitat [Cameroun] et Macro International Inc.

Boerma, J. Ties, A. Elisabeth Sommerfelt, and Shea O. Rutstein. 1991. *Childhood Morbidity and Treatment Patterns.* DHS Comparative Studies No.4. Columbia, Maryland: Institute for Resource Development/Macro Systems Inc.

Carver, Richard. 1995. What Future for Mozambique?, in "WRITENET Country Papers," REFWORLD. URL: http://www.unhcr.ch/refworld/country/writenet/wrimoz.htm.

Centers for Disease Control. 1994. Health Status of Displaced Persons Following Civil War (International Notes). *MMWR;* 43(38):701-703.

Central Statistical Office [Zambia], Ministry of Health and Macro International Inc. 1997. *Zambia Demographic and Health Survey, 1996.* Calverton, Maryland: Central Statistical Office and Macro International Inc.

Central Statistical Office [Zimbabwe] and Macro International Inc. 1995. *Zimbabwe Demographic and Health Survey, 1994.* Calverton, Maryland: Central Statistical Office [Zimbabwe] and Macro International Inc.

Cliff, J., and A.R. Noormahomed. 1988. Health as a Target: South Africa's Destabilization of Mozambique. *Soc Sci Med;* 27: 717-722.

Cliff, J., and A.R. Noormahomed. 1993. The Impact of War on Children's Health in Mozambique. *Soc Sci Med;* 36(7): 843-848.

Cliffe, Lionel. 1994. The Impact of War on Food Security in Eritrea: Prospects for Recovery, in Macrae and Zwi (eds.) *War and Hunger: Rethinking International Responses to Complex Emergencies.* London and New Jersey: Zed Books Ltd.

Conteh, Al-Hassan, Patricia H. David and Evasius K. Bauni. 1990. Environmental Risk Factors of Childhood Mortality in Liberia: Evidence and Policy Implications, in Hill (ed.) *Determinants of Health and Mortality in Africa*. Demographic and Health Survey Further Analysis Series Number 10. Columbia, Maryland: Macro Systems Inc.

Coulibaly, Salif, Fatoumata Dicko, Seydou Moussa Traoré, Ousmane Sidibé, Michka Seroussi et Bernard Barrère. 1996. *Enquête Démographique et de Santé, Mali 1995-1996.* Calverton,

Maryland: Cellule de Planification et de Statistique du Ministère de la Santé [Mali] et Macro International Inc.

Cousin, Tracy. 1997. Eritrean and Ethiopian Civil War. Inventory of Conflict and Environment (ICE) Case Study No.2. URL: http://www.american.edu/projects/mandala/ted/ice/eritrea.htm.

Croft, T., S. Rutstein, J. Brunner and N. Abderrahim. 1997. West Africa Spatial Analysis Prototype: Development of a Geo-Referenced Regional Data Base. Technical Paper. Calverton, Maryland: DHS/Macro International.

Cutts, F.T., C. Dos Santos, A. Novoa, P. David, G. Macassa and A.C. Soares. 1996. Child and Maternal Mortality during a Period of Conflict in Beira City, Mozambique. *Int J Epi*; 25(2): 349-356.

Department of Statistics [Sudan] and Institute for Resource Development/Macro International Inc. 1991. *Sudan Demographic and Health Survey 1989/1990.* Columbia, Maryland: Department of Statistics [Sudan] and Institute for Resource Development/Macro International Inc.

Federal Office of Statistics [Nigeria] and Macro International Inc. 1992. *Nigeria Demographic and Health Survey, 1990.* Columbia, Maryland: Federal Office of Statistics [Nigeria] and Macro International Inc.

Gaspar, Manuel da Costa, Humberto A. Cossa, Clara Ribiero dos Santos, Rosa Marlene Manjate e Juan Schoemaker. 1998. *Moçambique, Inquérito Demográfico e de Saúde, 1997.* Calverton, Maryland: Instituto Nacional de Estatística [Moçambique] e Macro International Inc.

Garenne, Michel, Rudi Coninx and Chantal Dupuy. 1997. Effects of Civil War in Central Mozambique and Evaluation of the Intervention of the International Committee of the Red Cross. *Journal of Tropical Pediatrics;* 43: 318-323.

Green, Reginald Herbold. 1994. The Course of the Four Horsemen: Costs of War and Its Aftermath in Sub-Saharan Africa, in Macrae and Zwi (eds.) *War and Hunger: Rethinking International Responses to Complex Emergencies.* London and New Jersey: Zed Books Ltd.

Haggerty, P.A., K. Muladi, B.R. Kirkwood, A. Ashworth, and M.N. Manun'Ebo. 1994. Community-based Hygiene Education to Reduce Diarrhoeal Disease in Rural Zaire: Impact of the Intervention on Diarrhoeal Morbidity. *International Journal of Epidemiology;* 23(5):1950-1959.

Hussain, A. and M. Herens. 1996. *Child Nutrition and Food Security during Armed Conflicts*. Rome: FAO.

Jongman, A.J. and A.P. Schmid. 1998. Contemporary Armed Conflicts in 1997. *Prevention and Management of Violent Conflicts: An International Directory.* The Netherlands: European Platform for Conflict Prevention and Transformation.

Kalipeni, Ezekiel, and Joseph Oppong. 1998. The Refugee Crisis in Africa and Implecations for Health and Disease: A Political Ecology Approach. *Social Science Medicine;* 46(12): 1637-1653.

Kirk, Dudley and Bernard Pillet. 1998. Fertility in Sub-Saharan Africa in the 1980s and 1990s. *Studies in Family Planning;* 29(1): 1-22.

Kourguéni, Idrissa Alichina, Bassirou Garba and Bernard Barrère. 1993. *Enquête Dèmographique et de Santè, Niger 1992.* Columbia, Maryland: Ministère des Finances et du Plan [Niger] et Macro International Inc.

Lavarentz, Marni. 1998. Reproductive Health Programs in Eritrea following a 30-Year for Independence. Paper Presented to the American Public Health Association Conference, Washington, DC, November 1998.

Loaiza, Edilberto. 1997. *Maternal Nutritional Status.* DHS Comparative Studies No. 24. Calverton, Maryland: Macro International Inc.

Machel, Graça. 1996. *UN Study on the Impact of Armed Conflict on Children.* URL: http://www.unicef.org/graca.htm.

Macrae, Joanna and Anthony Zwi. 1994. Famine, Complex Emergencies and International Policy in Africa: An Overview, in Macrae and Zwi (eds.) *War and Hunger: Rethinking International Responses to Complex Emergencies*. London and New Jersey: Zed Books Ltd.

Mosley, W.H., and L.H. Chen. 1984. An Analytical Framework for the Study of Child Survival in Developing Countries, in Mosley and Chen (eds.) *Child Survival Strategies for Research,* a supplement to vol. 10 of *Population and Development Review.*

National Council for Population and Development (NCPD), Central Bureau of Statistics (CBS) (Office of the Vice President and Ministry of Planning and National Development [Kenya]) and Macro International Inc (MI). 1994. *Kenya Demographic and Health Survey, 1993.* Calverton, Maryland: NCPS, CBS, and MI.

National Statistics Office [Eritrea] and Macro International Inc. 1997. *Eritrea Demographic and Health Survey, 1995.* Calverton, Maryland: National Statistics Office [Eritrea] and Macro International Inc.

Ndamobissi, Robert, Gora Mboup et Edwige Opportune Nguélébé. 1995. *Enquête Dèmographique et de Santè, République Centrafricaine 1994-95.* Calverton, Maryland: Direction des Statistiques Démographiques et Sociales [République Centrafricaine] et Macro International Inc.

Ndiaye, Salif, Papa Dembe Diouf et Mohamed Ayad. 1994. *Enquête Dèmographique et de Santè au Sènègal 1992-93.* Calverton, Maryland: Ministère de l'Economie et des Finances [Sènègal] et Macro International Inc.

Ngallaba, Sylvester, Saidi Hussein Kapiga, Ireneus Ruyobya and J. Ties Boerma. 1993. *Tanzania Demographic and Health Survey, 1991/1992.* Columbia, Maryland: Bureau of Statistics [Tanzania] and Macro International Inc.

Norwegian Refugee Council. 1998. *Internationally Displaced People: A Global Survey*. London: Earthscan Publications Ltd.

Ouagadijio, Bandoumal, Kostelngar Nogjimadji, Joël Nodjimbatem Ngonirim Ningam Ngakoutou, Keumaye Ignégongba, Joël S. Tokindang, Oumdague Kouo, Bernard Barrère et

Monique Barrère. 1998. *Enquête Dèmographique et de Santè, Tchad 1996-1997.* Calverton, Maryland: Bureau Central du Recensement [Tchad] et Macro International Inc.

Payson Conflict Study Group. 1999. Vulnerability Assessment Manual. Tulane Payson Center for International Development and Technology Transfer. Mimeograph.

Robinson, Courtland, Myung Ken Lee, Kenneth Hill, and Gilbert Burnham. 1999. Mortality in North Korean Migrant Households: a Retrospective Study. *Lancet;* 354: 291-295.

Sabo, Lois and Joachim Kibridge. 1989. Political Violence and Eritrean Health Care. *Soc Sci Med;* 28(7): 677-684.

Smith, Dan. 1997. *The State of War and Peace Atlas, 3rd Edition.* New York: Penguin Books.

Statistics Department [Uganda] and Macro International Inc. 1996. *Uganda Demographic and Health Survey, 1995.* Calverton, Maryland: Statistics Department [Uganda] and Macro International Inc.

UNHCR. 1999. *UNHCR by Numbers*. Geneva: UNHCR, Public Information Section.

UNICEF. 1988. *State of the World's Children.* New York: Oxford University Press.

USCR. 1999. *World Refugee Survey 1999.* Washington, DC: USCR and IRSA.

Waldron, I. 1987. Patterns and Causes of Excess Female Mortality among Children in Developing Countries. *World Health Statistics Report;* 40:194-210.

Wallensteen, Peter and Margareta Sollenberg. 1998. Armed Conflict and Conflict Complexes, 1989-97. *Journal of Peace Research; 35(5): 621-634.*

Appendix 1

Bivariate analysis of mortality/nutritional outcomes in relation to socioeconomic, demographic and environmental variables

Bivariate results - risk (odds ratio) of early child death among births in five years preceding the survey, by background characteristics, DHS 1990-1997

	Conflict Affected Countries						Non Conflict Affected Countries					
	Chad	Eritrea	Mozambique	Niger	Sudan	Uganda	Cameroon	CAR	Kenya	Tanzania	Zambia	Zimbabwe
Region												
High risk	2.55***	3.57***	3.06***	1.69***	1.49**	1.25*	2.05**	1.88**	2.45***	2.04***	1.25*	6.12***
Low risk	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Residence												
Rural	0.97	0.68**	1.14	1.38***	1.06	0.95	1.16	1.26*	1.18	0.78***	1.03	1.24
Migration												
Past 5 years	0.96	1.34***	1.69***	0.95	1.05	1.34***	0.86	1.11	0.92	1.07	1.05	...
6-35 years	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	...
Never	0.87	1.27	1.45***	1.25**	1.18	0.98	1.16	1.46**	1.34**	0.88	1.03	...
Household/SES												
Possession Scale												
0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1-2	0.79**	0.90	0.65***	0.99	0.96	0.97	0.70**	0.73**	0.76***	0.97	0.76***	0.85
3+	0.69*	0.84	0.53***	0.65***	0.66***	0.95	0.55***	0.79	0.52**	0.53**	0.64***	0.55**
Finished floor	0.87	1.08	0.69***	0.84***	...	0.85	0.73**	0.68**	0.72***	0.75***	0.92	0.93
Female head	0.95	1.51**	1.19*	1.12	...	0.96	0.67*	0.99	1.08	1.18	1.20**	0.85
Education												
Mother literate	0.92	1.17	0.55***	0.63***	0.68***	0.90	0.38***	0.75*	0.83*	0.86**	0.86**	0.78
Environment												
Water Source												
Piped	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Well	1.22	1.28	1.43***	1.65***	1.14	1.09	1.58**	1.54**	1.04	0.99	0.94	0.86
River/stream	1.27	0.85	1.14	1.17*	1.08	1.13	1.08	1.49**	1.21*	1.06	1.25**	1.13
Toilet Facility												
Some vs none	0.94	0.74*	0.72***	0.86**	0.78***	0.91	1.01	0.75**	0.56***	1.11	0.96	0.78
Mother's Characteristics												
Age												
15-19	1.16	0.90	0.62***	1.26*	0.69	1.56***	1.08	1.75**	2.12***	1.34*	1.13	1.35
20-24	0.99	0.79	1.10	1.10	0.95	1.04	1.40*	1.08	1.04	1.19*	1.26***	1.49
25-29	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30-34	1.02	0.88	1.14	0.92	0.92	1.03	1.18	0.89	1.22	1.06	0.99	1.24
35-49	1.05	0.56**	1.30***	1.20**	0.86	0.85	1.24	0.97	1.21	1.22*	0.78**	1.24
Parity												
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2-3	1.27**	0.90	0.70***	1.11	1.60**	1.29*	1.32	0.98	1.27	1.17	1.21*	1.47
4+	1.39***	0.76*	0.80**	1.72***	1.65***	1.09	1.42*	0.66**	1.39**	1.09	1.10	1.43
Maternal Health												
Received ANC	0.84	0.68***	0.30***	0.56***	0.79**	0.65***	0.50***	0.79*	0.34***	0.82*	0.77**	0.56**
Birth Interval < 24 mo.	1.69***	2.70***	2.20***	1.82***	1.78***	1.87***	3.29***	2.09***	1.66***	1.66***	1.58***	1.28
Child's Sex												
Female	0.87**	0.73**	0.65***	0.78***	0.80***	1.01	0.84	0.82	1.03	0.74***	0.86**	0.75*

Significant at: *p<0.10, **p<0.05, ***p<0.01

Bivariate results - risk (odds ratio) of stunting among children 6-35 months, by background characteristics, DHS 1990-1997

	Conflict Affected Countries						Non Conflict Affected Countries					
	Chad	Eritrea	Mozambique	Niger	Sudan	Uganda	Cameroon	CAR	Kenya	Tanzania	Zambia	Zimbabwe
Region												
High risk	2.40***	1.61	5.25***	2.49***		1.37***	4.57***	1.64***	1.82**	1.62***	3.04***	1.66**
Low risk	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Residence												
Rural	1.56***	1.87***	1.86***	1.35***		2.23***	2.18***	1.46***	1.85***	1.37***	1.97***	1.44***
Migration												
Past 5 years	0.87	0.83	1.20	0.85		0.99	0.79	1.12	0.89	0.96	0.93	…
6-35 years	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	…
Never	0.97	1.12	1.84***	1.41***		1.16	1.46**	1.13	1.10	1.11	1.12	…
Household/SES												
Possession Scale												
0	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
1-2	0.77***	0.67***	0.78***	0.77***		0.81***	0.95	0.79**	0.71***	0.72***	0.82**	0.97
3+	0.49***	0.25***	0.31***	0.56***		0.44***	0.31***	0.43***	0.26***	0.23***	0.38***	0.46***
Finished floor	0.61**	0.45***	0.35***	0.74***		0.47***	0.37***	0.69**	0.55***	0.38***	0.46***	0.61***
Female head	1.14	1.33**	1.61***	0.72**		0.95	0.66**	1.03	1.03	0.97	1.18*	0.97
Education												
Mother literate	0.62***	0.50***	0.50***	0.62***		0.70***	0.43***	0.66***	0.76***	0.79***	0.69***	0.61***
Environment												
Water Source												
Piped	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Well	0.87	1.93***	2.25***	1.43***		2.11***	2.57***	1.43**	0.95	1.49***	1.84***	1.27**
River/stream	0.95	1.32**	2.16***	1.18*		2.67***	3.36***	2.01***	1.29**	1.53***	2.21***	1.71***
Toilet Facility												
Some vs none	0.71***	0.47***	0.65***	0.84**		0.81**	0.62***	0.60***	0.60***	1.04	0.75***	0.76**
Mother's Characteristics												
Age												
15-19	0.77*	1.29	1.41**	1.38**		1.11	0.96	0.78	1.03	0.92	0.96	0.93
20-24	0.88	1.19	1.55***	0.94		1.18*	1.10	0.90	1.12	0.98	1.08	0.78
25-29	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
30-34	0.85	1.35	1.10	1.01		1.10	0.81	0.82	0.92	1.04	0.92	0.91
35-49	0.95	1.59	0.97	0.96		1.03	1.38**	0.95	1.17	1.06	1.11	1.10
Parity												
1	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
2-3	1.03	1.19	1.06	1.21*		1.07	1.12	1.28*	1.14	1.15	0.99	1.22
4+	1.07	1.55***	0.73***	1.17		1.08	1.34**	1.19	1.36**	1.25**	1.05	1.57***
Maternal Health												
Received ANC	0.80*	0.66***	0.53***	0.56***		0.72**	0.52***	0.65***	0.84	0.86	0.57***	0.70*
Birth Interval <24 m	1.54***	1.28**	1.18	1.19*		0.98	0.72*	1.31**	1.07	1.08	1.06	1.63**
Child Feeding												
Currently Breastfeeding	0.68***	0.78***	0.66***	0.76***		1.12	0.89	0.83*	1.05	0.83**	0.75***	0.72***
Breastfeeding Initiation												
Immediately	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
First Day	0.99	0.95	0.83*	1.11		1.01	0.64*	0.98	0.98	0.90	0.99	0.96
Later	0.79**	0.67***	1.15	1.12		1.44**	0.60**	1.21	1.31**	0.92	0.96	1.39*
# complementary foods in past 24 hours												
0	1.00	1.00	1.00	…		1.00	…	1.00	…	…	1.00	1.00
1-2	0.97	0.78*	2.34**	…		2.16***	…	0.99	…	…	1.49	0.96
3+	1.05	0.83	1.60***	…		1.84***	…	0.84	…	…	1.69*	1.39*
Child's Sex												
Female	0.97	1.14	0.93	0.98		0.87**	0.88	0.84*	0.84**	0.85**	0.85**	0.90

Significant at: *p<0.10, **p<0.05, ***p<0.01

Bivariate results - risk (odds ratio) of wasting among children 6-35 months, by background characteristics, DHS 1990-1997

	Conflict Affected Countries						Non Conflict Affected Countries					
	Chad	Eritrea	Mozambique	Niger	Sudan	Uganda	Cameroon	CAR	Kenya	Tanzania	Zambia	Zimbabwe
Region												
High risk	2.94***	4.76***	12.22***	1.51		2.82***	8.34***	1.83**	10.00***	2.13***	2.56***	2.05*
Low Risk	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Residence												
Rural	1.22*	1.51*	0.94	1.30**		1.24	1.25	1.49**	1.27	1.49**	1.46**	0.98
Migration												
Past 5 years	0.97	1.25	1.25	1.61**		0.78	1.64*	0.76	0.62*	1.15	1.09	…
6-35 years	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	…
Never	1.12	1.10	1.07	2.07***		1.12	1.87**	1.18	1.17	1.36**	1.25	…
Household/SES												
Possession Scale												
0	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
1-2	0.72***	0.62***	0.42***	0.78**		0.75**	0.81	0.71**	0.65***	0.83	0.69**	0.69*
3+	0.49**	0.26***	0.80	0.46***		0.39*	0.28***	0.59	0.75	1.05	0.53**	0.59*
Finished floor	0.52***	0.45***	0.94	0.65***		0.55**	0.37***	0.70	0.61**	1.11	0.69**	0.65**
Female head	1.10	1.46**	1.48**	0.90		0.92	0.68	1.10	0.89	1.35*	0.78	0.59**
Education												
Mother literate	0.75**	0.60***	0.71***	0.56***		0.65***	0.36***	0.75	0.44***	0.74**	0.51***	0.80
Environment												
Water Source												
Piped	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Well	1.51**	1.57***	1.42**	1.60***		1.56	2.39***	1.15	0.95	0.89	1.52**	1.14
River/stream	1.50**	1.38***	0.88	1.29*		1.49	1.31	1.35	1.59**	1.32*	1.07	0.78
Toilet Facility												
Some vs none	0.81**	0.65**	0.87	1.15		0.63***	0.56**	0.89	0.66**	0.60***	0.95	0.75
Mother's Characteristics												
Age												
15-19	1.07	0.94	0.75	1.66**		0.73	1.33	1.32	0.78	1.13	1.76**	2.25**
20-24	0.69***	0.96	0.90	1.72***		1.35	1.71*	1.07	1.05	0.81	1.43*	1.59
25-29	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
30-34	0.90	1.13	0.74	1.44**		1.44*	1.31	0.95	1.45	1.12	1.26	1.38
35-49	1.24	0.97	1.19	1.35*		1.22	1.34	1.05	1.56**	1.05	1.51*	1.31
Parity												
1	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
2-3	0.81*	0.84	1.43*	0.85		0.86	0.73	1.26	1.84**	0.97	1.11	0.88
4+	1.02	0.85	1.48**	0.72**		0.98	0.77	0.87	2.49***	1.12	0.93	0.98
Maternal Health												
Received ANC	0.64***	0.92	0.76*	0.64***		1.46	0.31***	0.84	0.49***	0.92	0.63**	0.99
Birth Interval <24 m	0.85	1.11	1.36	0.89		0.93	1.05	1.26	1.32	0.76	0.77	1.56
Child Feeding												
Currently Breastfeeding	1.44	1.02	1.49***	1.15		1.54**	1.04	1.67**	0.99	0.92	1.36*	1.80***
Breastfeeding Initiation												
Immediately	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
First Day	0.89	0.83	1.38	0.90		0.56**	0.91	0.66*	0.93	1.17	1.60***	0.84
Later	0.98	1.00	2.50	0.86		0.98	1.25	0.76	1.76***	1.57***	1.76**	1.83**
# complementary foods in past 24 hours												
0	1.00	1.00	1.00	…		1.00	…	1.00	…	…	1.00	1.00
1-2	1.05	1.50**	1.04	…		1.10	…	0.85	…	…	0.89	1.96*
3+	0.86	1.64**	1.84***	…		0.93	…	0.82	…	…	0.72	2.26*
Child's Sex												
Female	0.76***	1.09	1.00	0.64***		0.77*	0.74	0.88	0.90	0.71***	0.66***	0.65**

Significant at: *p<0.10, **p<0.05, ***p<0.01

Bivariate results - risk (odds ratio) of chronic energy deficiency among non-pregnant mothers age 15-49, by background characteristics, DHS 1990-1997

	Conflict Affected Countries						Non Conflict Affected Countries					
	Chad	Eritrea	Mozambique	Niger	Sudan	Uganda	Cameroon	CAR	Kenya	Tanzania	Zambia	Zimbabwe
Region												
High risk	9.72***	6.25***	6.75***			2.82***		1.44***	3.13***	1.71***	3.52***	8.33***
Low risk	1.00	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00
Residence												
Rural	0.84**	2.23***	1.80***			2.27***		1.36***	2.30***	1.88***	1.37***	2.86***
Migration												
Past 5 years	0.87	1.50***	1.05			0.94		0.92	0.82	0.99	0.89	…
6-35 years	1.00	1.00	1.00			1.00		1.00	1.00	1.00	1.00	…
Never	1.07	1.63***	2.87***			1.34**		0.89	1.82***	0.95	1.17	…
Household/SES												
Possession Scale												
0	1.00	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00
1-2	0.85**	0.68***	0.89			0.92		1.08	0.78***	0.52***	0.64***	0.81
3+	1.37*	0.17***	0.22***			0.20***		0.81	0.13***	0.12***	0.52***	0.35***
Finished floor	1.28*	0.36***	0.37***			0.36***		0.73**	0.62***	0.55***	0.64***	0.53***
Female head	0.99	1.09	0.92			0.73**		0.87	0.88	1.05	1.07	0.93
Education												
Mother literate	0.85*	0.50***	0.38***			0.64***		0.76**	0.40***	0.67***	0.88	0.80
Environment												
Water Source												
Piped	1.00	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00
Well	0.82*	1.68*	2.29***			1.65**		0.94	0.98	1.08	1.30***	1.42*
River/stream	0.88	1.66*	2.74***			1.40		1.28**	1.46**	1.41***	1.23	1.66*
Toilet Facility												
Some vs none	1.04	0.33***	0.28***			0.41***		0.83	0.58***	0.75***	0.75***	0.66**
Mother's Characteristics												
Age												
15-19	1.01	1.11	1.37*			1.51**		1.28	1.02	1.04	1.46**	1.14
20-24	0.82**	0.94	0.71**			1.05		1.30	0.89	0.93	1.33**	0.72
25-29	1.00	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00
30-34	0.73***	0.84	0.91			1.18		1.27	1.15	1.19	0.86	0.71
35-49	0.84**	0.68***	0.88			1.20		1.69***	1.39**	1.37**	1.33**	0.85
Parity												
1	1.00	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00
2-3	0.90	0.91	1.12			0.87		1.05	1.22	0.77**	0.91	0.81
4+	0.84*	0.76**	0.99			0.86		1.01	1.64**	1.05	0.72**	0.80
Maternal Health												
Received ANC	0.97	0.68***	0.75**			0.96		0.98	0.54***	0.89	0.83	1.17
Birth interval < 24 mo.	0.96	0.87	2.07***			0.98		0.88	1.11	1.01	0.96	1.26
Lactating	0.78***	1.09	0.92			1.16		1.02	1.33**	0.94	1.03	2.14***

Significant at: *p<0.10, **p<0.05, ***p<0.01

Appendix 2 Stepwise Regression Models

Likelihood of childhood death in relation to socioeconomic, demographic, and environmental variables in Eritrea, EDHS 1995

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Female Headed Household	1.54**	1.51**	1.41*	1.39	1.38	1.41	1.63*	1.66*	1.59*
Migration									
Past 5 years		1.34***	1.33***	1.36***	1.37***	1.38***	1.90***	1.88***	1.88***
6-35 years		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Never		1.26	1.29	1.28	1.27	1.25	1.08	1.09	1.01
Residence									
Rural			0.69*	0.48***	0.49***	0.37***	0.33***	0.34***	0.33***
SES									
Possession scale									
0				1.00	1.00	1.00	1.00	1.00	1.00
1-2				0.75**	0.73**	0.77**	0.69**	0.73**	0.75**
3+				0.49***	0.47***	0.65***	0.46***	0.51***	0.50***
Finished Floor				0.87	0.85	1.17	1.00	0.89	0.82
Education									
Mother literate					1.09	1.13	1.03	0.97	0.94
Environment									
Water source									
Piped						1.00	1.00	1.00	1.00
Well						1.24	1.27	1.23	1.23
River/Stream						0.96	1.20	1.16	1.12
Toilet facility									
Some vs. none						0.40**	0.46*	0.46*	0.46*
Maternal Health									
Received ANC							0.53***	0.52***	0.54***
Birth interval < 24 m							2.70***	2.81***	2.78***
Demographics									
Mother's Age group									
15-19								0.89	0.89
20-24								0.80	0.83
25-29								1.00	1.00
30-34								1.02	0.97
35-49								0.70	0.73
Female child								0.67**	0.67**
Regions									
Region 1									1.00
Region 2									2.86**
Region 3									4.55***
Region 4									2.27*
Region 5									2.94**
Region 6									2.70*

Significant at: *p<0.10, **p<0.05, ***p<0.01

Likelihood of childhood death in relation to socioeconomic, demographic, and environmental variables in Mozambique, IDSM 1997

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Female Headed Household	1.19**	1.19**	1.18**	1.09	1.11	1.10	1.05	1.06	1.14
Migration									
Past 5 years		1.72***	1.69***	1.63***	1.67***	1.67***	2.11***	2.18***	2.23***
6-35 years		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Never		1.45***	1.40***	1.22*	1.20	1.18	1.23	1.21	1.39**
Residence									
Rural			1.08	0.84	0.78**	0.74**	0.78	0.78*	0.61***
SES									
Possession scale									
0				1.00	1.00	1.00	1.00	1.00	1.00
1-2				0.66***	0.68***	0.69***	0.75***	0.75***	0.75***
3+				0.38***	0.43***	0.47***	0.34***	0.35***	0.37***
Finished Floor				0.84	0.98	1.08	1.14	1.19	1.23
Education									
Mother literate					0.61***	0.63***	0.87	0.82	0.88
Environment									
Water source									
Piped						1.00	1.00	1.00	1.00
Well						1.33**	1.29*	1.31*	1.18
River/Stream						1.01	0.78	0.77	0.77
Toilet facility									
Some vs. none						0.82**	1.04	1.04	0.99
Maternal Health									
Received ANC							0.32***	0.29***	0.27***
Birth interval < 24 m							2.05***	2.01***	2.04***
Demographics									
Agegroup									
15-19								0.77	0.78
20-24								1.25	1.26
25-29								1.00	1.00
30-34								1.24	1.31*
35-49								0.89	0.89
Female								0.58***	0.59***
Regions									
Region 1									1.00
Region 2									2.50***
Region 3									1.44
Region 4									2.90***
Region 5									1.32
Region 6									2.40**
Region 7									1.68
Region 8									1.82**
Region 9									2.53***
Region 10									3.41***
Region 11									1.05

Significant at: *p<0.10, **p<0.05, ***p<0.01

Likelihood of stunting among children 6-35 months of age in relation to socioeconomic, demographic and environmental variables in Eritrea , EDHS 1995

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	*Model 10*	Model 11
Child Age Group											
6-11 months	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12-23 months	4.12*	4.07***	4.15***	4.27***	4.47***	4.49***	4.50***	4.16***	4.43***	4.42***	4.41***
24-35 months	5.29*	5.28***	5.33***	5.46***	5.71***	5.71***	5.75***	5.38***	6.71***	6.62***	6.65***
Female Headed Household		1.33**	1.34**	1.32**	1.38**	1.40**	1.41**	1.49**	1.48**	1.47**	1.49**
Migration											
Past 5 years			0.84	0.87	0.89	0.92	0.91	1.02	0.93	1.14	1.11
6-35 years			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Never			1.15	1.12	1.10	1.11	1.09	1.15	1.25	1.41**	1.34*
Residence											
Rural				1.87***	0.98	0.93	0.87	0.95	0.92	0.94	0.97
Household / SES											
Possession Scale											
0					1.00	1.00	1.00	1.00	1.00	1.00	1.00
1-2					0.68***	0.71***	0.72***	0.62***	0.65 ***	0.63***	0.64***
3 +					0.24***	0.27***	0.28***	0.20***	0.17 ***	0.15***	0.15***
Finished Floor					0.85	0.91	1.01	1.28	1.22	1.27	1.09
Education											
Mother Literate						0.77*	0.78	0.83	0.67*	0.76	0.74
Environment											
Water source											
Piped							1.00	1.00	1.00	1.00	1.00
Well							1.16	1.02	1.03	1.05	1.09
River/stream							0.89	0.81	0.93	0.92	0.97
Toilet facility											
some vs. none							0.79	0.76	0.74	0.69	0.66
Maternal Health											
Received ANC by professional								0.78*	0.85	0.88	1.03
								1.41**	1.51***	1.64***	1.68***
Birth Interval < 24 m											
Breast feeding Initiation											
Immediately									1.00	1.00	1.00
First day									1.07	1.13	1.21
Later									0.54***	0.53***	0.60***
Demographics											
Mother's age group											
15-19										1.27	1.19
20-24										1.00	1.02
25-29										1.00	1.00
30-34										1.02	0.98
35-49										1.37*	1.37*
Female child										1.05	1.03
Region											
Region 1											1.00
Region 2											1.78
Region 3											1.67
Region 4											1.40
Region 5											1.14
Region 6											1.59

Significant at: *p<0.10, **p<0.05, ***p<0.01

Likelihood of stunting among children 6-35 months of age in relation to socioeconomic, demographic, and environmental variables in Mozambique, IDSM 1997

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	*Model 10*	Model 11
Child Age Group											
6-11 months	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12-23 months	2.23***	2.17***	2.27***	2.29***	2.30***	2.33***	2.38***	2.46***	2.40***	2.58***	2.78***
24-35 months	3.91***	3.92***	4.18***	4.30***	4.27***	4.29***	4.41***	4.42***	4.38***	4.78***	4.86***
Female Headed Household		1.62***	1.63***	1.59***	1.58***	1.59***	1.159**	1.66***	1.55 ***	1.60***	1.78***
Migration											
Past 5 years			1.45***	1.29*	1.08	1.07	1.09	1.00	1.00	0.87	0.86
6-35 years			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Never			2.23***	1.84***	1.44***	1.44***	1.52***	1.27	1.20	1.15	1.05
Residence											
Rural				1.86***	1.25*	1.20	0.97	0.90	0.91	0.88	0.96
Household / SES											
Possession Scale											
0					1.00	1.00	1.00	1.00	1.00	1.00	1.00
1-2					0.75***	0.79**	0.81**	0.81*	0.78**	0.76*	0.77**
3 +					0.59*	0.69	0.74	0.63	0.68	0.71	0.73
Finished Floor					0.38***	0.41***	0.44***	0.32***	0.30***	0.29***	0.34***
Education											
Mother Literate						0.70***	0.71***	0.87	0.89	0.78*	0.85
Environment											
Water source											
Piped							1.00	1.00	1.00	1.00	1.00
Well							1.59***	1.62***	1.66***	1.64***	1.65***
River/stream							1.52**	1.26	1.31	1.37	1.33
Toilet facility											
some vs. none							1.02	0.91	0.93	0.93	0.88
Maternal Health											
Received ANC by professional								0.77*	0.73**	0.81	0.87
Short Birth Interval (<24 m)								1.18	1.07	0.94	0.98
Breast feeding Initiation											
Immediately									1.00	1.00	1.00
First day									0.83	0.83	0.91
Later									1.42	1.62*	1.64*
Demographics											
Mother's age group											
15-19										3.22***	3.17***
20-24										2.05***	2.06***
25-29										1.00	1.00
30-34										1.22	1.19
35-49										0.80	0.75
Female child										0.97	1.04
Regions											
Region 1											1.00
Region 2											2.00*
Region 3											2.42**
Region 4											0.85***
Region 5											0.94***
Region 6											1.43***
Region 7											1.22***
Region 8											1.76**
Region 9											0.89***
Region 10											0.88***

Region 11											0.63***

Likelihood of wasting among children 6-35 months in relation to socioeconomic, demographic, and environmental variables in Eritrea, EDHS 1995

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	*Model 10*	Model 11
Child Age Group											
6-11 months	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12-23 months	1.93***	1.88***	1.88***	1.90***	1.98***	1.98***	1.98***	2.12***	1.88***	1.89***	1.86***
24-35 months	0.96	0.93	0.93	0.93	0.95	0.95	0.94	1.00	0.93	0.91	0.93
Female Headed Household		1.48***	1.50**	1.51***	1.47***	1.45***	1.44***	1.49***	1.49***	1.51***	1.67***
Migration											
Past 5 years			1.27	1.30	1.33*	1.36*	1.34*	1.36*	1.47*	1.58**	1.33*
6-35 years			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Never			1.12	1.10	1.05	1.05	1.04	1.15	1.12	1.16	0.99
Residence											
Rural				1.47**	0.73	0.70	0.76	0.78	0.82	0.79	0.81
Household SES											
Possession Scale											
0					1.00	1.00	1.00	1.00	1.00	1.00	1.00
1-2					0.57***	0.59***	0.59***	0.62***	0.55***	0.54***	0.60**
3 +					0.22***	0.24***	0.22***	0.19***	0.13***	0.13***	0.17***
Finished Floor					0.78	0.81	0.73	1.00	1.09	1.14	1.05
Education											
Mother Literate						0.84	0.86	0.85	0.97	0.96	1.04
Environment											
Water source											
Piped							1.00	1.00	1.00	1.00	1.00
Well							1.16	1.24	1.14	1.14	1.09
River/stream							1.12	1.24	1.18	1.21	1.33
Toilet Facility											
Some vs. None							1.47	1.06	1.18	1.10	1.04
Maternal Health											
Received ANC by professional								1.16	1.12	1.06	0.95
Short Birth Interval (< 24 m)								1.21	1.09	1.13	1.19
Breast-feeding Initiation											
Immediately									1.00	1.00	1.00
First day									0.73	0.75	0.66**
Later									0.99	1.05	1.01
Demographics											
Mother's age group											
15-19										0.32	0.25***
20-24										0.87	0.87
25-29										1.00	1.00
30-34										1.14	1.06
35-49										0.84	0.85
Female Child										0.66***	0.68**
Regions											
Region 1											1.00
Region 2											0.86
Region 3											0.46
Region 4											0.87
Region 5											0.46
Region 6											0.32

Likelihood of wasting among children 6-35 months in relation to socioeconomic, demographic, and environmental variables in Mozambique, IDSM 1997

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	*Model 10*	Model 11	Model 12
Child Age Group												
6-11 months	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12-23 months	1.80***	1.76***	1.73***	1.73***	1.60***	1.61***	1.57***	1.49**	1.37	1.37	1.36	1.14
24-35 months	0.83	0.83	0.85	0.85	0.80	0.79	0.77	0.65*	0.57**	0.54**	0.53**	0.43***
Female Headed Household		1.36**	1.40**	1.40**	1.22	1.24	1.22	1.29	1.43**	1.43**	1.43**	1.71***
Migration												
Past 5 years			1.30	1.32	1.31	1.33	1.35	1.79**	1.75**	1.80**	1.7 **	1.77**
6-35 years			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Never			1.12	1.16	1.05	1.05	1.09	1.25	1.26	1.28	1.29	1.15
Residence												
Rural				0.90	0.84	0.80	0.74	0.66*	0.73	0.74	0.75	0.65
Household SES												
Possession Scale												
0					1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1-2					0.39***	0.40***	0.40***	0.44***	0.46***	0.45***	0.46***	0.49***
3 +					0.82	0.83	0.84	0.91	0.92	0.92	0.92	0.96
Finished Floor					1.01	1.11	1.09	1.08	1.01	1.04	1.04	0.94
Education												
Mother Literate						0.70**	0.71**	0.67**	0.57 **	0.58***	0.61**	0.84
Environment												
Water source												
Piped							1.00	1.00	1.00	1.00	1.00	1.00
Well							1.47*	1.57*	1.60**	1.64**	1.64**	2.00***
River/stream							0.96	0.82	0.83	0.83	0.81	1.14
Toilet Facility												
Some vs. None							0.94	0.96	0.89	0.88	0.88	0.98
Maternal Health												
Received ANC by professional								0.76	0.73	0.72	0.71*	0.69*
Short Birth Interval (< 24 m)								1.94***	1.98***	1.98***	1.95***	2.01***
Breast-feeding Initiation												
Immediately									1.00	1.00	1.00	1.00
First day									1.68***	1.66***	1.67***	2.16***
Later									3.22***	3.21***	3.32***	2.60**
Demographics												
Mother's age group												
15-19											1.53	1.41
20-24											1.10	0.93
25-29											1.00	1.00
30-34											0.81	0.84
35-49											1.14	1.22
Female child											1.00	1.00
Region – 1												2.09
Region – 2												11.13***
Region – 3												10.87***
Region – 4												6.07***
Region – 5												9.44***
Region – 6												3.10
Region – 7												5.89***
Region – 8												0.64
Region – 9												6.68***
Region – 10												0.76

Likelihood of chronic energy deficiency among non-pregnant mothers age 15-49 in relation to socioeconomic, demographic, and environmental variables in Eritrea, EDHS 1995

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	*Model 10*
Female Headed Household	1.09	1.08	1.23*	1.19	1.25*	1.23*	1.21	1.16	1.20	1.23
Migration										
Past 5 years		1.49***	1.57***	1.63***	1.70***	1.74***	1.72***	1.62***	1.53***	1.32*
6-35 years		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Never		1.63***	1.57***	1.58***	1.59***	1.63***	1.78***	1.72***	1.67***	1.42***
Residence										
Rural			2.31***	1.26	1.18	1.09	1.25	1.26	1.21	1.27
Household /SES										
Possession Scale										
0				1.00	1.00	1.00	1.00	1.00	1.00	1.00
1-2				0.80**	0.85	0.86	0.96	0.96	0.96	1.06
3+				0.28***	0.31***	0.32***	0.37***	0.37***	0.38***	0.47**
Finished Floor				0.72	0.79	0.88	0.89	0.88	0.88	0.95
Education										
Mother Literate					0.72**	0.72**	0.77	0.74*	0.69**	0.72*
Environment										
Water Source										
Piped						1.00	1.00	1.00	1.00	1.00
Well						0.96	1.08	1.07	1.07	1.06
River/Stream						1.09	1.20	1.20	1.17	1.34*
Toilet Facility										
Some vs. None						0.74	0.76	0.76	0.77	0.71*
Maternal Health										
Received ANC by professional							0.97	0.97	0.98	1.01
Birth Interval (<24 m)							0.93	0.91	0.87	0.87
Currently Breastfeeding								0.79	0.73**	0.81
Maternal Age group										
15-19									1.32	1.10
20-24									1.09	1.13
25-29									1.00	1.00
30-34									0.83	0.77*
35-49									0.68***	0.69**
Regions										
Region 1										1.00
Region 2										0.37***
Region 3										0.52**
Region 4										0.53*
Region 5										0.28***
Region 6										0.31***

Likelihood of chronic energy deficiency among non-pregnant mothers age 15-49 in relation to socioeconomic, demographic, and environmental variables in Mozambique, IDSM 1997

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	*Model 10*
Female Headed Household	0.92	0.87	0.86	0.86	0.86	0.80	0.68**	0.70*	0.69**	0.64**
Migration										
Past 5 years		1.04	0.99	0.90	0.92	0.93	0.93	0.91	0.86	0.92
6-35 years		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Never		2.87***	2.59***	2.28***	2.22***	2.01***	2.03***	2.16***	2.17***	2.28***
Residence										
Rural			1.33*	0.91	0.82	0.53***	0.49***	0.52**	0.55**	0.47***
Household /SES										
Possession Scale										
0				1.00	1.00	1.00	1.00	1.00	1.00	1.00
1-2				1.04	1.09	1.14	1.14	1.16	1.13	1.17
3+				0.41	0.48	0.66	1.36	1.31	1.17	1.16
Finished Floor				0.49***	0.60	0.81	0.76	0.80	0.85	0.95
Education										
Mother Literate					0.57***	0.67**	0.46***	0.43***	0.43***	0.45***
Environment										
Water Source										
Piped						1.00	1.00	1.00	1.00	1.00
Well						1.82**	1.90**	1.94**	1.90**	1.93**
River/Stream						1.82**	1.95**	2.03**	1.97**	2.17**
Toilet Facility										
Some vs. None						0.40***	0.31***	0.32***	0.33***	0.38***
Maternal Health										
Received ANC by professional							0.89	0.89	0.88	0.90
Birth Interval (<24 m)							2.20***	2.03***	1.99***	1.82***
Currently Breastfeeding								0.95	0.94	0.92
Mother's age group										
15-19									2.37***	2.51***
20-24									0.84	0.83
25-29									1.00	1.00
30-34									0.85	0.84
35-49									0.81	0.87
Regions										
Region 1										1.00
Region 2										1.82
Region 3										2.58
Region 4										3.12
Region 5										3.91*
Region 6										3.71*
Region 7										1.96
Region 8										2.32
Region 9										1.52
Region 10										3.48
Region 11										1.89

Appendix 3 Summary of Referenced DHS Surveys in Sub-Saharan Africa, 1990-1998

Region and Country	Date of Fieldwork	Implementing Organization	Respondents	Sample Size	Male/Husband Survey	Supplemental Studies, Modules, and Additional Questions
Benin	Jun-Aug 1996	Institut National de la Statistique	AW 15-49	5,491	1,535 Men 20-60	AIDS, CA, MA, MM, SAI
Cameroon	Apr-Sep 1991	Direction Nationale du Deuxiême Recensement Général de la Population et de l'Habitat	AW 15-49	3,871	814 Husbands	CA, CD, SAI
Central African Republic	Sep-Mar 1994/95	Direction des Statistiques Démographiques et Sociales	AW 15-49	5,884	1,729 Men 15-59	AIDS, CA, CD, MA, MM, SAI
Chad	Dec-Jul 1996/97	Bureau Central du Recensement Direction de La Statistique, des Études Économiques et Démographiques	AW 15-49	7,454	2,320 Men 15-49	AIDS, CA, MA, MM, SAI
Eritrea	Sep-Jan 1995/96	National Statistics Office	AW 15-49	5,054	1,114 Men 15-59	AIDS, CA, MA, MM, SAI
Kenya	Feb-Aug 1993	National Council for Population and Development	AW 15-49	7,540	2,336 Men 15-54	AIDS
Malawi	Sep-Nov 1992	National Statistical Office	AW 15-49	4,850	1,151 Men 20-54	AIDS, CA, MA, MM, SAI
Mali	Nov-Apr 1995/96	CPS/MSSPA et DNSI	AW 15-49	9,704	2,474 Men 15-59	AIDS, CA, MA, MM, SAI
Mozambique	Jul-Jul 1996/97	Instituto Nacional de Estatística	AW 15-49	8,779	2,335 Men 15-49	AIDS, CA, MA, MM

Region and Country	Date of Fieldwork	Implementing Organization	Respondents	Sample Size	Male/Husband Survey	Supplemental Studies, Modules, and Additional Questions
Namibia	Jul-Nov 1992	Ministry of Health and Social Services, Central Statistical Bureau	AW 15-49	5,421		CA, CD, MA, MM
Niger	Mar-Jun 1992	Direction de la Statistique et des Comtes Nationaux	AW 15-49	6,503	1,570 Husbands	CA, MA, MM, SAI
Nigeria	Apr-Oct 1990	Federal Office of Statistics	AW 15-49	8,781		CA, SAI
Senegal	Nov-Aug 1992/93	Direction de la Prévision et de la Statistique	AW 15-49	6,310	1,436 Men 20+	AIDS, CA, MA, MM, SAI
South Africa	Jan-Sep 1998	Medical Research Council, National Department of Health	AW 15-49	11,735	5,753 Men 15+	AIDS, CA, MA, MM, SAi
Sudan	Nov-May 1989/90	Department of Statistics, Ministry of Economic and National Planning	EMW-15-49	5,860		FC, M, MM
Tanzania	Oct-Mar 1991/92	Bureau of Statistics, Planning Commission	AW 15-49	9, 238	2,114 Men 15-60	AIDS, CA, MA, SAI
Uganda	Mar-Aug 1995	Statistics Department, Ministry of Finance and Economic Planning	AW 15-49	7,070	1,996 Men 15-59	AIDS, CA, MA, MM, SAI
Zambia	Jul-Jan 1996/97	Central Statistics Office	AW 15-49	8,021	1,849 Men 15-59	AIDS, CA, MA, MM
Zimbabwe	Jul-Nov 1994	Central Statistics Office	AW 15-49	6,128	2,141 Men 15-54	AIDS, CA, MA, MM, PC, SAI

AIDS acquired immune deficiency syndrome
AW all women
CA child anthropometry
CD causes of death (verbal reports of symptoms)
EMW ever-married women
FC female circumcision
MA maternal anthropometry
MM maternal mortality
PC pill compliance
SAI service availability information