Government of National Unity
Government of Southern Sudan

Sudan Household Health Survey (SHHS) - 2006

World Food Programme
UNFPA
World Health Organization
USAID
unicef

December 2007

The Sudan Household Health Survey (SHHS) was carried out by the Federal Ministry of Health (FMoH) and the Central Bureau of Statistics (CBS) representing the Government of National Unity (GoNU), and the Ministry of Health (MoH) together with the Southern Sudan Commission for Census, Statistics and Evaluation (SSCCSE), both representing the Government of Southern Sudan (GoSS). The survey was carried out in collaboration with several ministries and institutions such as the Ministry of International Cooperation, Ministry of Education, and Ministry of Social welfare and women and child affairs, National Population Council, National Council for Child Welfare (NCCW) and National Water Corporation. Financial and technical support was provided by the United Nations Children's Fund (UNICEF), AGFUND and OPEC Fund through the Pan Arab Project for Family Health (PAPFAM), the World Food Programme (WFP), the United Nations Population Fund (UNFPA), the World Health Organization (WHO), the United States Agency for International Development (USAID) and the League of Arab States (ALS).

The survey has been conducted as part of the effort to assess the situation of children and women and to monitor progress towards selected MDG indicators. Survey tools are based on the models and standards developed by the global MICS project, and PAPFAM designed to collect information on the situation of children and women in countries around the world.

Federal Ministry of Health,
Government of National Unity,
Khartoum,
Republic of Sudan
Tel: +249183778597
Fax: +249183769928
E-mail: phc2008@smoh.go.sp

Ministry of Health,
Government of Southern Sudan,
Juba,
Republic of Sudan
Tel: +249811820678-+249811820134
Fax: +249811820134
E-mail: mohgoss@ mohgoss.sd

Central Bureau of Statistics,
Government of National Unity,
Khartoum,
Republic of Sudan
Tel: +249183777255
Fax: +249183771860
E-mail: dg@cbs.com.sd

Southern Sudan Commission for Census,
Statistics and Evaluation (SSCCSE)
Government of Southern Sudan
Rumbeik,
Republic of Sudan
Tel: +8821621243711
Fax: +249811823835
E-mail : info@ssccse.org

Summary of the main indicators

Sudan Household Health Survey (SHHS) and Millennium Development Goals (MDG) indicators, Sudan, 2006			
Topic	**MDG indicator number**	**Indicator**	**Value**
CHILD MORTALITY			**Value/1000 live births**
Child mortality		Neonatal mortality rate / 1000 live births	**41**
		Post neonatal mortality rate /1000 live births	**40**
	14	Infant mortality rate /1000 live births	**81**
		Child mortality rate /1000 live births	**34**
	13	Under-five mortality rate /1000 live births	**112**
NUTRITION			**Value %**
Childeren's nutritional status	4	Underweight prevalence (moderate and severe)	**31**
		Underweight prevalence (severe)	**9.4**
		Stunting prevalence (moderate and severe)	**32.5**
		Stunting prevalence (severe)	**15.2**
		Wasting prevalence (moderate and severe)	**14.8**
		Wasting prevalence (severe)	**3.5**
		Overweight prevalence	**3.6**
Breastfeeding		Exclusive breastfeeding rate (0-5 months)	**33.7**
		Timely complementary feeding rate (6-9 months)	**55.8**
		Frequency of complementary feeding (6-11 months)	**36.1**
		Continued breastfeeding rate (12-15 months)	**83.6**
		Continued breastfeeding rate (20-23 months)	**35.1**
		Adequately fed infants (0-11 months)	**35.0**
Salt iodisation		Iodised salt consumption	**11.4**
Vitamin A supplementation		Vitamin A supplementation (under-fives)	**76.4**
		Vitamin A supplementation (post-partum mothers)	**18.5**
CHILD HEALTH			**Value %**
Immunization		Tuberculosis immunization coverage (children aged 12-23 months receiving BCG vaccine before their first birthday)	**72.9**
		Tuberculosis immunization coverage (at any time up to the date of the survey)	**74.9**
		Immunization coverage for diphtheria, pertussis and tetanus (DPT) (children aged 12-23 months receiving DPT3 vaccine before their first birthday)	**52.9**
		Immunization coverage for diphtheria, pertussis and tetanus (DPT) (at any time up to the date of the survey)	**54.8**
		Polio immunization coverage (children aged 12-23 months receiving polio vaccines before their first birthday))	**59.5**
		Polio immunization coverage (at any time up to the date of the survey)	**61.9**

Sudan Household Health Survey (SHHS) and Millennium Development Goals (MDG) indicators, Sudan, 2006			
Topic	**MDG indicator number**	**Indicator**	**Value**
	15	Measles immunization coverage (children aged 12-23 months receiving measles vaccine before their first birthday)	**59.3**
		Measles immunization coverage (at any time up to the date of the survey)	**66.4**
		Fully immunized children (children aged 12-23 months receiving BCG, DPT1-3, OPV1-3 and measles vaccines before their first birthday)	**31.5**
		Fully immunized children (children aged 12-23 months receiving BCG, DPT1-3, OPV1-3 and measles vaccines at any time up to the date of the survey))	
Tetanus toxoid vaccination		Neonatal tetanus protection	**48.8**
Care of illness		Under fives with diarrhoea in the last two weeks preceding the survey	**28.2**
		Use of Oral Rehydration Therapy (ORT)	**58.3**
		Home management of diarrhoea	**22.1**
		Received ORT or increased fluids, and continued feeding	**55.9**
		Under fives with suspected pneumonia in the last two weeks preceding the survey	**12.0**
		Care-seeking for suspected pneumonia	**90.1**
		Knowledge of the two danger signs of pneumonia	**14.9**
Solid fuel use	29	Use of solid fuels	**72.4**
MALARIA PREVENTION AND TREATMENT			**Value %**
		Household availability of bednets	**36.8**
		Household availability of insecticide-treated nets (ITNs)	**18.4**
	22	Under-fives sleeping under insecticide-treated nets	**27.6**
		Under fives with fever in the last two weeks preceding the survey	**20.9**
	22	Antimalarial treatment (under-fives)	**54.2**
		Antimalarial treatment -under-fives (within 24 hours of onset of symptoms)	**2.6**
WATER AND SANITATION			**Value %**
Water	30	Use of improved drinking water sources	**56.1**
		Appropriate water treatment (all drinking water sources)	**4.5**
		Mean time to drinking water source	**42.9 minutes**
Sanitation	31	Use of sanitary means of excreta disposal	**31.4**
Water and sanitation		Use of both improved drinking water sources and sanitary means of excreta disposal	**23.8**
EDUCATION			**Value %**
Primary and secondary education		Net intake rate in primary education	**29.5**
	6	Net attendance rate of primary school-age children	**53.7**
	9	Gender parity index (primary school)	**0.93**
		Secondary school net attendance rate	**18.9**

Sudan Household Health Survey (SHHS) and Millennium Development Goals (MDG) indicators, Sudan, 2006			
Topic	**MDG indicator number**	**Indicator**	**Value**
		Primary school attendance rate of children of secondary school age	**35.5**
	7	Children reaching grade five	**90.3**
	7b	Primary completion rate	**19.4**
		Transition rate to secondary school	**64.5**
CHILD PROTECTION			**Value %**
Birth registration		Birth registration	**32.6**
Early marriage and polygyny		Marriage before age 15	**12.4**
		Marriage before age 18	**36.0**
		Young women aged 15-19 currently married/in union	**24.7**
		Polygyny	**27.5**
Children's living arrangements and orphanhood		Children's living arrangements (not living with a biological parent)	**6.9**
		Prevalence of orphans	**9.7**
Support to orphaned and vulnerable children		School attendance of non-orphans (10-14 years)	**53.5**
		School attendance of double orphans (10-14 years)	**66.8**
		Double Orphan to non-orphan school attendance ratio	**0.78**
REPRODUCTIVE HEALTH			**Value %**
Contraception	19c	Contraceptive prevalence	**7.6**
		Unmet need for family planning	**5.7**
Maternal and newborn health		Antenatal care	**69.6**
		Provider of antenatal care	**63.7**
	17	Births attended by a qualified health personnel	**49.2**
		Institutional deliveries	**19.4**
Maternal mortality	16	Maternal mortality ratio/100,000 live births	**1,107**
HIV/AIDS			**Value %**
HIV/AIDS knowledge		Awareness about AIDS among women	**70.4**
	19b	Knowledge about HIV prevention (correctly identifying two ways of avoiding HIV infection)	**4**
		Awareness about mother-to-child transmission of HIV	**26.4**
		Knowledge of means of mother-to-child transmission of HIV (all three means of vertical transmission)	**54**
Female genital mutilation/cutting (North specific)			**Value %**
Prevalence		Prevalence of female genital mutilation/cutting (FGM/C)	**69.4**
Approval for FGM/C		Approval for FGM/C (women aged 15-49 years)	**44.9**
		Approval for FGM/C (ever married women aged 15-49 years)	**50.9**
		Women who intend to circumcise their daughters	**53.6**
Food security			**Value %**
Food insecure population		Food insecure population-poor food consumption	**17.2**
		Food insecure population-borderline food consumption	**82.2**

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Preface

The Sudan Household Health Survey (SHHS) Report is the first national report published after the signing of the Comprehensive Peace Agreement (CPA) by the Government of Sudan and the Sudan People's Liberation Movement (SPLM) in January 2005. The report covers to some extent both national and global indicators, such as the Millennium Development Goals (MDGs), the goals and targets indicated in A World Fit for Children which represents the consensus outcome document of the UN General Assembly s Special Session on Children held in May 2002 and other international initiatives.

Data constraints in terms of both quality and comprehensive have been a major issue in Sudan. There is persistent lack of up-to-date baseline information, and hence the urgent need for data to improve the planning and decision-making process and monitor progress towards internationally agreed upon initiatives and goals; and indeed to contribute to the development of post conflict Sudan.

As an integral part of the national efforts to ensure progress towards the MDGs, the Government of National Unity (GoNU) and the Government of Southern Sudan (GoSS) have put strategic emphasis on addressing, in a broader context, several issues including those relating to health, education, water and sanitation, agriculture, environment and child protection. Both governments aim to address these issues through its development plans and programmes, poverty reduction strategies, and the programme of cooperation with different UN agencies and the Multi Donor Trust Fund (MDTF) - supported projects. The report, therefore, is a very important tool that reflects the breadth in scaling-up interventions that would make a substantial progress in accelerating progress towards the attainment of the MDGs and othere national development goals. It aligns with and recognises the efforts to promote sustainable progress towards the MDGs and other national development goals and targets, and illustrates the need for the adoption of a multi-disciplinary and multisectoral approach to combating poverty and improving the situation of children and women in Sudan.

The Sudan Household Health Survey report provides data on key socio-economic and demographic variables, covering a wide range of topics. It also divulges the most recent and detailed information on the situation of children and women in the Sudan.
In recognition of the close interrelatedness between the MDG indicators and sustainable growth and development, the GoNU and GoSS are committed and have a pressing duty, together with developmental partners, private sector and civil society to address the issues of concern highlighted in the report.

Being the first national report after more than two decades of the protracted conflict in Sudan, we hope that the information generated from the survey will prove to be useful in providing the necessary data that can lead to evidence based and sound policy formulation and effective programme planning. It is also our sincere hope that future surveys will learn from the experience of the SHHS to better sustain joint initiatives in getting quality and comprehensive information.

Signature-GoNU
Dr. Tabitha Butrus Shokaya

Minister of Health,Chair person of the SHHS steering committee
Government of National Unity
Khartoum

Signature-GoSS
Dr. Joseph Manytuil Wejang

Minister of Health, SHHS steering committee member
Government of Southern Sudan,
Juba

Signature
Prof. Awad Haj Ali

Director General
Central Bureau of Statistics;
SHHS technical director

Signature
Mr. Isaiah Chol Aruai

Chairman
Commission for Census, Statistics& Evaluation; SHHS deputy technical director

Acknowledgements

On behave of SHHS management team I would like to acknowledge the efforts exerted by the numerous individuals, departments, agencies and institutes who had dedicated their time, knowledge and experience to successfully complete the Sudan Household Health Survey.

Special recognition is due to excuting bodies of the survevy mainly; the Federal Ministry of Health (FMoH) and the Central Bureau of Statistics (CBS) representing the Government of National Unity (GoNU), and the Ministry of Health (MoH GoSS) and the Southern Sudan Commission for Census, Statistics and Evaluation (SSCCSE), both representing the Government of Southern Sudan (GoSS). Our appreciation is also due to other government and independent sectors/institutions, which have contributed to the various processes of the survey being part of the steering committee, technical committee, technical working group and/or the field work teams.

We would like to extend special appreciation to Arab League/ Pan Arab Project for Family Health; the initiator of the idea of the survey and the UN country offices namely UNICEF, UNFPA, WFP and WHO together with the United States Agency for International Development (USAID) for their invaluable support at the different stages of the SHHS. We would also like to extend especial thanks to experts from UNICEF headquarters and UNICEF Middle East and North Africa Regional Office, and PAPFAM and WHO headquarters' staff who gave their time and shared their experiences and knowledge to guarantee quality results of the survey.

Our sincere gratitude goes to all the staff, especially those at the States and locality levels who participated in the SHHS Survey for their strong support from the inception to the completion of the survey and who are quided and directed by the two executive directors (Dr. Olivia Lomoro and Dr. Igbal A. Bashir) and two field directors (Mr. Eliaba and Amin Dawoud)

Special thanks to Professor Awad Haj Ali, Director-General, CBS, Mr Isaiah chol aruai, Chairman, SSCCSE and Dr. Luka Biong Deng, former chairman of SSCCSE who represent the technical directing force for the survey.

Finally we would like to gratefully acknowledge the generous support received from Dr. Ahmed Abdelmoneum and Mr. K. Ramachandran (UNICEF Sudan country office) who played the major role and exerted at most effort towards having a unified national survey and the latter has contributed considerably during the different phases of the report writing process.

Dr. Mohamed Ali Yahia Elabassi
SHHS National Coordinator

Executive summary of findings

The Sudan Household Health Survey (SHHS), conducted in 2006, is the first household survey covering the whole of Sudan in two decades. Data constraints in Sudan have been severe, both in terms of quality and comprehensiveness. Earlier data on key social development indicators for North Sudan were drawn primarily from the Safe Motherhood Survey (SMS) conducted in 1999 and the Multiple Indicator Cluster Survey (MICS) conducted in 2000. These surveys were conducted during a period of conflict in Southern Sudan, so only the garrison towns of Juba, Malakal and Wau in Southern Sudan were covered. Data in respect of Southern Sudan were drawn primarily from the New Sudan Centre for Statistics and Evaluation (NSCSE) and from its publications entitled, "Towards a Baseline: Best Estimates of Social Indicators for Southern Sudan (2004)", and "Millennium Development Goals: Interim Report for Southern Sudan (2004)". The national and state-level data generated by the SHHS are expected to help in assessing the current status in relation to some of the key indicators relating to the Millennium Development Goals (MDGs), the World Fit For Children (WFFC) goals, Programme of Action adopted at the International Conference on Population and Development (ICPD), and other internationally and nationally agreed upon goals, as a basis for action. In addition to Arab initiatives specially the second Arab strategy for childhood for the period (2004-2011) which was approved and designed by all Arab countries.

Sample design and coverage

The sample for the Sudan Household Health Survey (SHHS) was designed to provide estimates in regard to some key indicators at the national level and for 25 states. It was judged that a minimum sample of about 850 households in each state would be necessary to make survey estimates with the required degree of precision at the state level. Allowing for some non-response in the survey, it was decided to take a sample of 1,000 households in each state. A two-stage cluster sampling design was employed to draw the sample in each state. The villages or quarters (in the case of urban areas) constituted the Primary Sampling Units (PSUs). It was decided to draw 40 clusters from each state and 25 households from each cluster. Accordingly, the survey aimed at a total sample of 25,000 households in 25 states of Sudan. The sampling frame for 12 states (Northern, River Nile, Red Sea, Kassala, Gedarif, Khartoum, Gezira, Sinnar, Blue Nile, White Nile, North Kordofan and South Kordofan) was compiled using the list of villages/quarters and estimated population updated by the Central Bureau of Statistics on the basis of the updated frame from the pre-census field operations for the year 2005. In the case of these 12 states, the clusters were distributed to urban and rural areas, according to the population size. The urban and rural clusters were selected randomly with probability of selection proportional to size. The sampling frames for the three states of North Darfur, West Darfur and South Darfur and for all the ten states in Southern Sudan were compiled using the list of villages and estimated population developed by the Expanded Programme on Immunization (EPI) for the National Immunization Days (NIDs) campaign. In the case of these states, stratification on urban and rural levels was not done. All selected clusters (villages/quarters) were fully covered with the exception of only 14 clusters in three states (seven clusters in Upper Nile State, five in Western Bahr El Ghazal state and two in South Kordofan State) due to insecurity influencing accessibility during the fieldwork period. From each selected cluster, 25 households were chosen using the method of systematic random sampling.

Of the 24,527 households selected for the sample, 24, 507 households were found to be occupied. Of these, 24,046 households were successfully interviewed for a household response rate of 98.1

per cent. Of the 32,599 women (age 15-49 years) identified in the selected households, 26,923 were successfully interviewed, yielding a response rate of 82.6 percent. Of the 22,512 children under age five listed in the households, questionnaires were completed for 19,870 children, which correspond to a response rate of 88.3 per cent. Overall response rates of 81 per cent and 86.6 per cent were calculated for the women's and under-5 children's interviews respectively.

Questionnaires

The survey tools consisted of five sets of questionnaires: 1) a *Household questionnaire* which was used to collect information on all de jure household members and the household; 2) a *Women's questionnaire* administered to all women aged 15-49 years in each household; and 3) an *Under-5 questionnaire* administered to mothers or caretakers of all children under 5 years of age living in the household; 4) *Community Questionnaire*; and 5) *Food Security Questionnaire*. The first three questionnaires are based on the MICS3 and PAPFAM model questionnaires. The *Household Questionnaire* covered a number of topics such as: education, Female Genital Mutilation/Cutting (FGM/C) (used in 15 states, excluding all ten states in Southern Sudan), Water and sanitation, household income and resources, use of insecticide-treated nets, salt iodization and maternal mortality. The *Questionnaire for Individual Women* covered topics such as: live birth history/child mortality, tetanus toxoid vaccination, maternal and newborn health, marital status (currentltly marroed/in union), contraception, Female Genital Mutilation/Cutting (FGM/C) and knowledge of HIV/AIDS. The *Questionnaire for Children under five* covered topics such as birth registration, vitamin A supplementation, breastfeeding, care of illness, immunization, treatment of malaria with anti-malarial drugs, and anthropometry (child nutrition). The *Food Security Questionnaire* covered household circumstances, household belongings and livestock, livelihoods and agricultural production, household expenditures, food consumption and sources, shocks and coping mechanisms, and food aid. The *Community Questionnaire* covered access to services, seasonal calendar and food aid and priorities.

Background characteristics of Households and respondants

Of the 146,723 household members listed in the 24,046 households successfully interviewed in the survey, 73,394 were males and 73,329 were females, the sex ratio of the sample population being 999 females for 1,000 males. The total population in Sudan was estimated at 40,169,996 (Male: 20,052,504; Female: 20,117,491), the sex ratio being 1,003 females for 1,000 males. About 45 per cent of the total estimated population was below the age of 15 years, the sex ratio being 970 females for 1,000 males. The population below 18 years constituted 50.9 per cent of the total population with a sex ratio of 948 females for 1,000 males while the population aged 18 years and above constituted 49.1 per cent of the total population. The proportion of under-five children in the total population was estimated at 14.8 per cent, the sex ratio being 941 females for 1,000 males.

Women in the age group 15-49 constituted about 22.3 per cent of the estimated total population. About 65.5 per cent of the women aged 15-49 years were currently married/in union and 28.6 per cent were formerly married/in union while never married/in union women constituted 5.9 per cent. Approximately two-thirds (64.4 per cent) of the women had given birth to a child before while 35.6 per cent never gave birth to a child. Women with no formal education made up 49.8 per cent of the total while 41.2 per cent had primary education and 8.9 per cent had secondary or higher education. The wealth index quintiles show that about 17.7 per cent of women belonged to the poorest households while women from the richest households constituted about 23.5 per cent.

Children under the age of five years constituted about 14.8 per cent of the total estimated population. Under-five children of mothers with no formal education constituted 62.3 per cent,

while 24 per cent of under-five children had mothers with primary education and 12.1 per cent had mothers with secondary or higher education. The data relating to the wealth index quintiles showed that about 21.2 per cent of under-five children belonged to the poorest households while children from the richest households constituted about 14.2 per cent.

Infant and under-five mortality

The infant and under-five mortality rates that have been computed by using the direct estimation method indicate that the infant mortality rate (IMR) in Sudan as a whole was 81 per 1,000 live births while the under -5 mortality rate (U5MR) was 112 per 1000 live births during the 5-year period before the SHHS. Estimates of neonatal, post-neonatal and child mortality rates have also been made using the direct method. They were respectively 41, 40 and 34 per 1,000 live births. The infant and under-5 mortality rates were the lowest in Gezira State (IMR: 52; U5MR: 63) and highest in Western Equatoria State (IMR: 151; U5MR: 192).

Children's nutritional status

The SHHS results indicated that nationwide, approximately one-tenth (9.4 per cent) of children under age five in Sudan were severely underweight, 15.2 per cent were severely stunted and 3.5 per cent were severely wasted. The underweight prevalence (severe) was above 15 per cent in five states namely North Darfur (15.4 per cent), Upper Nile (16.6 per cent), Jonglei (16.9 per cent), Northern Bahr El Ghazal (18.7 per cent) and Unity (22.1 per cent). The percentage of severely underweight children ranged between 10 and 15 per cent in seven states, and below ten per cent in the remaining states, the lowest being in Khartoum State at 3.7 per cent. The proportion of children who were severely stunted ranged from 11.7 per cent in Khartoum to 26.8 per cent in Unity State while the wasting prevalence (severe) varied from 0.7 per cent in South Darfur State to 12.2 per cent in Unity State.

Child feeding

The SHHS results show that only about four out of ten infants (42.5 per cent) aged 0-3 months (below four months) and only one in three infants (33.7 per cent) aged 0-5 months (below six months) were exclusively breastfed. The exclusive breastfeeding rates varied substantially by state. Only four states (North Darfur: 65.2 per cent, Khartoum: 56.1 per cent, Kassala: 52.8 per cent and White Nile: 52.8 per cent) reported exclusive breastfeeding rates above 50 per cent for infants aged 0-3 months (< 4 months), and only one state (North Darfur: 53.2 per cent) reported exclusive breastfeeding rate of above 50 per cent in the case of infants aged 0-5 months (< 6 months). The state with the lowest exclusive breastfeeding rate for children aged 0-3 months was Northern Bahr El Ghazal (12.9 per cent) while Western Equatoria State had the lowest rate (11.1 per cent) for children aged 0-5 months. Slightly more than half (55.8 per cent) of the infants aged 6-9 months in Sudan (180 to 299 days) received breast milk and complementary foods at least twice in 24 hours prior to the survey. Khartoum State reported the highest timely complementary feeding rate (82.1 per cent) for children aged 6-9 months while Western Bahr El Ghazal State reported the lowest rate (9.1 per cent). Overall, 83.6 per cent of children (84.5 per cent of boys and 82.6 per cent of girls) were still being breastfed at the age 12-15 months. Gadarif State reported the highest continued breastfeeding rate (95.6 per cent) for children aged 12-15 months while Jonglei State reported the lowest rate (57 per cent). A substantial drop in continued breastfeeding rate between the age categories of 12-15 months and 20-23 months was noticed. By age 20-23 months, only 35.1 per cent of children received continued breastfeeding. Kassala State reported the highest continued breastfeeding rate (60.7 per cent) for children aged 20-23 months and Warap State reported the lowest rate (8.3 per cent).

Household consumption of iodised salt

Only slightly over one out of ten (11.4 per cent) households in Sudan were found to be using adequately iodized salt, i.e. ≥15 parts per million. The percentage of households consuming adequately iodized salt ranged from 0.2 per cent in Northern State to 78.9 per cent in Central Equatoria State. Three states (North Darfur, West Darfur and Western Bahr El Ghazal) had more than 30 per cent of households using iodized salt while iodized salt was rarely used (less than 1 per cent) in eight states.

Vitamin A supplementation

The SHHS results indicated that approximately one-fifth (20.9 per cent) of children aged 6-59 months never received vitamin A supplement. More than three-fourths (76.4 per cent) of children aged 6-59 months had received a high dose of vitamin A supplement during the 6-month period prior to the survey. Approximately 1.5 per cent did not receive the supplement in the last six months preceding the survey but did receive one before that. About 1.2 per cent of children received a vitamin A supplement at sometime in the past. The percentage of children aged 6-59 months who had received a high dose of vitamin A supplement varied between states with more than 90 per cent of children receiving vitamin A supplements in nine states and less than 25 per cent of under-five children receiving the supplement in two states, the highest (96.9) being in Sinnar State and the lowest (19.2) being in Jonglei State.

The SHHS results showed that only 18.5 per cent of mothers aged 15-49 years with a live birth in the two years preceding the survey had received a high dose of vitamin A supplement before the infant was eight weeks old. The coverage was highest at 35.3 per cent in Khartoum State and lowest at 10.9 per cent in Sinnar State. The percentage of post-partum mothers receiving vitamin A supplement ranged between 20 and 30 in four states, and between 10 and 20 in 19 states.

Child health

The SHHS results indicate that nationwide about 14.7 per cent of children aged 12-23 months were not vaccinated against any of the childhood diseases at any time before the survey. The proportion of children 12-23 months of age who received all recommended vaccinations (BCG, DPT1-3, OPV1-3, and measles) before their first birthday was only 31.5 per cent. The vaccination coverage for BCG, DPT3, OPV3 and measles respectively were 72.9, 52.9, 59.5 and 59.3 per cent. The vaccination coverage rates in respect of children aged 12-23 months who received the vaccinations at any time up to the date of the survey were 74.9 per cent for BCG, 54.8 per cent for DPT3, 61.9 per cent for polio3, and 41.4 per cent for measles. Wide variations exist among states in regard to the vaccination coverage rates. BCG vaccination coverage was more than 90 per cent in three states, the highest being in Gezira States (95.1 per cent) and less than 50 per cent in five states, the lowest being in Jonglei State (25 per cent). In the case of DPT3, only two states reported a coverage of over 85 per cent, the highest being in Khartoum State (89.4 per cent) whilst seven states reported a very low DPT3 coverage (less than 20 per cent), the lowest being in Lakes State (11.9 per cent). The OPV3 coverage ranged from 89.5 per cent in Northern State to 17.6 per cent in Jonglei State. Measles vaccination coverage varied from 89.5 per cent in Gezira State to 19.7 per cent in Jonglei State while the proportion of fully immunised children ranged from 72.5 per cent in Northern State to 5.5 per cent in Western Bahr El Ghazal State.

Neonatal tetanus protection

The SHHS findings indicate that the percentage of mothers with a birth in the last 12 months protected against neonatal tetanus was only 48.8. The percentage of women who received at least 2 doses during last pregnancy increases from 43.2 for women in the age group 15-19 years to 52.2 for women in the age group 30-34 years and to 52.4 for women in the age group 40-44 years and then declines to 35.3 for women aged 45-49 years. The proportion of mothers with live births in the previous year who were given at least two doses of tetanus toxoid (TT) vaccine was highest in Khartoum State (74 per cent) followed by River Nile State (73 per cent), and below 20 per cent in two states, the lowest in Jonglei State at 10.1 per cent.

Management of diarrhoea

Overall 28.2 percent of under-five children had diarrhoea in the two weeks prior to the SHHS. Diarrhoea prevalence was very high in three states – Unity (50.5 per cent), Western Bahr El Ghazal State (51.8 per cent) and Western Equitoria State (53.3 percent), and lowest in Red Sea State (15.2 per cent). The ORT use rate during the episode of diarrhoea was found to be 58.3 per cent. About 31.3 per cent received fluids from ORS packets, 41.1 per cent received recommended homemade fluids while 41.7 per cent received no treatment. The ORT use rate was highest in Eastern Equatoria State (83.2 per cent) and the lowest in Blue Nile State (35.4 per cent). In all, about 22.1 per cent of children received adequate home management of diarrhoea ranging from 36.6 per cent in Western Equatoria State to 6.1 per cent in West Darfur State. The SHHS findings also indicate that over one-half (55.9 per cent) of under-five children with diarrhoea received ORT or increased fluids AND continued feeding, the percentage being highest in Eastern Equatoria State (76.8 per cent) and the lowest in Jonglei State (40.2 per cent).

Care seeking for suspected pneumonia

About 12 per cent of children aged 0-59 months were reported to have had symptoms of pneumonia during the two weeks preceding the SHHS. The states with higher percentages of children with acute respiratory infection include South Darfur (21.1 per cent), Unity (22.5 per cent), Western Equatoria (18.8 per cent), and Eastern Equatoria (17.6 per cent). Of the children with suspected pneumonia, 90.1 per cent were taken to an appropriate health provider. However, only 14.9 per cent of women knew of the two danger signs of pneumonia namely fast and difficult breathing. The percentage of mothers/caretakers who recognise the two danger signs of pneumonia ranged between 50 per cent in Upper Nile State and 1.1 per cent in Gedarif State. About 24.1 per cent of mothers identified fast breathing and 26.5 per cent identified difficult breathing as symptoms for taking children immediately to a health care provider.

Solid fuel use

Overall, about three-fourths (72.4 per cent) of all households were found to be using solid fuels as the primary source of domestic energy for cooking. More than 95 per cent of the households in ten states were found to be using solid fuels whereas three states namely River Nile State (21.1 per cent), Khartoum State (21.8 per cent) and Gezira State (29.4 per cent) had much lower levels.

Malaria prevention/control

Though about 36.8 per cent of households had a mosquito net, only 18.4 per cent of households had an insecticide-treated net (ITN). The results also indicated that 27.6 per cent of children aged 0-59 months slept under an ITN during the previous night of the survey. However, variations by state are quite wide: ranging from 56.6 in Sinnar State to 7.3 in Western Equatoria State. Less than 10 per cent of under-five children slept under an ITN in Central Equatoria State (8.5 per cent) and Eastern Equatoria State (9.7 per cent), besides Western Equatoria State. The SHHS results also

showed that overall, 54.2 per cent of children with fever in the last two weeks before the survey were treated with an "appropriate" anti-malarial drug, ranging from 88.6 in River Nile State to 26.9 in Jonglei State. However, only 2.6 per cent of them received anti-malarial drugs within 24 hours of onset of symptoms.

Use of improved sources of drinking water and sanitary means of excreta disposal

.Nationally 56.1 per cent of the household members were found to be using an improved source of drinking water at the time of the survey, ranging from 80.7 in Sinnar State and 80.3 in Northern States to 22.2 in Jonglei State. Approximately one-third (31.4 per cent) of the household members were found to use improved sanitation facilities. More than three-fourths of household members were reported to use improved sanitation facilities in three states: Northern States (79.7 per cent), River Nile State s(83.2 per cent), and Khartoum State (78 percent). In eight states, less than 10 per cent of households use improved sanitation facilities.

Education

The SHHS results indicated that nationwide, only 53.7 per cent of children of primary-school age were attending school, implying that a significant proportion (46.3 per cent) of them remained out of school. The net intake rate in grade 1 was only 29.5 per cent. The net attendance rate (NAR) was highest (67.7 per cent) among children aged 11 years implying that the enrolment peaks at this age. The NAR ranged from 91.1 per cent in River Nile State and 4.3 per cent in Unity State. Nationally the Gender Parity Index (GPI) in regard to primary school net attendance ratio was 0.93, the highest being 1.06 in Red Sea State. The GPI was over 0.90 in 12 states. However, the GPI was low in sex states, namely South Kordofan States (0.79), West Darfur States (0.74), Warap States (0.66), Northern Bahr El Ghazal States (0.43), Western Bahr El Ghazal States (0.61) and Lakes States (0.60). The data also showed a positive trend in terms of the survival rate to grade 5 in a majority of the states. Of all children starting grade one, about 90.3 per cent of them (91.3 per cent of boys and 89.1 per cent of girls) eventually reach grade five. The survival rate to grade 5 was over 90 per cent in 13 states and quite low in two states, namely Unity (13.2) and Northern Bahr El Ghazal (14). While about nine out of ten of those enrolled in grade 1 eventually reach grade 5, the overall primary school completion rate remained very low at only 19.4 per cent. The primary school completion rate ranged from 50.1 per cent in Khartoum State to 0.4 per cent in Unity, Warap and Lakes States.

Birth registration

The SHHS data showed that only about 32.6 per cent of children under-five years in Sudan had their births registered, with the registration rates ranging from 70.2 per cent in Khartoum State to 1.1 per cent in Lakes State. Among children whose births were not registered, the main reasons given for not registering were those related to cost (21.3 per cent), long distance to the birth registration office (17.1 per cent), the lack of awareness among parents of the need to get the birth of their children registered (21.3 per cent), and the lack of information regarding the place of birth registration (13.1 per cent).

Early marriage and polygyny

The SHHS results indicated that 12.4 per cent of women aged 15-49 years were married before age 15 years of age, while 36 per cent were married before the age of 18 years. The percentage of women married before age 15 ranged from 6.1 in River Nile State to 24.1 in Unity State while the percentage of women married before age 18 ranged from 19.3 in Northern State to 56.8 in Unity State and 56.4 in Blue Nile State. Nationwide, about 27.5 per cent of women aged 15-49 years were in polygynous marriage/union, ranging from 8.3 in Northern State to 58.7 in Upper Nile State. The

percentage of women in polygynous marriage/union was lowest (14.8) among women in the age group 15-19 years and highest (30.4) among women aged 45-49 years.

Children's living arrangements and orphanhood

The results of the SHHS show that 6.9 per cent of children did not live with a biological parent, whilst 15.2 per cent lived with only their mother. The prevalence of orphans (percentage of children under age 18 with at least one dead parent) was 9.7 per cent, the highest (16.7 per cent) being among those aged 15-17 years and lowest (5 per cent) among those aged 0-4 years. The prevalence of orphans ranged from 5.5 per cent in White Nile State to 20.5 per cent in Upper Nile State. The school attendance of children aged 10-14 years who were orphans was found to be 60.3 per cent as compared to 64.8 per cent for children in the same age group who were not orphans. The difference in school attendance rate between children who were orphans and not orphans was quite high in Kassala State (16.3 percentage points) and Blue Nile State (15.5 percentage points).

Reproductive health

The results of the SHHS indicated that the percentage of women aged 15-49 years currently married or in union who were using (or whose partner was using) a contraceptive method was only 7.6 per cent. About 4.3 per cent used the pill, 1.6 per cent uses lactation amenorrhoea, and 0.3 per cent each used female sterilisation, IUD and condom. About 0.5 per cent used injections while 0.2 per cent practiced periodic abstinence. The contraceptive use rate was found to be the highest in Northern State at 22.4 per cent followed by Khartoum State at 20.3 per cent and the lowest in Jonglei at 0.1 percent. The use of a modern method of contraception was relatively higher in Khartoum State (18 per cent) states ,Northern (16.4 per cent) and River Nile (14.1 per cent) than in other states. An analysis of contraceptive methods used by contraceptive users to avoid pregnancy showed that the most popular method was the pill which was used by one in two (52.9 per cent) women. The next most popular method was lactation amenorrhea Method (19.3 per cent). In all, out of the contraceptive users, modern methods (female sterilisation, pill, IUD, injection, condom, and Diaphram/foam/jelly) were used by 70 per cent while the remaining 30 per cent used traditional methods (LAM, periodic abstinence, withdrawal and other traditional methods). Among the contraceptive users, the use of modern methods was highest in Kassala State (92.4 per cent) followed by South Kordofan State (91.5 per cent) and lowest in Jonglei, Unity and Warap States at zero per cent. The SHHS findings show that 38.3 per cent of the women aged 15 - 49 years (currently married or in union) and pregnant at the time of the survey wanted to wait until later at the time they become pregnant and 14.3 per cent did not want to have any more children. It also showed that 63.9 per cent of these women who were not pregnant and not using contraceptives at the time of the survey did not want to be pregnant. These together contributed to an unmet need for contraception of 5.7 per cent. The unmet need for contraception was highest in Northern State at 18.3 per cent and the lowest in Jonglei State at zero per cent.

The findings of the SHHS indicate that 69.6 per cent of pregnant women received antenatal care (ANC) one or more times during pregnancy. The percentage of pregnant women receiving ANC at least once during pregnancy was highest in Khartoum State (94.8 per cent) and lowest in Jonglei (22.4 per cent). The percentage of women who received ANC at least once during pregnancy was highest (72.2 per cent) among those aged 15-19 years and lowest (59 per cent) among those aged 45-49 years. The findings reveal that the current provision of specific care provided as part of the antenatal care remains quite inadequate. The percentage of pregnant women who had their blood tests taken as part of the antenatal care received was only 45.5 per cent while blood pressure was measured in the case of 40.7 per cent of pregnant women and a urine specimen was taken in the case of 45.9 per cent. In the country as a whole, 63.7 per cent of women aged 15-49 years who gave birth in the two years preceding the survey had received antenatal care from qualified health

personnel (a doctor, nurse, or midwife). About one in seven (14.5 per cent) pregnant women received ANC from a medical doctor, one in five (20.4 per cent) was attended by an auxiliary midwife while about one in six (12.7 per cent) was attended by a nurse/midwife. The percentage of women attended by qualified personnel was highest in Khartoum State (89 per cent) and the lowest in Unity State (zero per cent).

The SHHS results show that only 49.2 per cent of births occurred in the two years prior to the survey were delivered by qualified health personnel (a medical doctor, nurse, midwife or auxiliary midwife).This percentage was highest in River Nile State (90.8) and the lowest in Eastern Equatoria State (4.9). Of the total births, 19.4 per cent were delivered in a health facility. The highest proportion of institutional deliveries was in Khartoum State (54 per cent) and the lowest in Blue Nile State (5 per cent).

The main complications experienced during pregnancy included headache (42.3 per cent), fever (42 per cent), abdominal pain (30.5 per cent), urinary pain (22 per cent) and edema (21.6 per cent). Other complications included severe breathlessness (18.4 per cent), hypertension (17.2 per cent), bleeding (13.2 per cent), convulsions (11.6 per cent) and Jaundice (11.5 per cent). The main complications during postpartum period included lower back pain (27.6 per cent), abdominal pain (25.5 per cent), upper back pain (22.1 per cent), painful urination (17.6 per cent), and painful breasts (17.2 per cent. Other complications included bleeding (14.5 per cent), edema (14 per cent), discharge (12.4 per cent) and dripping (8.2 per cent). The main complications during labour and delivery included prolonged labour (31.1 per cent), high fever (30.9 per cent), excessive bleeding (20 per cent) and convulsions (10.2 per cent).

About 79.5 per cent of pregnancies ended in live births while 10.6 per cent ended in stillbirths. Miscarriages accounted for 9.9 per cent.

Maternal mortality ratio

The complications of pregnancy and childbirth are a leading cause of death among women of reproductive age in Sudan. The Maternal Mortality Ratio (MMR) estimates calculated by using the data collected during the SHHS indicate that the national average for MMR was 1,107 per 100,000 live births, ranging from 94 in Northern State to 2,327 per 100,000 live births in Western Equatoria State.

Knowledge of the means of preventing HIV transmission

The SHHS results showed that overall, more than two-thirds (70.4 per cent) of women aged 15-49 years had heard of AIDS. The awareness of AIDS was highest among women in the age group 15-19 years (73.3 per cent) followed by women in the age group 20-24 years (72.8 per cent). In SHHS women were asked whether they knew of the main ways of preventing HIV transmission, having only one faithful uninfected partner, using a condom every time, and abstaining from sex. The results indicated that about four out of ten interviewed women (39 per cent) indicated that transmission of HIV could be prevented by having only one faithful uninfected sex partner.

Approximately one out of ten women (9.2 per cent) suggested use of condom as an important way of preventing HIV transmission while 11.2 per cent of interviewed women indicated abstaining from sex as another method of prevention. However, only 4 per cent of women knew all three ways (i.e. having only one faithful uninfected partner, using a condom every time, and abstaining from sex) of preventing HIV transmission. A significant proportion (44.5 per cent) of the women knew at least one of the ways of preventing HIV transmission while a high proportion (55.4 per cent) of them did not know any way of preventing HIV transmission. However, the percentage of women who knew two of the most effective ways (i.e. having one uninfected partner and using a

condom correctly every time) of preventing HIV transmission was fairly low (8 per cent) ,although there are differences by state, ranging from 36 per cent in Central Equatoria State to 0.9 per cent in Sinnar and West Darfur States.

The SHHS had also assessed the level of knowledge among women aged 15-49 years concerning mother-to-child transmission of HIV. Overall, 51.0 percent of women knew that HIV could be transmitted from mother to child. The percentage of women who knew all three ways of mother-to-child transmission of HIV was 25.1 percent, while 17.2 percent of women did not know of any specific way.

Food security

West Darfur, Northern Bahr El Ghazal, Warap and Jonglei states are the most food insecure states since 40-60 per cent of households in these states are found to have poor food consumption. Likewise, 20-40per cent of all households in North Darfur State and the states in southern Sudan (with the exception of Central Equatoria state) are found have poor food consumption. The percentages of households with poor food consumption are found be less than 20 in the rest of the states of Sudan (with the exception of South Kordofan).

Female genital mutilation/cutting (north specific)

During the SHHS, questions were added to the data collection in the 15 states of Sudan (where the practice of FGM/C is more common) to determine the prevalence and women's attitude towards this practice among women aged 15-49 years. The ten states of Southern Sudan were excluded from the collection of this data. The results indicate that the average FGM/C prevalence rate in the 15 states surveyed was 69.4 per cent, ranging from 39.8 per cent in West Darfur State to 83.9 per cent in River Nile State. The SHHS data indicated that on an average, 44.9 per cent women aged 15-49 years in these states believed that the practice of FGM/C should be continued. The percentage of women who believed that the practice of FGM/C should be continued was lowest in Khartoum State (26.9 per cent) and highest in North Darfur (62.9 per cent) followed by 61 per cent in South Darfur State. Among the ever-married women, 50.9 per cent of them believed that the practice of FGM/C should be continued. The percentage was lowest in Khartoum State (31.7 per cent) and highest in Kassala State (68.7 per cent). The SHHS results also indicated that on an average, 53.6 per cent ever married women aged 15-49 years in these states intended to circumcise their daughters. This percentage was lowest in Khartoum State (38.6) and highest in Kassala State (69).

I. Introduction

Country background

Sudan with an area of about 2.5 million kilometres is the largest country in Africa. It neighbours nine countries with wide open borders. The population in Sudan was estimated at 36 million in 2005 (projected from 1993 census). The majority of the population (72 per cent) lives in rural areas. Administratively, the country is governed by a decentralized federal system.

The country suffered from long and protracted standing civil conflicts. The signing of the Comprehensive Peace Agreement (CPA) by the Government of Sudan and the Sudan People's Liberation Movement (SPLM) on 9 January 2005 ended the last civil conflict in the South. However, significant political, economic and social challenges remain, including a successful resolution of the conflict in Darfur which started in 2003 and the smooth implementation of the East Sudan Peace Agreement (ESPA) signed in October 2006 which are considered central to improving the security, humanitarian situation, and the success of the recovery and development efforts in all parts of the country.

According to the Interim National Constitution (INC) and the Southern Sudan Interim Constitution (SSIC), the Government of Southern Sudan (GoSS) represents an autonomous level of governance between the ten Southern states under the GoSS and the GoNU.

Socioeconomic factors

Sudan is a low income country, which ranked 139 out of 177 countries based on Human Development Index (0.505) for the year 2005[1]; and according to Human Poverty Index (HPI), Sudan ranks 53rd among 88 developing countries. The incidence of poverty is high and there is considerable variation in poverty levels between and within states.

Economic activity is largely agricultural, which provides livelihood to 70 per cent of the population, contributing to 37 per cent of GDP and 15 per cent of total export earnings.

Civil war, political instability and natural disasters have characterized the life in Sudan and hampered economic progress. Since 1999, Sudan began to work with foreign partners to exploit its lucrative oil fields. This has improved the growth in national income to an average of 7 percent per annum and ultimately has resulted in steady growth of the economy. Oil production has become an important source of government revenues contributing about 50 per cent of 2005 budget.

Recent Developments in the Country

The signing of the CPA has provided unprecedented opportunities for development initiatives in the country. Concomitantly, with CPA there was a Joint Assessment Mission (JAM) to determine the developmental priorities to be addressed by the country and its donors. Based on available data, the JAM analyzed the massive scale of Sudan's deficits vis-à-vis the MDGs, highlighting the massive scale of the development challenge against selected goals. The process has resulted in a six-year "Framework for Sustained Peace, Development and Poverty Eradication in Sudan" which represents the national priorities in regard to the reconstruction and development requirements for poverty reduction and sustained human development towards achieving the MDGs. The

framework specifies strengthening of basic services as a priority, and includes the following strategic elements: strengthening decentralized governance and capacity building and institutional strengthening at all levels.

Both the GoNU and the GoSS are committed to a pro-poor development strategy. There are a number of national action plans aimed at promoting the well-being of children and women in Sudan; some already developed and others still in the process of being finalized. However, given the fact that Sudan has just emerged from decades of war, these national initiatives are by and large are neither holistic nor comprehensive, and moreover they lack the appropriate implementation plans' monitoring tools. Given the positive intentions of the Government in embarking on the formulation of policies and programmes that would have a positive impact on the situation of children and women in Sudan in particular, and on the achievement of the MDGs in general, the situation implies the need to determine a base line for monitoring the programme implementation process and progess towards achievement of the defined developmental goals and targets. The Sudan Household Survey represents the tool to make available the base line data required for the formulation and implementation of policies and programmes to improve the situation of children and women in Sudan.

Previous Surveys

Due to the lack of regular systematic comprehensive information system, Sudan has been conducting surveys to generate data on important important indicators for assessing progress towards developmental targets. These surveys have supplemented the data available from the population censuses and assisted in the evaluation of population and social service programmes. Most of the surveys were supported by regional or international agencies according to the area of interest of the agency concerned. Some of these surveys include the Demographic and Health Survey (DHS) carried out in 1989-90, a Maternal and Child Health survey which was conducted in Northern Sudan in 1993 (Sudan, Ministry of Health, 1994) under the Pan Arab Project on Child Development (PAPCHILD), a Maternal and Child Health survey which was conducted in Northern Sudan in 1993 (Sudan, Ministry of Health, 1994), Safe Motherhood Survey (SMS) of 1999, conducted by the Central Bureau of Statistics under the overall supervision of the Federal Ministry of Health. The latter one focused on the women and reproductive health and was supported by UNFPA. The SMS was followed by the Multiple-Indicator Cluster Survey (MICS) of 2000 was supported by the UNICEF and the World Bank and covering all northern states and selected urban areas of three states in Southern Sudan. The MICS 2000 was coupled by a survey supported by the UNICEF and conducted in Southern Sudan covering the areas controlled by the Sudan People's Liberation Movement (SPLM). Although these surveys have provided the country with some data on some key indicators, yet they were not nationwide and, therefore, the data generated through these surveys were not representative of Sudan as a whole. Thus, the Sudan Household Survey (SHHS) of 2006 has a unique character in covering the whole country and hence providing estimates on a large number of indicators on the situation of children and women at both the national and state levels.

Sudan Household Survey (SHHS)

This report is based on the Sudan Household Health Survey (SHHS), conducted in 2006. The survey was implemented by the Federal Ministry of Health (FMoH) and the Central Bureau of Statistics (CBS) representing the Government of National Unity (GoNU), and the Ministry of Health (MoH) together with the Southern Sudan Commission for Census, Statistics and Evaluation (SSCCSE), both representing the Government of Southern Sudan (GoSS). The survey was technically and financially supported by the United Nations Children's Fund (UNICEF), Pan Arab Project for Family Health (PAPFAM) of the League of Arab States (AL), the World Food

Programme (WFP), the United Nations Population Fund (UNFPA), the World Health Organization (WHO) and the United States Agency for International Development (USAID). So instead of having multiple surveys supported by single agency, the SHHS compiled the efforts of all agencies to conduct a unified survey that has met the interests of all stakeholders as its contents is a hybrid of family health survey of the Arab League, MICS, Food Security and Nutrition surveys. The planning and the implementation structures of SHHS i.e. Steering Committee, Technical Committee, Coordination Body and the Technical Working Group represented a wide group of ministries, institutions, agencies concerned to guarantee the best possible participatory process to guide the survey and ensure the quality of work.

The SHHS provides valuable information on the situation of household, children and women in Sudan. The survey was initiated, in large part, on the need to have a base line national data to monitor progress towards goals and targets emanating from national plans and international agreements: the MDGs, and the Plan of Action of A World Fit For Children (WFFC), the Arab World Fit for Children; the Arab charter for child rights; and the rest of the agreements committed by the country.

Data constraints in Sudan are severe, both in terms of quality and comprehensiveness. The SHHS is the first nationally representative survey in two decades covering key social development indicators. It is one of the first projects jointly implemented by the GoNU and GoSS following the CPA. The national and state-level data generated by the SHHS will help in assessing the current status of progress towards some of the key MDG goals and targets, assisting in monitoring of MDG commitments and in informed decision making, sound policy formulation and development planning required to accelerate progress towards the MDGs. They will also provide the key information required by the GoNU and GoSS for the preparation of the 2007 WFFC progress report and the 2007 MDG report.

Survey Objectives

The primary objectives of the 2006 Sudan Household Health Survey were:

To provide up-to-date information for assessing the situation of children and women in Sudan

To furnish data needed for monitoring progress toward goals established by the Millennium Development Goals, the goals of A World Fit For Children, Programme of Action adopted at the International Conference on Population and Development (ICPD), and other internationally agreed upon goals, as a basis for action.

To contribute to the improvement of data and monitoring systems in Sudan and to strengthen technical expertise in the design, implementation, and analysis of such systems.

To strengthen and build the institutional capacity of government partners for the upcoming 2008 Census and large scale surveys.

II. Sample and Survey Methodology

Sample design

The sample for the Sudan Household Health Survey (SHHS) was designed to provide estimates on some key indicators on the situation of children and women at the national level and for 25 states (Northern , River Nile, Red Sea, Kassala, Gedarif, Khartoum, Gezira, Sinnar, Blue Nile, White Nile, North Kordofan, South Kordofan, North Darfur, West Darfur, South Darfur, Jonglei, Upper Nile, Unity, Warap, Northern Bahr El Ghazal (NBG), Western Bahr El Ghazal (WBG), Lakes, Western Equatoria, Central Equatoria and East Equatoria) of Sudan. The target universe for the SHHS includes the households and members of individual households, including nomadic households camping at a location/place at the time of the survey. The population living in institutions and group quarters such as hospitals, military bases and prisons, were excluded from the sampling frame.

The states constituted the main sampling domains and in each state a two stage cluster sampling design was employed to draw the sample for the SHHS. The villages or quarters (in the case of urban areas) constituted the Primary Sampling Units (PSUs) for the SHHS. The PSU represented the smallest area or administrative unit which could be identified in the field with commonly recognised boundaries. The sampling frame for 12 states (Northern, River Nile, Red Sea, Kassala, Gedarif, Khartoum, Gezira, Sinnar, Blue Nile, White Nile, North Kordofan and South Kordofan) was compiled using the list of villages and quarters and estimated population updated by the Central Bureau of Statistics on the basis of the updated frame from the pre-census field operations for the year 2005. In the case of these 12 states the clusters were distributed to urban and rural areas, proportional to the size of urban and rural populations in these states. The urban and rural clusters in each of these states were selected randomly with probability of selection proportional to size. The sampling frames for three states of North Darfur, West Darfur and South Darfur and for all the ten states in Southern Sudan were compiled using the list of villages and estimated population developed by the Expanded Programme of Immunization (EPI) for the National Immunization Days (NIDs) campaign. In the case of these states, stratification on the urban and rural level was not done and the clusters were selected with probability proportional to size.

Sample size and Sample selection procedures

The sample size for the survey was determined by the accuracy and degree of precision required for the survey estimates for each state. It was judged that a minimum sample of 900 households would be necessary to make estimates results with some degree of precision at the state level. Allowing for some non-response in the survey, it was decided to take a sample of 1,000 households in each state. Since a similar level of precision was required for the survey results from each state, it was decided to draw 40 clusters from each state and 25 households from each cluster. The sampling frame of villages/quarters was compiled separately for each state based on the best available population measures. In cases where a selected village/quarter could not be reached because of security or access problems, it was replaced by a neighbouring village/quarter in the sampling frame. All selected clusters (villages/quarters) in each state were fully covered with the exception of only 12 clusters in two states in Southern Sudan (seven clusters in Upper Nile and five in Western Bahr El Gazal states) and two clusters in South Kordofan that had to be substituted due to insecurity influencing accessibility during the fieldwork period. After a household listing was carried out within the selected clusters, a sample of 25 households was drawn from each selected cluster using the method of systematic random sampling.

Sample weights and weighting procedures

Although each state sample can be considered as self-weighting, the total sample for Sudan was is not self-weighting since a fixed sample of households was drawn from each state, irrespective of its population size. Therefore, to derive estimates for Sudan as a whole it was necessary to assign a weight to each state-level sample. For reporting national level results, and to obtain unbiased estimates from the data, appropriate weights were applied to the sample data based on the probabilities of selection. Measures of sampling variability for key survey estimates were also calculated. Sample weights were calculated for each state-level sample and these were used in the subsequent analyses of the survey data. A detailed description of the weighting procedures is given in Appendix B.

Questionnaires

The survey tools consisted of five sets of questionnaires: 1) a ***Household questionnaire*** which was used to collect information on all *de jure* household members and the household; 2) a ***Women's questionnaire*** administered to all women aged 15-49 years in each household; and 3) an ***Under-5 questionnaire*** administered to mothers or caretakers of all children under 5 years of age living in the household; 4) ***Community Questionnaire***; and 5**) *Food Security Questionnaire***.

The first three questionnaires are based on the MICS3 and PAPFAM model questionnaires. A copy of the SHHS questionnaires is provided in Appendix F. The questionnaires included the following modules:

The ***Household Questionnaire*** included the following modules:

- Household information panel
- Household listing
- Education
- Female Genital Mutilation/Cutting (FGM/C) (used in 15 states, excluding all ten states in Southern Sudan)
- Prevalence of chronic diseases (used in 15 states, excluding all ten states in Southern Sudan)
- Water and sanitation
- Household characteristics
- Household income and resources
- Insecticide treated nets
- Salt iodization
- Maternal mortality (during the listing phase using a separate form for data collection)

The ***Questionnaire for Individual Women*** included the following modules:

- Women's information panel
- Live birth history/Child mortality
- Tetanus toxoid
- Maternal and newborn health
- Marriage and union
- Contraception
- Female Genital Mutilation/Cutting (FGM/C) (used in 15 states, excluding those in Southern Sudan)
- HIV/AIDS knowledge

The Questionnaire for Children under five years of age was administered to mothers of under-five children. In cases when the mother was not listed in the household list/roster, a primary caretaker

for the child was identified and interviewed. The ***Questionnaire for Children under Five*** included the following modules:

- Under-five children information panel
- Birth registration
- Vitamin A supplementation
- Breastfeeding
- Care of illness
- Immunization
- Malaria + source of supply of anti-malarial drugs
- Anthropometry

In addition to the administration of questionnaires, fieldwork teams tested the salt used for cooking in the households for iodine content, and measured the weights and heights of children under five years of age. Details and findings of these measurements are provided in the respective sections of the report.

The ***Community Questionnaire*** included the following modules:

- Demographics (Socio-economic classification)
- Access to services
- Seasonal calendar
- Food aid and priorities

The ***Food Security Questionnaire*** included the following modules:

- Household circumstances
- Household belongings and livestock
- Livelihoods and agricultural production
- Household expenditures
- Food consumption and sources
- Shocks and coping mechanisms
- Food aid

Training and Fieldwork

The questionnaires were pre-tested in November 2005 at the sites indicated below and modifications were made to the wording and translation of the questionnaires based on the results of the pre-test. The modified questionnaires were printed in January 2006.

Locations for pilot survey and pretesting of questionnaires in northern states included the following:

Althawra (alhara 7): Selected because it comprises of various ethnic groups with different socio-economic levels representing the majority of the population in the states in the northern, eastern and central parts of Sudan.
Umbadda Hamad Elneel (Almansoora): Represents the majority of the population from the western parts of Sud were an, including the internally displaced population (IDP).
Alsaroarab: Represents the rural population in northern states.

Locations for pilot survey and pre-testing of questionnaires in states in Southern Sudan were as follow:
Rumbek (Rumbek County and Rumbek East): Selected because of its accessibility and supervision given the fact that most of the SHHS activities were taking place at the SSCCSE office in Rumbek.

Baar Pakieng: Represents the population in the remote areas of Southern Sudan.

Training for the fieldwork was conducted for all the states involved in the SHHS during the month of February and March 2006, duration varying between 7-10 days. The training was conducted at three levels -- national, sub-national and state levels. To ensure consistency, the sub-national training sessions for all trainees in all states were conducted by the same trainers. The training included lectures and discussions relating to interviewing techniques and the contents of the questionnaires, supervision and monitoring of quality of data. Towards the end of the training period, trainees spent three days in the field to practice interviewing in selected states.

Field work began in March 2006 in 14 states, in April 2006 in one state, and from May to June 2006 in the remaining ten states. The average period taken to complete the field work in 25 states of Sudan was 31 days with a minimum duration of 25 days and a maximum duration of 43 days, mainly in those areas severely affected by conflict.

The data were collected by 112 teams in the 25 states of Sudan. This comprised of 4-6 teams for each of the ten states in Southern Sudan, and four teams per state for the remaining 15 states keeping in view the geographical accessibility and division. More than one third of the teams comprised of four interviewers, one driver, one editor/measurer and a supervisor while another one-third (for the states in Southern Sudan) did not have drivers due to lack of vehicles in these areas and fear of landmines in using vehicles. In all, the data collection involved 850 interviewers, and 110 team leaders and supervisors, and 40 national supervisors and leaders.

Data processing

Data entry and editing began simultaneously with data collection. Data entry took place in two locations – in Khartoum from March to May 2006, and in Rumbek from June to August 2006. Using CSPro software, the Khartoum team comprising 40 data entry operators, 6 data entry supervisors, 10 data editors and 6 programmers entered the data for the 15 northern states into 40 microcomputers. The Rumbek team comprising 26 data entry operators in two shifts (morning and afternoon shifts), 4 data entry supervisors, 7 data editors and 2 programmers entered the data for the ten southern states into 13 microcomputers. In order to ensure quality control, all questionnaires were double entered for the first six states that were completed (100 per cent double entry). This was followed by double entry of questionnaires from five clusters randomly selected from the remaining 19 states. Internal consistency checks were also performed. Procedures and standard programs developed under the global MICS3 project and PAPFAM and adapted to the Sudan questionnaire were used throughout. Data were analysed using the Statistical Package for Social Sciences (SPSS) software programme (Version 14), and the model syntax and tabulation plans developed by UNICEF, WHO, WFP, and Pan-Arab Project for Family Health(PAPFAM).

III. Sample Coverage and the Characteristics of Households and Respondents

Sample coverage

Of the 24,527 households selected for the sample, 24, 507 households were found to be occupied. Of these, 24,046 households were successfully interviewed for a household response rate of 98.1 percent. Of the 32,599 women (age 15-49 years) identified in the selected households, 26,923 were successfully interviewed, yielding a response rate of 82.6 percent. Of the 22,512 children under age five years listed in the households, questionnaires were completed for 19,870 children, which correspond to a response rate of 88.3 per cent. Overall response rates of 81 per cent and 86.6 per cent were calculated for the women's and under-5 children's interviews respectively (Table 3.1).

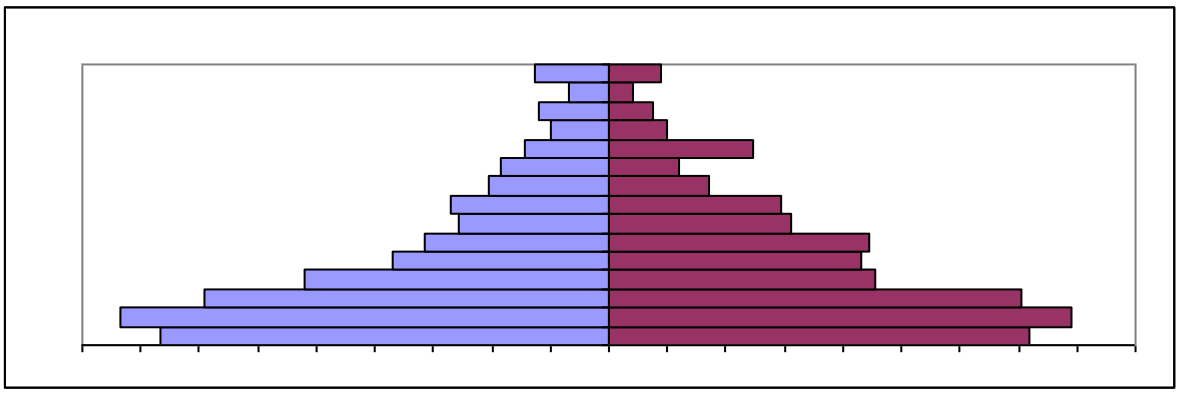
It is important to note that while the average response rate for households was 98.1 per cent, it ranged between 90 per cent in Western Equatoria State to 99.8 per cent in White Nile and Eastern Equatoria States. The women's overall response rate was highest in Gezira State at 98.3 per cent and the lowest in Western Bahr El Ghazal State at 54.4 per cent. The overall response rate for under-five children was highest in White Nile State at 99.5 per cent and the lowest in Northern Bahr El Ghazal State at 57.4 per cent. In some of the states in Southern Sudan, as indicated in Table HH.1, the overall response rate for women and under-five children was low. The overall response rate for women's questionnaire was less than 60 per cent in four states in Southern Sudan. This is due to several reasons that include the challenging situation imposed by the long decades of civil war, overburdening of women in households, and survey fatigue. For example, a significant proportion of eligible women, mothers and caretakers of children under five in these states were either too tired to complete the questionnaires or busy looking for food and wood for cooking, fetching water from a borehole, taking a sick child/children to a distant health facility, or simply just tired of participating in surveys.

Characteristics of household Population

Household population distribution by age and by sex: The age and sex distribution of survey population is provided in Table3.2. The distribution is also used to produce the population pyramid shown in Figure 3.1.

Of the 146,723 household members listed in the 24,046 households successfully interviewed in the survey, 73,394 were males and 73,329 were females. Based on these figures the average household size was estimated at 6.1.

The total population in Sudan was estimated at 40,169,996 (Male: 20,052,504; Female: 20,117,491). The total population in the age group 0-14 years (below age 15) was estimated at 18,080,477 (Male: 9,175,363; Female: 8,905,114), constituting 45 per cent of the total estimated population. The total population in the age group 0-17 years was estimated at 20,448,403 (Male: 10,498,038; Female: 9,950,365), constituting 50.9 per cent of the total population. The population aged 18 years and above constituted 49.1 per cent of the total population. The proportion of under-five children in the total population was estimated at 14.8 per cent, the sex ratio being 941 females for 1,000 males.



Household composition

Table 3.3 provides basic background information on the households. These background haracteristics are used in subsequent tables in this report; the figures in the table are also intended to show the numbers of observations by major categories of analysis in the report.

About 87.8 per cent of the households had at least one child under 18, while 57.9 per cent had at least one child under five, and 90.3 per cent had at least one eligible woman in the age group 15-49 years. The households with 4-5 members constituted the largest proportion (28 per cent) of the total number of households while households with only one member constituted the least proportion (1.2 per cent) of all households. The majority of households (81.5 per cent) were headed by a male.

Table 3.4 provides information on the background characteristics of female respondents 15-49 years of age. The table includes information on the distribution of women according to their state of residence, age, marital status, motherhood status, education[2], and wealth index quintiles[3]. In addition to providing useful information on the background characteristics of women, the table is also intended to show the numbers of observations in each background category. These categories are used in the subsequent tabulations of this report.

Women in the age group 15-49 constituted about 22.3 per cent of the estimated total population. Women in the age group 25-29 years constituted the largest proportion (21.1 per cent) of the total number of women while the lowest proportion of women was in the age group 45-49 years (5.5 per cent). About 65.5 per cent of the women aged 15-49 years were currently married/in union and 28.6 per cent were formerly married/in union while never married/in union women constituted 5.9 per cent. Approximately two-thirds (64.4 per cent) of the women had given birth to a child before while 35.6 per cent never gave birth to a child. Women with no formal education made up 49.8 per cent of the total women while 41.2 per cent had primary education and 8.9 per

cent had secondary or higher education. The wealth index quintiles show that about 17.7 per cent of women belonged to the poorest households while women from the richest households constituted about 23.5 per cent.

Table 3.5 provide information on the background characteristics of children under the age of 5 years. These include distribution of children by several attributes: sex, state of residence, age in months, mother's or caretaker's education, and wealth index quintiles.

Children under the age of five years constituted about 14.8 per cent of the total estimated population. Under-five children of mothers with no formal education constituted 62.3 per cent, while 24 per cent of under-five children had mothers with primary education and 12.1 per cent had mothers with secondary or higher education. The data relating to the wealth index quintiles

showed that about 21.2 per cent of under-five children belonged to the poorest households while children from the richest households constituted about 14.2 per cent.

Children in the age group 24-35 months and 36-47 months constitute the largest proportion (21.5 per cent each) of the total number of under-five children. About 10.4 per cent of the children belong to the age group 6-11 months while children aged 0-5 months (below 6 months of age) constitute about 11.3 per cent of the total population of under-five children.

IV. Water and Sanitation

Water and sanitation

Safe drinking water is a basic necessity for good health. Unsafe drinking water can be a significant carrier of diseases such as trachoma, cholera, typhoid, and schistosomiasis. Drinking water can also be tainted with chemical, physical and radiological contaminants with harmful effects on human health. In addition to its association with disease, access to drinking water is often an important issue for women and children, especially those in rural areas, who bear the primary responsibility for bringing water, often from long distances.

The Millennium Development Goal (MDG) is to reduce by half, between 1990 and 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation. The World Fit for Children goal calls for reduction by at least one-third in the proportion of households without access to hygienic sanitation facilities and affordable and safe drinking water.

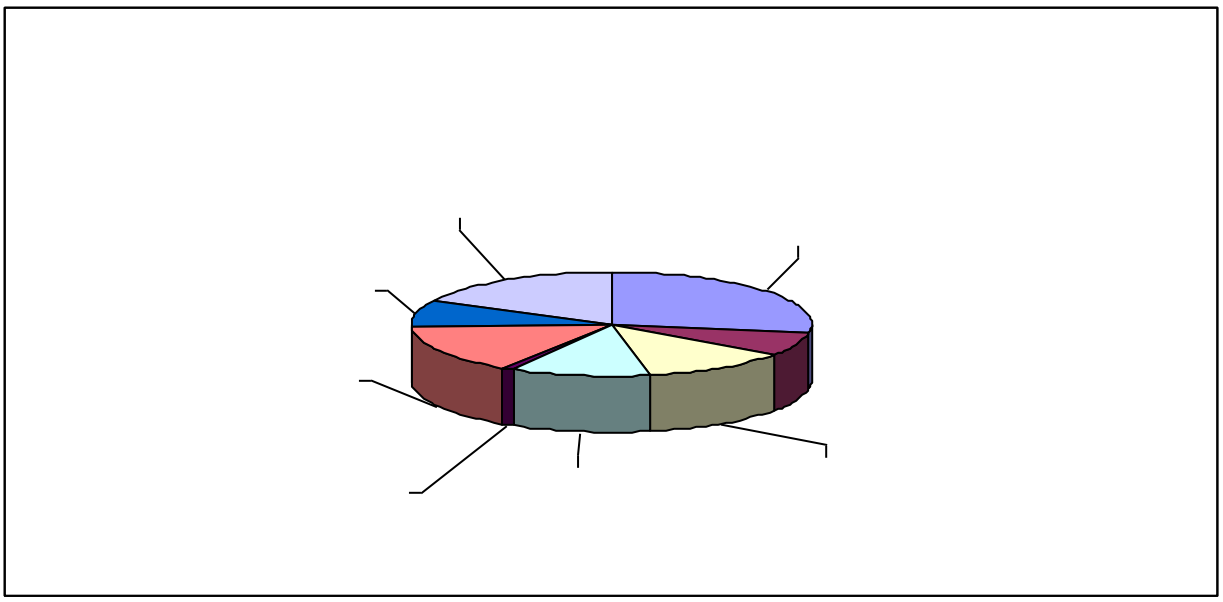
The list of indicators used in the Sudan Household Health Survey (SHHS) is as follows:

- Use of improved drinking water sources: Proportion of household members living in households using improved sources of drinking water, i.e., piped water into dwelling/yard or plot, public tap/standpipe, tube well/borehole, protected well, protected spring, and rainwater collection
- Appropriate water treatment : Proportion of household members living in households using drinking water that has been treated;
- Mean time to drinking water source: Average time taken (in minutes) by all households to go to source of drinking water, collect water and return to house, i.e., average time taken by households which have drinking water source on premises, and by households which take less than 15 minutes, 15 minutes to less than 30 minutes, 30 minutes to less than 1 hour or 1 hour or more to go to source of drinking water, collect water and return ;
- Use of sanitary means of excreta disposal: Proportion of household members using improved sanitation facilities, i.e.,toilet connected to sewage system, any other flush toilet, improved pit latrine, traditional pit latrine);
- Use of both improved drinking water sources and sanitary means of excreta disposal: Proportion of household members living in households using both improved drinking water sources and sanitary means of excreta disposal

Sources of drinking water

The distribution of the household members by source of drinking water is shown in Table 4.1 and Figure 4.1. Improved sources of drinking water are any of the following types of supply: piped water into dwelling/yard or plot, public tap/standpipe, tube well/borehole, protected well, protected spring, and rainwater collection. However, for the states in Southern Sudan piped water is not considered as water from an improved source, since in most cases the water is piped directly from river or pond without being treated to make it safe to drink. Bottled water is considered an improved water source only if the household is using an improved water source for other purposes, such as hand-washing and cooking. Water sources such as unprotected well, unprotected spring, tanker truck, cart with tank/drum and surface water are considered as unimproved sources of drinking water.

About 8.7 per cent of the overall household members used drinking water that was piped into dwelling and 19 per cent used drinking water that was piped into their yard or plot. In all more than a quarter (27.7 per cent) of the household members used drinking water that was piped into dwelling. Other improved sources of drinking water used by the household members include tubewell/borehole (11.8 per cent), protected well and spring (9.9 per cent) and public tap/stand pipe (6.8 per cent). The main sources of unimproved sources of water used by the household members include unprotected well and spring (22 per cent), tanker truck and cart with tank/drum (10.7 per cent), surface water (4.4 per cent) and other unimproved sources (6.4 per cent).

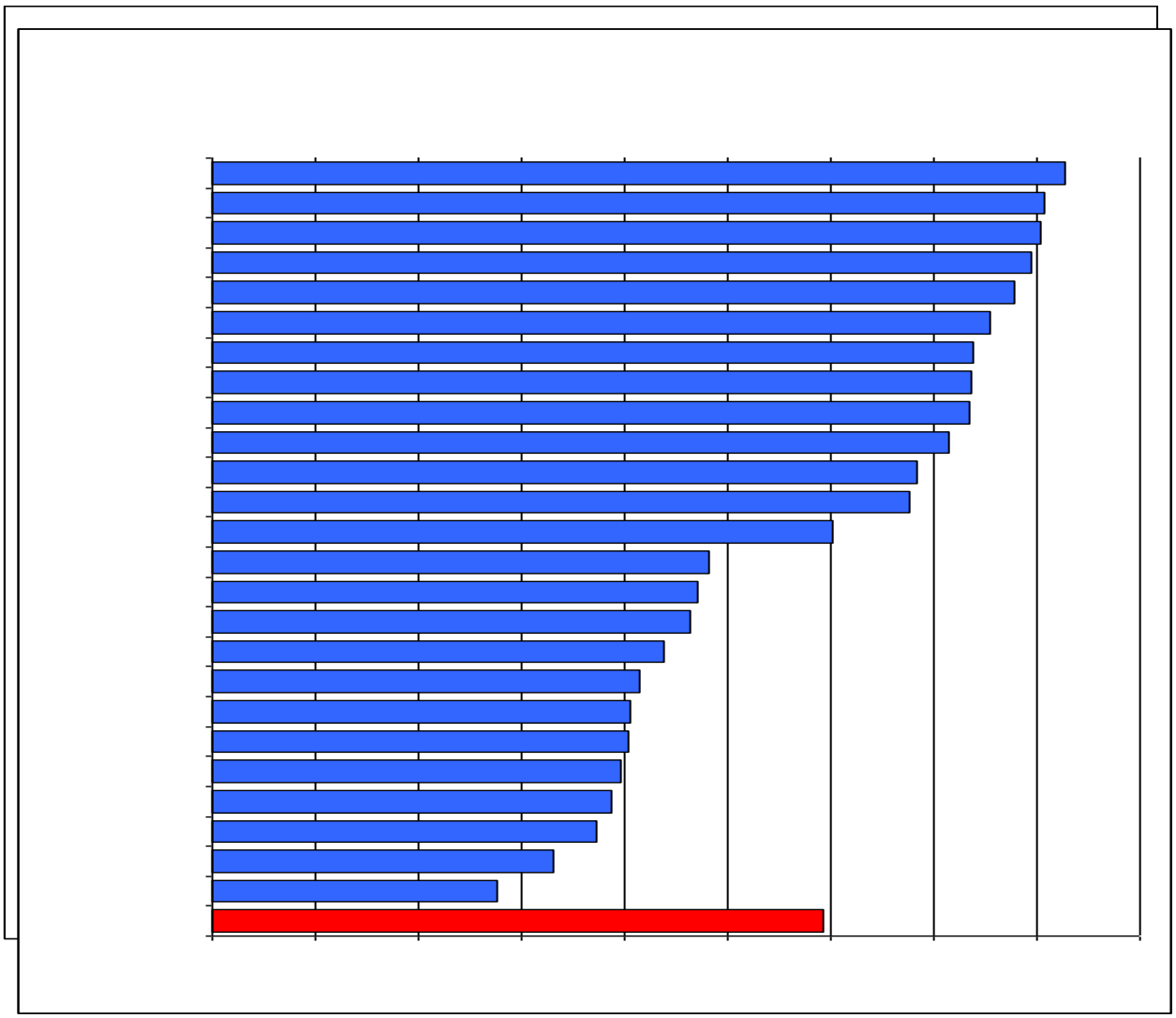


The source of drinking water used by the household members varies widely by state (Table 4.1). More than three out of four household members in Khartoum State and about two-thirds of household members in Northern, River Nile, and Gezira states use drinking water that is piped into their dwelling or into their yard or plot. About four out of ten household members in Sinnar and about one-third of household members in Kassala and White Nile states use drinking water that is piped into their dwelling or into their yard or plot. Public tap/stand-pipe is a main source of drinking water in states like North Kordofan, West Darfur, and South Darfur. Tubewell/borehole is the main source of drinking water in nine out of ten states in Southern Sudan, while protected well is a major source of drinking water in Sinnar, Blue Nile, South Kordofan, North Darfur, West Darfur, and South Darfur.

Use of improved sources of drinking water

An average of 56.1 per cent of the household members were found to be using an improved source of drinking water (i.e., piped water into dwelling/yard or plot, public tap/standpipe, tube well/borehole, protected well, protected spring, and rainwater collection) at the time of the survey, ranging from 80.7 per cent in Sinnar to 22.2 in Jonglei State (Table 4.1 and figure 4.2).

The percentage of household members using improved drinking water sources increases with the educational level of the household head, being 72.2 per cent in the case of household head with secondary and higher education, 59.6 per cent in the case of those with primary education as compared to 49.4 per cent in the case of those with no education. The percentage of household members using improved drinking water sources also increases with the economic level of the household, being 87.1 per cent in the case of the richest households as compared to 48 per cent in the case of the poorest households.



Household water treatment

Use of in-house water treatment is presented in Table 4.2. Household members were asked how they treated water at home to make it safer to drink; boiling, adding bleach or chlorine, using a water filter, and using solar disinfection were considered as proper treatment of drinking water. The table shows the percentages of household members using appropriate water treatment methods, separately for all households, for households using improved and unimproved drinking water sources.

Only 4.5 per cent of household members apply an appropriate water treatment method in the case of all drinking water sources (i.e. both improved and unimproved drinking water sources). Nationwide, the percentage of household members applying an appropriate water treatment method in the case of improved drinking water sources and unimproved drinking water sources respectively were only 4.1 and 5. The percentage of households applying water treatment methods in the case of all drinking water sources were found to be relatively higher in Western Bahr El Ghazal (37.5 per cent), Western Equatoria (30.4 per cent), Central Equatoria (20.2 per cent) and Northern Bahr El Ghazal (16.5 per cent) as compared to other states.

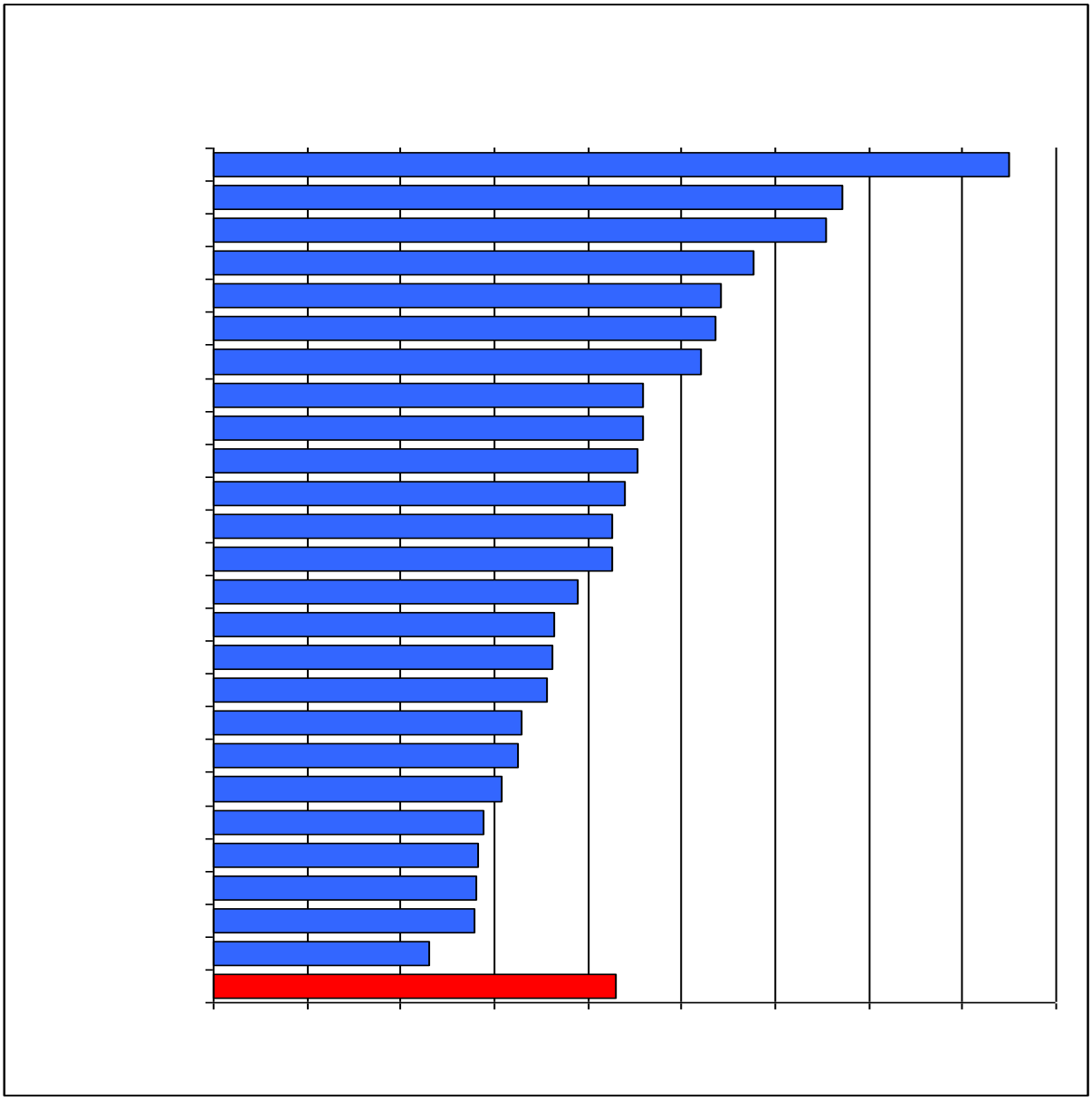
Time to source of water

The amount of time it takes to obtain water is presented in Table . These results refer to one roundtrip from home to drinking water source and back. The findings indicate that about 30.1 per cent of households had a drinking water source on the premises. For about 16.4 per cent of all households, it takes less than 15 minutes to get to the source of drinking water, get water and return to their houses. For about 13.8 per cent of all households it takes 15 minutes to less than 30 minutes to reach the source of drinking water, collect water and return, while 18.2 per cent of households spend between 30 and 60 minutes for this purpose, and about 17 per cent spend more than one hour to get to the water source and return to the household. Excluding those households with a drinking water source on the premises, the average time to go to the source of drinking water, get water and return to their house is about 42.9 minutes.

The states where more than one-fourth of households take more than one hour or more to go to source of drinking water, collect water and return to the house include Kassala (38 per cent),

Jonglei (27.3 per cent), Lakes (35.3 per cent), Western Equatoria (40.2 per cent) and Central Equatoria (40.6 per cent).

One striking finding is the high average time spent by the households in Red Sea (84.9 minutes), Kassala (67.1 minutes), and White Nile (65.4 minutes) to get to the drinking water source, collect water and return to the house (Figure 4.3)



Person collecting water

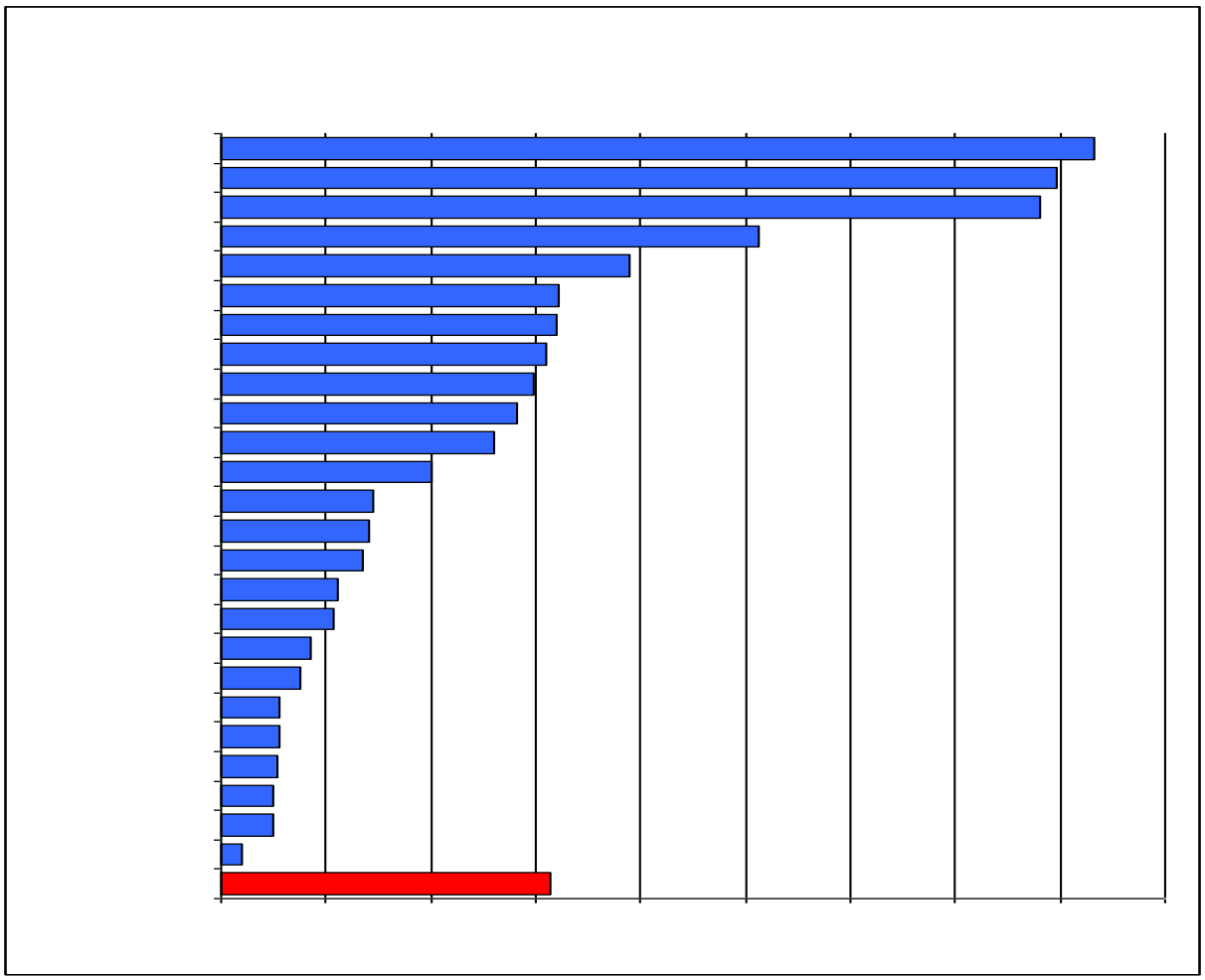
Table shows the person usually collects the water when the source of drinking water is not on the premises. In the majority of households, this is usually an adult woman (59.1 per cent). Adult men collect water in only 21.5 per cent of the households, while children under age 15 years do the job in about 15.3 per cent of the households.

Use of sanitary means of excreta disposal

Inadequate disposal of human excreta and personal hygiene is associated with a range of diseases including diarrhoeal diseases and polio. Improved sanitation facilities for excreta disposal include: flush or pour flush to a piped sewer system, septic tank, or latrine; ventilated improved pit latrine, pit latrine with slab, and composting toilet.

Table 4.5 shows that approximately one-third (31.4 per cent) of the household members use improved sanitation. The proportion of household members using improved sanitation facilities was highest in River Nile State (83.2 percent) and the lowest in Warap State (1.9 percent) (Figure 34, WS 4).

Table 4.5 also shows that a large proportion of the household members (22.3 per cent) use mostly pit latrines without slab, i.e. open pit: the states where more than one-third of the household members use this type of means of excreta disposal (i.e pit latrines without slab/open pit) include Gezira (38.9 per cent), Blue Nile (57.5 per cent), North Kordofan (35.9 per cent), North Darfur (38.3 per cent), South Darfur (42 per cent), Western Equatoria (44.4 per cent) and Central Equatoria (34.5 per cent). Nationwide, about 42.9 per cent of the households have no sanitation facilities. The proportion of household members who had no sanitary means of execrita disposal was highest in Warap State (96.8 percent) and the lowest in Khartoum State (3.1 percent)



The percentage of household members using sanitary means of excreta disposal seems to increase with the educational level of the household head, being 17.4 per cent in the case of household head with no education, 39.3 per cent in the case of those with primary education as compared to 60.4 per cent in the case of household head with secondary or higher education. The percentage of household members using sanitary means of excreta disposal also seems to increase with the

economic level of the household, being 79.1 per cent in the case of the richest households as compared to only 3.4 per cent in the case of the poorest households.

Use of improved water sources and improved sanitation facilities

Nationwide only 23.8 per cent of household members use both an improved sources of drinking water and sanitation facility, ranging from over 60 per cent in three states - Northern (68.3 per cent), River Nile (62.9 per cent) and Khartoum (65.5 per cent)—to less than 10 per cent in 13 states (Table 4.6). The proportion of household members uses both an improved sources of drinking water and sanitation facility was highest in Northern State (68.3 per cent) and the lowest in Jonglei State (1.4 per cent).

The percentage of household members using both an improved sources of drinking water and sanitation facility seems to have a link with the educational level of the household head, being 49.5 per cent in the case of household head with secondary or higher education, 29.6 per cent in the case of those with primary education as compared to 11.8 per cent in the case of those with no education. The wealth index of the household also seems to have an impact on the use of both the

improved drinking water sources and improved sanitation facilities by household members. The percentage of household members using both an improved drinking water source and sanitary facility was only 2.1 per cent in the case of the poorest households compared to 69.6 per cent in the case of the richest households

V. Child Mortality

One of the overarching Millennium Development Goals (MDGs) is to reduce under-five mortality rate by two thirds between 1990 and 2015. The World Fit for Children (WFFC) target seeks to achieve reduction in the infant and under-five mortality rate by at least one-third during the period 2000-2010, in pursuit of the goal of reducing it by two thirds by 2015. Monitoring progress towards this goal is an important objective.

Using the SHHS data, attempt was made to derive the following estimates of mortality in the five years preceding the survey using the direct estimation method.

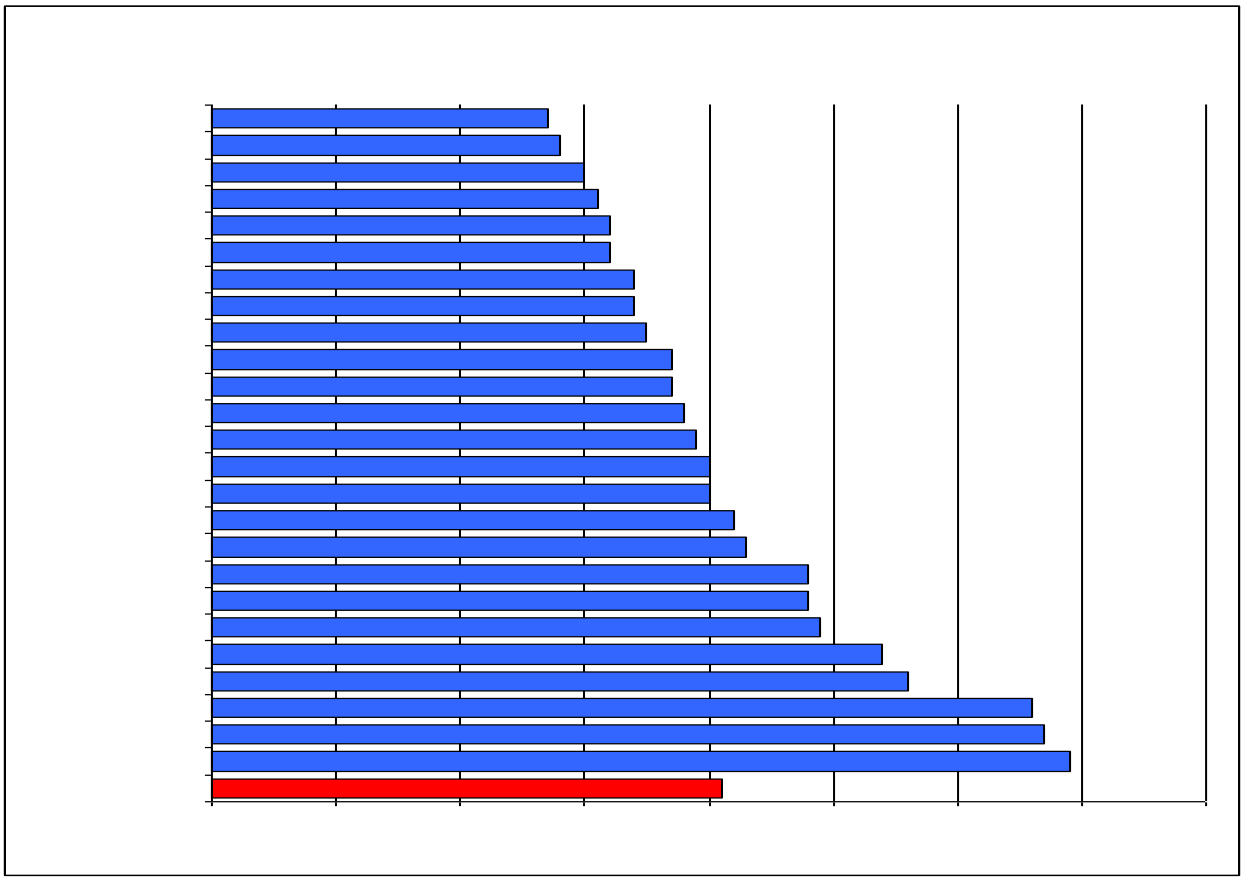
Neonatal mortality rate: Probability of infants dying during the first 28 completed days of life, per 1,000 live births;
Post neo-natal mortality rate: Probability of infants dying between one month and exactly one year of age, per 1,000 live births;
Infant mortality rate: Probability of dying between birth and exactly one year of age, per 1,000 live births;
Child mortality rate: Probability of dying between the first and fifth birth days, per 1,000 live births;
Under-five mortality rate: Probability of dying between birth and exactly five years of age, per 1,000 live births.

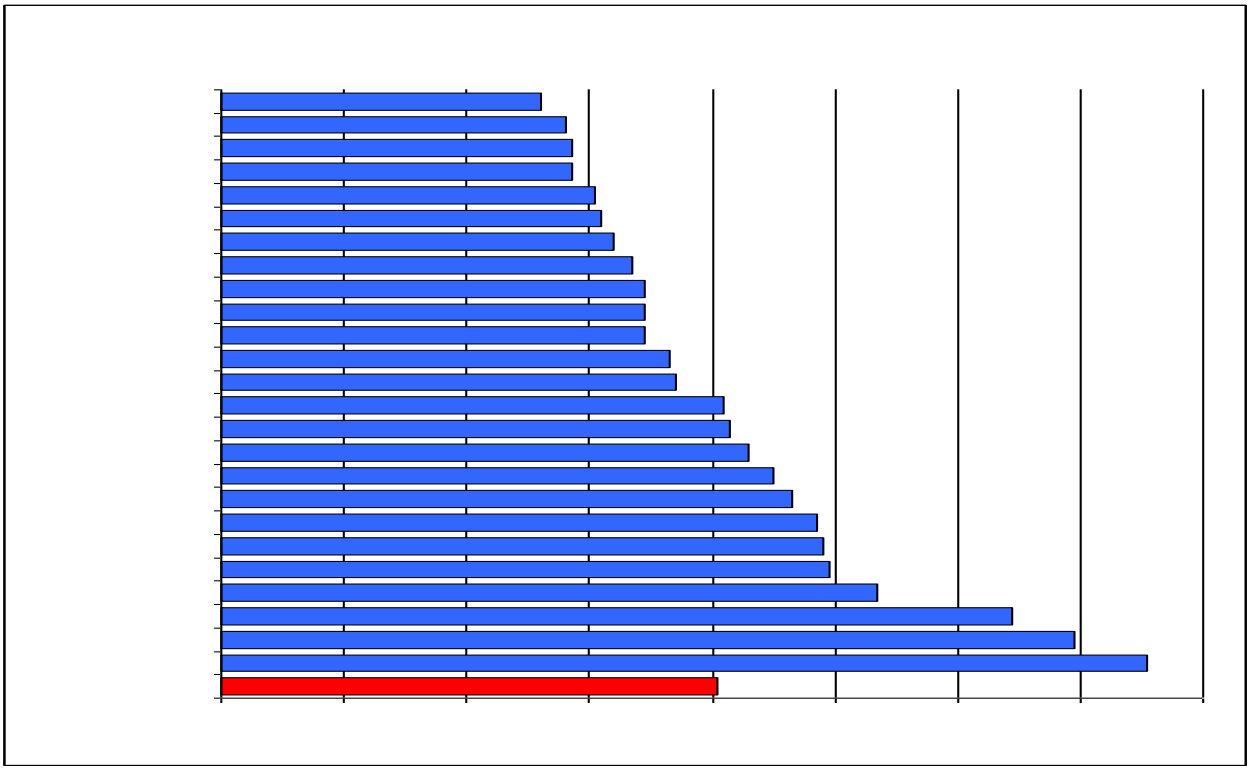
Table 5.1 provides the estimates of neonatal, post neonatal, infant, child and under-five mortality rates in the five years preceding the survey using the direct estimation method.

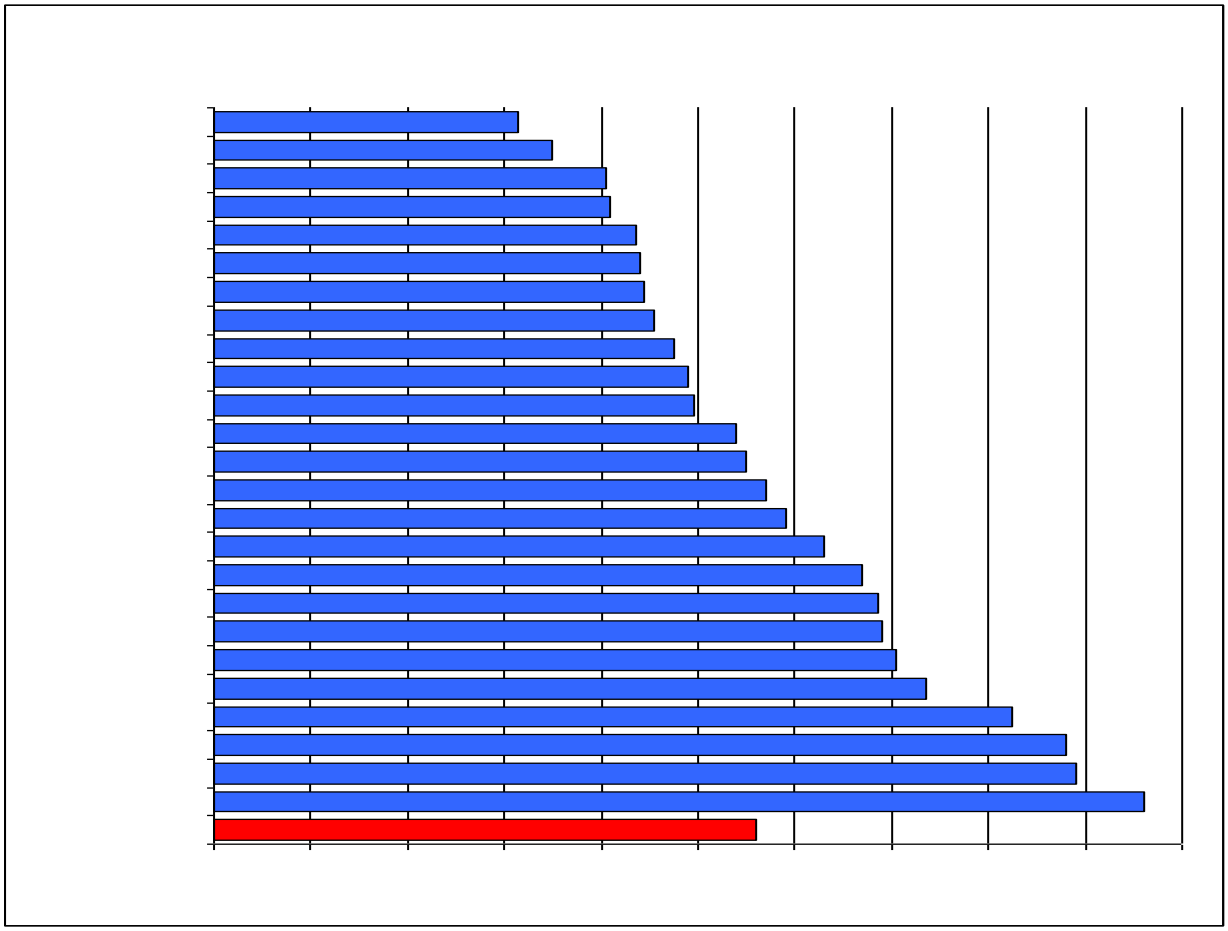
The neonatal mortality rate (NMR) was estimated at 41 per 1,000 live births.

Some difference between the probabilities of dying among males and females after the first month of life was noticed. The IMR for males was estimated at 78 as compared to 84 for females. The U5MR was also higher for females (119) than for males (106).

Table 5.1 also provides estimates of neonatal, infant and under-five mortality rates by state. The estimates of neonatal, infant and under-5 mortality rates were lowest in Gezira State (NMR: 27; IMR: 52; U5MR: 63) and highest in Western Equatoria State (NMR: 69; IMR: 151; U5MR: 192). Ten of the states had NMR higher than that of the national average (Figure 5.1) where as 12 States had the IMR and the U5MR higher than that of the national average (Figures 5.2 and Figures 5.3).







VI. Nutrition

Children's nutritional status is a reflection of their overall health. When children have access to an adequate food supply, are not exposed to repeated illness, and are well cared for, they reach their growth potential and are considered well nourished.

Malnutrition is associated with more than half of all child deaths worldwide. Undernourished children are more likely to die from common childhood ailments, and those who survive, suffer recurring sicknesses and faltering growth. Three-quarters of the children who die from causes related to malnutrition were only mildly or moderately malnourished – showing no outward sign of their vulnerability. The Millennium Development Goal (MDG) target is to reduce by half the proportion of people who suffer from hunger between 1990 and 2015. The World Fit for Children goal is to reduce the prevalence of malnutrition among children under five years of age by at least one-third (between 2000 and 2010), with special attention to children under 2 years of age. A reduction in the prevalence of malnutrition will assist in the goal to reduce child mortality.

In a well-nourished population, there is a reference distribution of height and weight for children under the age of five years. Under-nourishment in a population can be gauged by comparing children to a reference population. The reference population used in this report is the World Health Organisation (WHO)/the U.S. Center for Disease Control (CDC)/the U.S. National Center for Health Statistics (NCHS) reference: New WHO growth standards were made available in April 2006 and syntax programmes were produced to facilitate the calculation of anthropometry data based on these new growth standards. The key measures used to assess the nutritional status of children include weight-for-age, height-for-age and weight-for-height. Each of the three nutritional status indicators (underweight prevalence, stunting prevalence and wasting prevalence) can be expressed in standard deviation units (z-scores) from the median of the reference population.

Weight-for-age is a measure of both acute and chronic malnutrition. Children whose weight-for-age is more than two standard deviations below the median of the reference population are considered *moderately or severely underweight* while those whose weight-for-age is more than three standard deviations below the median are classified as *severely underweight.*

Height-for-age is a measure of linear growth. Children whose height-for-age is more than two standard deviations below the median of the reference population are considered short for their age and are classified as *moderately or severely stunted.* Those whose height-for-age is more than three standard deviations below the median are classified as *severely stunted.* Stunting is a reflection of chronic malnutrition as a result of failure to receive adequate nutrition over a long period and recurrent or chronic illness.

Weight-for-height is a measure of acute malnutrition, which is the generally accepted standard measure for assessing the severity of malnutrition in a population. Children whose weight-for-height is more than two standard deviations below the median of the reference population are classified as *moderately or severely wasted,* while those who fall more than three standard deviations below the median are *severely wasted*. Wasting is usually the result of a recent nutritional deficiency. The indicator may exhibit significant seasonal shifts associated with changes in the availability of food or disease prevalence. Children whose weight-for-height is more than two standard deviations above the median of the reference population are classified as *overweight*.

The key nutrition status indicators used in the SHHS include the following:

Underweight prevalence: Proportion of children under age five who fall below minus 2 (moderate and severe) and below minus 3 (severe) standard deviations from median weight for age of the NCHS/WHO reference population;

Stunting prevalence: Proportion of children under age five who fall below minus 2 (moderate and severe) and below minus 3 (severe) standard deviations from median height for age of the NCHS/WHO reference population; and

Wasting prevalence: Proportion of children under age five who fall below minus 2 (moderate and severe) and below minus 3 (severe) standard deviations from median weight for height of the NCHS/WHO reference population.

In the SHHS, weights and heights of children under 5 years of age in the selected households were measured using standard anthropometric equipment according to international procedures**.** Findings in this section are based on the results of these measurements.

During the data entry/analysis, it was found that out of a total of 22,512 children investigated, 74.9 per cent of the cases had no missing values for age, weight or height. In other words, about three-quarters of the cases had coherent/appropriate values. Out of the remaining cases, 2,642 had missing data for age or had an age whose value was outside the range of 0-59 months and 5,001 had missing data for weight while 5,307 had missing data for height. The missing data varied according to location. Missing data were imputed according to accepted linear regression models. In the end, records of some children (5.3 per cent of the 22,512 children) who were not measured and those children whose measurements were still outside of a plausible range (11.4 per cent of th cases) were excluded. Thus, in all, 16.7 per cent of the cases were excluded from analysis.

Child malnutrition

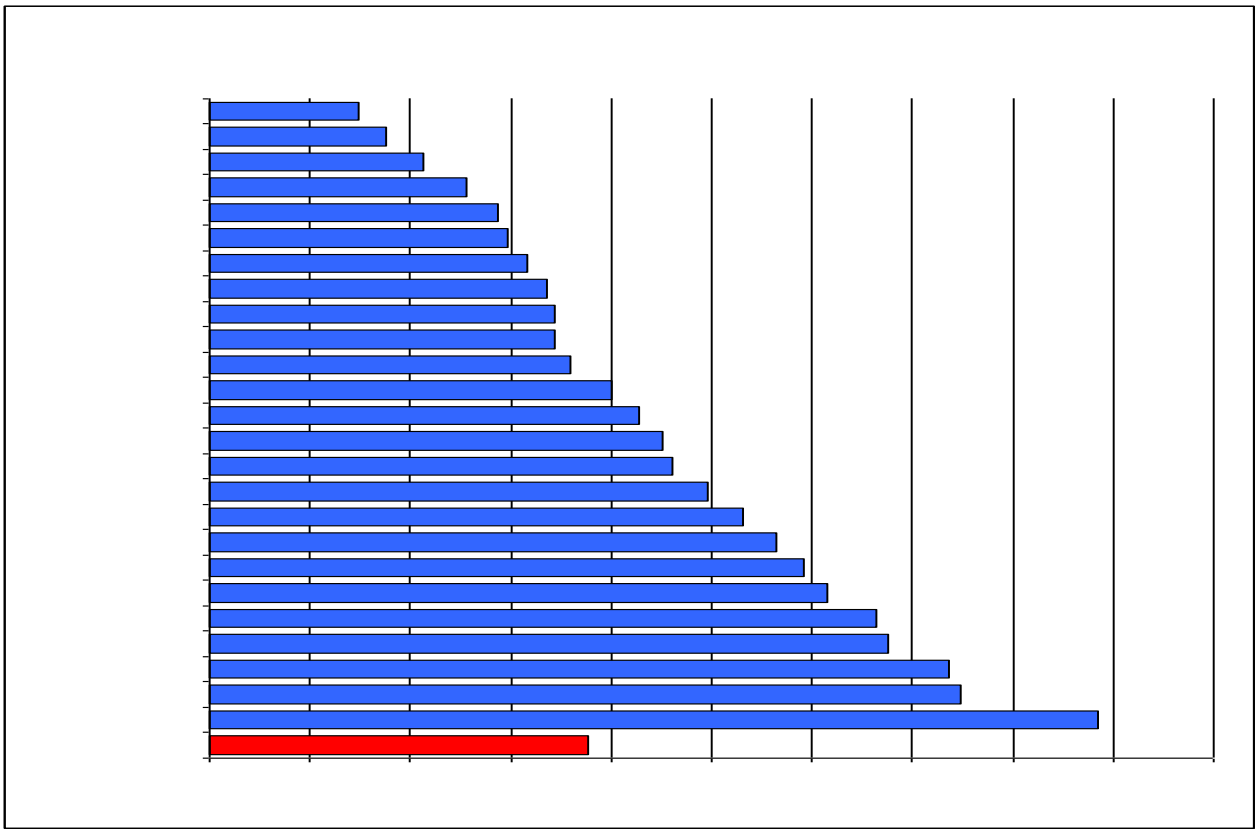
Table 6.1 shows the percentage of children aged 0-59 months who were moderately or severely malnourished at the time of survey. It presents the underweight, stunting and wasting prevalence rates among under-five children, based on the anthropometric measurements that were taken during field work. Additionally, the table includes the percentage of children who were found to be overweight.

Underweight prevalence

Approximately one-third (31 per cent) of children under age five in Sudan were found to be moderately underweight while 9.4 per cent were severely underweight (Table 6.1). There is only a slight difference in terms of those who were moderately underweight among boys (31.7 per cent) and girls (30.3 per cent). Similarly, there is only a marginal difference between boys (9.7 per cent) and girls (9 per cent) in terms of those who were severely underweight. The percentage of children classified as moderately or severely underweight decreases with increasing levels of education of the mother. For example, the percentage of severely underweight children was 11.7 for children of mothers with no education, 6.4 for children of mothers with primary education, and 4.1 among

children of mothers with secondary or higher education. The nutritional status of children also appears to be positively related to economic status of the households. The percentage of children who are classified as severely underweight decreases with increasing economic level (wealth index) of the household. The underweight prevalence among children belonging to the richest households was found to be the lowest (3.4 per cent) compared to children from the poorest households (14.3 per cent).

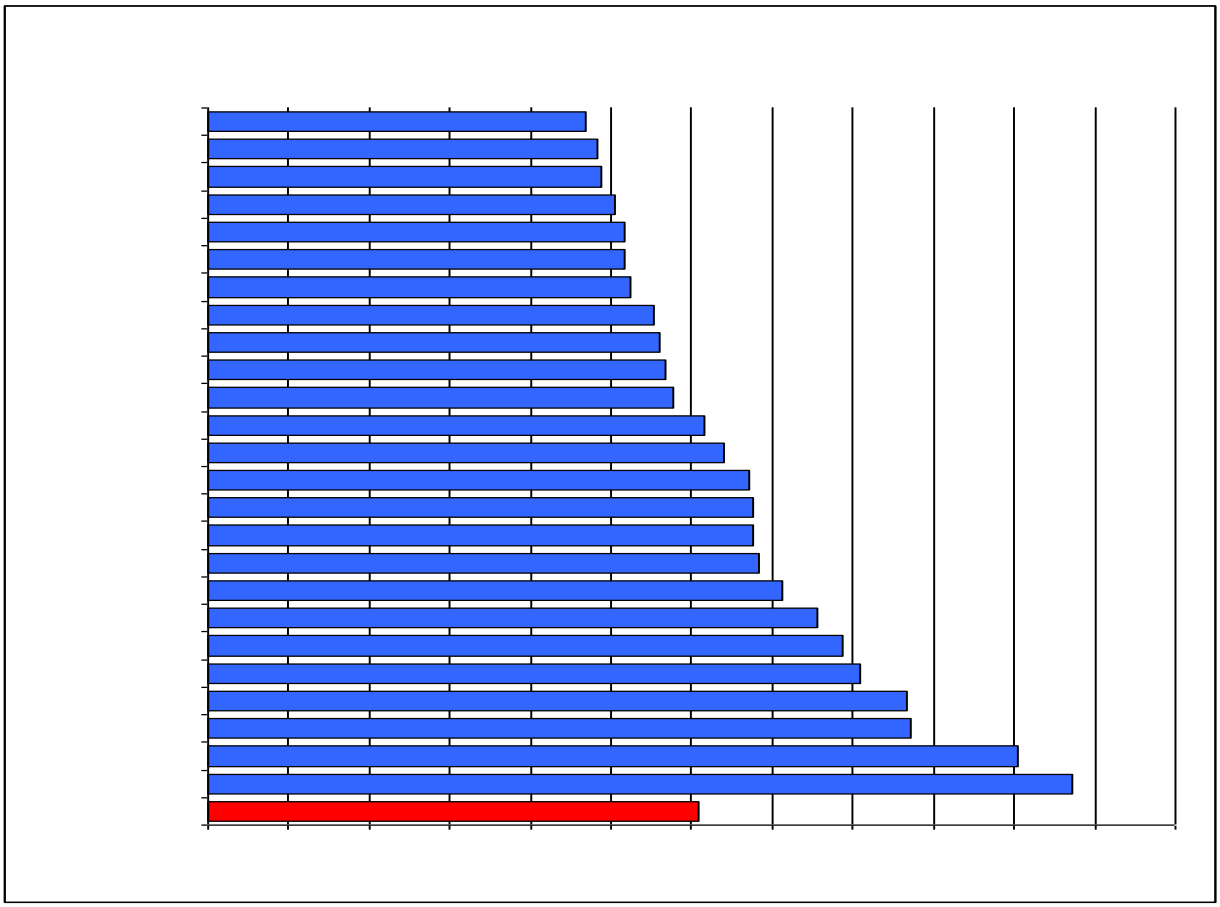
The proportion of children who were severely underweight was highest in Unity State (22.1 per cent) and the lowest in Khartoum (3.5 per cent) (Table 6. 1 and Figure 6.1).



Stunting prevalence

Almost one-third of children under five (32.5 per cent) were moderately stunted (too short for their age) and 15.2 per cent were severely stunted, or in other words chronically malnourished. The difference in stunting prevalence between boys and girls is greater in terms of moderate stunting (33.7 per cent of boys versus 31.2 per cent of girls) compared to severe stunting (15.4 per cent of boys and 14.9 per cent of girls). The percentage of children classified as severely stunted was found to decrease when they had more educated mothers. The percentage of severely stunted children was 17.9 per cent for children of mothers with no education as compared to 12 per cent among children of mothers with primary education, and 8.5 per cent among children of mothers with secondary or higher education. Children belonging to the richest households were the least stunted (8.2 per cent) compared to children from the poorest households (18.2 per cent).

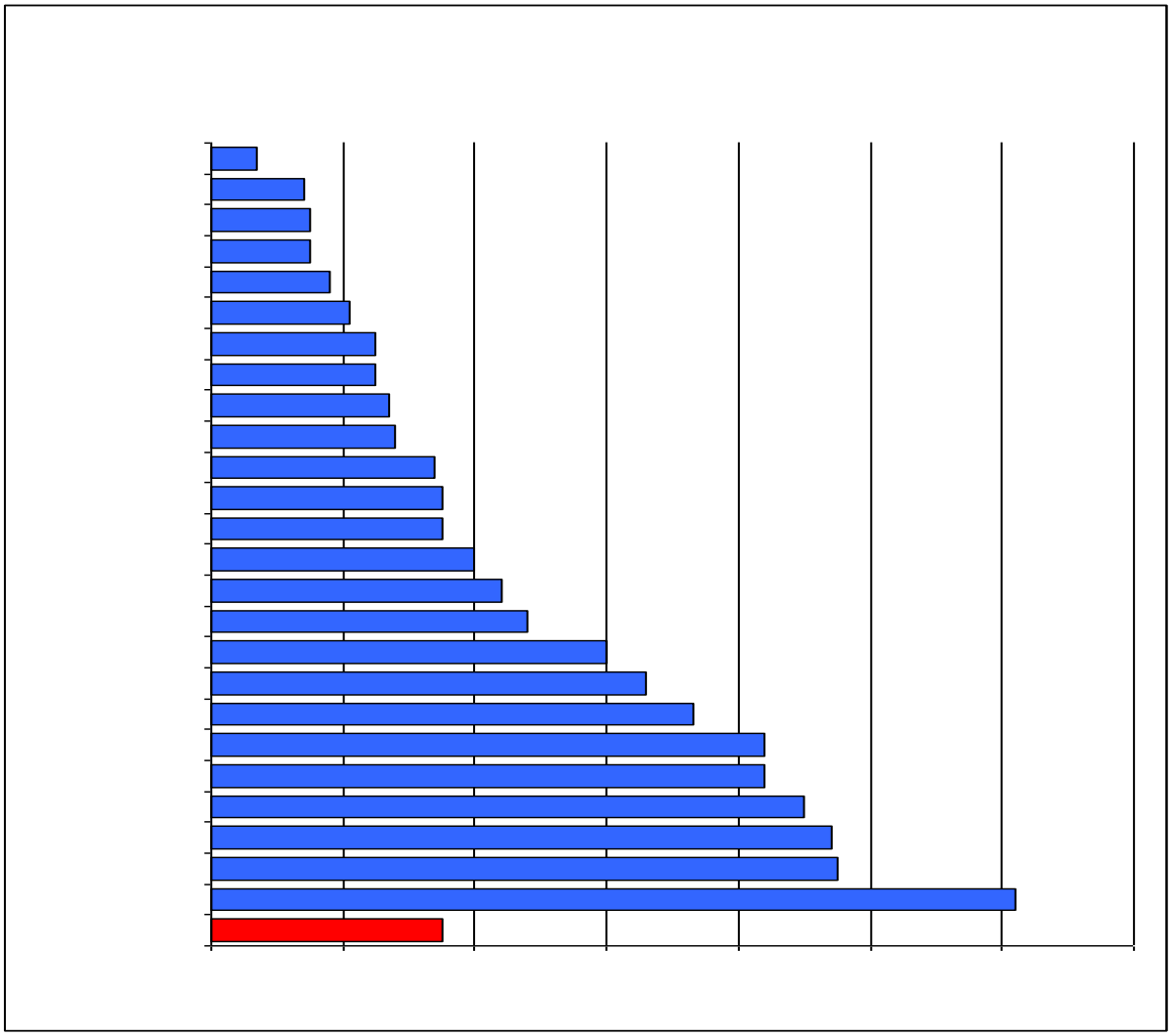
The highest proportion of children who were severely stunted was in Unity State (26.8 per cent) and the lowest in Khartoum State (11.7 per cent) (Table 6.1 and Figure 6.2).



Wasting prevalence

Approximately one out of seven under-five children (14.8 per cent) in Sudan were found to be moderately wasted or too thin for their height while 3.5 per cent were severely wasted (Table 6.1). Wasting is usually the result of a recent nutritional deficiency related to, for example, recent illness or inadequate dietry intake. The prevalence estimate may exhibit significant seasonal shifts associated with changes in the availability of food or disease prevalence. The difference in wasting prevalence between boys and girls was greater in terms of moderate wasting (15.4 per cent of boys versus 14.1 per cent of girls) compared to severe wasting (3.6 per cent of boys versus 3.4 per cent of girls). The percentage of severely wasted children was 4.2 per cent among children of mothers with no education as compared to 2.4 per cent among children of mothers with primary education and 2.3 per cent among children of mothers with secondary or higher education. Similarly, the percentage of severely wasted children was 6.3 per cent in the poorest households as compared to 2.3 per cent in the richest households.

The highest wasting prevalence (severe) was in Unity State (12.2 per cent) and the lowest in South Darfur State at 0.7 per cent (Table 6.1 and Figure 6.3).

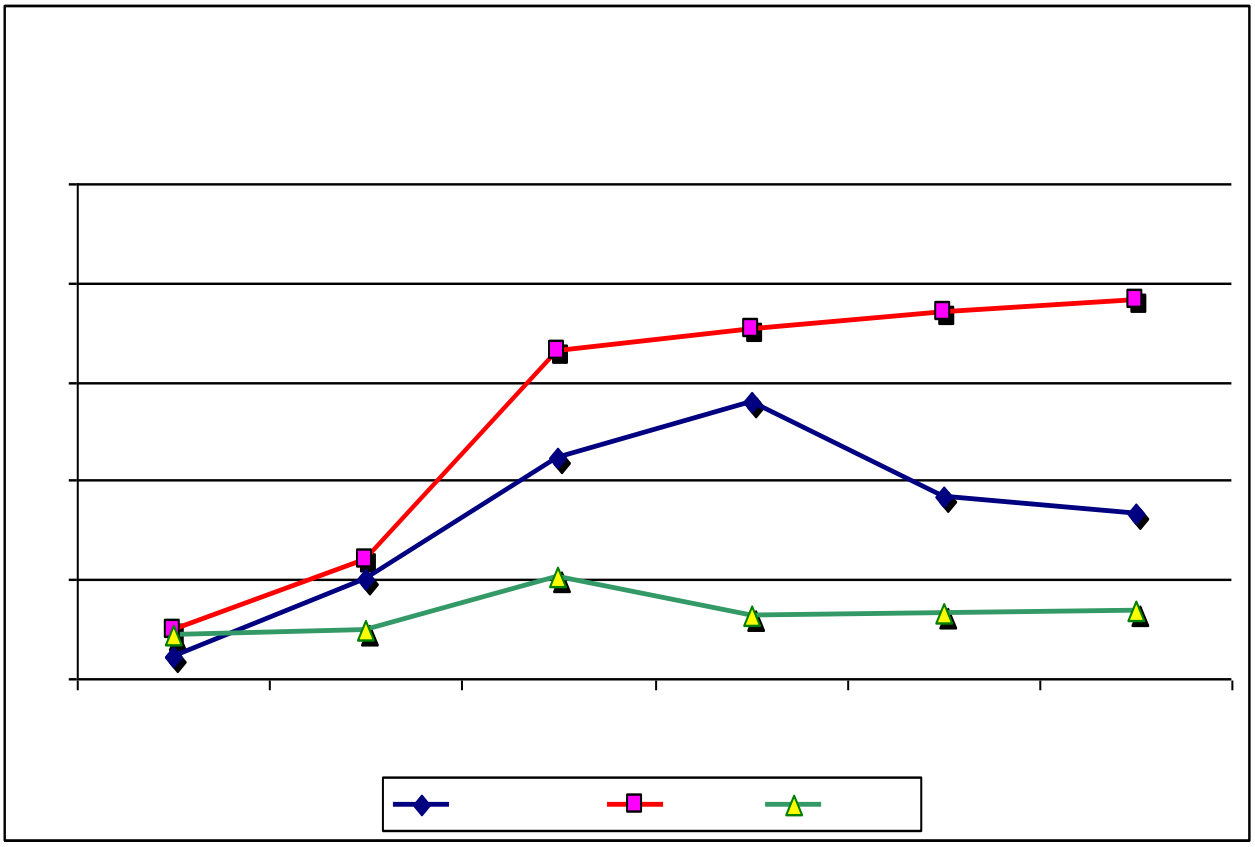


Overweight prevalence

About 3.6 per cent of children were found to be overweight (Table 6.1) with girls (4 per cent) slightly more overweight than boys (3.2 per cent). The percentage of children classified as overweight was highest in Warap State (10.2 per cent) and the lowest in South Darfur and Gadarif states (1.3 per cent).

Child malnutrition by age group

The prevalence of underweight, stunting, and wasting varies with age. Figure 6.4 presents severe malnutrition (underweight, stunting, wasting) according to the age group. Children aged below 6 months and 6-11 months were less severely underweight, stunted or wasted in comparison to children 12 months and older. Prevalence of severe underweight peaks in the age group 24-35 months (14 per cent). Severe stunting steadily increases with age, as it represents the cumulative impact of chronic malnutrition. Severe stunting is highest among the age group 48-59 months (19.1 per cent). Severe wasting peaks in the age category of 12-23 months, likely representing increased exposure of infants to contamination through water, food, and environment related to infant and young child feeding practices.



Breastfeeding

Breastfeeding for the first few years of life protects children from infection, provides an ideal source of nutrients, and is economical and safe. However, many mothers stop breastfeeding too soon and there are often pressures to switch to infant formula, which can contribute to growth faltering and micronutrient malnutrition. Artificial feeding can be unsafe if clean water and/or fuel necessariy to sterilize feeding utensils are not readily available. The World Fit for Children goal states that children should be exclusively breastfed for 6 months and continue to be breastfed with safe, appropriate and adequate complementary feeding for up to 2 years of age and beyond.

WHO/UNICEF feeding recommendations include the following:

- Exclusive breastfeeding for first six months
- Continued breastfeeding for two years or more
- Safe, appropriate and adequate complementary foods beginning at 6 months
- Frequency of complementary feeding
- Breastfeeding be initiated within one hour of birth.

The indicators of recommended child feeding practices are as follows:

- Exclusive breastfeeding rate (0-5 months): Proportion of infants 0-5 months (less than 180 days) of age who are exclusively breastfed.

- Timely complementary feeding rate (6-9 months): Proportion of infants 6-9 months (180 to 299 days) of age who are receiving breastmilk and complementary food at least twice in prior 24 hours.
- Continued breastfeeding rate (12-15 months and 20-23 months): Proportion of children 12-15 months and 20-23 months of age who are breastfeeding at the time of the survey.
- Frequency of complementary feeding (6-11 months): Proportion of infants 6-11 months of age who receive breastmilk and complementary food at least the minimum recommended number of times per day (two times per day for infants aged 6-8 months, and three times per day for infants aged 9-11 months).
- Adequately fed infants (0-11 months): Proportion of infants aged 0-11 months who are appropriately fed: i.e., proportion of infants aged 0-5 months who are exclusively breastfed and proportion of infants aged 6-11 months who are breastfed and ate solid or semi-solid food at least the minimum recommended number of times (two times per day for infants aged 6-8 months, three times per day for infants aged 9-11 months) on the previous day of the survey.

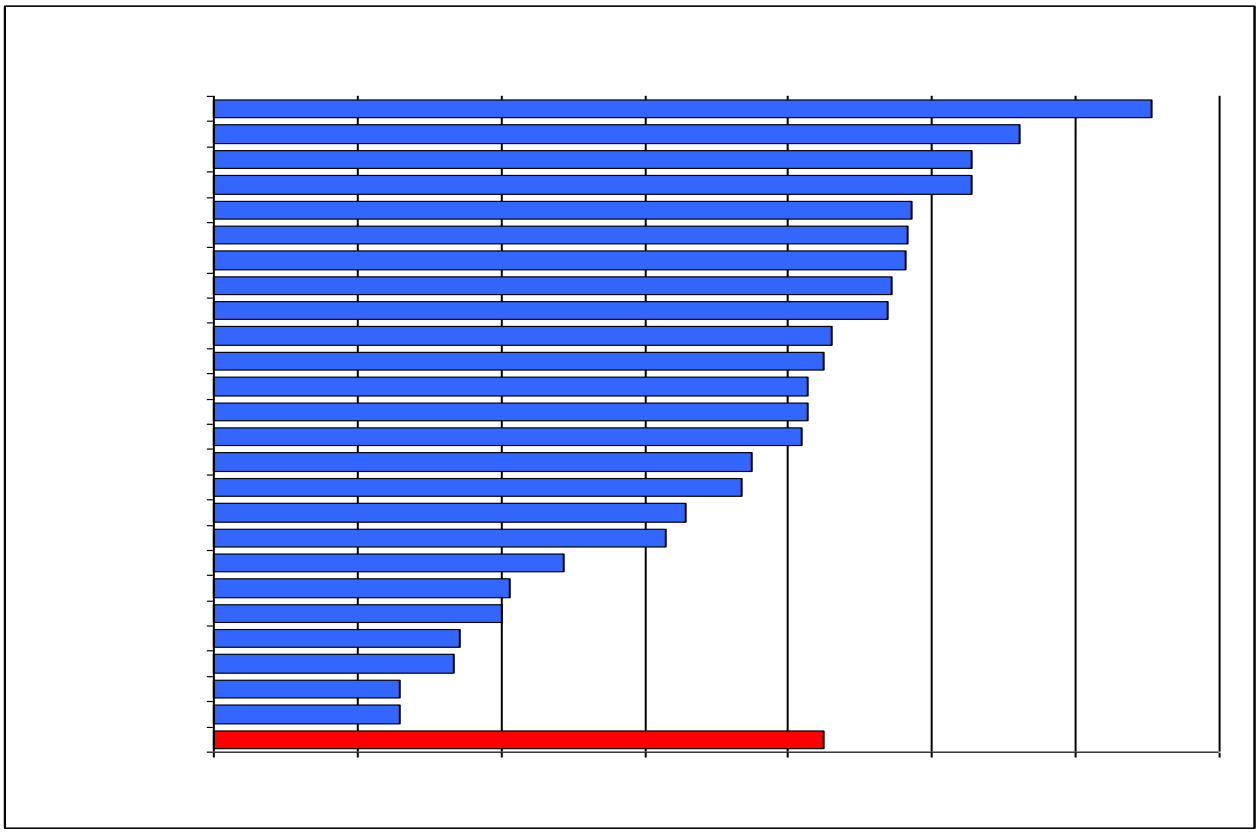
Table 6..2 shows both breastfeeding practice for infants during specific age categories (birth to less than four months, birth to less than 6 months, 12-15 months, and 20-23 months) as well as the percentage of children to whom complementary foods were introduced at the appropriate time. Breastfeeding status and receipt of complementary food is based on the reports of mothers/caretakers of children's consumption of food and fluids in the 24 hours prior to the interview.

Exclusive breastfeeding rate

Exclusively breastfed refers to infants who received only breast milk (and vitamins, mineral supplements, or medicine). Less than half of the infants (42.5 per cent) aged 0-3 months (below four months) in Sudan were exclusively breastfed while one in three infants (33.7 per cent) aged 0-5 months (below six months) were exclusively breastfed (Table 6.2). Girls aged 0-3 months (45.2 per cent) and 0-5 months (35.5 per cent) were more likely to be exclusively breastfed than boys aged 0-3 months (40 per cent) and 0-5 months (32.1 per cent).

The SHHS findings indicate that the rates of exclusive breastfeeding increase with the increasing level of mother's education. For instance, the rate of exclusive breastfeeding (0-3 months) was 36 per cent for infants of mothers with no education, as compared to 46.3 per cent for infants of mothers with primary education and 69.4 per cent for infants of mothers with secondary education or more. Similarly, the rate of exclusive breastfeeding (0-5 months) was 29.4 per cent for infants of mothers with no education as compared to 36.8 per cent for infants of mothers with primary education and 49 per cent for children with mothers with secondary education or more. Rates of exclusive breastfeeding also varied between infants belonging to the poorest and richest households. The exclusive breastfeeding rate for infants aged 0-3 months was 33.7 per cent among infants of mothers belonging to the poorest households as compared to 63.9 per cent among children of mothers belonging to the richest households. Similarly, the exclusive breastfeeding rate for infants aged 0-5 months was 28.9 per cent among infants of mothers belonging to the poorest households as compared to 46.4 per cent among children of mothers belonging to the richest households.

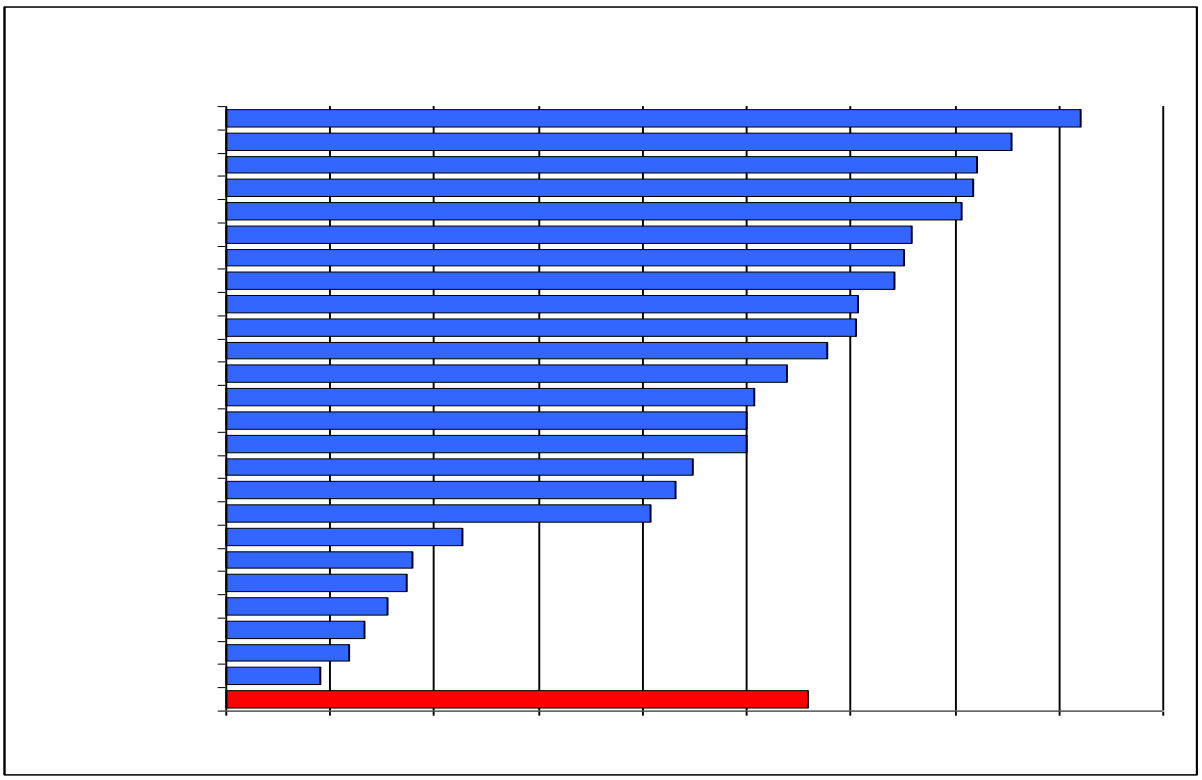
The state with the highest exclusive breastfeeding rates for children aged 0-3 months and children aged 0-5 months was North Darfur at 65.2 and 53.2 percent respectively for each age group.
The state with the lowest exclusive breastfeeding rate for children aged 0-3 months was Northern Bahr El Ghazal (12.9 per cent) while Western Equatoria State had the lowest rate (11.1 per cent) for children aged 0-5 months(Table 6.2 and Figure 6.5).



Timely complementary feeding rate

Table 6.2 also shows the *timely complementary feeding rate*, i.e. the percentage of infants aged 6-9 months (180 to 299 days) who received breastmilk and complementary foods at least twice in the prior 24 hours. Slightly more than half (55.8 per cent) of the infants aged 6-9 months in Sudan received complementary food. The percentage of infants aged 6-9 months who received breastmilk and complementary foods increases sharply with level of education of the mother, with 78.2 per cent of children of mothers with secondary education or more receiving complementary foods and breastmilk, compared to 63.8 per cent of children of mothers with primary education, and with 44.4 per cent of children of mothers with no education. The percentage of infants aged 6-9 months who received breastmilk and complementary foods showed noteworthy change with the economic status (wealth index quintiles) of the households, as 75.7 per cent of children of mothers from the richest households received both breastmilk and complementary foods compared to 29.9 per cent of children of mothers belonging to the poorest households.

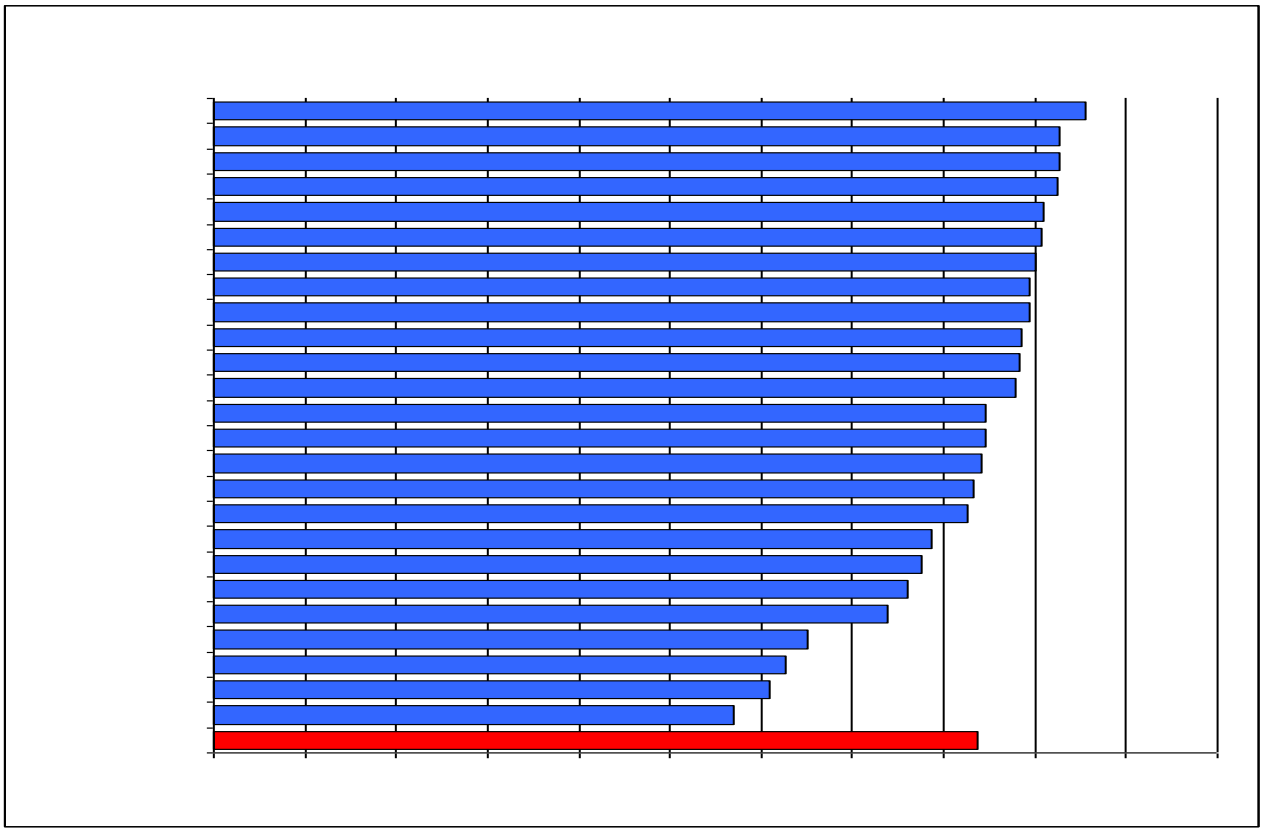
Khartoum State reported the highest timely complementary feeding rate (82.1 per cent) for children aged 6-9 months while Western Bahr El Ghazal State reported the lowest rate (9.1 per cent) (Table 6.2 and Figure 6.6).



Continued breastfeeding rate

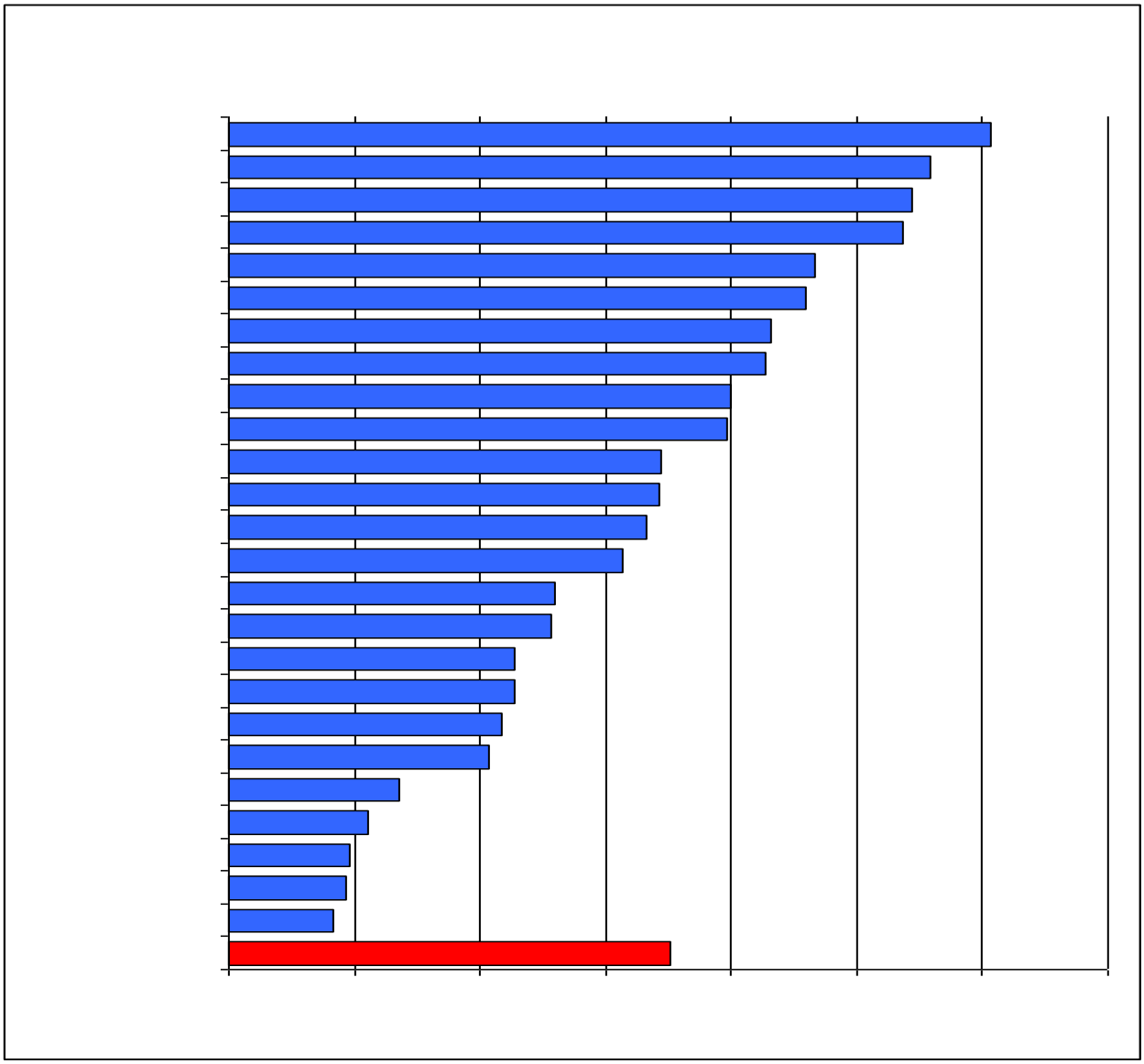
Table 6.2 also shows the *continued breastfeeding rate*, i.e. the percentage of children aged 12-15 months and 20-23 months who were still breastfeeding at the time of the survey. On average, 83.6 per cent of children (84.5 per cent of boys and 82.6 per cent of girls) were still being breastfed at the age of 12-15 months, the rate increasing with increasing levels of education of the mother. The continued breastfeeding rate among children aged 12-15 months was 91 per cent for children of mothers with secondary or higher education compared to 87.5 per cent for children of mothers with primary education, and 80.6 per cent for children of mothers with no education.The continued breastfeeding rate among children aged 12-15 months showed an increasing trend with increasing levels of economic status (wealth index quintiles) of the households. The rate among children aged 12-15 months was 87.9 per cent in the richest households compared to 75.7 per cent for children belonging the poorest households.

Gadarif State reported the highest continued breastfeeding rate (95.6 per cent) for children aged 12-15 months. The state with the lowest continued breastfeeding rate for children aged 12-15 was Jonglei (57 per cent) (Table 6.2 and Figure 6.7).



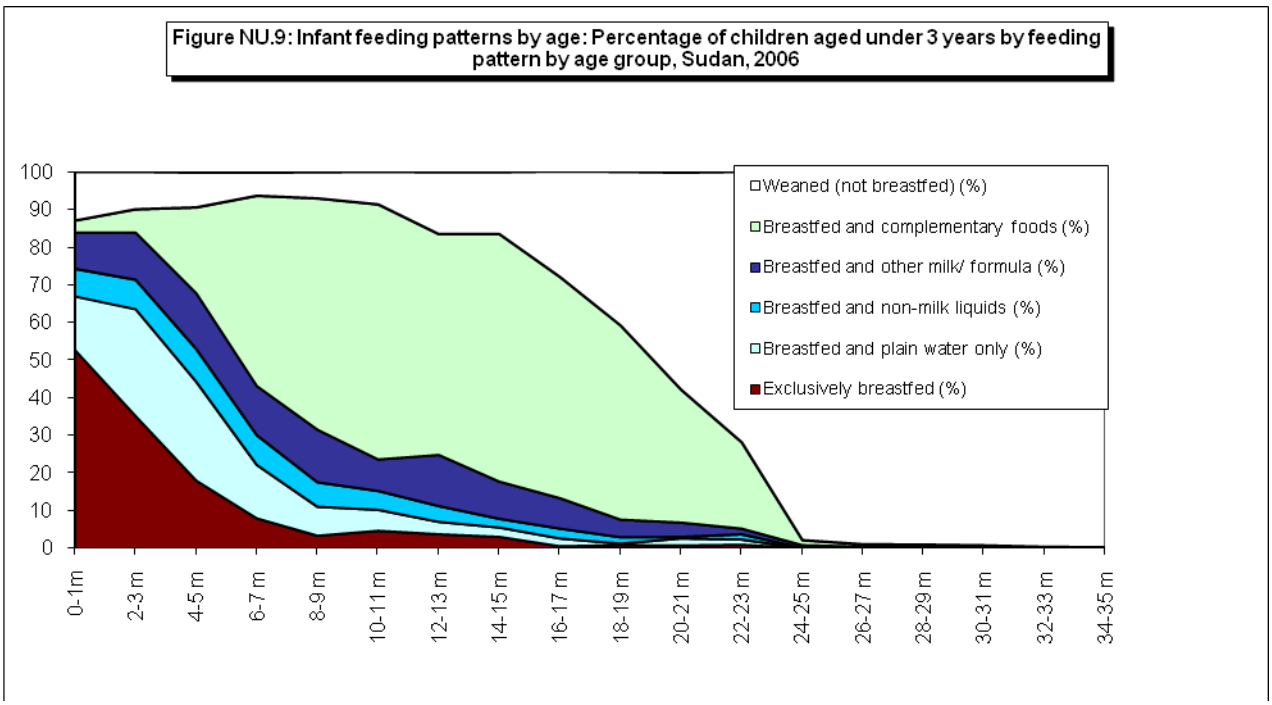
There is a substantial drop in continued breastfeeding rate between the age categories of 12-15 months and 20-23 months. By age 20-23 months, 35.1 per cent of children (32.8 per cent of boys and 37.5 per cent of girls) received continued breastfeeding (Table 6.2) as compared to 83.6 per cent (84.5 per cent of boys and 82.6 per cent of girls) for children aged 12-15 months. The continued breastfeeding rate among children 20-23 months of age increased with increasing levels of education of the mother. The rate was 41.6 per cent among children of mothers with secondary education or more as compared to 40.4 per cent among mothers with primary education and 31 per cent among children of mothers with no education. The continued breastfeeding rate for children aged 20-23 months also showed an increasing trend with increasing economic level (wealth index) of the households. The rate was 46.2 per cent among children of mothers from the richest households as compared to 26.1 per cent among children of mothers from the poorest households.

Kassala State reported the highest continued breastfeeding rate (60.7 per cent) for children aged 20-23 months and Warap reported the lowest rate (8.3 per cent) (Table 6.2 and Figure 6.8)



Infant feeding patterns by age

Table 6.3 and Figure 6. 9 showed the pattern of breastfeeding according to the child's age in months. Even at the earliest ages, a large proportion of children were receiving liquids or foods other than breast milk, and few mothers continue breastfeeding after 24 months. In all, only about 2.3 percent of children aged over two years were receiving breast milk.



Frequency of complementary feeding

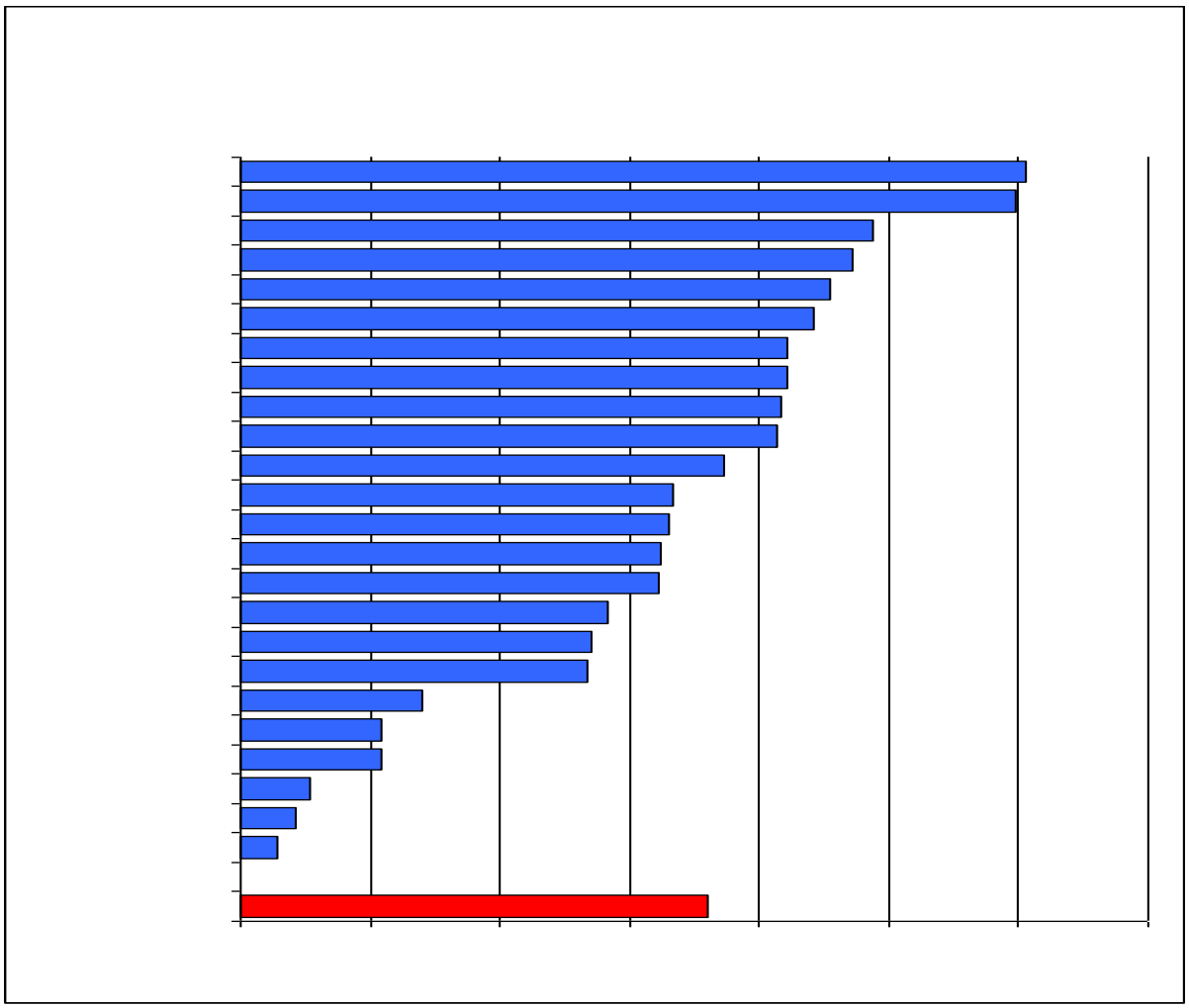
Table 6.4 presents information on the frequency infant feeding, i.e. the percentage of infants aged 6-11 months who are breastfed and who ate semi-solid or solid food at least the minimum recommended number of times the previous day (two or more times per day for infants aged 6-8 months and three or more times per day for infants aged 9-11 months). It presents frequency of

feeding according to age categories (6-8 months and 9-11 months) as well as in a composite category of 6-11 months of age that takes into account the recommendations for feeding frequency.

The findings indicate that 38.9 per cent of infants aged 6-8 months received breastmilk and complementary food at least 2 times in prior 24 hours while 33 per cent of infants aged 9-11 months received breastmilk and complementary food at least 3 times in prior 24 hours. Slightly over one-third (36.1 per cent) of children aged 6-11 months received breastmilk and complementary food at least the minimum recommended number of times per day. The percentage of infants aged 6-11 months who received breastmilk and complementary food at least the minimum recommended number of times per day increases with increasing level of education of the mother (27.1 per cent of infants of mothers with no education compared to 42 per cent of infants of mothers with primary education and 58.2 per cent of infants of mothers with secondary

or higher education). The percentage of infants aged 6-11 months who received breastmilk and complementary food at least the minimum recommended number of times per day also increases with increasing economic status of the households (58 per cent among children from the richest households as compared to 16.2 per cent of children belonging to the poorest households).

The proportion of infants aged 6-11 months who received breast milk and complementary food at least the minimum recommended number of times per day was highest in River Nile State at 60.5 per cent followed by Khartoum State at 59.7 per cent and lowest in Western Bahr El Ghazal State at 2.8 per cent and Unity State. It worth mentioning that Unity State at zero per cent (Table 6.3 and Figure 6.10).

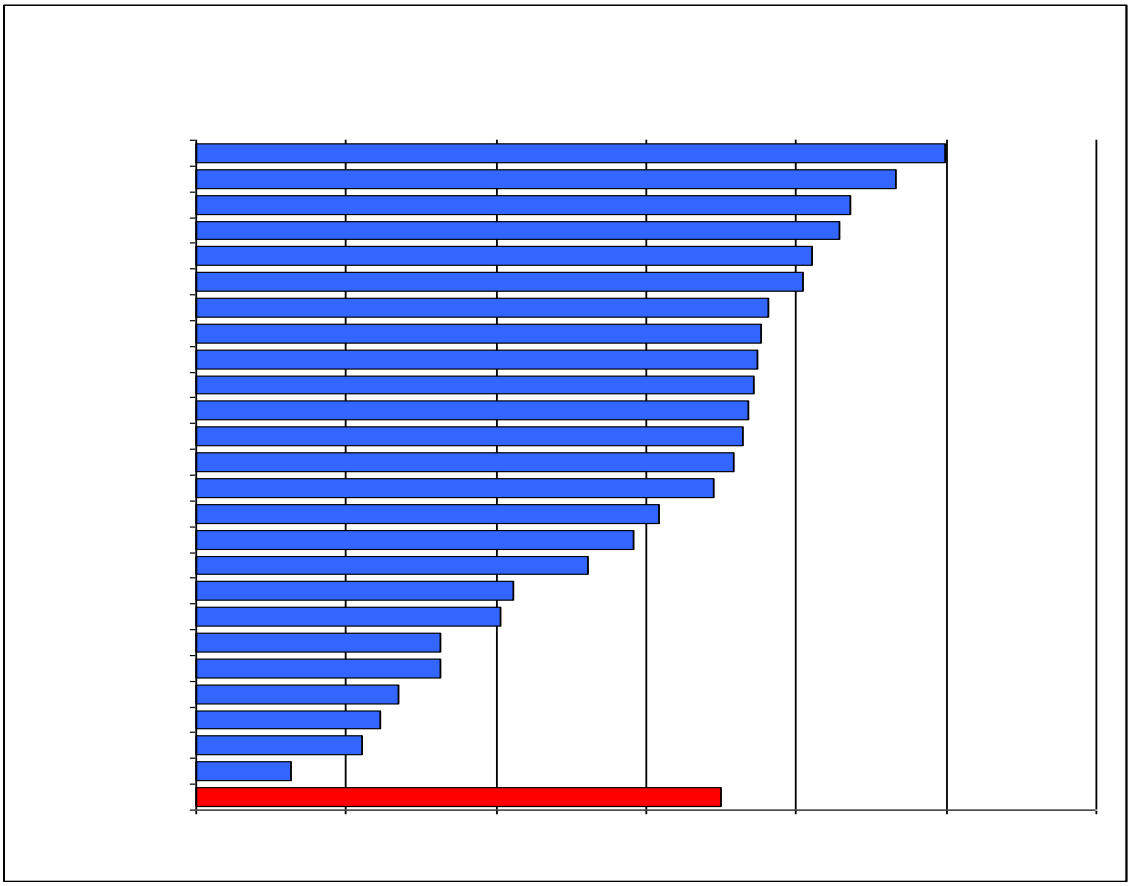


Adequacy of infant feeding

Table 11, NU.3 also presents data on adequately fed infants (0-11 months). Infants aged 0-11 months are considered adequately fed if those aged 0-5 months are exclusively breastfed, and those aged 6-11 months are still breastfed and given complementary foods – solid/semi-solid foods – appropriate number of times during the previous day, (i.e. two or more times per day for infants aged 6-8 months and three or more times per day for infants aged 9-11 months). According to these criteria, approximately one-third (33.7 per cent) of infants 0-5 months and approximately 35 per cent of infants aged 0-11 months were adequately fed.

The percentage of adequately fed infants (0-11 months) increases with increasing level of education of the mother. The percentage of adequately fed infants aged 0-11 months was 28.3 among mothers with no education as compared to 39.5 for infants of mothers with primary education and 54.3 for infants of mothers with secondary or higher education. The percentage of adequately fed infants (0-11 months) increases with increasing level of economic status of the households. The percentage of adequately fed infants aged 0-11 months was 23.2 among infants from the poorest households compared to 52.3 among infants in the richest households.

The percentage of adequately fed infants aged 0-11 months ranged from 49.9 in Khartoum State to 6.3 in Unity State (Table 6.3 and Figure 6.11). In addition to Khartoum State, the percentage of adequately fed infants (0-11 months) was over 40 per cent in five states.



Salt iodisation

Iodine Deficiency Disorders (IDDs) are the world's leading cause of preventable mental retardation and impaired psychomotor development in young children. In its most extreme form, iodine deficiency causes cretinism (the condition of severely stunted mental and physical growth). It also increases the risks of stillbirth and miscarriage in pregnant women. Iodine deficiency is most commonly and visibly associated with goitre (the swelling in the neck due to an enlarged thyroid gland). IDDs takes their greatest toll in impaired mental growth and development, contributing in turn to poor school performance, reduced intellectual ability, and impaired work performance. The international goal is to achieve sustainable elimination of iodine deficiency by 2005.

One of the globally accepted ways of preventing and addressing IDDs is to ensure adequate levels of household consumption of iodized salt, quantified through the indicator of percentage of households consuming adequately iodized salt i.e. $\geq$15 parts per million (ppm) or more of iodine/iodate in the salt used in the household. Table 6.5 presents the percentage of households consuming adequately iodized salt in Sudan. It may be noted that more than 90 per cent of the households in 14 states had their salt tested.

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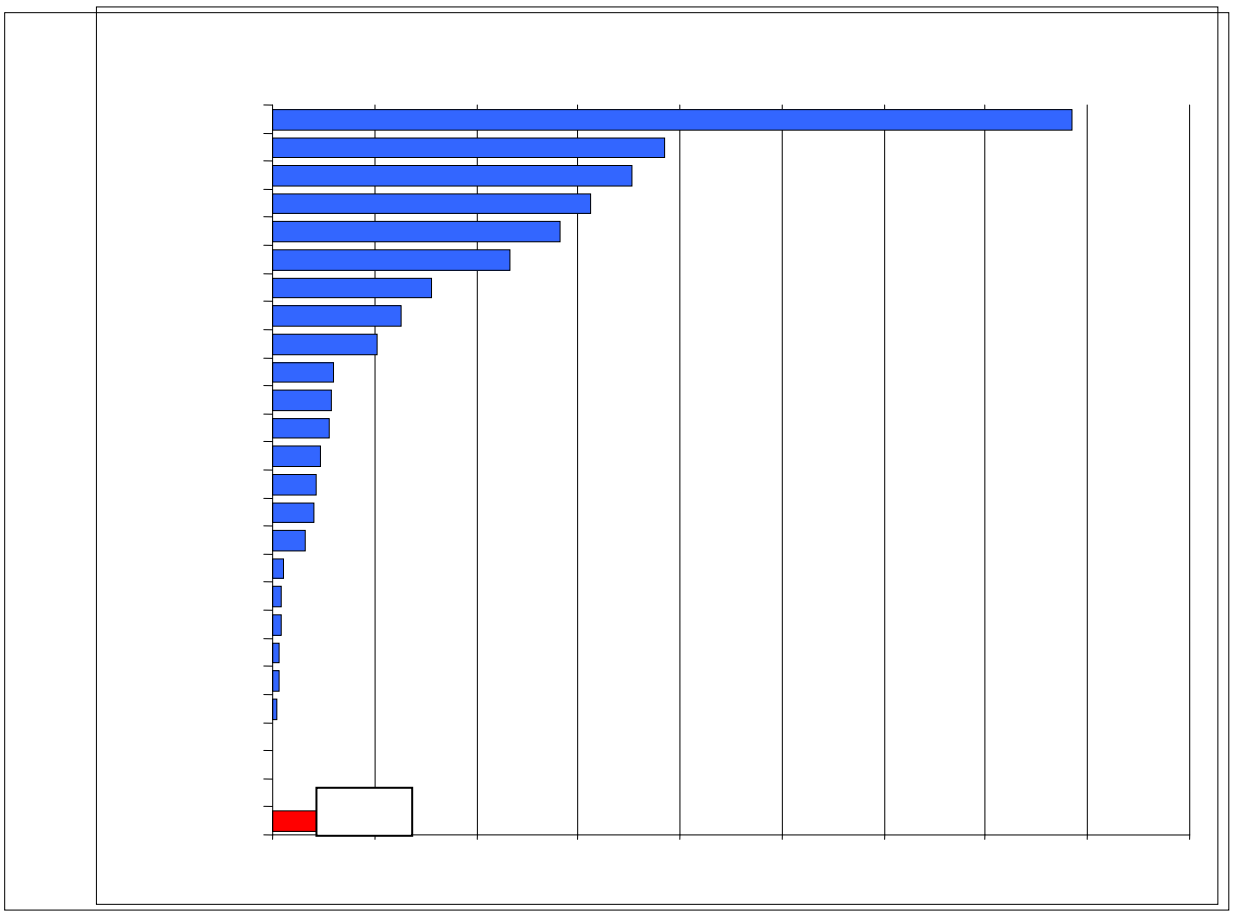
In Sudan the salt iodization programme targeting universal coverage was started in 1994. The programme has been reviewed in order to identify the gaps and to initiate affirmative actions in terms of legislative measures, salt production and social mobilization. Based on international standards the country is committed to achieve the use of iodized salt by 90 per cent of households by the year 2008; process of iodized salt production from the main sources was initiated to cover 100 per cent of households and the banning of production of non-iodized salt after a six-month grace period. The machines and materials (including potassium iodate) required for the production of iodized salt have already been procured and iodized salt production commenced in June 2007.

During the SHHS, cooking salt was tested for iodine levels (eg. presence of potassium iodate) with salt testing kits in 84.5 per cent of households. In only 11.4 per cent of these households was the salt found to contain 15 ppm or more of iodine (Table 6.5 and Figure 6.12). Use of iodised salt was lowest in Northern State (0.2 per cent) and highest in Central Equatoria State (78.5 per cent, whilst

it was rarely used (less than 1 per cent) in eight states. Only three states (North Darfur, South Darfur and Western Bahr El Ghazal) had more than 30 per cent of households using iodized salt.



Vitamin A Supplementation

Vitamin A is essential for eye health and proper functioning of the immune system. It is found in foods such as milk, liver, eggs, red and orange fruits, red palm oil and green leafy vegetables, although the amount of vitamin A readily available to the body from these sources varies widely. In developing areas of the world, where vitamin A is largely consumed in the form of fruits and vegetables, daily per capita intake is often insufficient to meet dietary requirements. Inadequate intakes are further compromised by increased requirements for vitamin A as children grow or during periods of illness, as well as increased losses during common childhood infections. As a result, vitamin A deficiency is quite prevalent in the developing world and particularly in countries with the highest burden of under-five deaths.

The 1990 World Summit for Children set the goal of virtual elimination of vitamin A deficiency and its consequences, including blindness, by the year 2000. This goal was also endorsed at the Policy Conference on Ending Hidden Hunger in 1991, the 1992 International Conference on Nutrition, and the UN General Assembly's Special Session on Children in 2002. The critical role of vitamin A for child health and immune function makes control of deficiency a primary component of child survival efforts and therefore critical to the achievement of the fourth Millennium Development Goal: a two-thirds reduction in under-five mortality by the year 2015.

For countries with vitamin A deficiency problems, current international recommendations call for high-dose vitamin A supplementation every four to six months, targeting all children between the ages of six to 59 months living in affected areas. Providing young children with two high-dose vitamin A capsules a year is a safe, cost-effective, efficient strategy for eliminating vitamin A deficiency and improving child survival. Giving vitamin A to new mothers who are breastfeeding helps protect their children during the first months of life and helps to replenish the mother's stores of vitamin A, which are depleted during pregnancy and lactation. For countries with vitamin A supplementation programs, the definition of the indicator is the per cent of children 6-59 months of age who received at least one high dose vitamin A supplement in the last six months.

Based on UNICEF/WHO guidelines, the Federal Ministry of Health, Government of National Unity and the Ministry of Health, Government of Southern Sudan recommended that children aged 6-11 months be given one high dose vitamin A capsules and children aged 12-59 months given a high dose vitamin A capsule once in every 6 months. In some parts of the country, vitamin A capsules are linked to immunization services and are given when the child has contact with these services after six months of age. It is also recommended that mothers take a vitamin A supplement within eight weeks of giving birth due to increased vitamin A requirements during pregnancy and lactation. The SHHS indicators in regard to vitamin A supplementation are as follows:

Vitamin A supplementation (under fives): Proportion of children 6-59 months of age who havereceived at least one high dose vitamin A supplement in the 6 months prior to the survey;

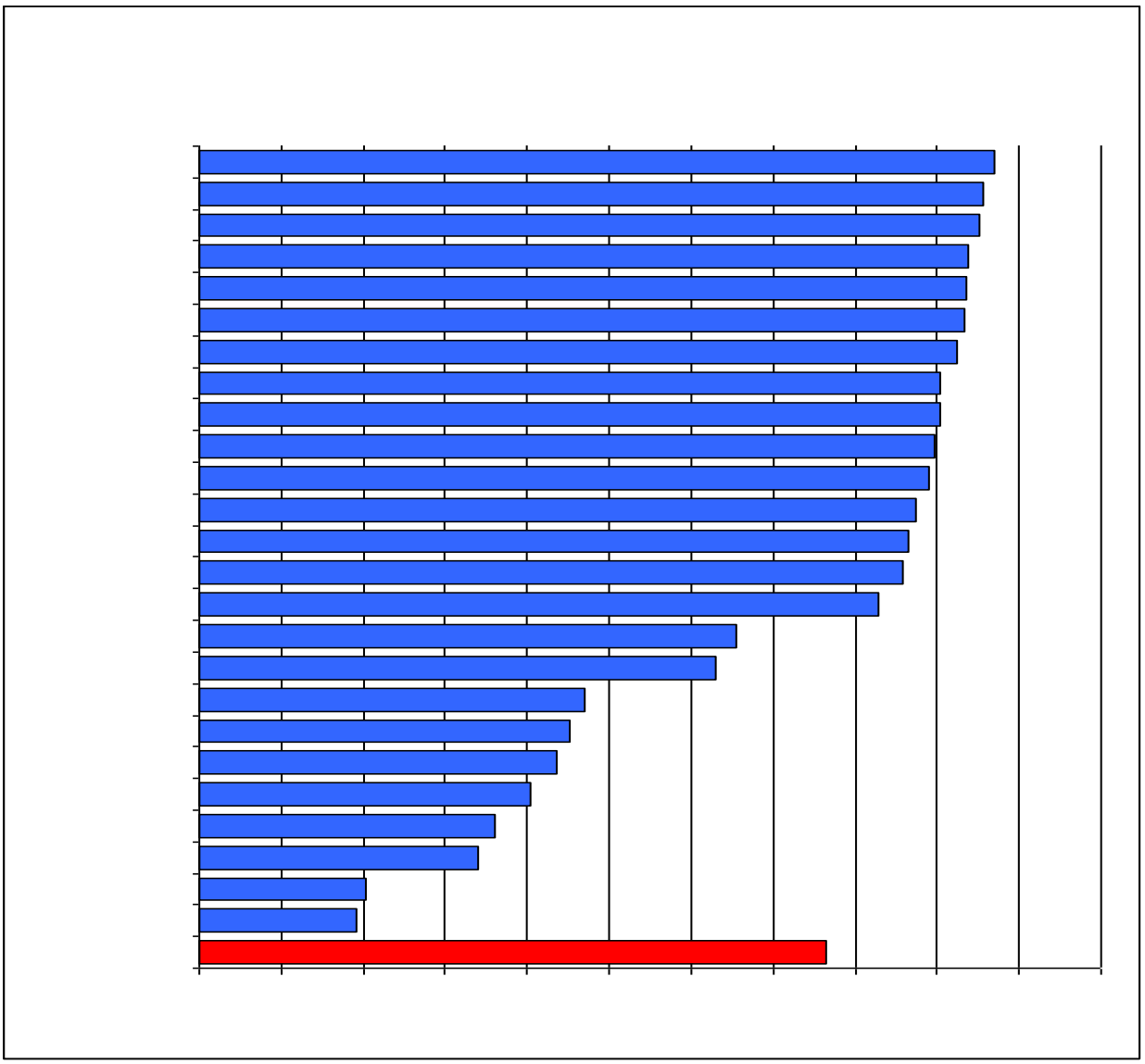
Vitamin A supplementation (post-partum mothers): Proportion of women aged 15-49 years with a live birth in the two years preceding the survey who have received a high dose vitamin A supplement within eight weeks after child birth

Vitamin A supplementation (under fives)

The SHHS findings indicate that within the six months prior to the SHHS, 76.4 per cent of children aged 6-59 months in the Sudan received a high dose of vitamin A supplement (Table 6.6). Approximately 1.5 per cent did not receive the supplement in the last six months but did receive one before that. About 1.2 per cent of children received a vitamin A supplement at sometime in the past but their mother/caretaker was unable to specify when. Approximately one-fifth (20.9 per cent) of children aged 6-59 months never received vitamin A supplement.

The likelihood that a child 6-59 months has had received a high dose of vitamin A supplement in the last 6 months preceding the survey is related to the educational level of the mother: 93.5 per cent of children of mothers with secondary or higher education received the supplement as compared to 89.7 per cent of children of mothers with primary education and 67.6 per cent of children of mothers with no education. The likelihood that a child 6-59 months has received a vitamin A supplement in the last 6 months is also positively related to economic status (wealth index) of the households with 92.9 per cent of children from the richest households having received vitamin A supplement in last six months preceding the survey as compared to 52.3 per cent of children in the poorest households.

The percentage of children aged 6-59 months who received a high dose of vitamin A supplement varied between states with more than 90 per cent of children receiving vitamin A supplements in nine states and less than 25 per cent of under-five children receiving the supplement in two states, the highest being in Sinnar State (96.9) and the lowest being in Jonglei State (19.2) (Table 6.6 and Figure 6.13).

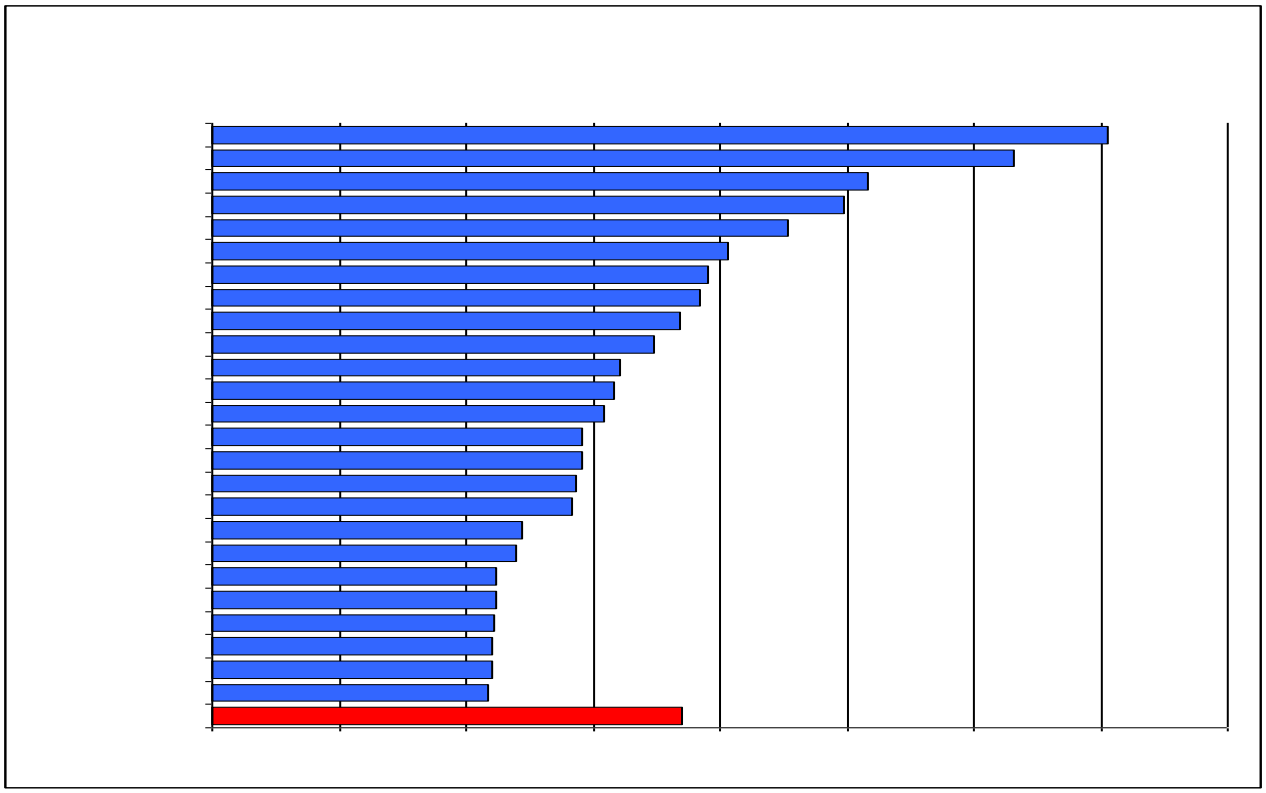


Vitamin A supplementation (post-partum mothers)

Table 6.7 shows the percentage of women aged 15-49 years who had a live birth in the two years preceding the survey and received a high dose of vitamin A supplement before the infant was eight weeks old.

In Sudan, only 18.5 per cent of mothers aged 15-49 years with a live birth in the two years preceding the SHHS received a high dose of vitamin A supplement before the infant was 8 weeks old. Vitamin A supplementation (post-partum mothers) is positively related to the women's level of education. However, supplementation in the highest education level is still low at 28.9 per cent among women with secondary or higher education. With respect to the economic level of the households, coverage was 27.3 per cent among women belonging to the richest households as compared to 13.6 per cent among those from the poorest households.

The coverage of Vitamin A supplementation (post-partum mothers) was highest at 35.3 per cent in Khartoum State followed by 31.6 per cent in Unity State and lowest at 10.9 per cent in Sinnar State (Table 6.7 and Figure 6.14).



VII. Child Health

Providing a safe and healthy start in life for all children and avoiding child deaths due to preventable diseases are critical to the task of reducing infant and under-five mortality rates. Immunization plays a key part towards achieving the goal of reducing infant and under-five mortality rates. Globally, immunizations have saved the lives of millions of children in the three decades since the launch of the Expanded Programme on Immunization (EPI) in 1974. Worldwide there are still 27 million children overlooked by routine immunization, and as a result, vaccine-preventable diseases cause more than 2 million deaths every year. A World Fit for Children goal is to ensure that the rates of full immunization of children under one year of age reach 90 per cent nationally, with at least 80 per cent coverage in every district or equivalent administrative unit. Key indicators used for assessing progress towards this goal include the following:

Tuberculosis immunization coverage: Proportion of children 12-23 months of age who were vaccinated against Tuberculosis by 12 months of age, i.e. percentage of children aged 12-23 months who received BCG vaccine before their first birthday; and proportion of children 12-23 months of age who received BCG vaccine at any time up to the date of the survey.

DPT3 immunization coverage: Proportion of children 12-23 months of age who were vaccinated against diphtheria, pertussis and tetanus by 12 months of age, i.e. percentage of children aged 12-23 months who received DPT3 vaccine before their first birthday; and proportion of children 12-23 months of age who received DPT3 vaccine at any time up to the date of the survey.

Polio immunization coverage: Proportion of children 12-23 months of age who were vaccinated against polio by 12 months of age, i.e. percentage of children aged 12-23 months who received OPV3 before their first birthday; and proportion of children 12-23 months of age who received OPV3 at any time up to the date of the survey.

Measles immunization coverage: Proportion of children 12-23 months of age who were vaccinated against measles by 12 months of age, i.e. percentage of children aged 12-23 months who received measles vaccine before their first birthday; and proportion of children 12-23 months of age who received measles vaccine at any time up to the date of the survey.

Fully immunized children: Proportion of children 12-23 months of age who were vaccinated against childhood diseases by 12 months of age, i.e. percentage of children aged 12-23 months who received BCG, DPT1-3, OPV-1-3, and measles vaccine before their first birth day; and proportion of children 12-23 months of age who receieved BCG, DPT1-3, OPV1-3, and measles vaccinations at any time up to the date of the survey.

Elimination of maternal tetanus constitutes an important strategy for achieving the goal of reducing maternal mortality ratio. A World Fit for Children goal is to eliminate maternal and neonatal tetanus by 2015. Prevention of maternal and neonatal tetanus requires that all pregnant women be given at least two doses of tetanus toxoid vaccine. However, if women have not received two doses of the vaccine during the last pregnancy, they (and their newborn) are also considered to be protected if they received at least two doses of tetanus toxoid vaccine, the last within the prior 3 years; received at least 3 doses, the last within the prior 5 years; received at least 4 doses, the last within 10 years; or received at least 5 doses during lifetime. A key SHHS indicator in this regard includes the following:

Neonatal tetanus protection: Proportion of mothers with live births in the previous year who were given at least two doses of tetanus toxoid (TT) vaccine within the appropriate interval prior to giving birth.

Diarrhoea is the second leading cause of death worldwide among children under five years. Most diarrhoea-related deaths in children are due to dehydration from loss of large quantities of water and electrolytes from the body in liquid stools. Management of diarrhoea – either through oral rehydration salts (ORS) or a recommended home fluid (RHF) - can prevent many of these deaths. Preventing dehydration and malnutrition by increasing fluid intake and continuing to feed the child, with a focus on breastfeeding children below two years of age, are also important strategies for managing diarrhoea. Key global goals include: i) to reducing by one half deaths due to diarrhoea among children under the age of five by 2010 compared to 2000 level (A World Fit for Children

The key SHHS indicators include the following:

Unde fives with diarrhoea: Proportion of children 0-59 months of age who had diarrhoea in the two weeks preceding the survey.

Oral rehydration therapy (ORT) use rate: Proportion of children aged 0-59 months (with diarrhoea in the two weeks prior to the SHHS) who received oral rehydration salts and/or an appropriate household solution.

Home management of diarrhoea: Proportion of children aged 0-59 months with diarrhoea in the 2 weeks prior to the survey who received more fluids AND continued eating somewhat less, the same or more food.

Received ORT or increased fluids AND continued feeding: Proportion of children aged 0-59 months who had had diarrhoea in the two weeks prior to the survey and received ORT (oral rehydration salts or an appropriate household solution) or received more fluids AND continued eating somewhat less, the same or more food during the episode of diarrhoea .

Pneumonia is another leading cause of death in children and timely treatment of pneumonia is a key intervention for child survival. A World Fit for Children goal is to reduce by one-third deaths due to acute respiratory infections. Children with suspected pneumonia are those who had an illness with a cough accompanied by rapid or difficult breathing and whose symptoms were NOT due to a problem in the chest and a blocked nose. The SHHS indicators are:

Under fives with suspected pneumonia: Proportion of children 0-59 months of age with suspected pneumonia in the last two weeks preceding the survey

Care seeking for suspected pneumonia: Proportion of children aged 0-59 months with suspected pneumonia in the last two weeks preceding the survey taken to an appropriate health provider.

Knowledge of the two danger signs of pneumonia: Proportion of mothers/caretakers of children aged 0-59 months who recognize fast and difficult breathing as signs of pneumonia for seeking care immediately.

More than 3 billion people around the world rely on solid fuels (biomass and coal) for their basic energy needs, including cooking and heating. Cooking and heating with solid fuels leads to high levels of indoor smoke, a complex mix of health-damaging pollutants. The main problem with the use of solid fuels is products of incomplete combustion, including carbon monoxide (CO), polyaromatic hydrocarbons, Sulphur Dioxide (SO_2), and other toxic elements. Use of solid fuels increases the risks of acute respiratory illness, pneumonia, chronic obstructive lung disease, cancer, and possibly tuberculosis, low birth weight, cataracts, and asthma. The SHHS indicator is as follows:

Use of solid fuel use: Proportion of residents in households who use solid fuels -- wood, charcoal, crop residues and dung -- as the primary source of domestic energy for cooking.

Malaria remains a leading cause of death in children under five in Sudan. It also contributes to anaemia in children and is a common cause of school absenteeism. Preventive measures, especially the use of insecticide-treated nets (ITNs), can dramatically reduce malaria mortality rates among children. In areas where malaria is common, international recommendations suggest treating any fever in children as if it were malaria and immediately giving the child a full course of recommended anti-malarial tablets. Children with severe malaria symptoms, such as fever or convulsions, should be taken to a health facility. Key SHHS indicators include the following:

Household availability of bed net: Proportion of households with at least one bed net.
Household availability of insecticide-treated nets (ITNs): Proportion of households with atleast one insecticide-treated net, either permanently treated or treated within the previous year.
Under-fives sleeping under insecticide-treated nets (ITNs): Proportion of children 0-59 months of age who slept under an insecticide-treated net during the previous night of the survey.
Underfives with fever: Proportion of children 0-59 months of age reported to have had fever in the last two weeks preceding the survey.
Anti-malarial treatment (Under-fives): Proportion of children 0-59 months of age reported to have had fever in the last two weeks preceding the survey and were treated with appropriate anti-malarial drugs.
Antimalarial treatment within 24 hours of onset of symptoms of malaria: Proportion of children aged 0-59 months reported to have had fever in the previous two weeks and were treated with an appropriate anti-malarial drug within 24 hours of onset of symptoms of malaria.

Routine immunization

According to UNICEF and WHO guidelines, a child should receive a Bacillis-Cereus-Geuerin (BCG) vaccination to protect against tuberculosis, three doses of DPT to protect against diphtheria, pertussis, and tetanus, three doses of polio vaccine, and measles vaccination by the age of 12 months.

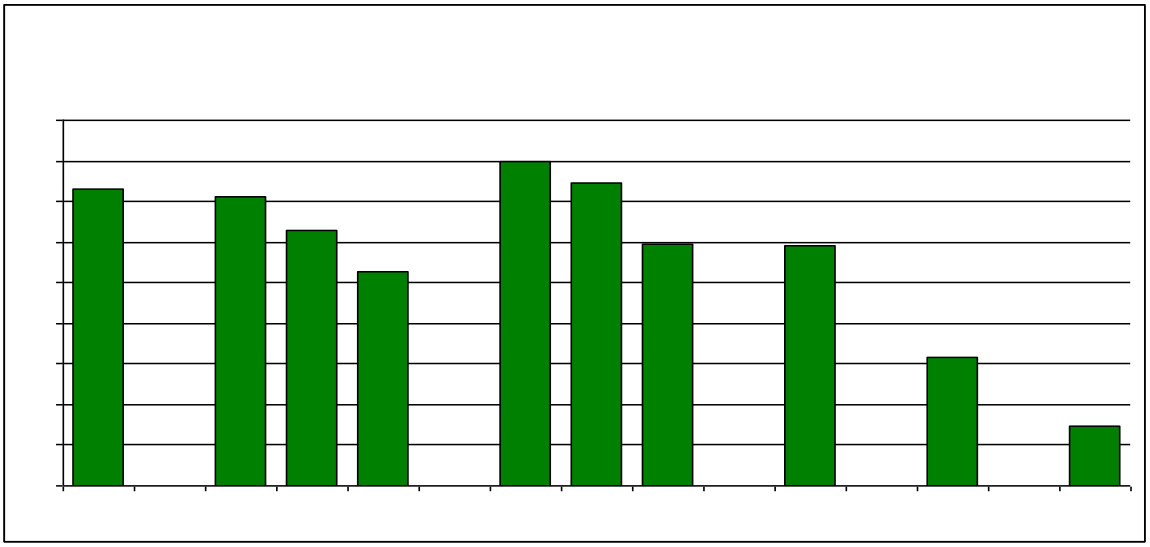
During the SHHS, mothers were asked to provide to interviewers vaccination cards for children under the age of five. Interviewers copied vaccination information from the cards onto the SHHS questionnaire. If the child did not have a card, the mother was asked to recall whether or not the child had received each of the vaccinations and, for DPT and polio, how many times. The percentage of children aged 12 to 23 months who received each of the vaccinations is shown in Table 7.1.

The denominator for each of the indicators in Table 7.1 is comprised of children aged 12-23 months so that only children who were old enough to be fully vaccinated were counted. In the first and second top rows, the numerator includes all children who were vaccinated at any time before the survey according to the vaccination card or the mother's report respectively. In the bottom/last row, only those who were vaccinated by 12 months of age, i.e. before their first birthday, as recommended, are included. Overall, 34.6 per cent of children had health/vaccination cards (Table 7.2).

BCG vaccination coverage (percentage of children aged 12-23 months who received BCG vaccine by the age of 12 months) was 72.9 per cent (Table 7.1). DPT3 vaccination coverage (percentage of children aged 12-23 months who received the third dose of DPT vaccine by the age of 12 months) was 52.9 per cent.The coverage declined to 63 per cent for the second dose of DPT vaccine and 52.9 per cent for the third dose (Figure 7. 1).

Polio3 vaccination coverage (percentage of children aged 12-23 months who received the third dose of polio vaccine by the age of 12 months) was 59.5 per cent. The vaccination coverage for the first dose of polio vaccine was 79.7 per cent. The coverage declined to 74.6 per cent for the second dose and to 59.5 per cent for the third dose.

Measles vaccination coverage (percentage of children aged 12-23 months who received measles vaccine by the age of 12 months) was 59.3 per cent.



The percentage of children who had all the recommended vaccinations (BCG, DPT1-DPT3, polio1-polio3, and measles) by their first birthday was low at only 31.5 percent. The percentage of children aged 12-23 months who had none of the recommended vaccinations by 12 months of age was 14.8 per cent. (Table 7.1 and Figure 7.1).It worth mentioning that women were asked to report vaccination received by their children including those during the national immunization days for poliomyelitis erradication.This is most probably the reason for the inconsistency between the coverage rate of DPT3 and polio 3.

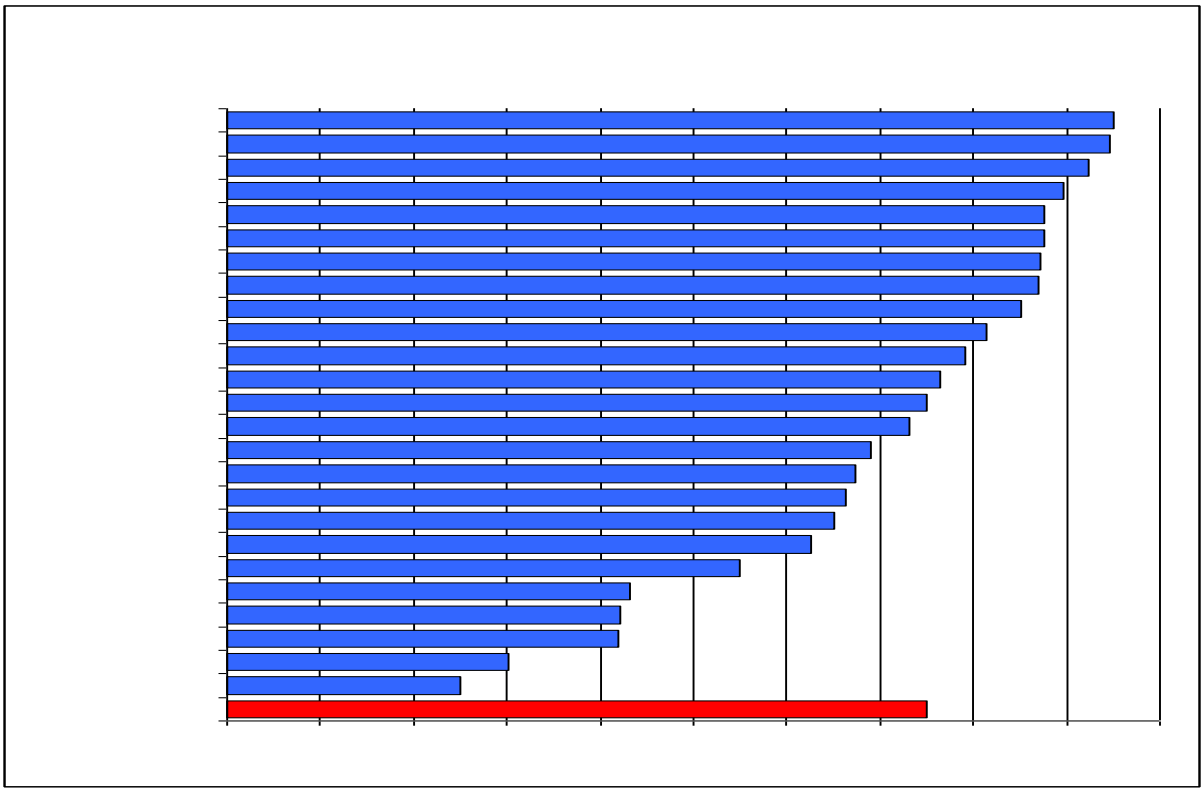
Table 7.2 shows the percentage of children aged 12-23 months vaccinated at any time before the survey by background characteristics (by state of residence, mother's educational level and by wealth index quintiles). The vaccination coverage rates indicated in the table are based on information from both the vaccination cards and mothers'/caretakers' reports.

There is only a slight difference in vaccination coverage by gender. The vaccination coverage for males and females respectively were 74.7 and 75 per cent for BCG, 53.7 and 55.9 per cent for DPT3, 61.5 and 62.3 per cent for polio3, and 64.9 and 68 per cent for measles.

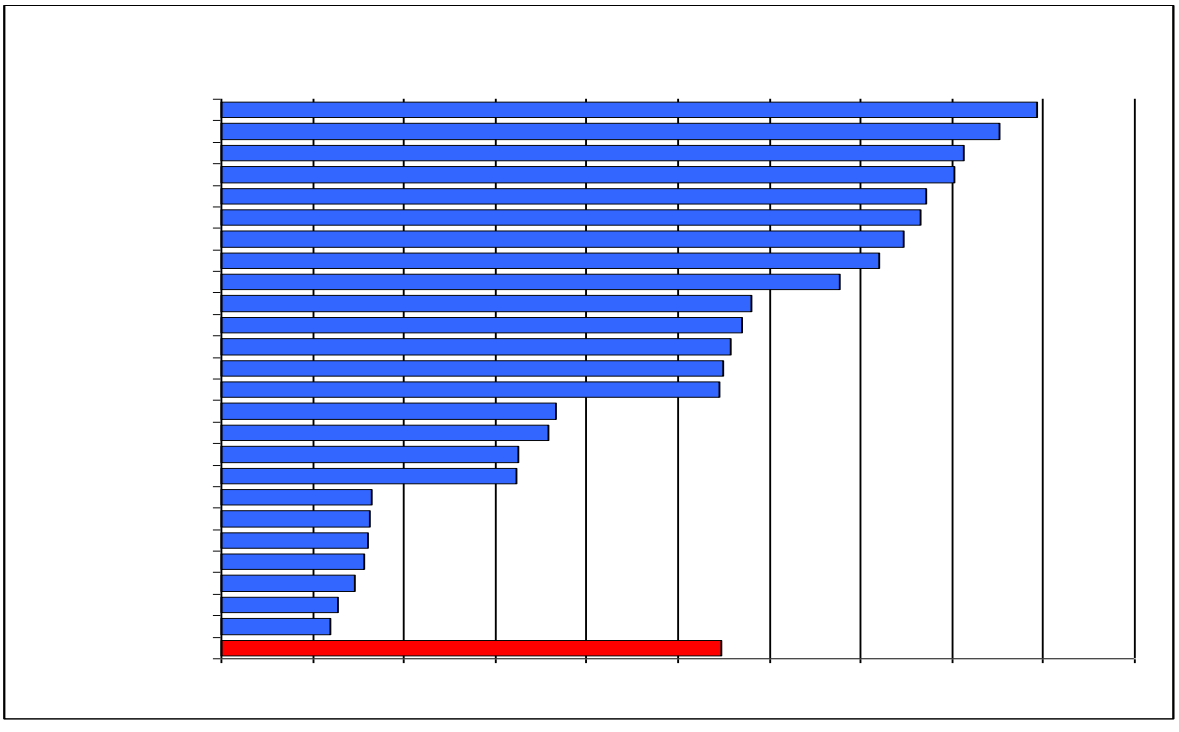
Vaccination coverage, as expected, seems to have a close link with the level of mothers' education. BCG, DPT3, Polio and Measles vaccination coverage ranged from 65.1, 41.7, 51.6 and 56 per cent respectively for children of mothers with no education to 87.8, 71.2, 75.6 and 79.4 per cent respectively for children of mothers with primary education, and to 93.4, 80.5, 80.1 and 89 per cent respectively for children of mothers with secondary or higher education. The percentage of children vaccinated against all childhood diseases was 30.6 for children of mothers with no education as compared to 54.8 for children of mothers with primary education, and 63 for children of mothers with secondary or higher education. The percentage of children who received no vaccination was the lowest (1.4 per cent) among children of mothers with secondary or higher education as compared to 4.3 for children of mothers with primary education and 22.2 for children of mothers with no education.

Vaccination coverage also has a close link with the economic status of the household. The BCG vaccination coverage was 51.9 per cent in the case of children belonging to the poorest households as compared to 94.7 per cent for children from the richest households. For DPT3 vaccination, the coverage was only 25.9 per cent for children from the poorest households while it was 85 per cent for children from the richest households. The vaccination coverage for polio ranged between 33.7 per cent for children from the poorest households and 81.3 per cent for children from the richest households while measles vaccination coverage ranged from 46.6 per cent for children from the poorest households to 87.2 per cent for children from the richest households. The percentage of fully immunized children (i.e. children vaccinated against all childhood diseases) was only 16.5 for children from the poorest households as compared to 64.1 for children from the richest households. The percentage of children who received no vaccination was only 0.9 per cent among children belonging to the richest households as compared to 34.2 for children from the poorest households.

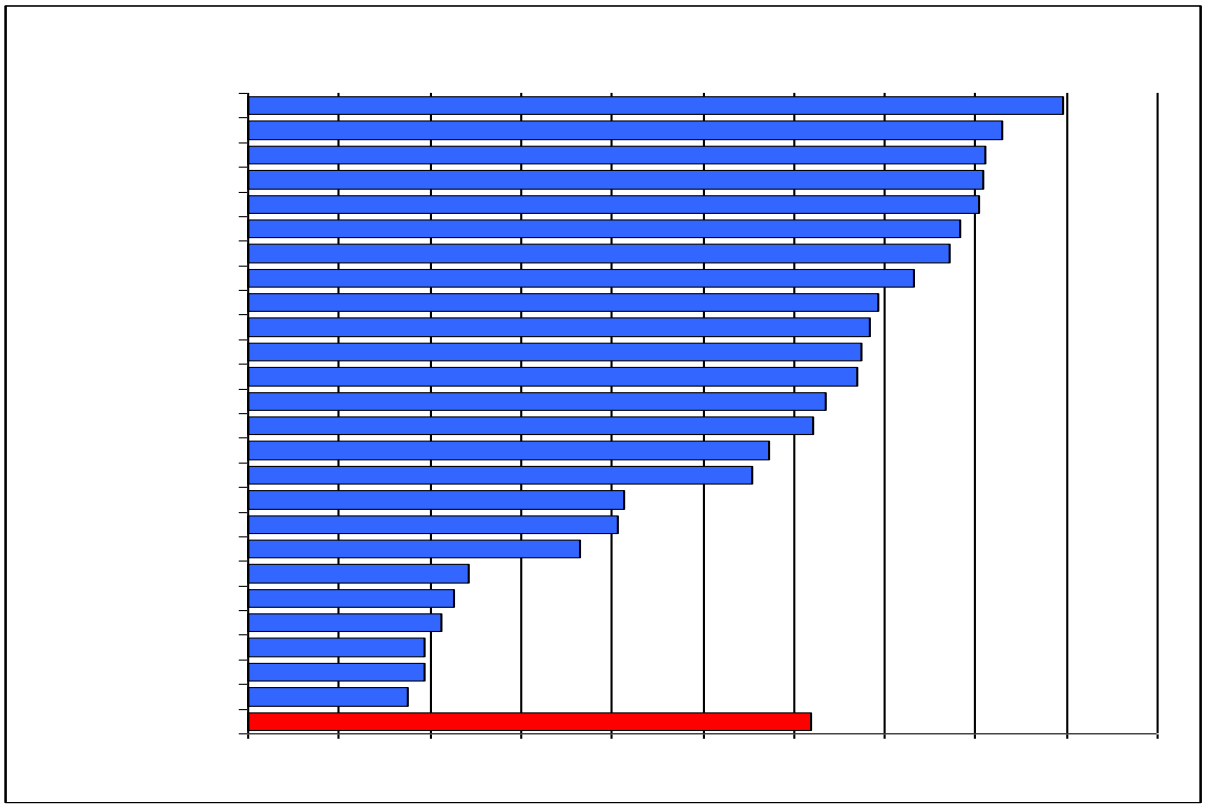
Tuberculosis immunization coverage: ercentage of children aged 12-23 months who received BCG vaccine at any time up to the date of the survey (Table 7.2 and figure 7.2).



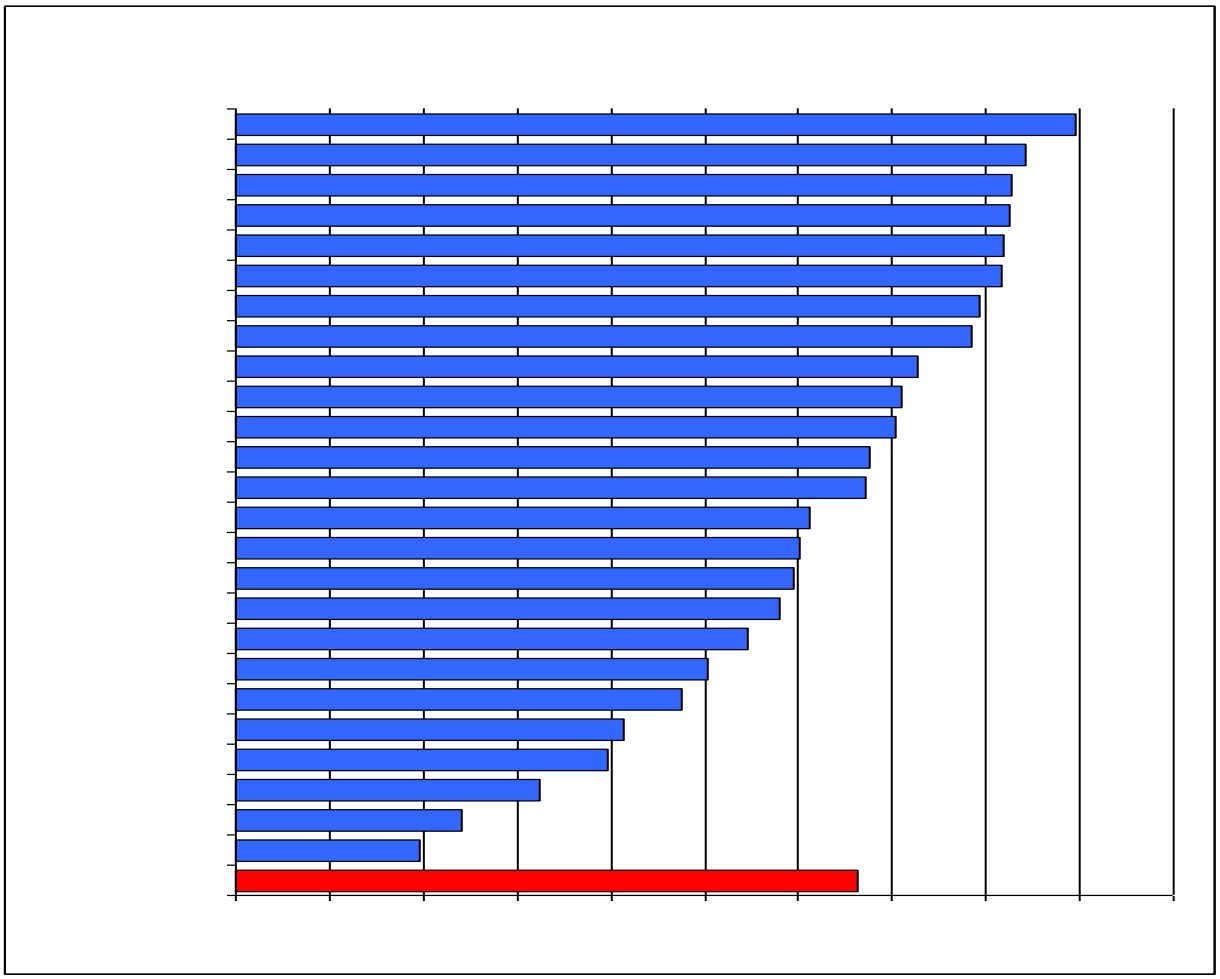
DPT3 immunization coverage: Table 7.2 Figure 7.3 showed wide variations among states in regard to children aged 12-23 months who received DPT3 vaccine at any time up to the date of the survey. Only two states reported a coverage of over 85 per cent, the highest being in Khartoum State (89.4 per cent) whilst seven states reported a very low DPT3 coverage (less than 20 per cent), the lowest being in Lakes State (11.9 per cent).



Polio3 immunisation coverage: Wide variations also exist among states in regard to percentage of children aged 12-23 months who received polio3 vaccine at any time up to the date of the survey. Only one state (Northern State) reported a coverage of over 85 per cent whilst six states reported a very low OPV3 coverage (less than 25 per cent), the lowest being in Jonglei State (17.6 per cent). (Table 7.2 & Figure 7.4).

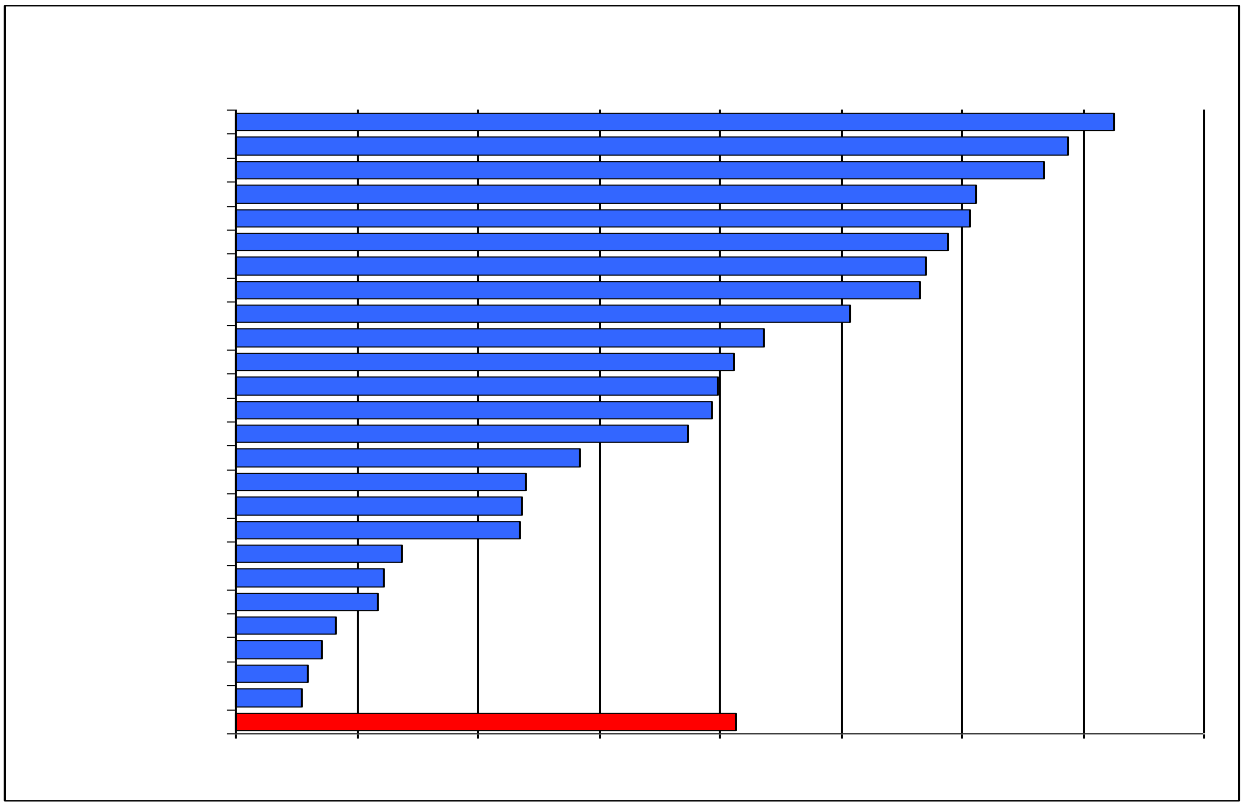


Measles immunization coverage: Only one state (Gezira at 89.5 per cent) had a measles vaccination coverage (i.e., percentage of children aged 12-23 months who received measles vaccine at any time up to the date of the survey) of over 85 per cent (Table 7.2 & Figure 7.5). The coverage was lowest in Jonglei State (19.7 per cent).



Fully immunized children

The percentage of children aged 12-23 months who received DPT1-3, OPV-1-3, BCG and measles vaccines at any time up to the date of the survey was only 41.4 per cent (Table 7.2). Major state differentials exist in regard to fully immunized children with only one state (Northern State) reporting a coverage of over 70 per cent, whilst seven states reported a coverage below 20 per cent, the lowest being in Western Bahr El Ghazal State (5.5) (Table 7.2 and Figure 7.6)

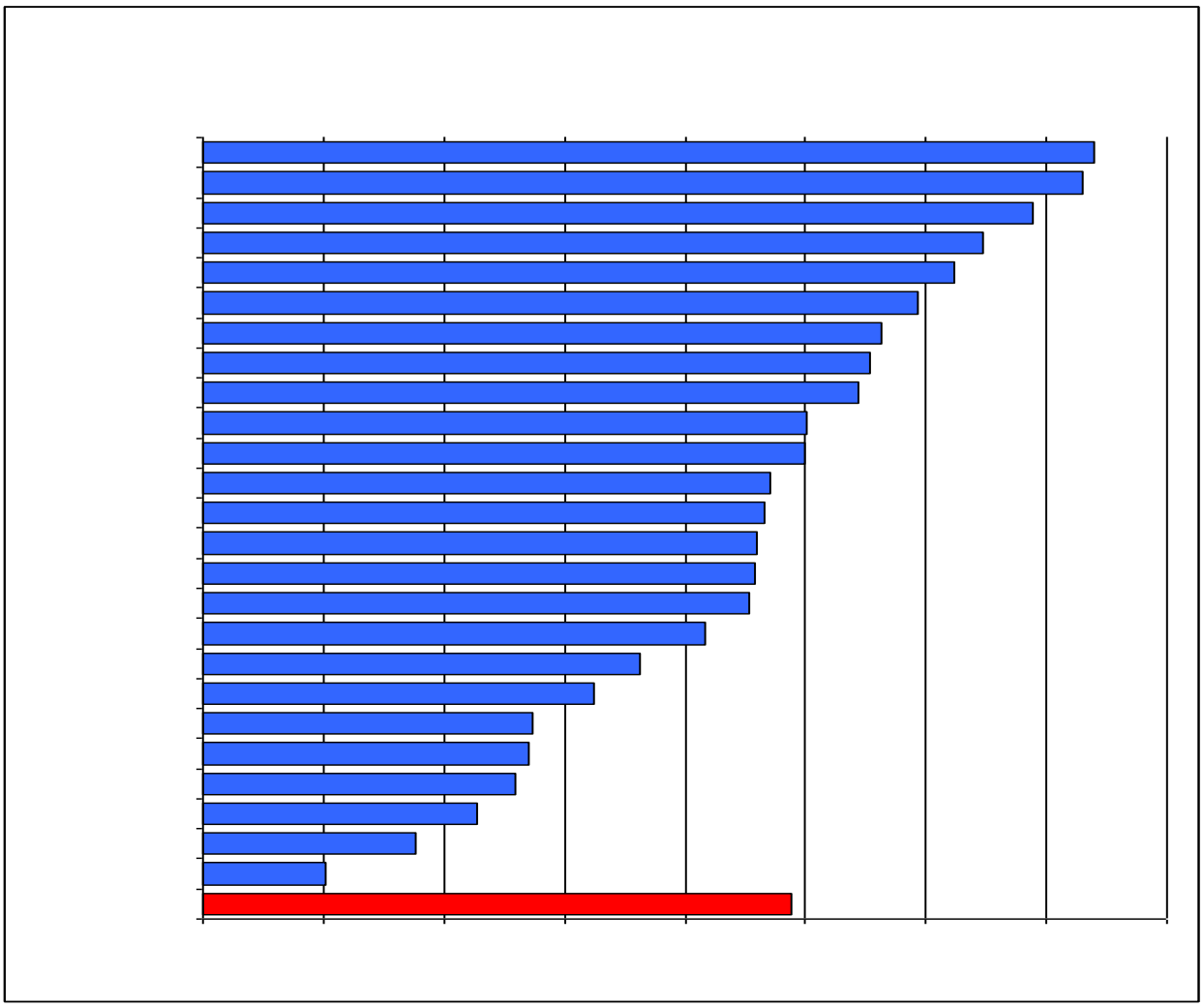


Neonatal tetanus protection

Table 7.3 shows the status of mothers protected against neonatal tetanus, i.e. proportion of mothers with live births in the previous year who were given at least two doses of tetanus toxoid (TT) vaccine within the appropriate interval prior to giving birth. Findings indicate that the percentage of mothers with a birth in the last 12 months protected against neonatal tetanus was only 48.8.

The table also shows the age pattern of these mothers. The percentage of women who received at least 2 doses during last pregnancy increases from 43.2 for women in the age group 15-19 years to 52.2 for women in the age group 30-34 years and to 52.4 for women in the age group 40-44 years and then declines to 35.3 for women aged 45-49 years. The level of education of the mother is also related to the likelihood of neonatal tetanus protection. For example, 67.6 per cent and 74.1 per cent of mothers protected against neonatal tetanus respectively had received primary and secondary or higher education as compared to 35.7 for mothers who had had no education. The economic status of the mothers also plays a role; the percentage of mothers protected against neonatal tetanus was 79.5 for those from the richest households as compared to 26.4 for those belonging to the poorest households.

Figure 7.7 shows the protection of women against neonatal tetanus by state. The proportion of mothers with live births in the previous year who were given at least two doses of tetanus toxoid (TT) vaccine was highest in Khartoum (74 per cent) followed by River Nile (73 per cent), and below 20 per cent in two states, the lowest in Jonglei at 10.1 per cent.



Management of diarrhoea

In the SHHS questionnaire, mothers (or caretakers of childeren) were asked to report whether their child had had diarrhoea in the two weeks prior to the survey. If so, the mother was asked a series of questions about what the child had to drink and eat during the episode and whether this was more or less than the child usually ate and drank.

Prevalence of diarrhea: Table 7.4 presents diarrhoea prevalence (proportion of children aged 0-59 months who had diarrhoea in the two weeks prior to the survey). Overall, 28.2 percent of under-five children had diarrhoea in the two weeks prior to the survey. Diarrhoea prevalence was very high in three states; the highest rate being in Western Equatoria (53.3 percent) followed by Western Bahr El Ghazal (51.8 per cent) and Unity State (50.5 per cent) and the lowest being in Red Sea State (15.2 per cent). The diarrhoea prevalence was 23.2 per cent among children less than 6 months old as compared to 36.9 among children aged 6-11 and 36.2 among children aged 12-23 months. Prevalence was relatively lower among children in the age group 36-47 months (22.4 per cent) and in the age group 48-59 months (21.9 per cent). Only a small difference was noted in diarrhoea prevalence between boys (28.9 per cent) and girls (27.4 per cent).

The mother's level of education was found to influence diarrhoea prevalence among children, as was the economic status of the household. The percentage of children who had had diarrhoea in the last two weeks before the survey was higher (32.3) among children of mothers with no education as compared to children of mothers with primary education (23.5 per cent) and children of mothers with secondary or higher education (16.4 per cent) and higher among children in the poorest households (37.8 per cent) than among those in the richest households (16.6 per cent).

ORT use rate

Table 7.4 also shows the ORT use rate, i.e. proportion of children aged 0-59 months with diarrhoea in the previous two weeks prior to the survey who had received oral rehydration salts(ORS) and/or an appropriate household solution (oral rehydration therapy) during the episode of diarrhoea. Since mothers were able to name more than one type of fluids, the percentages do not necessarily add to 100. About 31.3 per cent received fluids from ORS packets, 41.1 per cent received recommended homemade fluids while 41.7 per cent received no treatment. The ORT use rate was 58.3 per cent. Very little difference was noted between boys (59.4 per cent) and girls (57.1 per cent) in terms of ORT use rate

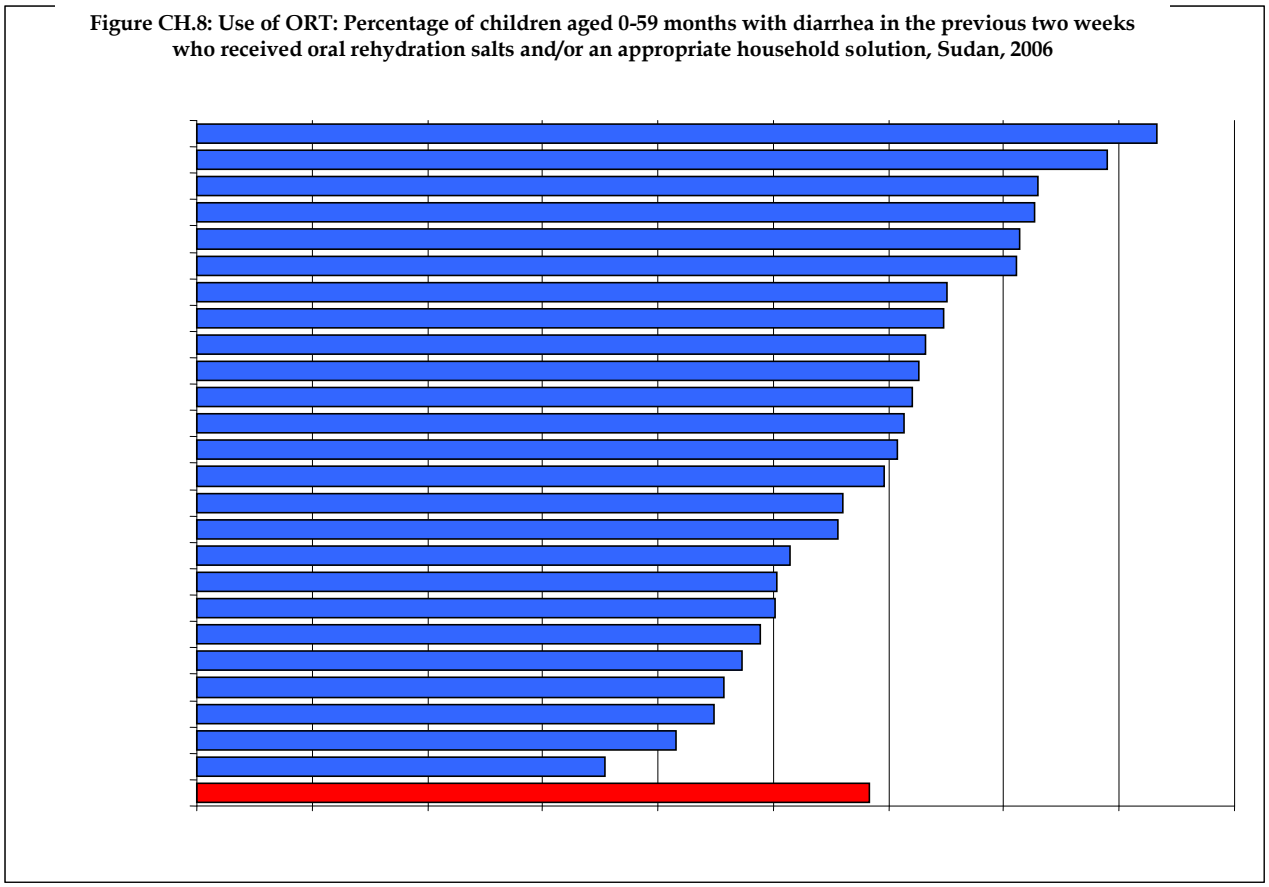
The percentage of children with diarrhoea who received fluid from ORS packet increases from 23.9 in the case of children aged below six months to 33.7 for children aged 48-59 months while the percentage of children who received recommended homemade fluid increases from 24.4 in the case of children aged below six months to 45.6 for children aged 24-35 months, and then decreases to 36.9 for children aged 48-59 months. The ORT use rate increases from 40.3 per cent for children aged below 6 months to 63.1 per cent for children aged 24-35 months, and then declines to 57.6 per cent for children aged 48-59 months. While 59.2 per cent of children aged below six months received no treatment, the percentage declines steadily to 36.9 for children aged 24-35 months, and then increases to 42.3 in the case of children aged 48-59 months.

Children with diarrhoea who received recommended homemade fluid was 37 per cent for children of mothers with no education compared to 60.1 per cent for children with mothers with secondary or higher education unlike in the case of children who received fluid from ORS packet. The percentage of children who received fluid from ORS packet was lower for children of mothers with secondary or higher education at 18.2 per cent than children of mothers with primary education (23 per cent) and with no education (35 per cent).

The percentage of children who received homemade fluid was higher among children belonging to the richest households (58.6 per cent) than that among children from the poorest households (35 per cent). However, the percentage of children who received fluid from ORS packet was lower among children from the richest households (22.3 per cent) than those from the poorest households (37.2 per cent).

The ORT use rate was 56.9 per cent for children of mothers with no education compared to 60.9 per cent for children of mothers with primary education, and 66.7 per cent for children of mothers with secondary or higher education. The ORT use rate was 66.7 per cent for children from the richest households compared to 56.8 per cent for those from the poorest households.

Figure CH.8: Use of ORT: Percentage of children aged 0-59 months with diarrhea in the previous two weeks who received oral rehydration salts and/or an appropriate household solution, Sudan, 2006



The ORT use rate was highest in Eastern Equatoria State (83.2 per cent) and the lowest in Blue Nile State (35.4 per cent) (Table 7.4 and Figure 7.8).

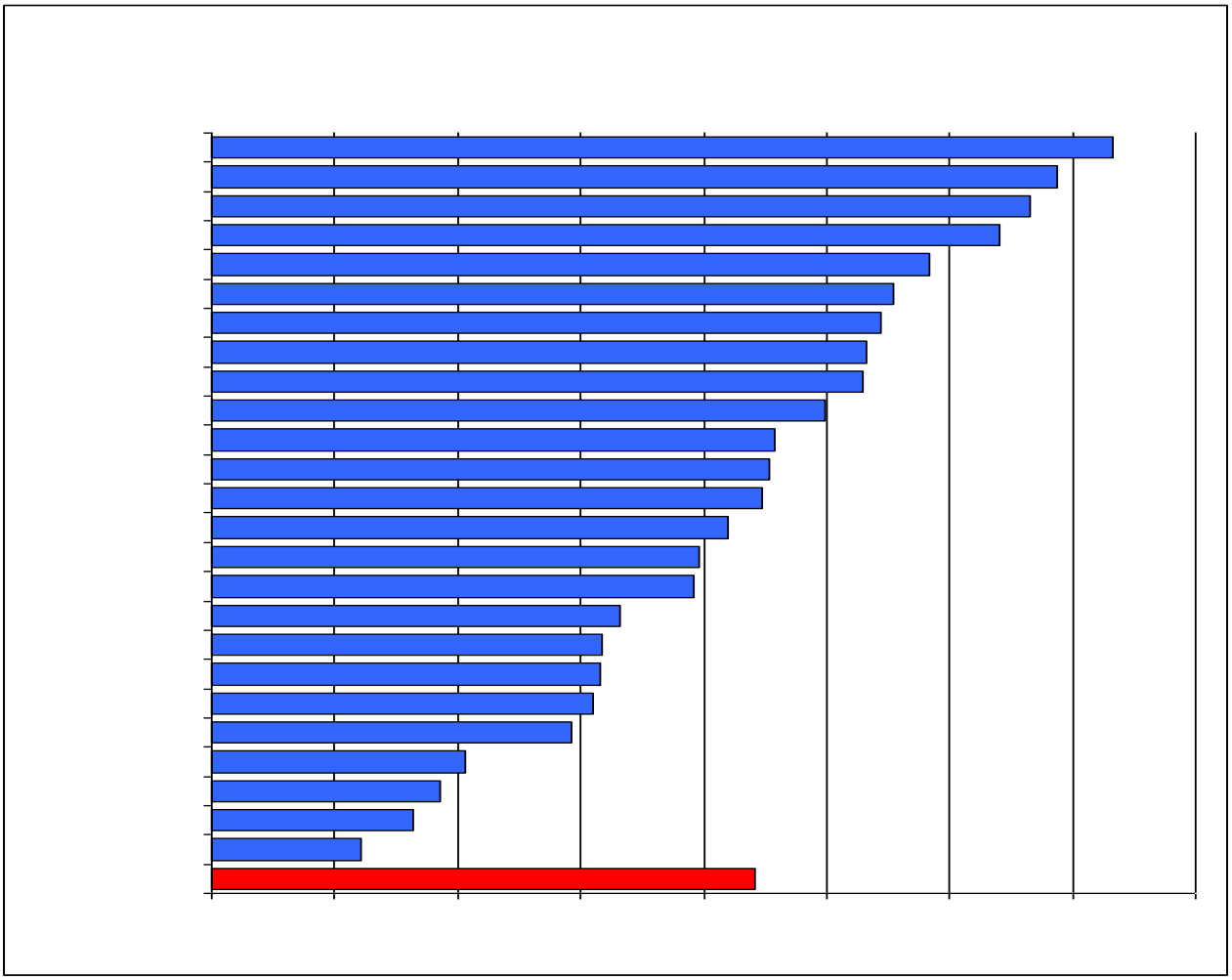
Home management of diarrhea

Table 7.5 presents home management of diarrhoea (proportion of children aged 0-59 months with diarrhoea in the previous two weeks who received more fluids AND continued eating somewhat less, the same or more food).

The SHHS findings indicate that about one-fourth (26.4 per cent) of under-five children with diarrhoea took ORS or an appropriate household solution more than usual while 63 per cent took

the same quantity or less and 78.9 per cent ate somewhat less, same or more (continued feeding), but 78.6 per cent ate much less or ate almost none (Table 7.5). In all, about 22.1 per cent of children received adequate home management of diarrhoea (i.e. received more fluids AND continued eating somewhat less, the same or more food during the episode of diarrhoea). It is also observed that 55.9 per cent of children either received ORT or increased fluids and continued feeding. Very little difference was noted between boys (21.5 per cent) and girls (22.7 per cent) in terms of home management of diarrhoea.

The percentage of children who were offered adequate home management of diarrhoea ranged from 13.8 among those aged 0-11 months to 25.6 among those aged 48-59 months. There is little impact of educational and economic levels of mothers on home management of diarrhoea. However, there are differences among states in terms of home management of diarrhoea (Figure 7.9). The percentage of children aged 0-59 months with diarrhoea who received more fluids AND continued eating somewhat less, the same or more food during the episode of diarrhoea was highest in Western Equatoria (36.6 per cent) and the lowest in West Darfur (6.1 per cent) .



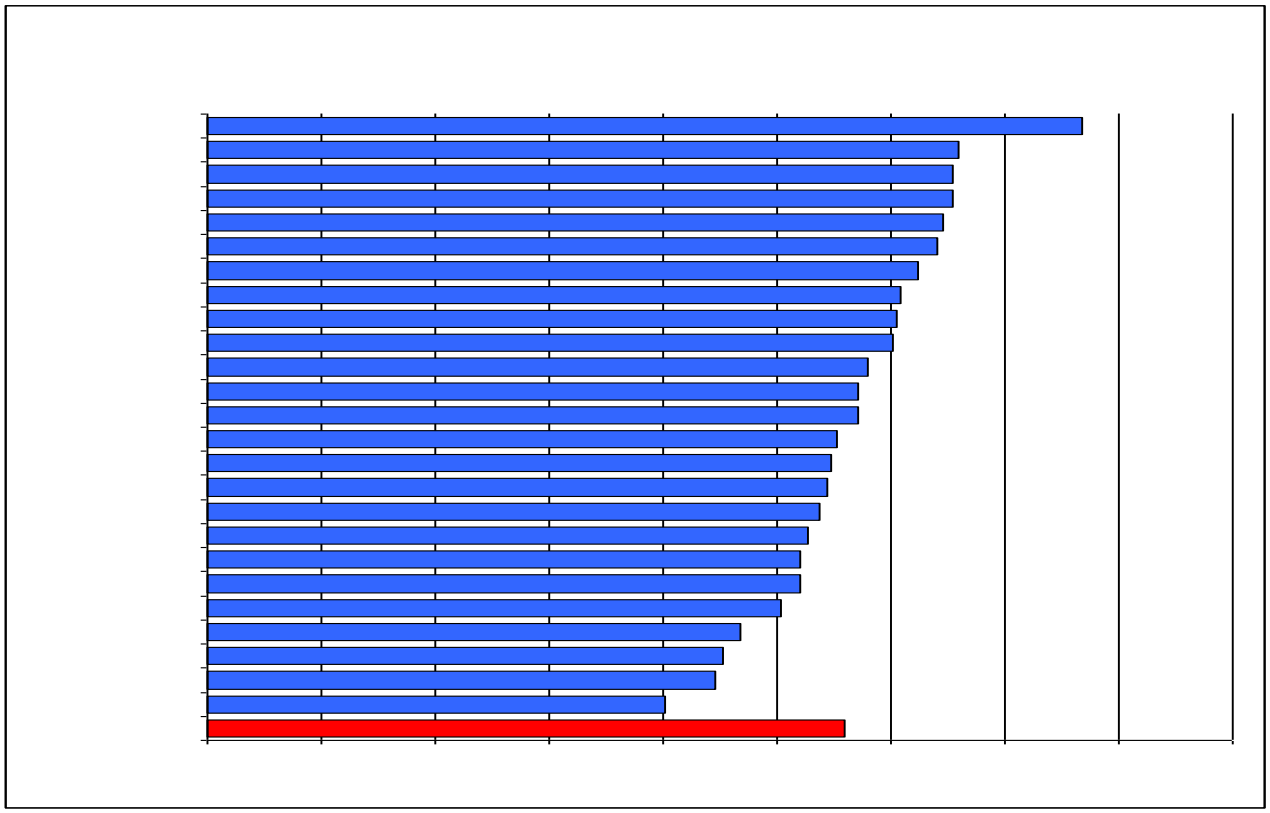
Received ORT or increased fluids, with continued feeding

The SHHS findings also indicate that over one-half (55.9 per cent) of under-five children with diarrhoea received ORT or increased fluids AND continued feeding (Table 7.5). Very little difference was noted between boys (56.1 per cent) and girls (55.7 per cent) during the episode of diarrhoea. However, there is noticeable difference between children of different age groups. The

percentage increased from 39.0 per cent among children aged 0-11 months to 58.8 among those aged 12-23 months, and to 63.3 among children aged 24-35 months, and then declined to 61.9 among those aged 36-47 months and to 60.4 among those aged 48-59 months.

The educational level of the mothers and the economic status of the household was found to impact the percentage of children receiving ORT or increased fluids AND continued feeding; the percentage being 54.9 per cent for children of mothers with no education as compared to 58.7 per cent among children of mothers with primary education and 60.4 per cent among children of mothers with secondary or higher education. The percentage of children showed an increasing trend from 53.2 per cent for children from the poorest households to 58.9 per cent for children from the richest households.

There are also differences among states in terms of children with diarrhoea who received ORT or increased fluids AND continued feeding (Figure 7.10), the percentage being highest in Eastern Equatoria (76.8 per cent) and the lowest in Jonglei (40.2 per cent).



Care seeking for suspected pneumonia

Table 7.6 presents the prevalence of suspected pneumonia (i.e. proportion of children who had acute respiratory infection in the two weeks prior to the survey). It also indicates details relating to care seeking for suspected pneumonia (proportion of children aged 0-59 months who had suspected pneumonia in the last two weeks and were taken to an appropriate health provider).

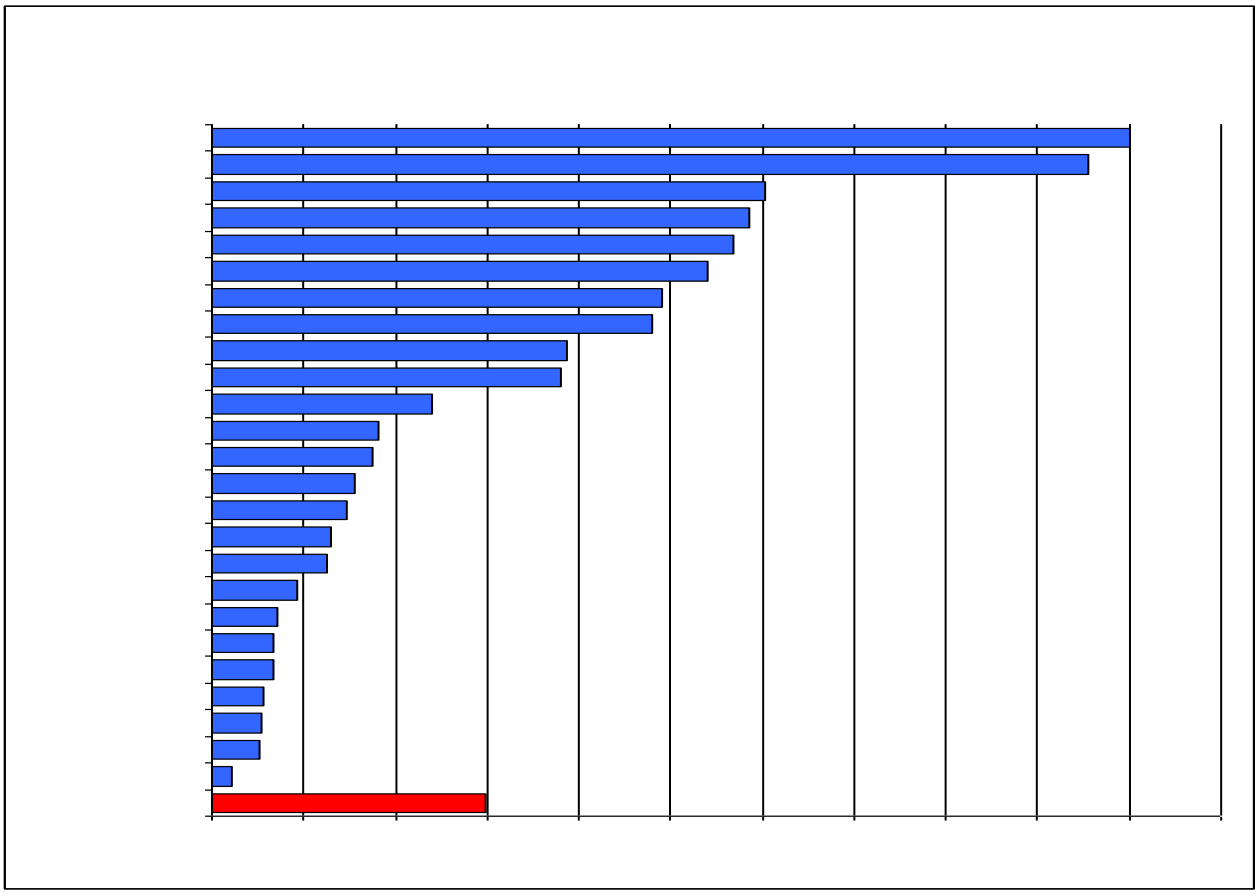
About 12 per cent of children aged 0-59 months were reported to have had symptoms of pneumonia during the two weeks preceding the survey, ranging from 22.5 per cent in Unity State and 5.8 per cent in Jonglei. Very little difference between boys (11 per cent) and girls (9.8 per cent) and with regards to the level of mother's education and the economic level of the household was observed. Only a marginal difference was noted between boys (12.9 per cent) and girls (11.1 percent) in regard to those who had acute respiratory infection in the last two weeks before the survey.

Of the children with suspected pneumonia, 90.1 per cent were taken to an appropriate health provider, with not much difference between boys (90.1 per cent) and girls (90.2 percent). The percentage of children with suspected pneumonia taken to government hospital, government health centre and government health post and mobile/outreach clinic was 65.1. The percentage of children with suspected pneumonia taken to private facilities such as private hospital/clinic, private physician, pharmacy, mobile clinic and other private medical facilities was 18.1.

Knowledge of the danger signs of pneumonia

Mothers' knowledge of the danger signs of pneumonia is an important determinant of care-seeking behaviour. Information relating to the knowledge of the danger signs of pneumonia (proportion of mothers/caretakers of children aged 0-59 months who recognize fast and difficult breathing as signs for seeking care immediately) is presented in Table 7.7. Overall, only 14.9 per cent of women know of the two danger signs of pneumonia namely fast and difficult breathing. About 24.1 per cent of mothers identified fast breathing and 26.5 per cent identified difficult breathing as symptoms for taking children immediately to a health care provider. The most commonly identified symptom for taking a child to a health facility is fever (59.6 per cent) followed by becoming sicker (49.5 per cent). The percentage of mothers/caretakers who recognise the two danger signs of pneumonia was higher among mothers with secondary or higher education (20.4) as compared to mothers with no education (14.4). Similarly, the percentage of mothers/caretakers who recognise the two danger signs of pneumonia was higher among mothers from the richest households (21.1) than those belonging to the poor households (15.2).

The percentage of mothers/caretakers who recognise the two danger signs of pneumonia was highest in Upper Nile (50 per cent) and the lowest in Gedarif (1.1 per cent). (Figure 7.11).

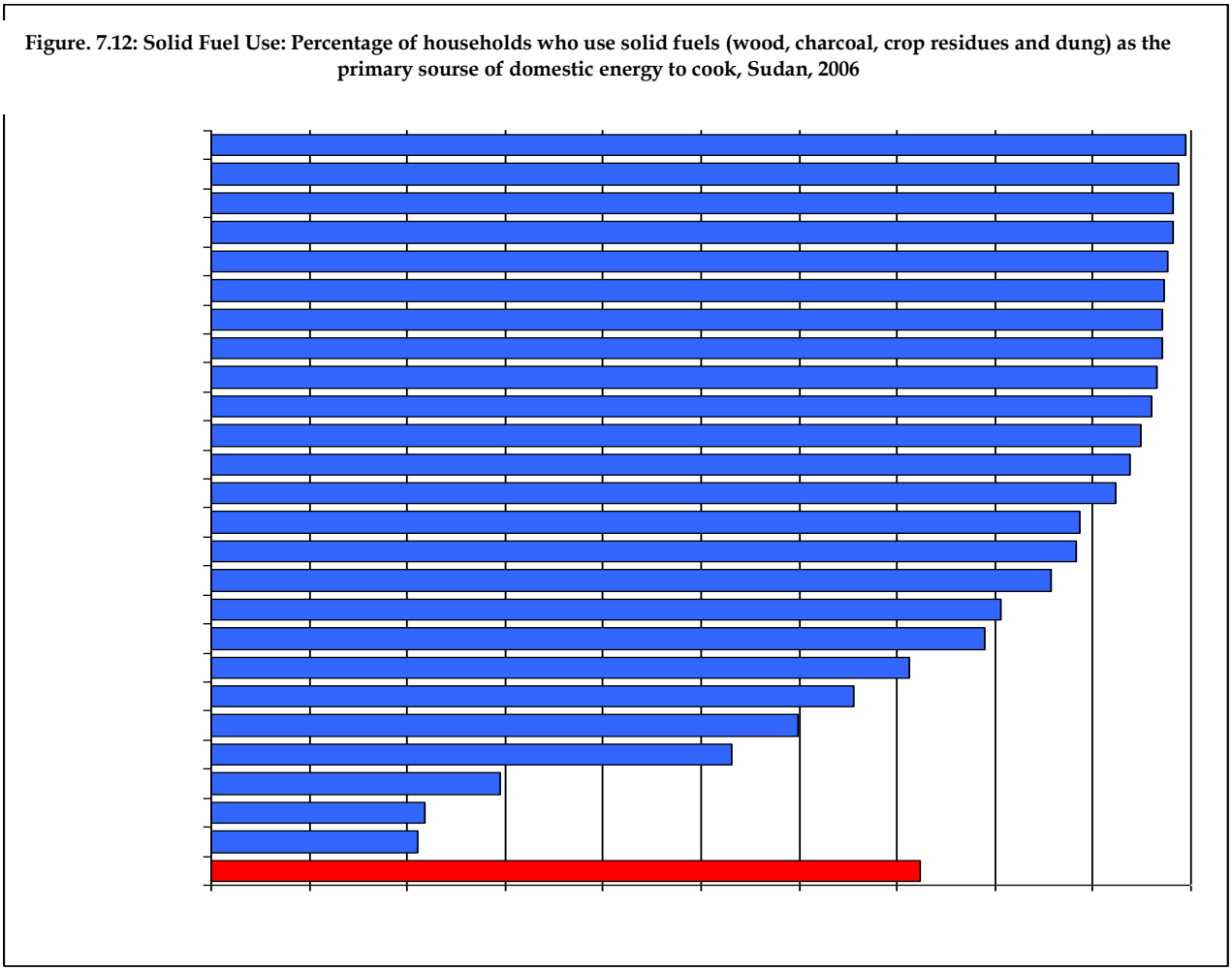


Solid fuel use

Table 7.8 showed solid fuel use, i.e., proportion of the population using solid fuels as the primary source of domestic energy for cooking. Overall, about three-fourths (72.4 per cent) of all households in Sudan were found to be using solid fuels for cooking. The table also clearly shows that the overall percentage was high due to high level of use of wood (53.7 per cent) for cooking purposes.

More than 95 per cent of the households in ten states use solid fuels (Figure 7.12) the highest being West Equatoria at 99.4 percent whereas River Nile (21.1 per cent) has the lowest level.

Figure. 7.12: Solid Fuel Use: Percentage of households who use solid fuels (wood, charcoal, crop residues and dung) as the primary sourse of domestic energy to cook, Sudan, 2006



Malaria prevention and control

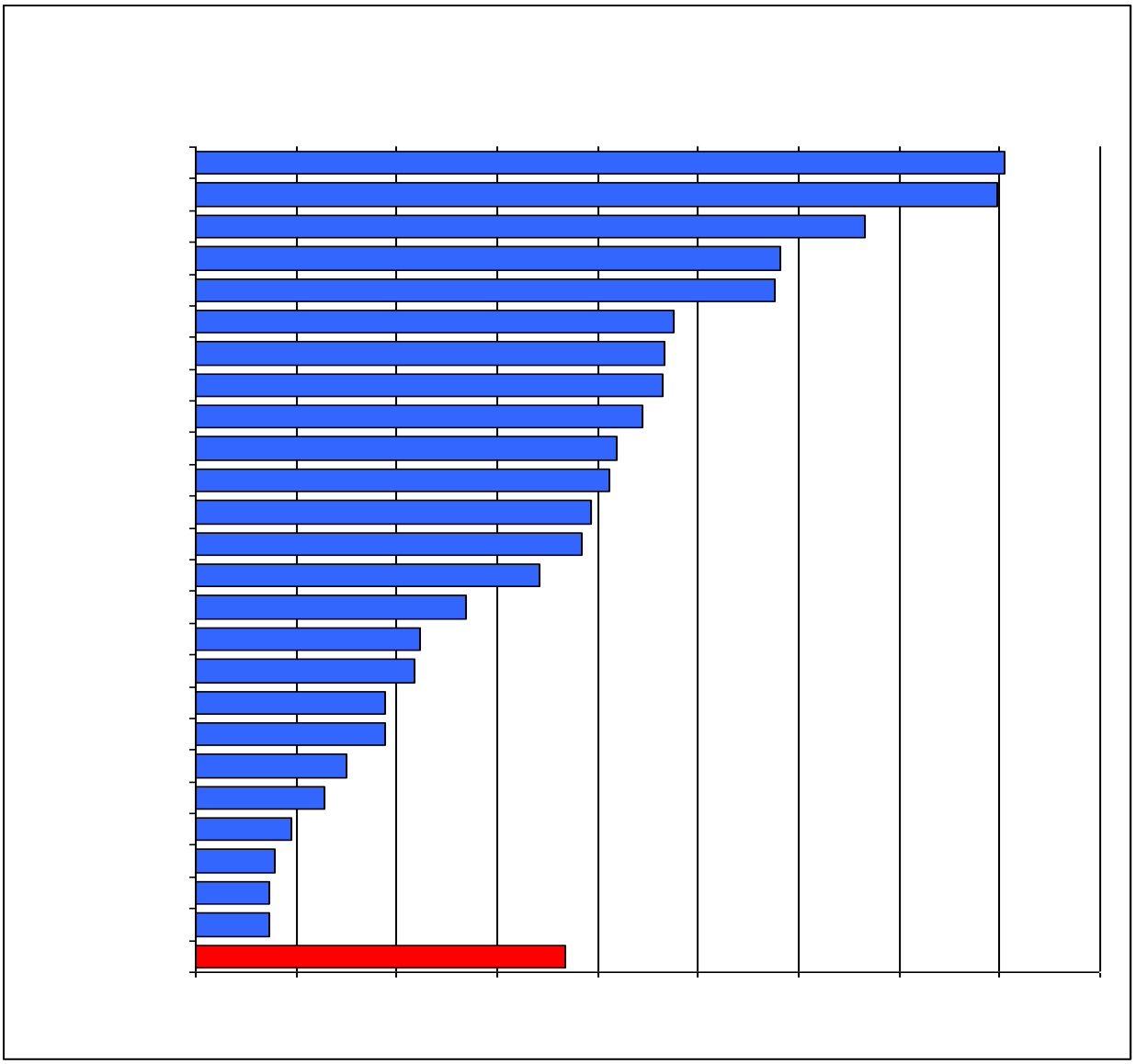
The SHHS questionnaire incorporated questions on the availability and use of bed nets, both at household level and among children under five years of age, as well as anti-malarial treatment. The results are presented in (Table 7.9 and Table 7.10).

Availability of insecticide-treated nets

Table 7.9 presents information relating to the availability of bednets - proportion of households with at least one mosquito net and proportion of households with at least one insecticide- treated net). The results indicated that only 36.8 per cent of households had a mosquito net (Table 7.9), and that only 18.4 per cent of households had an insecticide-treated net (ITN).

However, states vary widely in terms of household availability of bed nets. The percentage of households with at least one mosquito net was highest in Unity (78.5) and the lowest in Northern State (14.6) (Table 7.9) while the percentage of households with at least one ITN was highest in Sinnar (40.2) and the lowest in Northern and Western Bahr El Ghazal (3.7) (Table 7.9 and Figure 7.13).

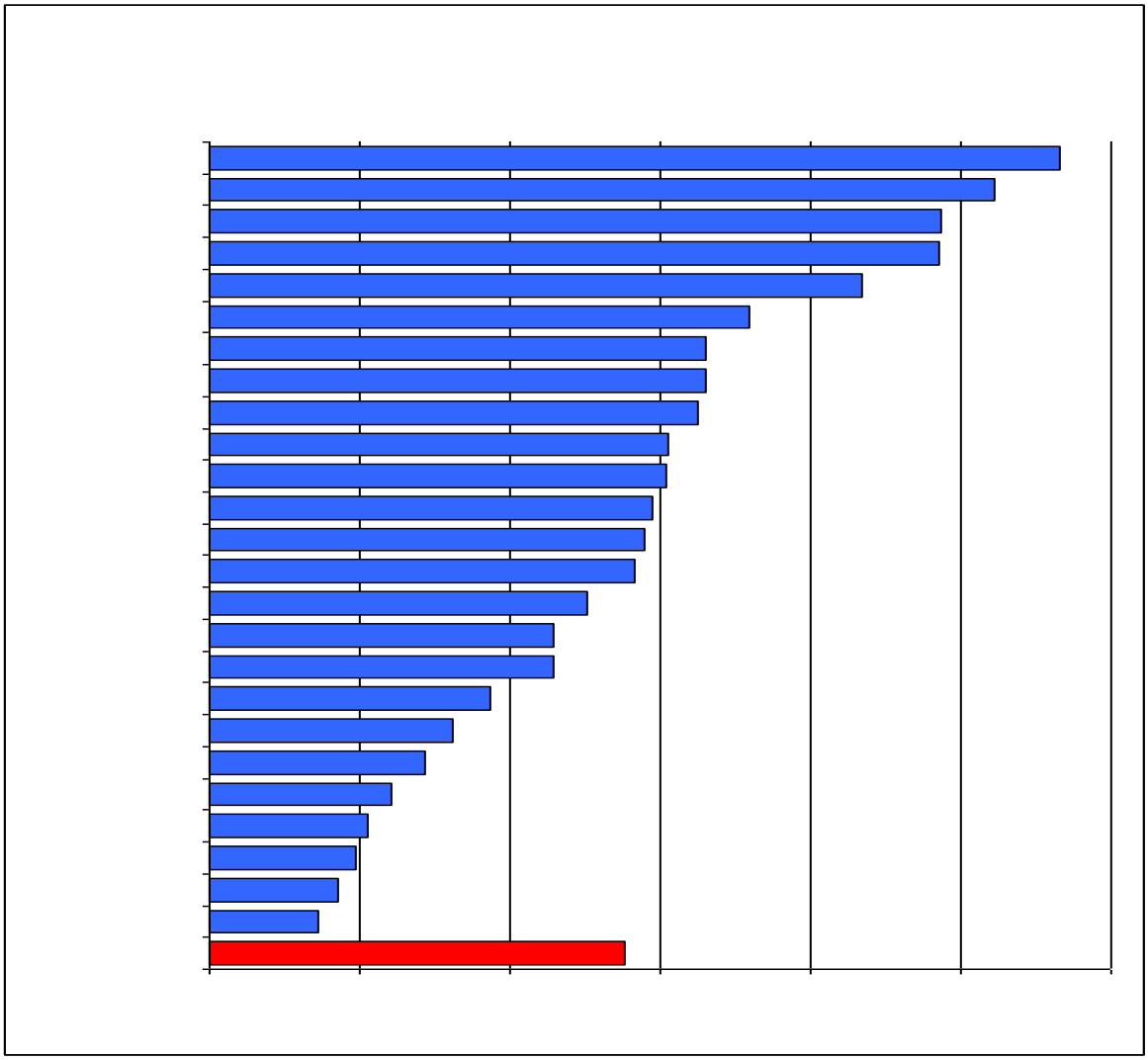
Educational level of the household head had no impact on the availability of ITNs, although the wealth index did: the percentage of households with at least one ITN was only 9.1 in the case of the poorest households as compared to 23.3 for the richest households.



Children sleeping under insecticide-treated nets

Table 7.10 presents information relating to proportion of children sleeping under an insecticide-treated net (ITN). Results indicate that 27.6 per cent of children aged 0-59 months slept under an ITN during the previous night of the survey.

The proportion of children who slept under an insecticide-treated net varied with the economic level of the households: 37.1 per cent belonged to the richest households as compared to 15.3 from the poorest households. The educational level of the household head seems to have only a marginal impact on the proportion of children sleeping under an ITN. However, variations by state are quite wide: ranging from 56.6 in Sinnar to 7.3 in Western Equatoria (Fig 7. 14).

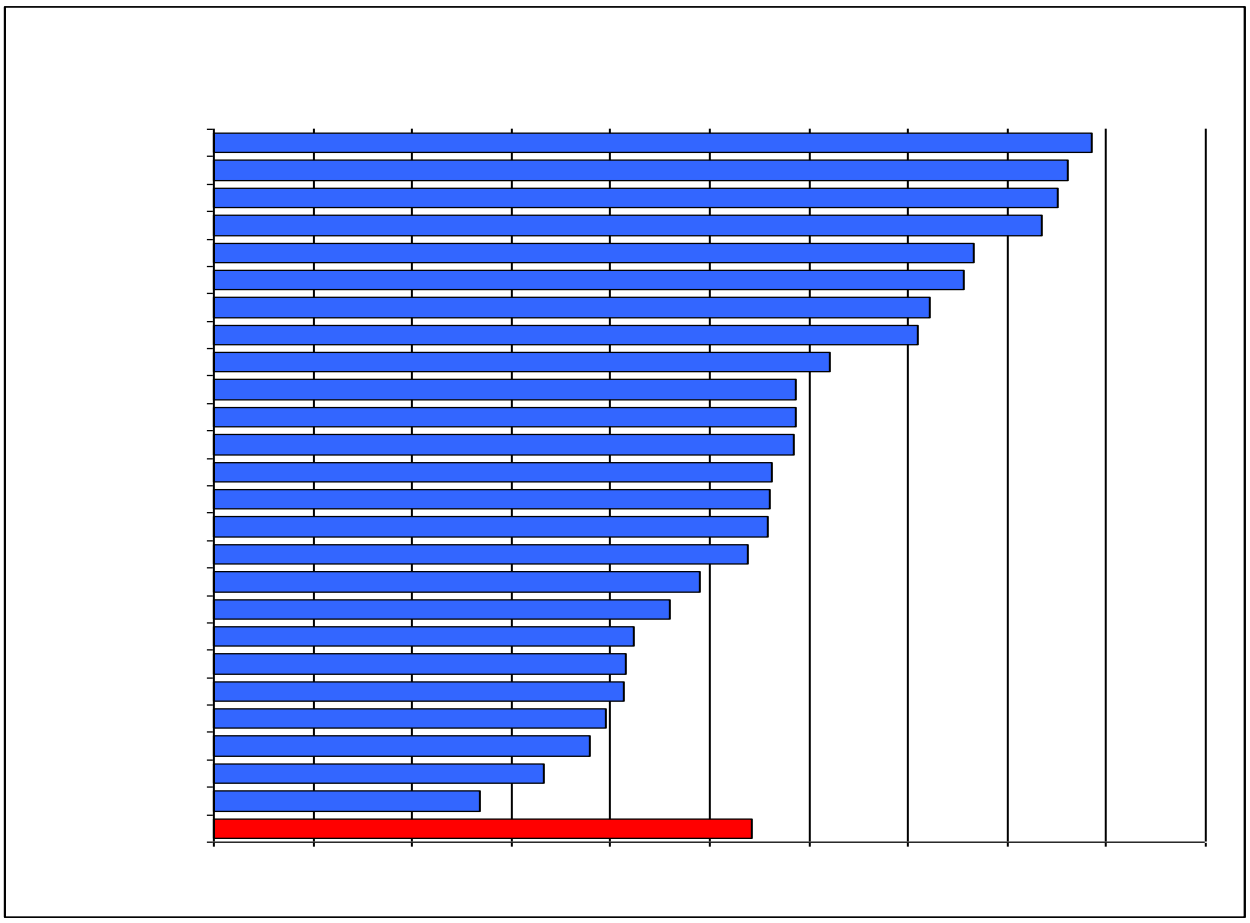


Treatment of children with anti-malarial drugs

Questions on the prevalence (proportion of children 0-59 months of age who were ill with fever in the last two weeks) and treatment of fever were asked for all children under age five. Slightly more than one in five (20.9 per cent) of under-five children were ill with fever in the two weeks prior to the survey (Table 7.11). Fever prevalence increased with age and peaked at 24-35 months (23.3 per cent). State differences in fever prevalence are wide, ranging from 53.4 per cent in Western Equatoria to 4.1 percent in North Darfur. Fever prevalence is more common among children of mothers with no education (25.5 per cent) than among children of mothers with primary education (15.3 per cent) and secondary or higher education (9 per cent). Fever is also more common among children belonging to the poorest households (33.6 per cent) than among those belonging to the richest households (11.6 percent).

Mothers were asked to report all of the medicines given to a child to treat the fever, including both medicines given at home and medicines given or prescribed at a health facility. Overall, 54.2 per cent of children with fever in the last two weeks before the survey were treated with an "appropriate" anti-malarial drug (Table 7.11), ranging from 88.6 in River Nile to 26.9 in Jonglei (Figure 30, CH.15). However, only 2.6 per cent received anti-malarial drugs within 24 hours of onset of symptoms. "Appropriate" anti-malarial drugs include chloroquine, SP, amodaquine, artimisine combination drugs, etc. In Sudan, 44.9 percent of children with fever were given chloroquine, while 9.6 per cent were given SP. Only 3.8 per cent received artemisinin-based combinations. A cosiderable proportion of children (26.4 percent) were given other types of medicines that are not anti-malarials, including anti-pyretics such as paracetemol, aspirin, or ibuprofen.

Findings indicate that children of mothers with primary education (71.7 per cent) and with secondary or higher education (78.3 per cent) are more likely than children of mothers with no education (48.3 per cent) to receive appropriate anti-malarial drugs as are the children belonging to the richest households (84.3 per cent) than children from the poorest households (42.6 per cent). Not much difference was noted between boys (55.8 percent) and girls (52.4 per cent) receiving appropriate anti-malarial drugs.



Sources of anti-malarial drugs

During SHHS, questions were included to collect information on the sources of antimalarials. Table 7.12 provides information relating to the sources of antimalarials for children under five years of age.

VIII.Education

Education is a human right and a vital prerequisite for combating poverty, empowering women, and protecting children from hazardous and exploitative labour and sexual exploitation. Education is also a key factor to promoting human rights and democracy, promoting peace and tolerance, protecting the environment, and influencing population growth. Research points strongly to the economic and social benefits of basic education. Educating girls directly contributes to improvement of family welfare and reduction in the effects of poverty. Basic education of good quality is critical to equipping individuals with the means to contribute to and benefit from economic development and to reducing deprivation and vulnerability of the disadvantaged populations. Education helps in improving the earning potential of an individual, promotes the health of children, reducing child mortality.

Research also points strongly to the economic and social benefits of girls' education. Educating girls directly contributes to improvement of family welfare and reduction in the effects of poverty. The SHHS results indicate that with a few years of basic education, women are more likely to seek antenatal care, institutional deliveries, skilled attendant at delivery, and to provide children with better nutrition, ensure they are immunized and provided with appropriate medical care during illness, thereby reducing infant and under five mortality.

The education system in Sudan comprises of basic/primary, secondary and tertiary education. Basic/primary education for pupils aged 6-13 years consists of eight years of education covering grades 1-8 leading to basic/primary education certificate. Pre-school education, offered through Kindergartens for children aged 4-5 years, is neither free nor compulsory. The general/academic and technical secondary education covers grades 9-11 leading to the Sudan School Certificate. The school education system also includes schools for children with special needs, and technical and vocational education centres which offer two-year vocational courses. The entry qualification required for enrolling in undergraduate courses offered by universities is the Sudan School Certificate. In this report, the term primary education refers to basic education (grades 1-8).

Primary and secondary school participation:

Universal access to basic education and the achievement of primary education by the world's children is one of the most important Millennium Development Goals and those of A World Fit for Children. The MDG target is to ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling. The WFFC target in support of this MDG target is to reduce the number of primary school-age children who are out of school by 50 per cent and increase net primary school enrolment or participation in alternative, good quality primary education programmes to at least 90 per cent by 2010.

The key indicators for primary and secondary school participation and school progression corresponding to the school year 2005-2006 include the following:

Net intake rate in primary education: Proportion of children of primary school-entry age attending first grade of primary school.

Net attendance rate of primary school-age children: Proportion of children of the official primary school-age group attending primary or secondary school.

Gender parity index : Ratio of primary school-age girls to boys attending primary school;

Secondary school net attendance rate: Proportion of children of the official secondary school-age group attending secondary school or higher-level institutions.
Primary school attendance rate of secondary school-age children: Proportion of children of secondary-school age attending primary school.
Survival rate to grade five: Proportion of children entering first grade of primary school in a given school year who eventually reach grade five (i.e., percentage of a cohort of pupils enrolled in the first grade of primary school in a given school year who move to each successive grade and reach grade 5 .
Net primary school completion rate: Proportion of children of primary school completion age attending the last grade of primary school.
Transition rate to secondary education: Proportion of children who were in the last grade of primary school during the previous school year attending secondary school.

Net Intake Rate (NIR) in primary education

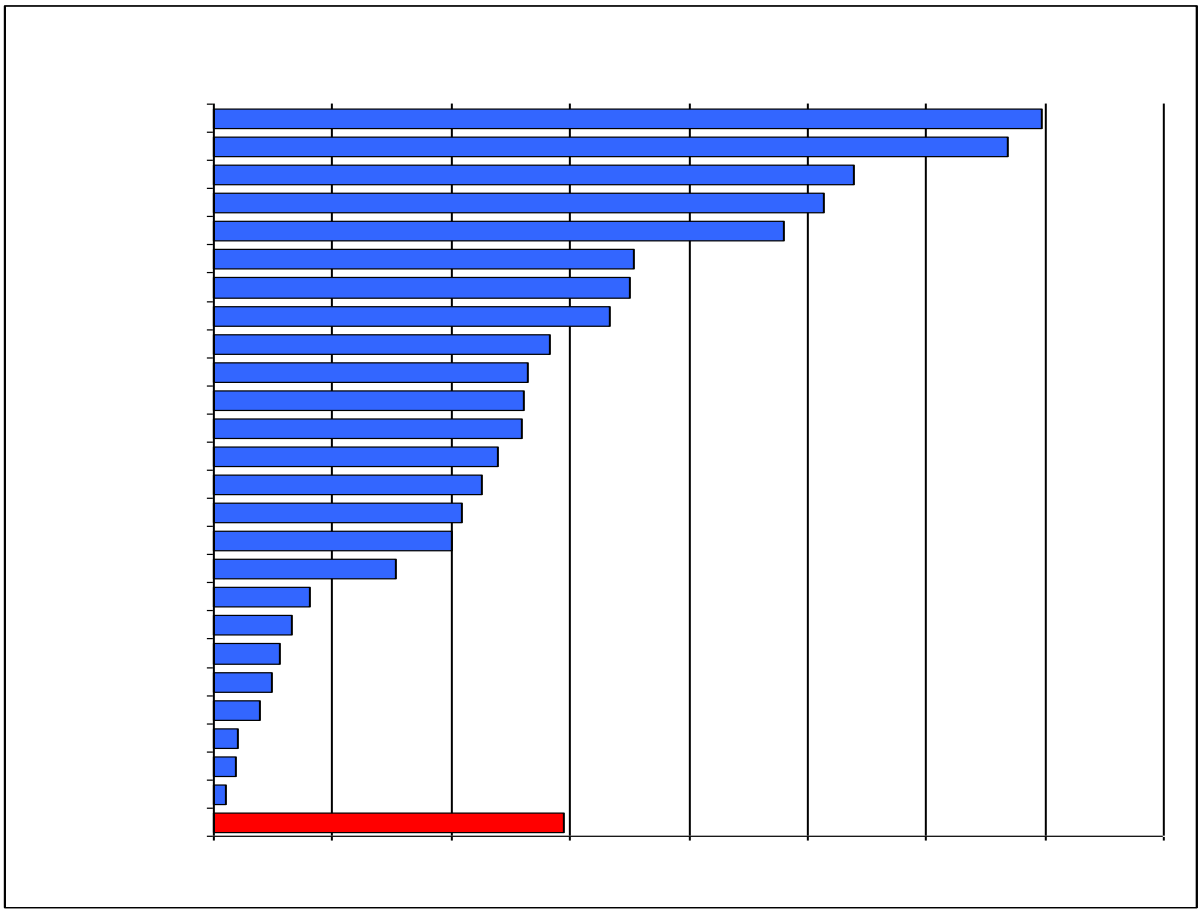
net intake rate (NIR) in primary education, i.e. the proportion of children of primary school-entry age attending first grade of primary school at the time of the survey. The official primary school entrance age in Sudan is 6 years. However, at the time of collecting SHHS data (February-June 2006), the new entrants in the first grade of primary education during the school year 2005-2006 had almost reached the age of 7 years. Therefore, in table 1, the age of the new entrants in the first grade of primary education is shown as 7 years although their age at the time of registration in the first grade of primary school in 2005 was 6 years.

The NIR shows the level of access to primary education of the eligible population. A high NIR indicates a high degree of access to primary education for children of official primary school entrance age while a low NIR indicates a low degree of access to primary education for children of official primary school entrance age. Achieving NIR of 100 per cent is a key target for achieving the goal of universal primary education.

The SHHS findings indicate that the net intake rate was only 29.5 per cent at the time of the survey. Sex differentials do exist; the NIR for boys was 31.6 per cent compared to 27.5 per cent for girls.

Economic level of the household appears to have an influence on the percentage of children of primary school-entry age attending grade 1. The net intake rate (NIR) was only nine per cent for children belonging to the poorest households as compared to 71 per cent for those from the richest households. Interestingly, there was little difference in net intake rates between children of mothers with no education (30.3 per cent) and those of mothers with primary education (30.5 per cent), and those of mothers with secondary or higher education (28.3 per cent) (table 9.2).

Large differentials in the net intake rates are present by state (Table 8.1 and Figure 8.1). The NIR ranged from 69.8 per cent in River Nile State and 66.9 per cent in Khartoum State (66.9 per cent) to 1 per cent in Northern Bahr El Ghazal State (Table 8.1 and Figure 8.1).



Net attendance rate of primary school-age children

net attendance rate (NAR) of primary school-age children, i.e. the proportion of children of primary school-age group attending primary or secondary school at the time of the survey. The official primary school-age group in Sudan is 6-13 years. However, at the time of collecting SHHS data (February-June 2006), children aged 6-13 years attending primary or secondary school in the beginning of the school year 2005-2006 had almost reached the age group of 7-14 years. Therefore, in table 34, ED.2, the age group of pupils attending primary or secondary school is shown as 7-14 years although they belonged to the age group 6-13 years in the beginning of the school year 2005-2006.

The NAR shows the extent of participation in education of children belonging to the official primary school-age group. A high NAR denotes a high degree of participation in education of the primary school-age population while a low NAR indicates a low degree of participation of the primary school-age population. Achieving NAR that is closer to 100 per cent is a key target for achieving the goal of universal primary education. Where the net attendance rate (NAR) of primary school-age children is less than 100 per cent, the complement (i.e., 100 per cent minus the NAR value) provides a measure of proportion of out-of-school primary school-age children.

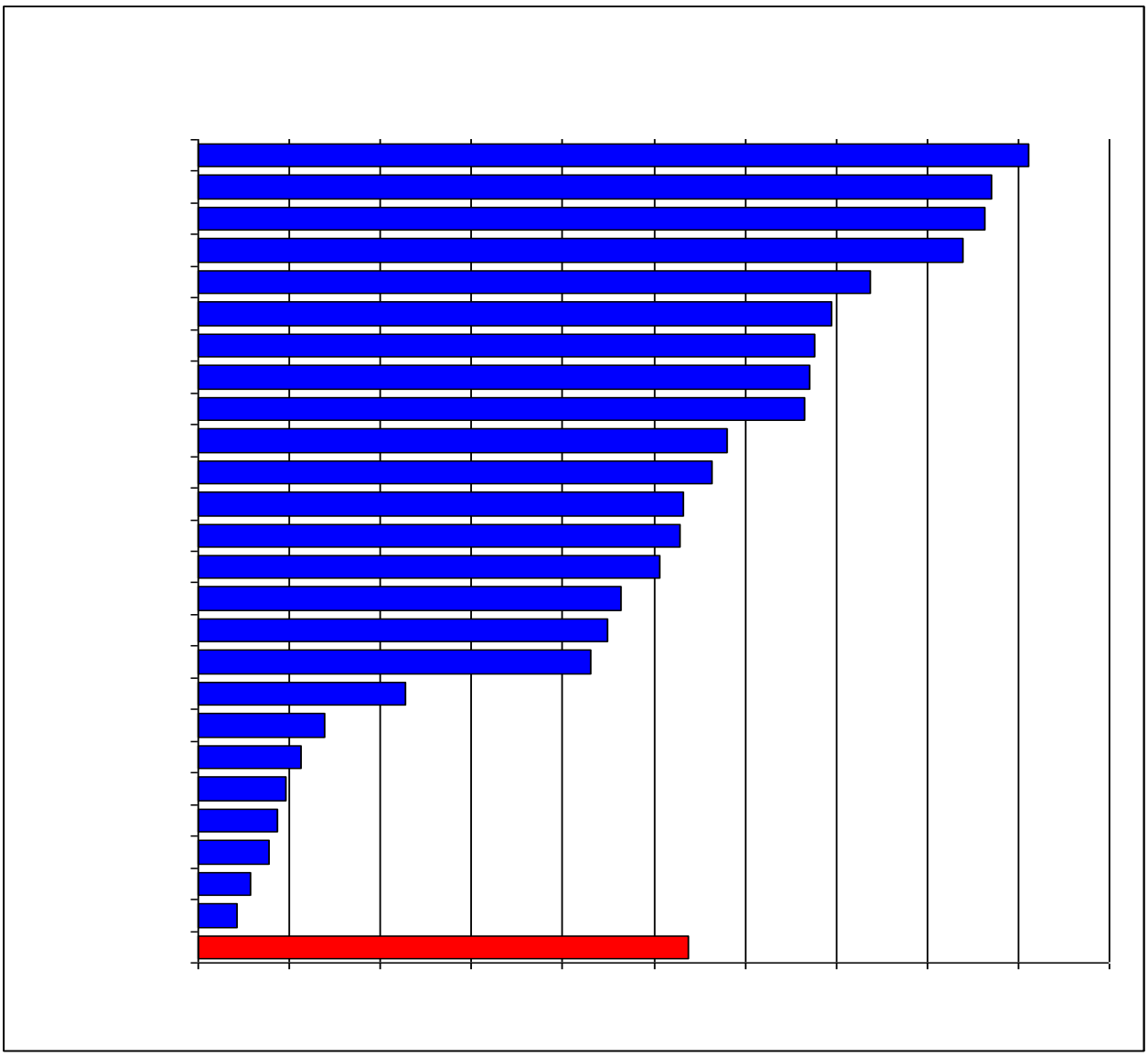
The SHHS data indicate that nationwide, only 53.7 per cent of children of primary-school age were attending school at the time of the survey, implying that a large proportion (46.3 per cent) of them remained out of school. The percentage of children of primary-school age attending school at the time of the survey was highest (67.7 per cent) among children aged 11 years and lowest among children aged 7 years (33.2 per cent) table 8.2.

Sex differentials in net attendance rates of primary school-age children do exist; the primary school net attendance rate for boys was 55.7 per cent compared to 51.7 per cent for girls. The net attendance rate (NAR) for boys was highest among those aged 11 years (69.5 per cent) and lowest among those aged 7 years (34.4 per cent). In the case of girls, the NAR was highest among those aged 11 years (65.9 per cent) and lowest among those aged 7 years (32.1 per cent).

The economic level of the households appears to have an influence on on NAR of primary school-age children. The NAR was only 19.4 per cent among children belonging to the poorest households compared to 92.9 per cent among children from the richest households. The NAR for boys was 22.4 per cent among those belonging to the poorest households compared to 93.6 per cent among those from the richest households. Similarly, the NAR for girls was only 16.4 per cent among those belonging to the poorest households compared to 92.1 per cent among those from the

richest households. The level of education of the mother did not show any impact o n thenet attendance rate of primary school-age children.

There are considerable variations in the net attendance rate (NAR) of primary school-age children among states - from 91.1 per cent in River Nile State to 4.3 per cent in Unity State (Table 9.2 and Figure 8.2. There are also considerable variations among states in terms of the net attendance rate of boys -- from 91.9 per cent in River Nile to 4.5 per cent in Unity State. Noticable variations also exist among states in net attendance rate of girls – from 90.4 per cent in River Nile to 3.4 per cent in Northern Bahr El Ghazal State.



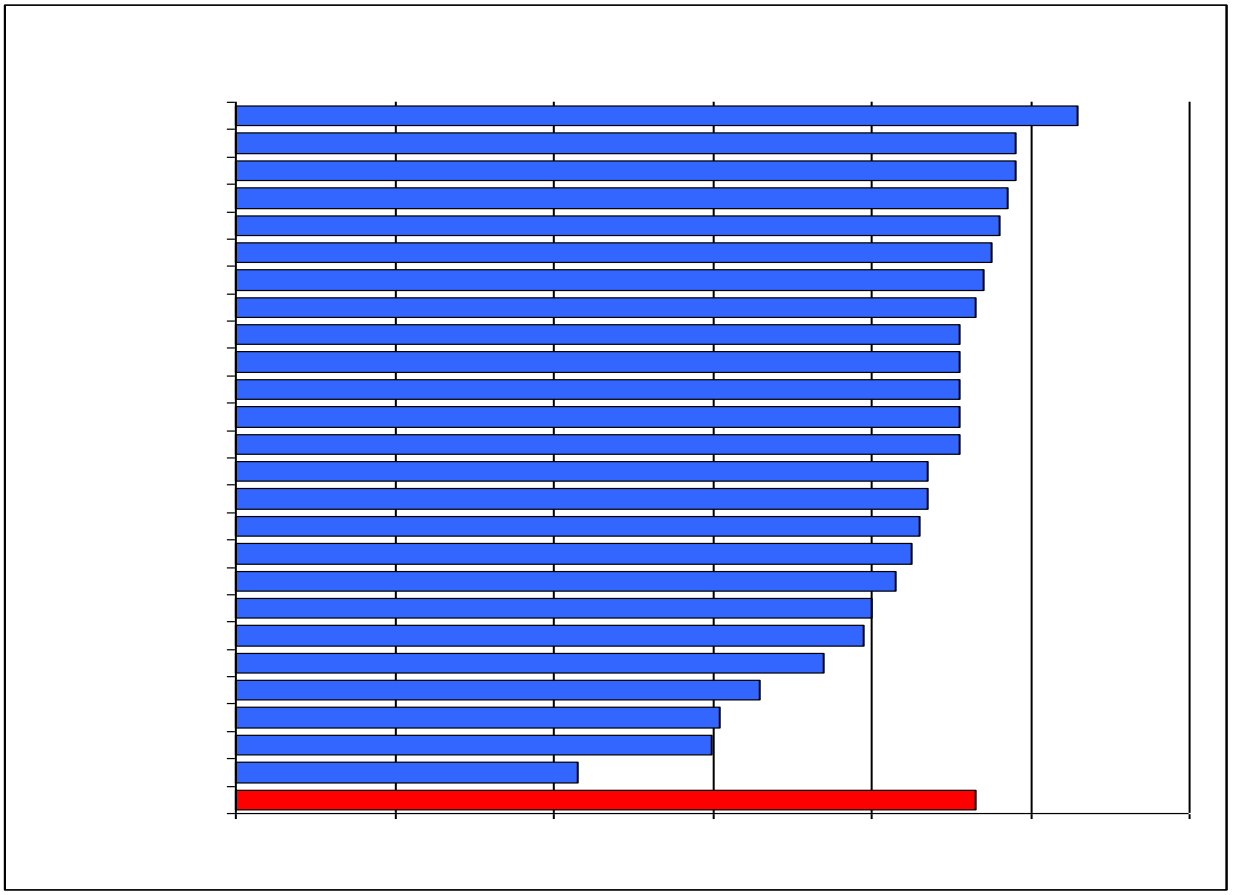
Gender parity

Another MDG target is to eliminate gender disparity in primary and secondary education, preferably by 2005, and in all levels of education no later than 2015. The WFFC target also envisages elimination of gender disparities in primary and secondary education by 2005, and achieving gender equality in education by 2015, with a focus on ensuring girls' full and equal access to and achievement in basic education of good quality. A key indicator for assessing

progress towards meeting these MDG and WFFC targets is the ratio of girls to boys in primary and secondary education (better known as the Gender Parity Index).

The ratio of girls to boys attending primary and secondary education (better known as the Gender Parity Index) is provided in Table 8.3. The Gender Parity Index (GPI) figures shown here are obtained from net attendance ratios rather than gross attendance ratios. The table shows that gender parity for primary school is 0.93, ranging from 1.06 in Red Sea State to 0.43 in Northern Bahr El Ghazal State (Table 9.3 and Figure 8.3). The GPI is over 0.90 in 12 states. In addition to Northern Bahr El Ghazal, the disadvantage of girls is particularly pronounced in six more states and among children living in the poorest households. The national value for this indicator seems to be negatively sekwed; however this national value is not a simple average for the values of the 25 states or for the values of the Northern States and the Southern states. The estimation of this indicator depends of the sapmle and wiehgts aloctaed to each state.

The gender parity index seems to improve with the economic level of the households. The GPI was only 0.73 among children belonging to the poorest households compared to 0.98 among children belonging to the richest households. There was very little difference in gender parity index among children of mothers with no education, with primary education, and with secondary or higher education.



Secondary school net attendance rate

, i.e., the proportion of children of secondary school-age group attending secondary school or higher-level institutions. The official secondary school-age group in Sudan is 14-16 years. However, at the time of collecting SHHS data (February-June 2006), children aged 14-16 years attending secondary school or higher-level institutions in the beginning of the school year 2005-2006 had almost reached the age group of 15-17 years. Therefore, in table 8.4, the age group of pupils attending secondary schools or higher-level institutions is shown as 15-17 years although they belonged to the age group 14-16 years in the beginning of the school year 2005-2006.

The SHHS data indicate that only less than one-fifth (18.9 per cent) of the children of secondary-school age were found to be attending secondary school or higher level of institutions at the time of the survey. Of the remaining 81.1 per cent of secondary school-age children, some of them were either attending primary school or were out of school.

Sex differentials in secondary school net attendance rates do exist; the net attendance rate for boys being 16.5 per cent compared to 21.9 per cent for girls. The secondary school net attendance rate

was highest (24.3 per cent) among children aged 17 years and lowest (11.6 per cent) among those aged 15 years. In the case of boys, the net attendance rate was highest (22.7 per cent) among those aged 17 years and lowest (9.7 per cent) among boys aged 15 years. In the case of girls also, the net attendance rate was highest (26.1 per cent) among those aged 17 years and lowest (14.6 per cent) among those aged 15 years.

The secondary school net attendance rate seems to increase with the economic level of the households. The NAR was only 1.3 per cent among children from the poorest households compared to 49.5 per cent among children from the richest households. The same trend is also seen in the case of NAR for boys and girls. The NAR was only 1.9 per cent among boys from the poorest households compared to 46.1 per cent among those from the richest households. Similarly, the NAR for girls was only 0.4 per cent among girls from the poorest households compared to 53.3 per cent among girls from the richest households. There was only a slight difference in secondary school net attendance rate among children of mothers with no education (18.3 per cent), children of mothers with primary education (20.8 per cent), and children of mothers with secondary or higher education (21.4 per cent).

There are large variations in the secondary school net attendance rate among states, ranging from 41.6 per cent in River Nile to zero per cent in Unity State (Table 8.4 and figure 8.4). There are also considerable variations among states in terms of secondary school net attendance rate (NAR) for boys. The secondary school NAR for boys ranged between 33.2 per cent in Northern State and zero per cent in Unity State.

Large variations also exist among states in terms of secondary school net attendance rate (NAR) for girls, with River Nile State registering the highest net attendance rate of 52.6 per cent and five states (Upper Nile, Unity, Warap, Western Bahr El Ghazal and Lakes) registering the lowest secondary school NAR at zero per cent.

Secondary school-age children attending primary school

The percentage of secondary school-age children attending primary school is presented in Table 8.5. More than a third (35.5 per cent) of secondary school age-children were found to be attending primary school when they should be attending secondary school. About 45.6 per cent of secondary school-age children were not attending school at all since the net secondary school attendance rate was only 18.9 per cent. The percentage of secondary school-age children attending primary school was highest (64.5 per cent) in Lakes State and the lowest (4.9 in Upper Nile State).

Children reaching grade 5 (Survival rate to grade 5)

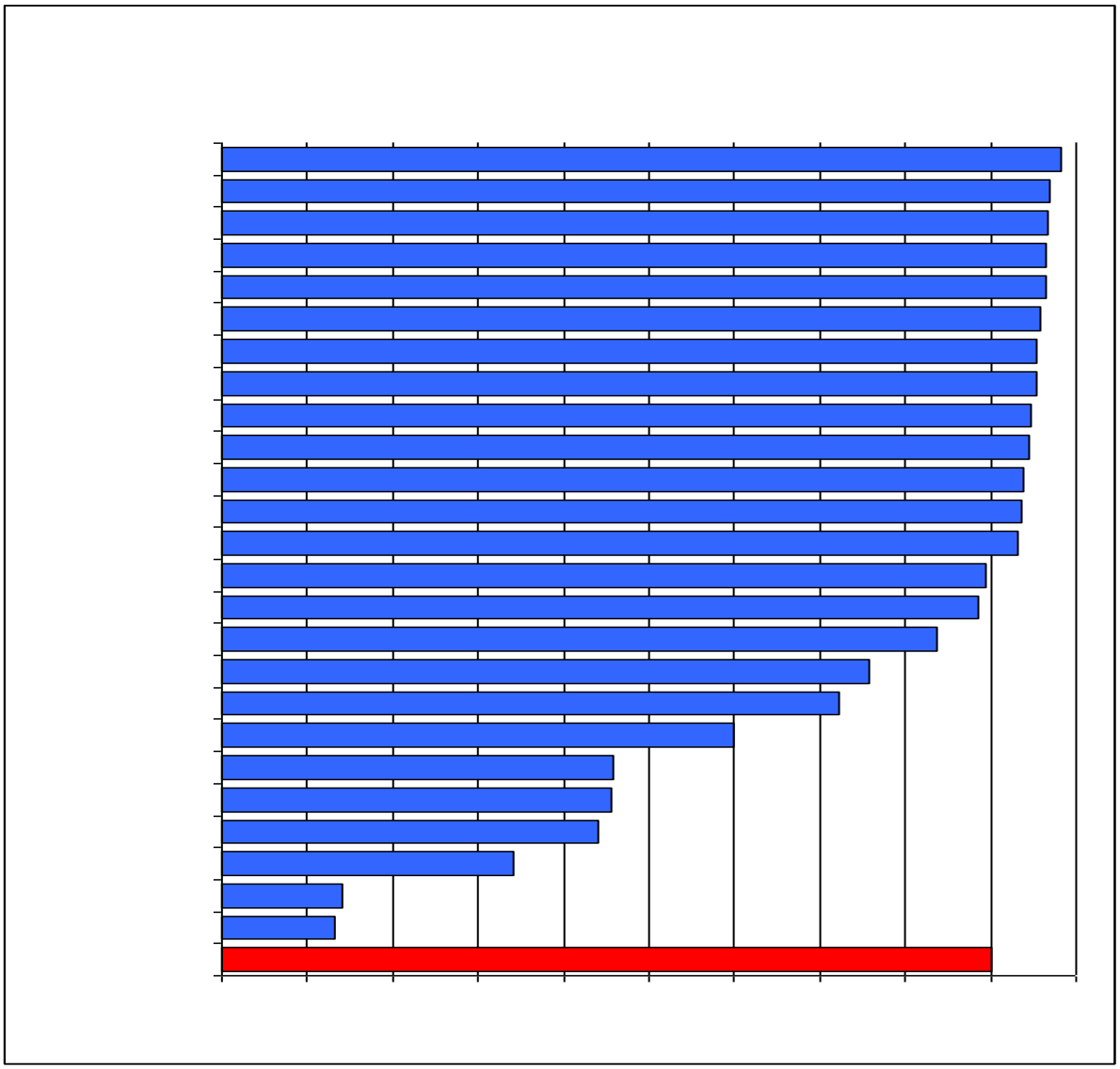
Table 8.6 shows the survival rate to grade 5, i.e., the percentage of pupils entering first grade of primary school who eventually reach grade 5. In other words, the survival rate to grade 5 represents the percentage of a cohort of pupils enrolled in the first grade of primary school in a given school year who move to each successive grade and reach grade 5. Survival rate is a measure of the internal efficiency of the education system. It reflects the situation regarding retention of pupils from grade to grade in primary schools. It also reflects the magnitude of dropout by grade. Survival rates may vary from grade to grade, indicating grades with relatively higher or lower drop-out rates. Survival rate to the fifth grade of primary education is considered as the prerequisite for sustainable literacy.

Nationwide, of all children starting grade one, about 90.3 per cent of them (91.3 per cent of boys and 89.1 per cent of girls) eventually reach grade five. It may be noted that this number includes children who repeat grades and eventually move up to reach grade five, this is why the value of this proportion is relatively high when compared to the net primary school completion rate (mentioned below) which includes only children of primary school completion age . as for the indicator of gender parity above, the national value for this indicator seems to be negatively skewed; however this national value is not a simple average for the values of the 25 states or for the values of the Northern States and the Southern states. The estimation of this indicator depends of the sample and weights aloctaed to each state.

The survival rate to grade 5 was over 90 per cent in 13 states. The rate ranged between 13.2 percent in Unity State and 98.2 percent in Kassala State (Table 8.6 and figure 8.4).

The percentage of children entering first grade who eventually reach grade 5 seems to be linked to the level of education of the mother and economic level of the household. The percentage of children reaching grade 5 was 89.2 for children of mothers with no education as compared to 93.6

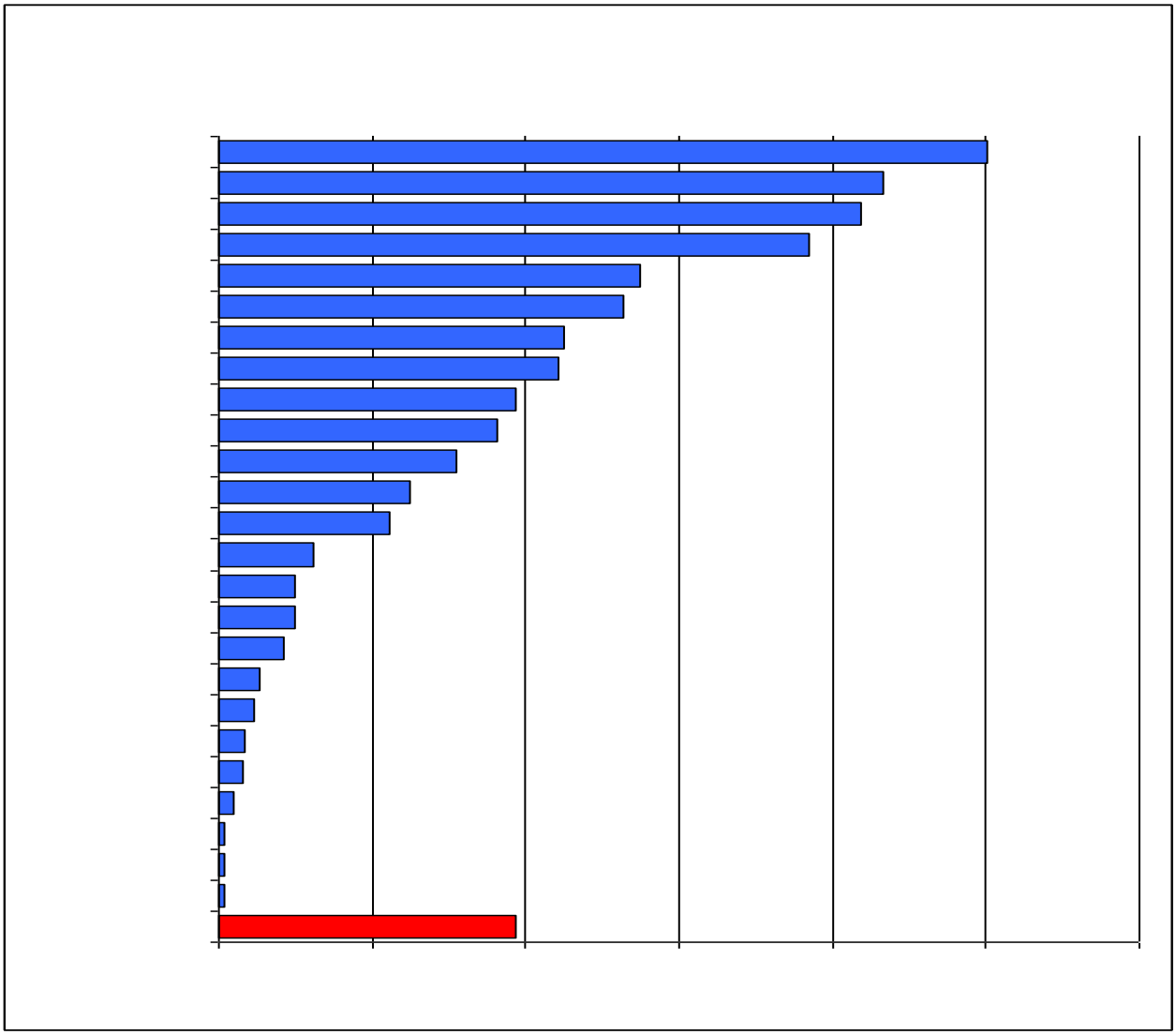
among children of secondary and higher education. The percentage was 96.3 for children from the richest households compared to 80 among children from the poorest households.



Primary school completion rate

Table 8.7 shows the net primary school completion rate, i.e., proportion of children of primary school completion age attending the last grade of primary school. At the time of the survey, only 19.4 per cent of the children of primary completion age (13 years) were attending the last grade of primary education. This value should be distinguished from the gross primary completion rate which includes children of any age attending the last grade of primary school. Including only children of primary school completeion age caused a discrepancy between the value of this prprortion (19.4%) and the proportion of children reaching grade five (90.3%), which included children of all ages reaching grade five.The net primary school completion rate ranged from 50.1 per cent in Gadarif State to 0.4 per cent in Upper Nile, Unity and Western Bahr El Ghazal states (Table 8.6 and Figure 8.5).

The net primary school completion rate seems to increase with the economic level of the households. The completion rate was only 2.1 per cent among children from the poorest households compared to 54.8 per cent among children from the richest households. There was no marked difference in completion rate among children whose mothers had no education and children whose mothers had primary education and children of mothers with secondary or higher education.



Transition rate to secondary education

The transition rate to secondary education in regard to 15 of the 25 states is presented in Table 8.8; since the number of secondary schools was very limited in the ten states in Southern Sudan, data from these states were not included in the analysis of the results. About 64.5 per cent of the children who completed primary education in 15 States had joined secondary schools, the transition rate to secondary education ranging from 94.4 per cent in River Nile State to 32.3 per cent in Kassala State. Mother's educational level and economic status appears to have a positive impact on the transition rate to secondary school. The transition rate was 64.9 per cent for children of mothers with no education as compared to 72.4 per cent among children of secondary and higher education. The transition rate to secondary education for children from the richest households was 77.9 per cent compared to 31.3 per cent among children from the poorest households.

IX. Child Protection

Birth registration

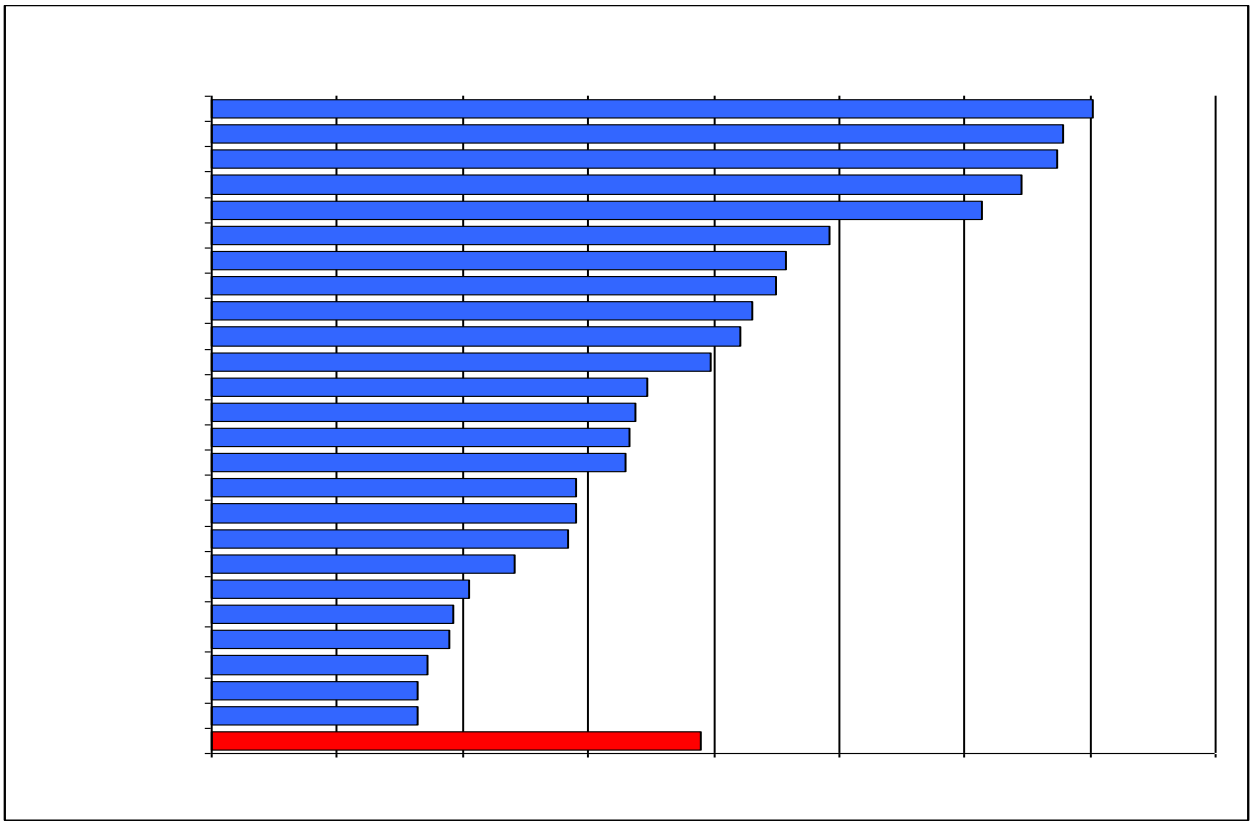
The Convention on the Rights of the Child states that every child has the right to a name and a nationality and the right to protection from being deprived of his or her identity. Birth registration is a fundamental means of securing these rights for children. The World Fit for Children goal is to develop systems that ensure the registration of every child at or shortly after birth, and fulfil his or her right to acquire a name and a nationality, in accordance with national laws and relevant international instruments. The main SHHS indicator relating to birth registration is birth registration rate: Proportion of children 0-59 months of age whose births are reported registered.

Table 9 .1 showed that about 32.6 per cent of children under-five years in Sudan have their births registered, with the registration rates ranging from 70.2 per cent in Khartoum State to 1.1 per cent in Lakes State (Figure 9.1).
Birth registration rate was highest among children aged 12-23 months (36.3 per cent) and lowest among children aged 0-11 months (29 per cent). Birth registration appears to increase with mother's educational level and the economic status of the household: birth registration rate among children of mothers with no education was only 16.6 per cent compared to 48.9 per cent for children of mothers with primary education and 80.3 per cent for children of mothers with secondary or higher education; birth registration rate among children from poor households was only 6.1 per cent compared to 85.5 per cent among those from the richest households.

Reasons for not registering birth

Among children whose births were not registered, the main reasons given for not registering were those related to cost (21.3 per cent), long distance to the birth registration office (17.1 per cent), the lack of awareness among parents of the need to get the birth of their children registered (21.3 per cent), and the lack of information regarding the place of birth registration (13.1 per cent). The percentage of children whose birth was not registered due to the lack of awareness among parents of the need to get the birth of their children registered was higher among children of mothers with no education (25.4 per cent) than those among children of mothers with primary education (8.8 per cent) and among children of mothers with secondary or higher education (3.5 per cent). The percentage of children whose birth was not registered due to the lack of information regarding the place of birth registration was also higher among children of mothers with no education (15.2 per cent) than among children of mothers with primary education (7.2 per cent) and those among mothers with secondary or higher education (4.6 per cent).

The percentage of children whose birth was not registered due to the lack of awareness among parents of the need to get the birth of their children registered was higher among children belonging to the poorest households (9.3 per cent) than those belonging to the richest households (0.1 per cent). The percentage of children whose birth was not registered due to the lack of information regarding the place of birth registration was also higher among children belonging to the poorest households (5 per cent) than among those from the richest households (0.3 per cent).



Early marriage and polygany

Marriage before the age of 18 is a reality for many young girls. According to UNICEF's worldwide estimates, over 60 million women aged 20-24 were married/in union before the age of 18. Factors that influence child marriage rates include: the state of the country's civil registration system, which provides proof of age for children; the existence of an adequate legislative framework with an accompanying enforcement mechanism to address cases of child marriage; and the existence of customary or religious laws that condone the practice.

In many parts of the world parents encourage the marriage of their daughters while they are still children in the hope that the marriage will benefit them both financially and socially, relieving the financial burden on the family. Nonetheless, child marriage is a violation of human rights, compromising the development of girls and often resulting in early pregnancy and social isolation, with little education and poor vocational training reinforcing the gendered nature of poverty. The right to 'free and full' consent to a marriage is recognized in the Universal Declaration of Human Rights (article 16-2)- which states that consent cannot be 'free and full' when one of the parties involved is not sufficiently mature to make an informed decision about a life partner. The Convention on the Elimination of all Forms of Discrimination against Women mentions the right to protection from child marriage in article 16, which states: "The betrothal and the marriage of a child shall have no legal effect, and all necessary action, including legislation, shall be taken to specify a minimum age for marriage..." While marriage is not considered directly in the Convention on the Rights of the Child, child marriage is linked to other rights - such as the right to express their views freely, the right to protection from all forms of abuse, and the right to be protected from harmful traditional practices - and is frequently addressed by the Committee on the Rights of the Child. Other international agreements related to child marriage are the Convention on Consent to Marriage, Minimum Age for Marriage and Registration of Marriages,

the African Charter on the Rights and Welfare of the Child and the Protocol to the African Charter on Human and People's Rights on the Rights of Women in Africa. Child marriage was also identified as a type of commercial sexual exploitation of children by the Pan-African Forum against the Sexual Exploitation of Children.

Young married girls are a unique, though often invisible, group. Required to perform heavy amounts of domestic work, under pressure to demonstrate fertility, and responsible for raising children while still children themselves, married girls and child mothers face constrained decision-making and reduced life choices. Boys are also affected by child marriage but the issue impacts girls in far larger numbers and with more intensity. Cohabitation - when a couple lives together as if married - raises the same human rights concerns as marriage. Where a girl lives with a man and takes on the role of caregiver for him, the assumption is often that she has become an adult woman, even if she has not yet reached the age of 18. Additional concerns due to the informality of the relationship - for example, inheritance, citizenship and social recognition - might make girls in informal unions vulnerable in different ways than those who are in formally recognized marriages.

Research suggests that many factors interact to place a child at risk of marriage. Poverty, protection of girls, family honour and the provision of stability during unstable social periods are considered as significant factors in determining a girl's risk of becoming married while still a child. Women who marry at a younger age are more likely to believe that it is sometimes acceptable for a husband to beat his wife and were more likely to experience domestic violence themselves. The age gap between partners is thought to contribute to these abusive power dynamics and to increase the risk of untimely widowhood.

Closely related to the issue of child marriage is the age at which girls become sexually active. Women who are married before the age of 18 tend to have more children than those who marry later in life. Pregnancy related deaths are known to be a leading cause of mortality for both married and unmarried girls between the ages of 15 and 19, particularly among the youngest of this cohort. The demand for a young wife to reproduce and the power imbalance resulting from the age differential lead to very low condom use among such couples.

The main SHHS indicators in regard to early marriage and polygyny are as follows:

Marriage before age 15: Proportion of women aged 15-49 years who were first married or in union by the exact age of 15 years;
Marriage before age 18: Proportion of women aged 20-49 years of age who were first married or in union by the exact age of 18 years;
Young women aged 15-19 years currently married or in union: Proportion of women aged 15-19 years who were married or in union at the time of the survey;
Polygyny: Proportion of women aged 15-49 years in a polygynous union.

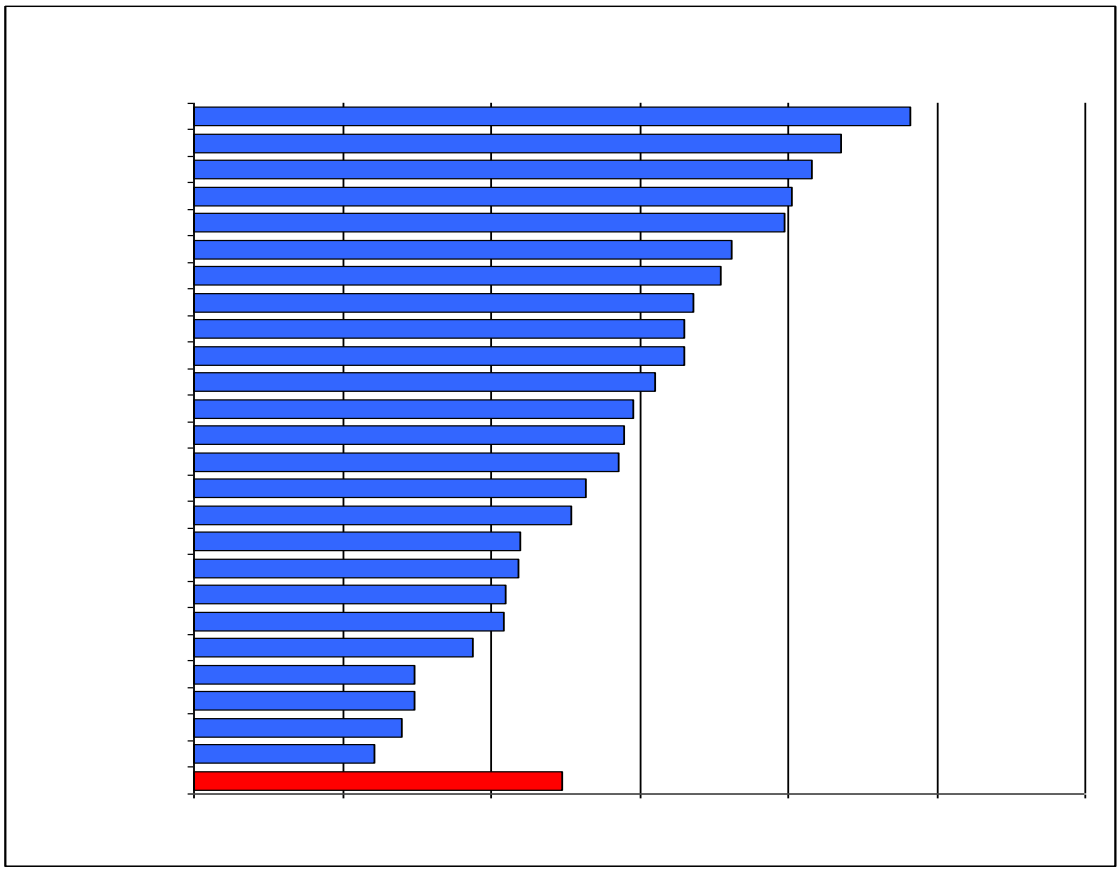
Women married before 15 and 18 years of age

The results provided in Table 9.2, indicated that 12.4 per cent of women aged 15-49 years were married before age 15, and 36 per cent were married before the age of 18 years.

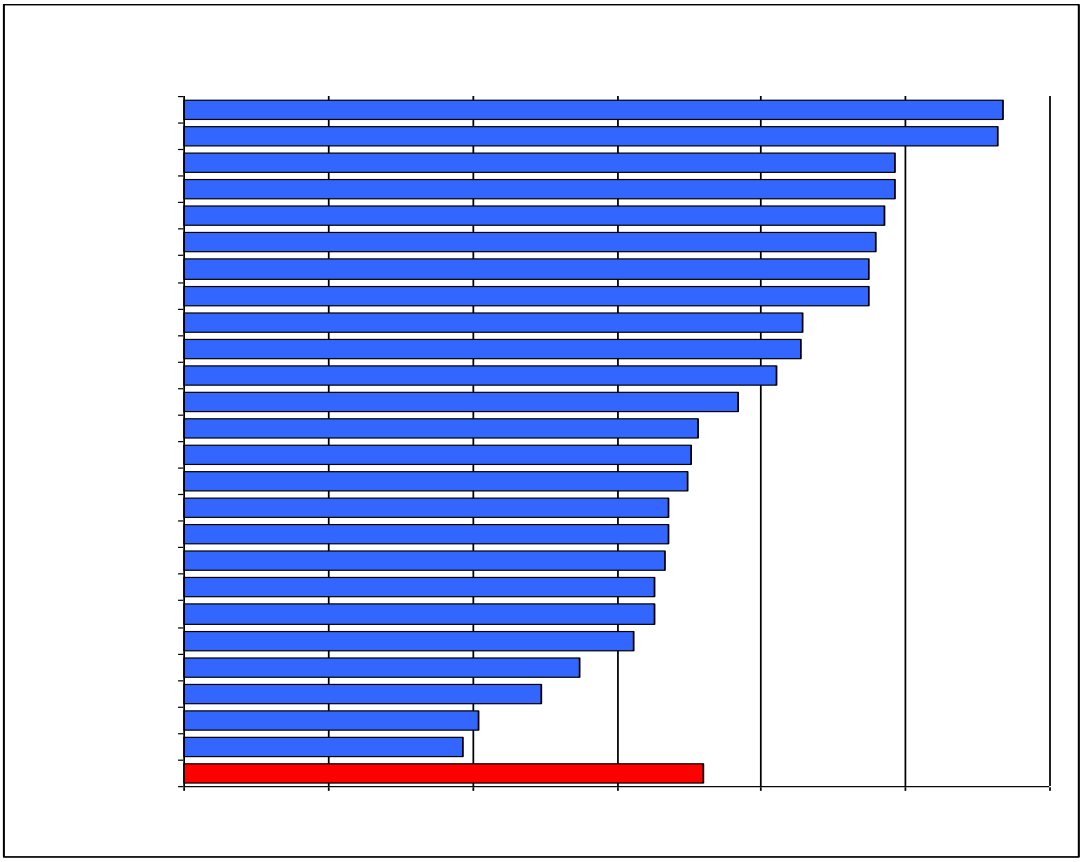
The incidence of early marriage appears to be linked to the mother's educational status and the economic level of the household. While the percentage of women married before 15 years of age was 17.9 in the case of women with no education, it was only 7.7 for women with primary

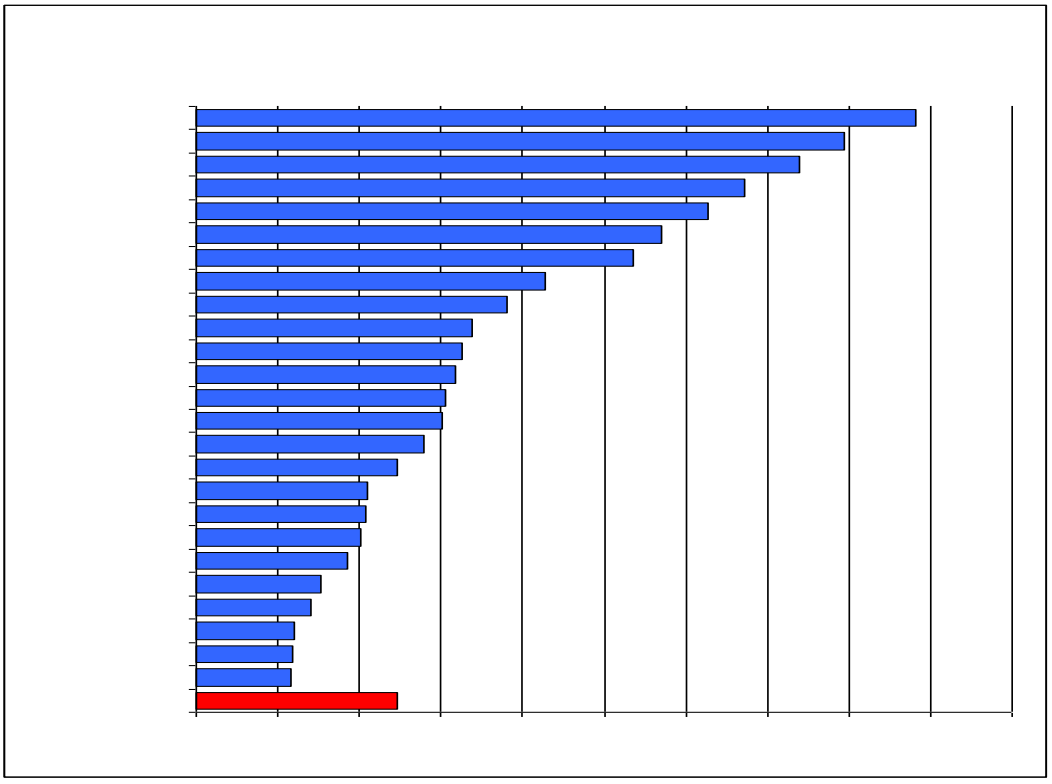
education and 3.8 in the case of women with secondary or higher education. Similarly, the percentage of women married before 18 years of age was 46.6 in the case of women with no education compared to 28.5 in the case of women with primary education and only 9 in the case of women with secondary or higher education. With regard to economic status, the percentage of women married before 15 years of age was 16.1 among those from the poorest households and only 5.8 among those from the richest households. Similarly, the percentage of women married before age 18 was 41.8 among those from the poorest households, and only 19.9 in the case of those belonging to the richest households.

The percentage of women married before age 15 ranged from 6.1 in River Nile State to 24.1 in Unity State (Table 9.2 and Figure 9.2).
The percentage of women married before age 18 ranges from 19.3 in River Nile State to 56.8 in Unity State and 56.4 in Blue Nile State (Table 9.2 and Figure 9.3).



The percentage of young women aged 15-19 years currently married or in union ranges from 11.6 in Gezira State to 88.1 in Unity State (Figure 9.4).





Women in polygynous marriage/union

The number of women in a polygynous union is also indicated in Table 9.2. Nationwide, about 27.5 per cent of women aged 15-49 years were in polygynous marriage/union, ranging from 8.3 in River Nile State to 58.7 in Unity State.

The incidence of polygynous marriage/union appears to be linked to women's educational status and the economic status of the household. While the percentage of women aged 15-49 years in polygynous marriage/union was 34.9 in the case of women with no education, it was only 15.8 among women with primary education and 14.2 among women with secondary or higher education. The percentage of women aged 15-49 years in polygynous marriage/union was only 12.3 in the case of women belonging to the richest household compared to 41.9 among women belonging to the poorest households. The age of the woman also appears to be a factor: the percentage of women in polygynous marriage/union was lowest (14.8) among women in the age 15-19 years compared to 30.4 among women aged 45-49 years

Children's living arrangements and orphanhood

Children who are orphaned or in vulnerable households may be at increased risk of neglect or exploitation if the parents are not available to assist them. Children are considered as orphaned and vulnerable if they have experienced the death of either parent, if either parent is chronically ill, or if the only adult aged 18-59 years in the household either died (after being chronically ill) or was chronically ill in the year prior to the survey. The main SHHS indicators include the following:

Children's living arrangements: Proportion of children aged 0-17 years not living with a biological parent;
Prevalence of orphans: Proportion of children under age 18 with at least one dead parent.

The results of the SHHS presented in Table 9.3 showed that 6.9 per cent of children did not live with a biological parent, whilst 15.2 per cent lived with only their mother. The percentage of children who did not live with a biological parent was highest (11.9 per cent) among those aged 15-17 years and lowest (3.2 per cent) among those aged 0-4 years. This percentage ranged from 2.6 per cent in Northern State to 20.9 per cent in Western Equatoria State. This percentage was relatively higher in West Darfur State (10.3 per cent), Upper Nile State (13.7 per cent), Unity State (13.5 per cent), Warap State (11.4 per cent), and Lakes State (10.4 per cent) .

Nationwide the prevalence of orphans (percentage of children under age 18 with at least one dead parent) was 9.7 per cent, the highest (16.7 per cent) being among those aged 15-17 years and lowest (5 per cent) among those aged 0-4 years. The prevalence of orphans ranged from 5.5 per cent in White Nile State to 20.5 per cent in Upper Nile State.

One of the measures developed for the assessment of the status of orphaned and vulnerable children relative to their peers looks at the school attendance of children 10-14 for children who have lost both parents (double orphans) versus children whose parents are alive (and who live with at least one of these parents). If children whose parents have died do not have the same access to school as their peers, then families and schools are not ensuring that these children's rights are being met. The main SHHS indicators in this regard include the following:

School attendance of double orphans: Percentage of double orphans (i.e., children aged 10-14 years whose both parents are dead) attending school -- boys and girls combined;
School attendance of non-orphans: Percentage of non-orphans (i.e., children aged 10-14 years whose both parents are alive and who live with at least one parent) attending school -- boys and girls combined;
Double Orphan to non-orphan school attendance ratio: Ratio of school attendance among double orphans (both mother and father dead) aged 10-14 years to that among non-orphans aged 10-14 years).

Table 9.4 presents information relating to school attendance of orphaned children. The SHHS findings indicate that the school attendance of children aged 10-14 years who were orphans was 60.3 per cent as compared to 64.8 per cent for children in the same age group who were not orphans. The percentage difference in school attendance between children who are orphans and not orphans was more than ten percentage points in Northern, Red Sea, Kassala, Sinnar, Blue Nile, Upper Nile, Lakes and Western Equatoria States. The school attendance of children who were orphans appears to increase with the economic level of the household. The school attendance of orphans was only 22 among children belonging to the richest households compared to 90.6 per cent among children belonging to the richest households.

X. Reproductive Health

The SHHS included some key indicators required to assess situation of reproductive health (RH) services that contribute to reproductive health and well being of people by preventing and solving RH problems. The key topics covered by the SHHS included contraception, antenatal care, assistance during delivery, place of delivery, complications during labour and delivery, complications during pregnancy, complications during postpartum, outcomes of pregnancies and maternal mortality. The key SHHS indicators include the following:

Contraceptive prevalence: Proportion of women currently married or in union aged 15-49 years who are using (or whose partner is using) a contraceptive method (either modern or traditional).
Unmet need for family planning: Proportion of women aged 15-49 years who are currently married or in union and want to space their births or limit the number of children and who are not currently using contraception.
Antenatal care: Proportion of women aged 15-49 years who received antenatal care (ANC) at least once during pregnancy in the 2 years preceding the survey.
Provider of antenatal care: Proportion of women aged 15-49 years attended at least once during pregnancy in the two years preceding the survey by qualified/skilled health personnel (doctor, nurse or midwife.
Births attended by qualified/skilled health personnel: Proportion of women aged 15-49 years with a birth in the two years preceding the survey who were attended during childbirth by a qualified health personnel (doctor, nurse or midwife).
Institutional deliveries (Delivered in a health facility): Proportion of women aged 15-49 years with a birth in the two years preceding the survey who delivered in a health facility.
Maternal mortality ratio: Number of deaths of women from pregnancy related causes, when pregnant or within 42 days of termination of pregnancy, per 100,000 live births.

Use of contraception

Appropriate family planning is important to the health of women and children since it prevents pregnancies that are too early or too late. It also extends the period between births.

The results of the SHHS indicated that the contraceptive prevalence (i.e. percentage of women aged 15-49 years currently married or in union who were using or whose partner is using a contraceptive method) was only 7.6 per cent (Table 10.1). About 4.3 per cent used the pill, 1.6 per cent relied on lactation amenorrhoea method (LAM), and 0.3 per cent each used female sterilisation, intra-uterine device (IUD) and condom. About 0.5 per cent used injections while 0.2 per cent practiced periodic abstinence.

Adolescents, young women and older women are less likely to have access to contraception than other women. The contraceptive use rate was lowest (4.2 per cent) among those in the age group 15-19 years as compared to 9.9 per cent among those in the age group 30-34 years and 40-49 years.

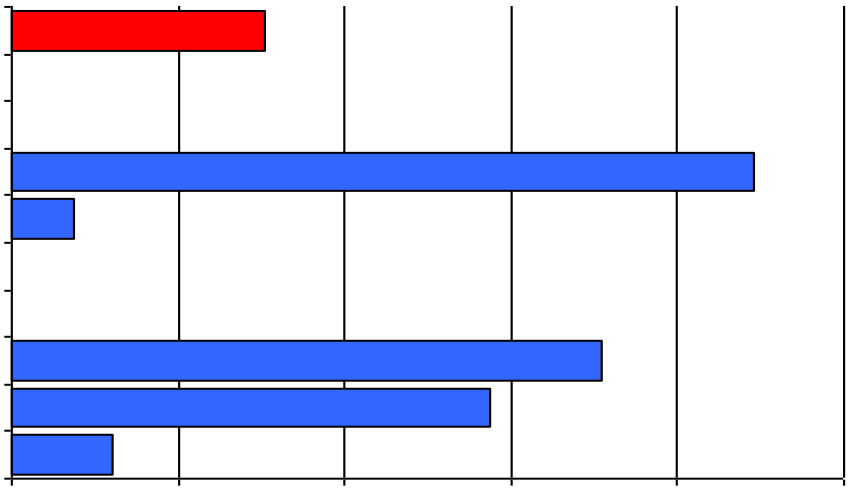
Women's educational level seems to have an impact on contraceptive use. The contraceptive use rate was only 3 per cent among those with no education compared to 14.4 per cent among those with primary education and 17.7 per cent among women with secondary or higher education (Figure 10.1). The percentage of women using any modern method of contraception was only 1.6

among those with no education as compared to 11.7 among those with primary education and 15.3 per cent among those with secondary or higher education.

The economic level (wealth index) of the household also influences contraceptive use. The percentage of women using any method of contraception was only 1.9 among women from the poorest households compared to 22.3 per cent among women belonging to the richest households. Similarly, the percentage of women using any modern method of contraception was 0.4 per cent among women from the poorest households compared to 19.7 percent among women belonging to the richest households.

The SHHS results indicated that the contraceptive use rate was highest in Northern State at 22.4 per cent followed by Khartoum State at 20.3 per cent and the lowest in Jonglei State at 0.1 percent. The use of a modern method of contraception was relatively higher in Northern (16.4 per cent), River Nile (14.1 per cent) and Khartoum (18 per cent) states than in other states.

Figure RH1: contracetptive prevelance (Prpoprtion of women currently married or in union aged 15-49 years who are using (or whose husnad/partner) is using contraceptive method (either modern or traditional), Sudan, 2006



Method of contraception used by contraceptive users

An analysis of contraceptive methods used by contraceptive users i.e. women aged 15-49 years married or in union who are currently using (or whose partner is using) a contraceptive method to avoid pregnancy (Table 10.2) showed that the most popular method was the pill which was used by one in two (53 per cent) women. The next most popular method was Lactation Amenorrhea Method (19.3 per cent). Among the contraceptive users, 5.6 per cent used injections, 4.1 per cent used female sterilisation, 3.8 per cent used IUD and 3.3 per cent used condom. In all, out of the

contraceptive users, modern methods (female sterilisation, pill, IUD, injection, condom, and diaphram/foam/jelly) were used by 70 per cent while the remaining 30 per cent used traditional methods (LAM, periodic abstinence, withdrawal and other traditional methods).

Among the contraceptive users, the use of pill was highest (61.4 per cent) among those aged 15-19 years and lowest (40.4 per cent) among those aged 45-49 years. The proportion of women using the modern contraceptive methods was lowest among those aged 25-29 years (64.6 per cent) and highest among those aged 45-49 years (86.3 per cent). The use of modern contraceptive method was lowest (45.1 per cent) among those who had no living child and highest (74 per cent) among those who had one living child.

The method mix varies by educational level of women. Slightly over one-fourth (28.2 per cent) of contraceptive users with no or primary education use the pill while 37.4 per cent of them use LAM. In contrast, 70 per cent of contraceptive users with secondary or higher education use the pill and only 5.3 per cent use LAM. The percentage of contraceptive users who used modern methods of contraception was only 46.2 among women with no education as compared to 77.5 by those with primary education and 83.6 by those with secondary or higher education.

The method mix also varies by the economic level of the household. Only 5 per cent of contraceptive users belonging to the poorest households use the pill while 58 per cent of them use LAM. In contrast, 65.1 per cent of contraceptive users from the richest households use the pill and only 8.2 per cent use LAM. The percentage of contraceptive users who used modern methods of contraception was only 14.6 per cent among those belonging to the poorest households as compared to 85.8 per cent by those from the richest households.

The SHHS results indicated that among the contraceptive users, the use of modern methods was highest in Kassala State (92.4 per cent) followed by South Kordofan State (91.5 per cent) and lowest in Lakes State at 0.4 percent. It worth mentioning that three states had zero per cent of modern methods use.

Unmet need

Unmet need[4] for contraception refers to fecund women who are not using any method of contraception, but who wish to postpone the next birth or who wish to stop childbearing altogether.

Unmet need for spacing: Women in unmet need for spacing includes women who are currently married (or in union), fecund (are currently pregnant or think that they are physically able to become pregnant), currently not using contraception, and want to space their births. Pregnant women are considered to want to space their births when they did not want the child at the time they got pregnant. Women who are not pregnant are classified in this category if they want to have another child, but want to have the child at time later.

Unmet need for limiting: Women in unmet need for limiting are those women who are currently married (or in union), fecund (are currently pregnant or think that they are physically able to become pregnant), currently not using contraception, and want to limit their births. The latter group includes women who are currently pregnant but had not wanted the pregnancy at all, and women who are not currently pregnant but do not want to have another child.

Total unmet need for contraception is simply the sum of unmet need for spacing and unmet need for limiting.

Table 10.3 showed the unmet need for contraception, i.e. percentage of women aged 15-49 years currently married or in union with an unmet need for family planning. The SHHS findings show that 38.3 per cent of the women aged 15 - 49 years (currently married or in union) and pregnant at the time of the survey who at the time became pregnant wanted to wait until later and 14.3 per cent did not want to have any more children. It also shows that 63.9 per cent of women aged 15-49 years (currently married or in union) who were not pregnant and not using contraceptives at the time of the SHHS did not want to be pregnant. These together contributed to an unmet need for contraception of 5.7 per cent. The unmet need for contraception was highest in Northern State at 18.3 per cent and the lowest in Lakes and Upper Nile states at 0.2 per cent. It is worth mentioning that Jonglei State had zero per cent unmet need for contraception.

The unmet need for contraception varies by educational level of women and by the economic level of the household. The unmet need for contraception was 2.2 per cent in the case of women with no education as compared to 11 per cent for women with primary education, and 12 per cent for women with secondary or higher education. The unmet need was only 0.9 per cent among women belonging to the poorest households compared to 16.9 per cent among women from the richest households.

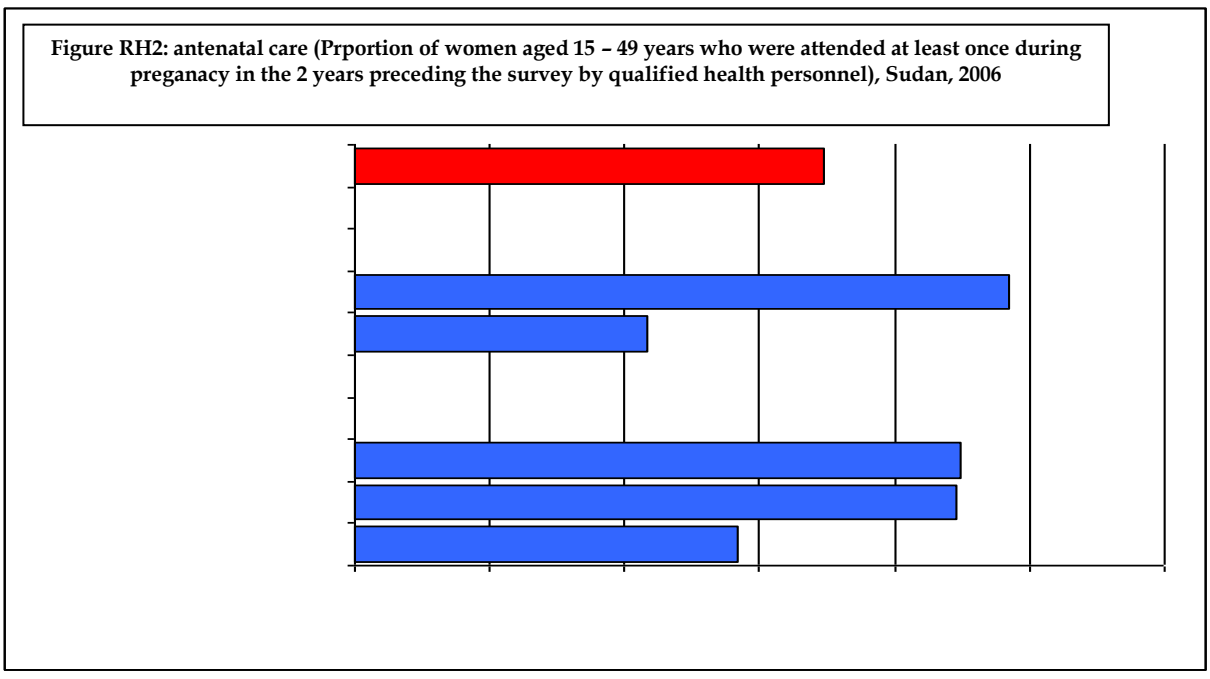
Antenatal care (ANC)

The antenatal period presents important opportunities for reaching pregnant women with a number of interventions that may be vital to their health and well-being and that of their infants. Better understanding of foetal growth and development and its relationship to the mother's health has resulted in increased attention to the potential of antenatal care as an intervention to improve both maternal and newborn child health. For example, if the antenatal period is used to inform women and families about the danger signs and symptoms and about the risks of labour and delivery, it may provide the route for ensuring that pregnant women do, in practice, deliver with the assistance of a qualified health care provider.

The findings of the SHHS indicated that 69.6 per cent of pregnant women received ANC one or more times during pregnancy (Table 10.4). The percentage of pregnant women receiving ANC at least once during pregnancy is highest in Khartoum State (94.8 per cent) and lowest in Jonglei State (22.4 per cent).

The percentage of women who received ANC at least once during pregnancy was highest (72.2 per cent) among those aged 15-19 years and lowest (59 per cent) among those aged 45-49 years.
The percentage of women who received ANC was also found to be influenced by the women's education level and economic level of the household: only 56.8 per cent of pregnant women without education received ANC at least once during pregnancy, while 89 per cent of pregnant women with primary education and 89.9 per cent of pregnant women with secondary or higher education received ANC one or more times during pregnancy (Figure 10.2). The percentage of women receiving ANC was higher among women from the richest households than those from the poorest households, being only 43.2 per cent in the poorest households compared to 97 per cent of in the richest.

Figure RH2: antenatal care (Prportion of women aged 15 – 49 years who were attended at least once during preganacy in the 2 years preceding the survey by qualified health personnel), Sudan, 2006

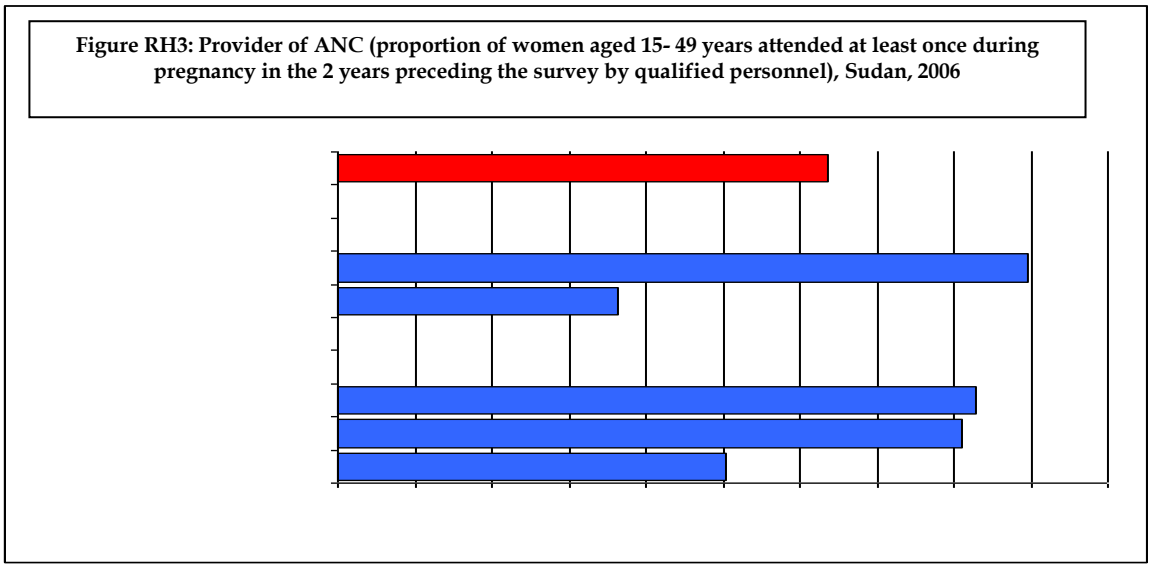


Antenatal care providers

The type of personnel providing antenatal care to women is presented in Table 10.4. In the country as a whole, 63.7 per cent of women aged 15-49 years who gave birth in the two years preceding the survey had received antenatal care from qualified health personnel (a doctor, nurse, or auxiliary midwife). About one third (36.4 per cent) pregnant women received ANC from a medical doctor, one in seven (14.5 per cent) received ANC from an auxiliary midwife while about one in eight (12.7 per cent) received ANC from a nurse/midwife. At the same time, 12.3 per cent of pregnant women were provided ANC by traditional birth attendants, community health workers and others.

Both the women's educational level and economic level of the household seem to influence the proportion of pregnant women receiving ANC from qualified personnel. The percentage of women who received ANC from qualified personnel was 50.3 in the case of women with no education compared to 81 in the case of women with primary education, and 82.9 in the case of women with secondary or higher education (Figure 10.3). The percentage of women who received no ANC was only 13 in the case of women with secondary or higher education compared to 33.7 for women with no education. The percentage of women who received ANC from qualified health personnel was 36.4 in respect of women from the poorest households to 89.5 in the case of women from the richest households. The percentage of women who received no ANC was only seven in the case of women from the richest households compared to 44.6 for women from the poorest households.

Figure RH3: Provider of ANC (proportion of women aged 15- 49 years attended at least once during pregnancy in the 2 years preceding the survey by qualified personnel), Sudan, 2006



The percentage of women aged 15-49 years (who gave birth in the two years preceding the survey) attended by a qualified personnel was highest in Khartoum State (89 per cent) and the lowest in Jongli State at 13.6 per cent .It is worth mentioning that Unity State had none of the women who gave birth in the two years preceding the survey attended by a qualified personnel.

Services provided as a part of ANC

The types of services provided during ANC (i.e. pregnant women receiving specific care as part of the antenatal care received) are shown in Table 10.5. The standard guidelines indicated the specific care to be provided as a part of ANC, including:

Folic and iron supplementation
Tetanus immunization
Blood pressure measurement
Urine testing for bateriuria and proteinuria
Measurement of Hb. Level
Counselling on the place and mode of delivery (birth plan), and
Giving information on birth spacing and nutrition

This table indicates the proportion of pregnant women receiving ANC one or more times during pregnancy who had their blood test taken, blood pressure measured and urine specimen taken. The SHHS findings reveal that the current provision of specific care provided as part of the antenatal care remains quite inadequate. The percentage of pregnant women who had their blood tests taken as part of the antenatal care received was 45.5 per cent while blood pressure was measured in the case of 40.7 per cent of pregnant women and a urine specimen was taken in the case of 45.9 per cent (Table 10.5). Khartoum State had the highest proportion of pregnant women who had their blood tested (90.4 percent), blood pressure measured (91 per cent) and urine specimen tested (89.8 per cent) as part of the antenatal care received. The lowest proportion of pregnant women who had their blood test taken was in Warap state (9 per cent), while the lowest proportion of women who had their urine specimen taken was in Jonglei (10.9 per cent). In 10 states, blood pressure was not measured at all as part of the antenatal care provided.

The percentage of pregnant women receiving specific care as part of the antenatal care provided among women aged 15-49 years who gave birth in two years preceding the survey and received antenatal care is shown in Table 10.6. The SHHS findings indicate that of those pregnant women who received ANC, the percentage of those who had their blood tests taken was 62.6 per cent while blood pressure was measured in the case of 58.5 per cent and a urine specimen was taken in the case of 62.7 per cent (Table 10.6). Khartoum State had the highest proportion (94.7 per cent) of pregnant women who received antenatal care and had their blood tested (95.4 percent), blood pressure measured (95.9 per cent) and urine specimen tested (94.7 per cent). The lowest proportion of pregnant women who received antenatal care and had their blood test and urine specimen were taken was in Warap State (15 and 23.8per cent respectively). In 10 states, no pregnant women who received antenatal care had their blood pressure measured.

Assistance during delivery

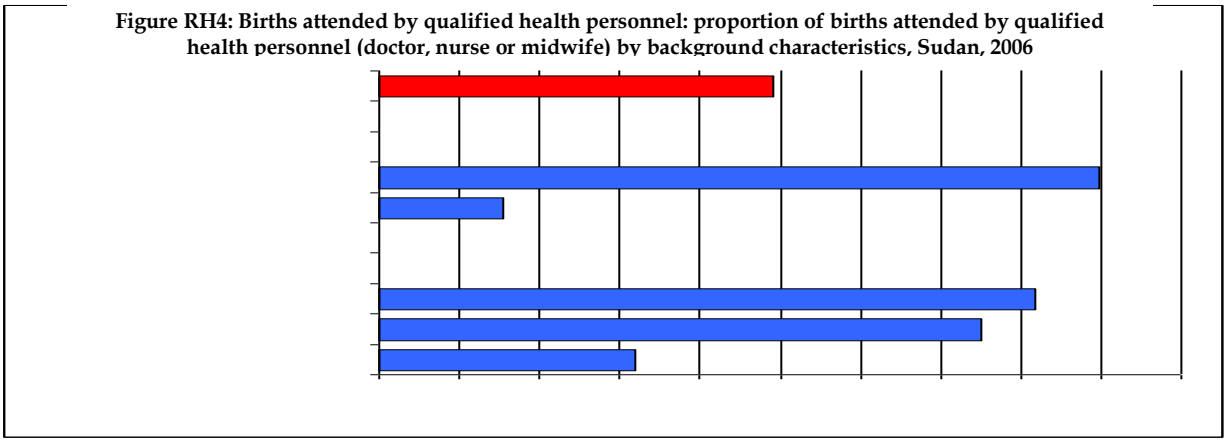
Globally, three quarters of all maternal deaths occur during delivery and the immediate post-partum period. The single most critical intervention for safe motherhood is to ensure that a competent health worker with midwifery skills is present at every birth, and transport is available to a referral facility for obstetric care in case of emergency. A World Fit for Children goal is to ensure that women have ready and affordable access to skilled attendance at delivery. The indicators are the proportion of births with a qualified attendant and proportion of institutional deliveries. The skilled attendant at delivery indicator is also used to track progress toward the Millennium Development target of reducing the maternal mortality ratio by three quarters between 1990 and 2015.

The global definition of skilled attendance defined the skilled attendant as a health professional who is trained and competent in the skills needed to manage normal childbirth and the immediate postnatal period, can identify complications and provide emergency management and/or refer the case. In Sudan, with the exception of doctors, other midwifery health cadres are not trained to provide prereferral emergency management and hence are not regarded as Skilled Birth Attendants (SBAs) as per the standard definition. In this report the word qualified, as per the above mentioned definition, will be used instead of SBA.

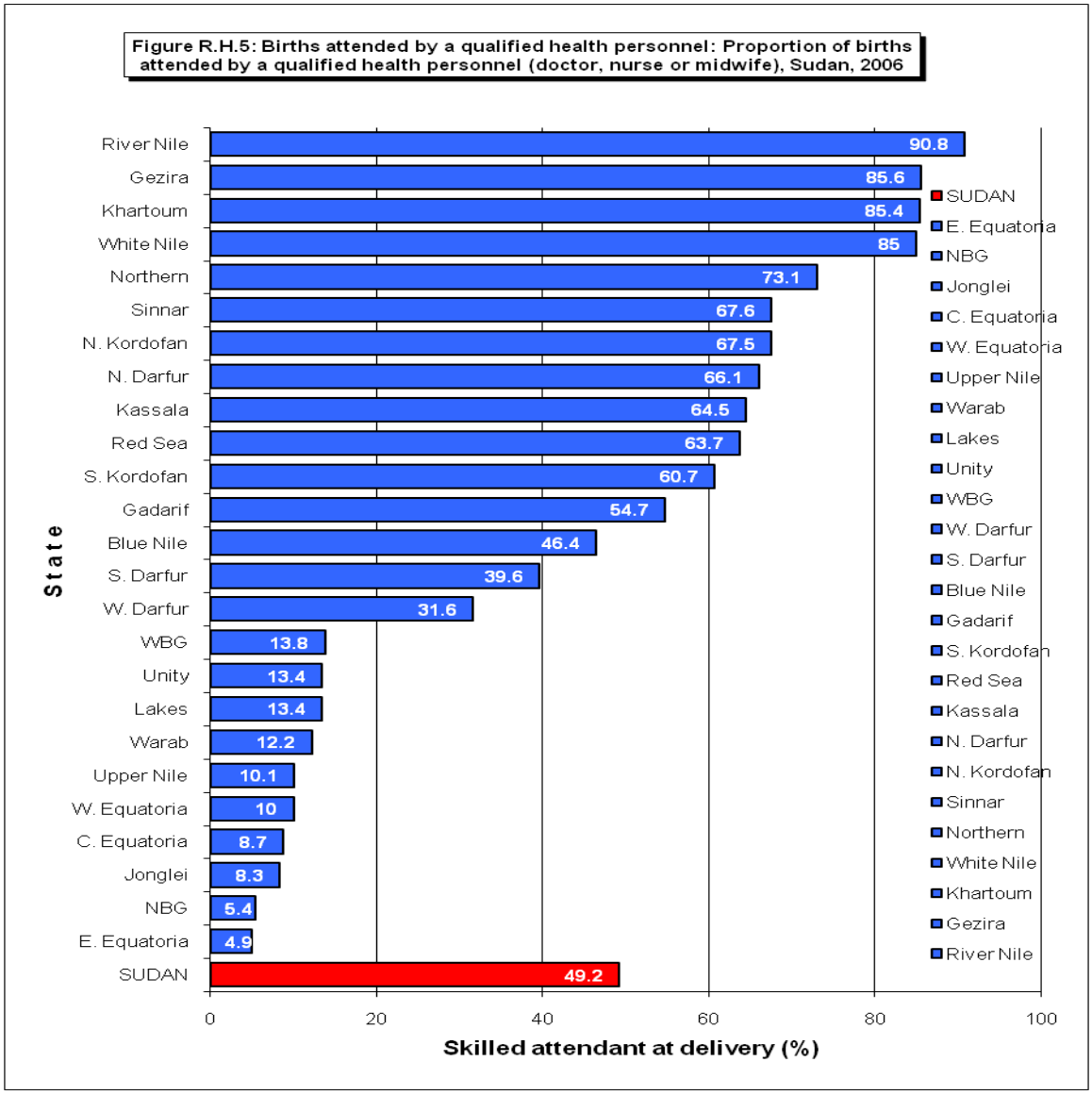
The SHHS included questions to assess the proportion of births attended by qualified health personnel (a medical doctor, nurse, midwife or auxiliary midwife). About 49.2 per cent of births occurred in the two years prior to the SHHS were delivered by a qualified health personnel (Table 10.7). This percentage is highest in the River Nile State (90.8) and the lowest in Eastern Equatoria (4.9) (Figure 10.5).

The more educated a woman is, the more likely she is to have delivered with the assistance of a qualified health personnel, being 31.8 per cent in the case of women with no education compared to 75.1 per cent in the case of women with primary education and 81.9 per cent in the case of women with secondary or higher education (Figure 10.4). . The percentage of women who received no assistance was 16.9 for those with no education compared to 3.7 in the case of women with primary education and 3.3 for women with secondary or higher education. The percentage of women who have delivered with the assistance of qualified personnel was only 15.4 in respect of women from the poorest households compared to 89.9 in the case of women from the richest households. The percentage of women who received no assistance during delivery was 23.5 for women from the poorest households while it was only 1.5 in the case of women from the richest households.

Figure RH4: Births attended by qualified health personnel: proportion of births attended by qualified health personnel (doctor, nurse or midwife) by background characteristics, Sudan, 2006



Doctors assisted with the delivery of 5.9 per cent of births and nurses/midwives assisted with 17.3 per cent while 26.1 per cent of births were delivered by auxiliary midwife. The percentage of women with a birth in two years preceding the survey assisted by a medical doctor ranged from 16.5 in Khartoum State to 0.7 in Eastern Equatoria State. The percentage of births delivered by a nurse/midwife was highest in Northern State (47.2 per cent) and the lowest in Northern Bahr El Ghazal State (9.5 per cent) while White Nile State (61.8 per cent) had the highest percentage of births delivered with assistance by an auxiliary midwife. Overall, about 19.7 per cent of births were delivered with assistance of Traditional Birth Attendants (TBA), the highest being in Western Equatoria State (48.6 per cent) and the lowest in Northern State (1.5 per cent). Central Equatoria State (39.5 per cent) had the highest proportion of births delivered without any attendant. The states with the lowest proportion of women not assisted at delivery included Northern and River Nile States at 0.7 per cent. Eleven states had one out of five deliveries attend by TBAs).



Institutional deliveries

Of the total births, 19.4 per cent were delivered in a health facility (Table 10.5). The highest proportion was in Khartoum State (54 per cent) and the lowest in Blue Nile State (5 per cent) (Figure 10.6). It is seen that the more educated a woman is, the more likely she is to have delivered in a health facility. The percentage of births delivered in a health facility was only 12.1 for women with no education compared to 27.4 for women with primary education and 54.1 for women with secondary or higher education (Figure 10.7). The percentage of births delivered in a health facility by women from the poorest households was 10.1, whilst it was 53.9 in the case of women from the richest households.

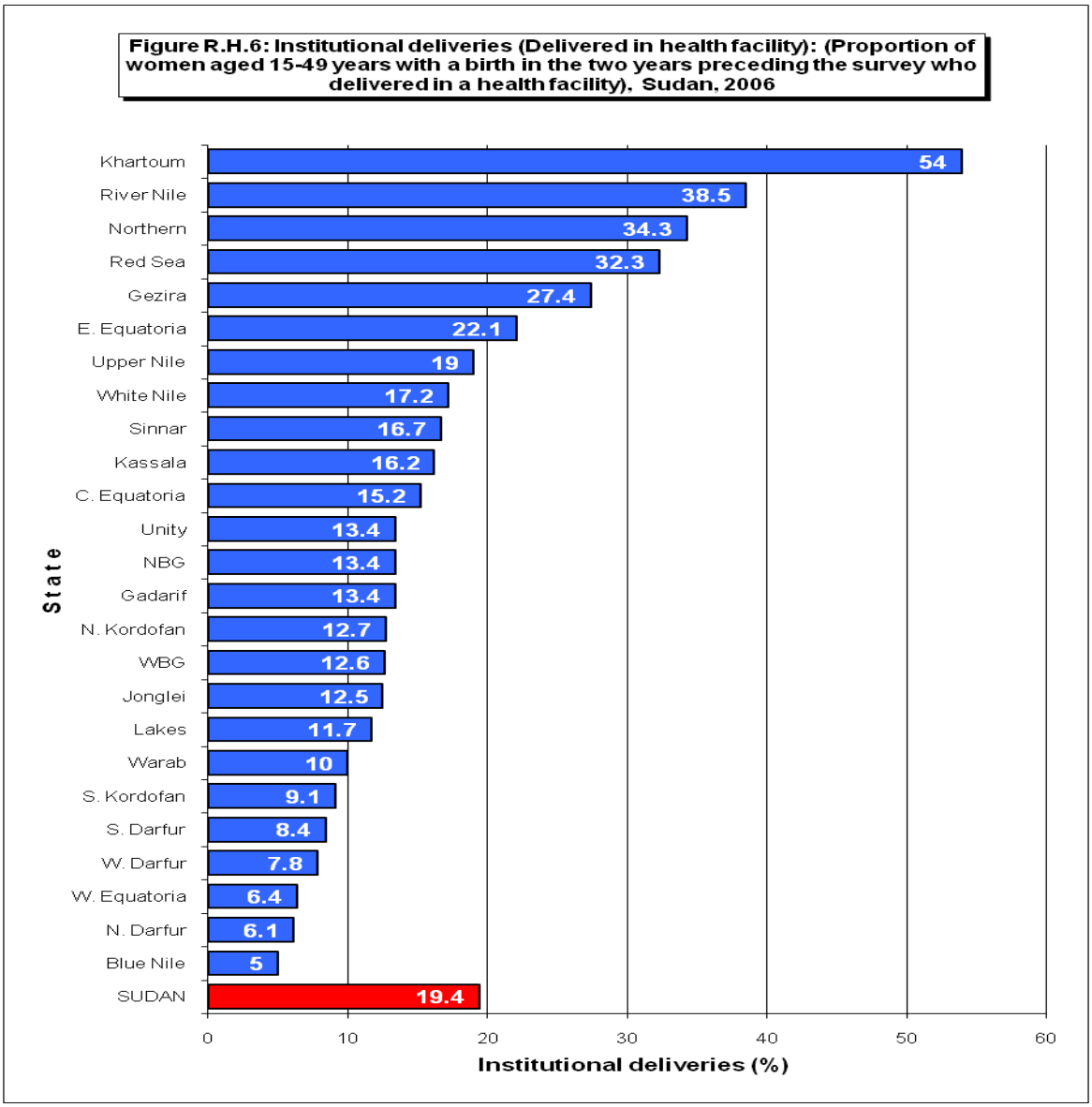
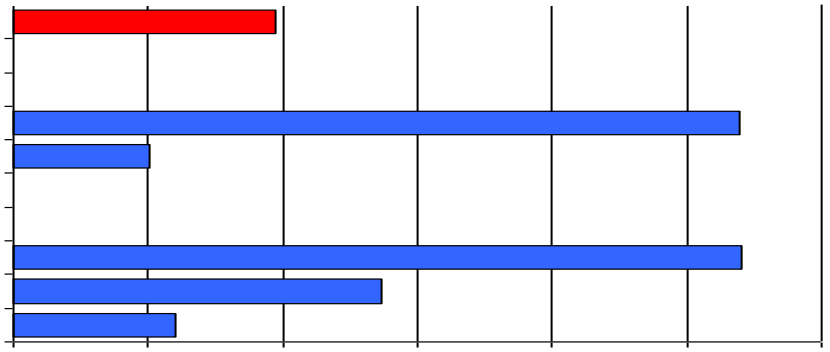


Figure RH7: Institutional deliveries (delvered in health facility),(proprtion of omen aged 15 – 49 years with a birth in the 2 years preceding the survey who delivered in a health facility, background chareteristics, Sudan, 2006



Mode of delivery

Of the total births in the two years preceding the survey, 86.7 per cent were delivered vaginally, 2.1 per cent assisted with forceps and 4.5 per cent by caesarean section (Table 10.8). The highest caesarean section (CS) rate was in River Nile at 14.2 per cent and the lowest in Upper Nile at 0.7 per cent.

Place of delivery

Of the total births in the two years preceding the SHHS, 76.5 per cent were delivered at home, 2.2 per cent at a Primary Health Care Centre (PHCC), 0.9 per cent at a Primary Health Care Unit (PHCU), 13.2 per cent in a public hospital and 1.5 per cent in a private hospital (Table 10.9). The highest proportion of births delivered in a public hospital was in Khartoum State at 40.8 per cent and the lowest in NBG state at .7 per cent. It is worth to mentioning that Warap State has zero per cent of births delivered in a public hospital.

The percentage of births delivered in a public hospital was only 6.2 in respect of women with no education compared to 22 in the case of women with primary education and 35.5 in the case of women with secondary or higher education. Similarly, the percentage of births delivered in a private hospital was only 0.1 in respect of women with no education compared to 14 in the case of women with secondary or higher education. The SHHS results also show that the percentage of births delivered in a public or private hospital increases with economic level of the household. The percentage of births delivered in a public hospital was only 3.2 in the case of women from the poorest households compared to 39 in the case of women from the richest households, while the

percentage of births delivered in a private hospital was 0.5 for women from the poorest households compared to 9.5 for women from the richest households.There were fourteen states with no births delivered in a private hospital.

Iron supplementation

Table 10.10 shows the percentage of women aged 15-49 years (with a birth in two years preceding the survey) who received iron supplementation. Overall, 40.8 per cent of women with a birth in two years preceding the survey had received iron supplementation. The percentage was found to be linked to some extent to the level of education and economic status of the women. Only 30.9 per cent of women with no education received iron supplementation compared to 55 in the case of women with primary education and to 59.6 per cent in the case of women with secondary or higher education. The percentage was only 24.3 in the case of women from the poorest households compared to 66 in the case of women from the richest households.

The highest proportion of women who received iron supplementation was in Northern State at 64.3 per cent followed by Khartoum State at 63.5 per cent and the lowest in Jonglei State at 14.8 per cent.

Complications during pregnancy

Table 10.11 shows the percentage of women aged 15-49 years who gave birth in the two years preceding the survey by type of pregnancy complications. The main complications during pregnancy included headache (42.3 per cent), fever (42 per cent), abdominal pain (30.5 per cent), urinary pain (22 per cent) and edema (21.6 per cent). Other complications included severe breathlessness (18.4 per cent), hypertension (17.2 per cent), bleeding (13.2 per cent), convulsions (11.6 per cent), and Jaundice (11.5 per cent).

The SHHS results showed that the pregnancy complications were less among women with higher educational level. For instance, the percentage of women aged 15-49 years who gave birth in the two years preceding the survey who experienced headache was 48.2 among women with no education as compared to 34.7 among women with primary education and 24.2 among women with secondary or higher education. The percentage of women who had high fever during pregnancy was 47.6 among women with no education as compared to 34.5 among women with primary education and 26 among women with secondary or higher education. The percentage of women who experienced convulsions during pregnancy was 15.3 among women with no education as compared to 6.4 among women with primary education and 3.8 among women with secondary or higher education. Similarly, the percentage of women who had urinary pain during pregnancy was 25.3 among women with no education as compared to 17.6 among women with primary education and 13.6 among women with secondary or higher education.

The SHHS results also show that the pregnancy complications were less among women with higher economic level of the household. For instance, the percentage of women aged 15-49 years who gave birth in the two years preceding the survey who experienced headache was 53.9 among women from the poorest households compared to 25.5 among women from the richest households. The percentage of women who had high fever during pregnancy was 52 among women from the poorest households compared to 23.4 among women from the richest households. The percentage of women who experienced convulsions during pregnancy was 20.1 among women from the poorest households compared to 3.2 among women from the richest households. Similarly, the percentage of women who had urinary pain during pregnancy was 27.3 among women from the poorest households compared to 12.8 among women from the richest households.

Complications during labour and delivery

Table 10.12 shows the percentage of women aged 15-49 years who gave birth in the two years preceding the survey by type of complications during labour and delivery. The main complications during labour and delivery include prolonged labour (31.1 per cent), high fever (30.9 per cent), excessive bleeding (22 per cent) and convulsions (10.2 per cent).

The level of complications during labour and delivery were found to decrease with increasing level of education of the woman. For instance, the percentage of women aged 15-49 years who gave birth in the two years preceding the survey who experienced prolonged labour was 34.7 among women with no education as compared to 26.1 among women with primary education and 22.6 among women with secondary or higher education. The percentage of women who had high fever during labour and delivery was 38.5 among women with no education as compared to 20 among women with primary education and 15.5 among women with secondary or higher education. The percentage of women who experienced convulsions during labour and delivery was 13.8 among women with no education as compared to 5 among women with primary education and 2.9 among women with secondary or higher education. Similarly, the percentage of women who had excessive bleeding during labour and delivery was 25.8 among women with no education as compared to 11.5 among women with primary education and 10.4 among women with secondary or higher education.

The level of complications during labour and delivery were also found to decrease with increasing economic level of the household. For instance, the percentage of women aged 15-49 years who gave birth in the two years preceding the survey who experienced prolonged labour was 38.2 among women from the poorest households compared to 20 among women from the richest households. The percentage of women who had high fever during labour and delivery was 44.8 among women from the poorest households compared to 12.1 among women from the richest households. The percentage of women who experienced convulsions during labour and delivery was 17.5 among women among women from the poorest households compared to 2.1 among women from the richest households. Similarly, the percentage of women who had excessive bleeding during labour and delivery was 34.6 among women from the poorest households compared to 5.9 among women from the richest households.

Complications during postpartum

Table 10.13 shows the percentage of women pregnant in past two years by complication during postpartum period. The main complications during postpartum period included lower back pain (27.6 per cent), abdominal pain (25.5 per cent), upper back pain (22.1 per cent), painful urination (17.6 per cent), and painful breasts (17.2 per cent.

The SHHS results show that complications during postpartum period were less among women with higher educational level. For instance, the percentage of women pregnant in past two years who experienced lower back pain during postpartum period was 32.9 among women with no education as compared to 19.9 among women with primary education and 18.6 among women with secondary or higher education. The percentage of women who had abdominal pain during the postpartum period was 31.2 among women with no education as compared to 17.4 among women with primary education and 13.3 among women with secondary or higher education. The percentage of women who experienced upper back pain was 27.6 among women with no education as compared to 14.3 among women with primary education and 12 among women with secondary or higher education. Similarly, the percentage of women who had experienced painful

urination was 22.1 among women with no education as compared to 11.5 among women with primary education and 7.9 among women with secondary or higher education.

The SHHS results also show that complications during postpartum period were less among women from households with relatively higher economic level. For instance, the percentage of women pregnant in past two years who experienced lower back pain during postpartum period was 40.7 among women belonging to the poorest households compared to 15.6 among women from the richest households. The percentage of women who had abdominal pain during the postpartum period was 38.7 among women belonging to the poorest households compared to 12.4 among women from the richest households. The percentage of women who experienced upper back pain was 33.7 among women belonging to the poorest households compared to 10.7 among women from the richest households. Similarly, the percentage of women who had experienced painful urination was 27.1 among women belonging to the poorest households compared to 7.9 among women from the richest households.

Outcomes of pregnancies

Table 10.14 shows the pregnancy outcomes for women aged 15-49 years who gave birth in the two years preceding the survey. About 79.5 per cent of pregnancies ended in live births while 10.6 per cent ended in stillbirths. Miscarriages accounted for 9.9 per cent.

The SHHS results show that women of higher education level had a higher percentage of live births and lower percentage of still births. For example, about 86.8 per cent of pregnancies ended in live births among women with secondary or higher education as compared to 84.9 per cent among women with primary education and 76.1 per cent among women with no education. Similarly, while 13.6 per cent of pregnancies ended in stillbirths among women with no education, the percentage of stillbirths was only 5.6 among women with primary education and 4.3 among women with secondary or higher education.

The SHHS results also show that women belonging to richer households had a higher percentage of live births and lower percentage of still births. For instance, 84.1 per cent of pregnancies ended in live births among women from the richest households compared to 69.9 per cent among women from the poorest households. Similarly, while 17.7 per cent of pregnancies ended in stillbirths among women from the poorest households, the percentage of stillbirths was only 4.3 among women from the richest households.

Maternal Mortality

The complications of pregnancy and childbirth are a leading cause of death and disability among women of reproductive age in developing countries. And for every woman who dies, approximately 20 more suffer injuries, infection and disabilities in pregnancy or childbirth. This means that at least 10 million women a year incur this type of damage.

The most common fatal complication is post-partum haemorrhage. Sepsis, complications of unsafe abortion, prolonged or obstructed labour and the hypertensive disorders of pregnancy, especially eclampsia, claim further lives. These complications, which can occur at any time during pregnancy and childbirth without forewarning, require prompt access to quality obstetric services equipped to provide lifesaving drugs, antibiotics and transfusions and to perform caesarean sections and other surgical interventions that prevent deaths from obstructed labour, eclampsia and intractable haemorrhage. One MDG target is to reduce the maternal mortality ratio by three quarters, between 1990 and 2015.

Maternal mortality is defined as the death of a woman from pregnancy-related causes when pregnant or within 42 days of termination of pregnancy (ICD.10). The maternal mortality ratio is the number of maternal deaths per 100,000 live births.

In the SHHS, using direct estimation method for measuring Maternal Mortality Ratio (MMR). Data was collected during the listing process of the PSUs which were designed to have average number of households of 80 to 120. It was estimated that the listing phase would provide the opportunity of covering an average of 80.000 to 100.000 households and thus giving an adequate sample size for the MMR estimation.

Listing of the households was undertaken in each selected segment in order to prepare a list of households for the selection of the 25 households for the enumeration process.
A standardized and pre-structured form was used to collect the following variables from each household in the selected PSUs:

The total number of live births during the two years preceding the survey.

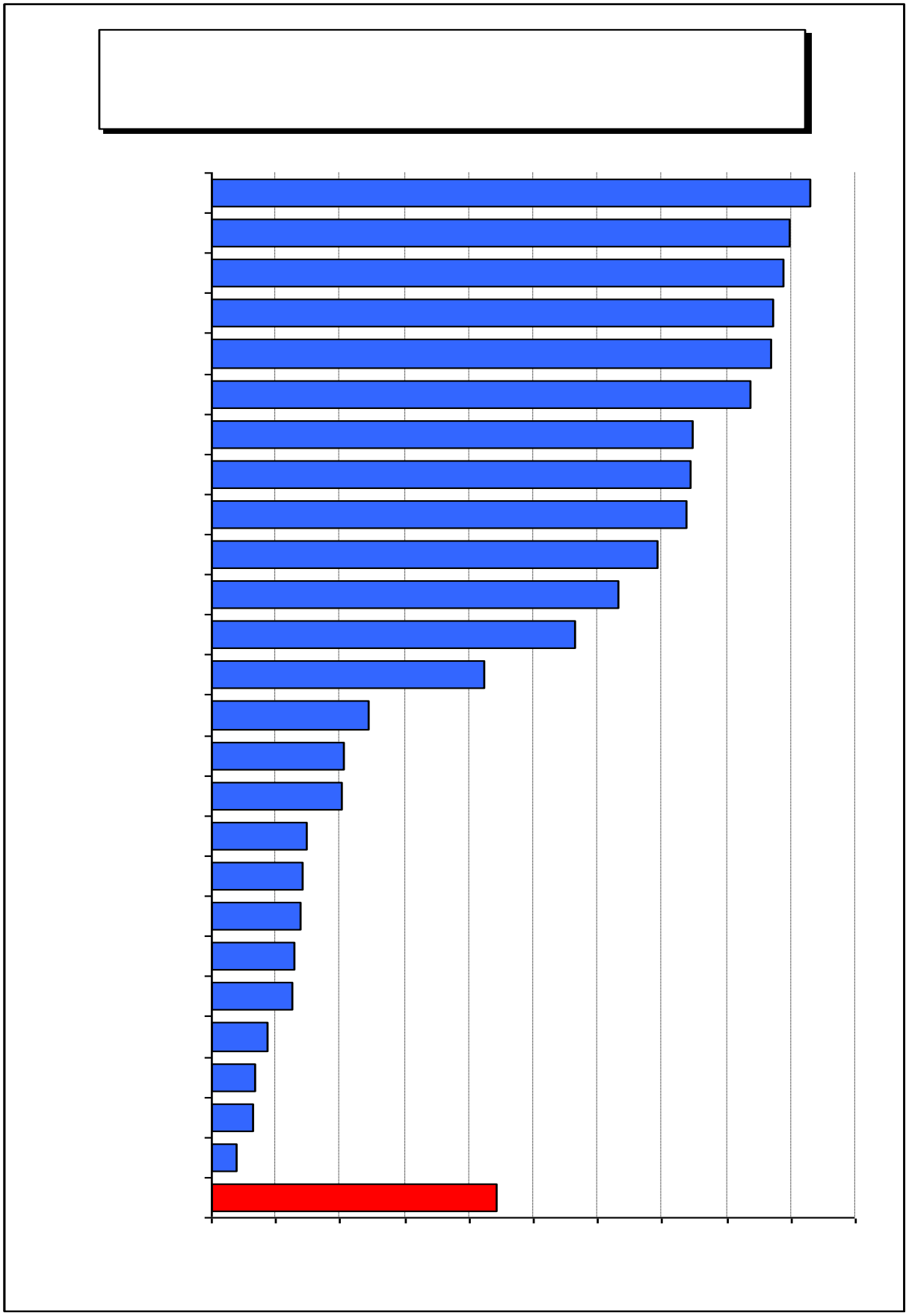
The total number of deaths of females in the age group 12 – 54 years during the two years preceding the survey.

The total number of females' deaths occurring during pregnancy, child birth or during the postpartum period, due to causes other than accidents, also during the two years preceding the survey.

Table 10.15 provides the MMR by States

The National average of MMR was estimated at 1,107 per 100,000 live births. The MMR was lowest in Northern State (94 per 100,000 live births) followed by River Nile State (161 per 100,000 live births) and highest in Western Equatoria State (2,327 per 100,000 live births) and Lakes State (2,243 per 100,000 live births) . Thirteen of the states have MMR higher than the national average, all of them in the conflictaffected areas. Six of the states have MMR higher than 2,000 per 100,000 live births (Figure 10.8).

State	Maternal mortality ratio
Northern	94
River Nile	161
Red Sea	166
Kassala	1,414
Gadarif	609
Khartoum	311
Gezira	355
Sinnar	320
Blue Nile	515
White Nile	366
North Kordofan	213
South Kordofan	503
North Darfur	346
West Darfur	1,056
South Darfur	1,581
Jonglei	1,861
Upper Nile	2,094
Unity	1,732
Warap	2,173
Northern Bahr El Ghazal (NBG)	2,182
Western Bahr El Ghazal (WBG)	2,216
Lakes	2,243
Western Equatoria	2,327
Central Equatoria	1,867
Eastern Equatoria	1,844
SUDAN	**1,107**



XI. HIV/AIDS

One of the most important prerequisites for reducing the rate of HIV infection is accurate knowledge of how HIV is transmitted and strategies for preventing transmission. Correct information is the first step towards raising awareness and giving young people the tools to protect themselves from infection. Misconceptions about HIV are common and can confuse young people and hinder prevention efforts. Different population groups are likely to have variations in misconceptions although some appear to be universal (for example that sharing food can transmit HIV or mosquito bites can transmit HIV). The UN General Assembly Special Session on HIV/AIDS (UNGASS) called on governments to improve the knowledge and skills of young people to protect themselves from HIV. Achieving the MDG of reducing HIV infections by half requires improving the level of knowledge of HIV and its prevention, and changing behaviours to prevent further spread of the disease. The HIV module was administered to women 15-49 years of age.

The indicators to measure the knowledge of HIV transmission and prevention include the following:

Awareness about AIDS among women: Proportion of women in the age group 15-49 years who have heard of AIDS;
Knowledge of about HIV prevention: Proportion of women aged 15-49 years who correctly identify two main ways of avoiding HIV infection/transmission (i.e., having only one uninfected partner and using condoms);
Awareness about mother-to-child transmission of HIV: Proportion of women aged 15-49 years who know that AIDS can be transmitted from mother to child;
Knowledge of means of mother-to-child transmission of HIV: Proportion of women aged 15-49 years who correctly identify three means of vertical transmission (i.e., HIV transmission from mother to child).

Awareness about AIDS

Table 11.1 presents information relating to the awareness of AIDS among women (i.e. proportion of women aged 15-49 years who have heard of AIDS). Overall, more than two-thirds (70.4 per cent) of women aged 15-49 years had heard of AIDS. The awareness of AIDS was highest (73.3 per cent) among women in the age group 15-19 years and lowest (66.9 per cent among women in the age group 25-29 years.

The awareness of AIDS is low among women with no education. Only 49.6 per cent of them have heard of AIDS. On the other hand, as much as 90.5 per cent of women with primary education and 93.5 per cent of women with secondary or higher education have heard of AIDS. The awareness of AIDS is also particularly poor among women from the poorest households. For example, the percentage of women who have heard about AIDS was only 39.3 among women from the poorest households compared to 97.2 among women belonging to the richest households.

The awareness AIDS among women aged 15-49 years also varies substantially by state of residence. It was highest in Khartoum State where 94.3 of women aged 15-49 years have heard about AIDS and lowest in Jonglei State (24.8 per cent).

Knowledge of the modes of HIV transmission

The SHHS attempted to ascertain women's knowledge of the modes of HIV transmission. About one-half of women (51.5 per cent) reported sexual intercourse as the main mode of transmission (Table 11.2). Nearly four out of ten women (39.7 per cent) mentioned blood transfusion as a mode of HIV transmission while 38.8 per cent of them thought that the disease could be transmitted through injection with needles already used by someone. Only 7.5 per cent of women felt that HIV could be transmitted by not using a condom. About 12.9 per cent of women did not know how HIV was transmitted.

The knowledge of the modes of HIV transmission is quite low among women with low educational level. For instance, only 28.7 per cent of women with no education as compared to 71.8 per cent of those with primary education and 85.7 per cent of those with secondary or higher education mentioned sexual intercourse as a mode of HIV transmission. The percentage of women

who reported blood transfusion as a mode of HIV transmission was only 17.8 among women with no education as compared to 58.1 among those with primary education and 76.9 among those with secondary or higher education. Similarly, the percentage of women who mentioned that HIV could be transmitted by injection with needles used by someone was only 18.2 among women with no education compared to 56.7 per cent among those with primary education and 70.8 per cent among those with secondary or higher education.

The knowledge of the modes of HIV transmission is also lower among women belonging to the poorest households as compared to those from the richest households. The percentage of women who reported that HIV could be transmitted through sexual intercourse was only 24.8 among women from the poorest households compared to 86.2 among those from the richest households. The percentage of women who reported that HIV could be transmitted by blood transfusion was only 12.6 among those belonging to the poorest households compared to 75.6 among women from the richest households. Similarly, the percentage of women who indicated that HIV could be transmitted by injection with needles already used by someone was only 12.3 among those belonging to the poorest households compared to 70.2 among women from the richest households.

Knowledge of misconceptions concerning HIV transmission

The SHHS also tried to ascertain some of the common misconceptions among women about the mode of HIV transmission. The most common misconceptions concerning HIV transmission are that HIV can be transmitted (i) by mosquito bites, (ii) by sharing food; (iii) by supernatural means and (iv) that a healthy looking person cannot be infected by HIV. About 3.9 per cent of women aged 15-49 years believed that HIV could be transmitted by mosquito bites and 1.6 per cent of them believed that it could be transmitted by sharing food with a person with AIDS virus while about 0.7 per cent of women thought that HIV could be transmitted through supernatural means (Tables 11.3).

About 38.4 per cent of the women knew that a healthy-looking person could be infected by AIDS.

The percentage of women who believed that a healthy-looking person could be infected by AIDS varied with educational level of the women and economic status of the households. For instance, while the percentage of women who believed that a healthy-looking person could be infected byAIDS was only 18.8 among those with no education, it was 54.8 among women with primary education and 72.2 per cent among those with secondary or higher education. The percentage of women who knew that a healthy-looking person could be infected by AIDS was only 13.4 among those from the poorest households compared to 68.8 among those belonging to the richest households.

Knowledge of the main ways of preventing HIV transmission

One indicator which is both an MDG and UNGASS indicator is the percentage of young women who have correct knowledge of the main ways of preventing HIV transmission. Women were asked whether they knew of the main ways of preventing HIV transmission; having only one faithful uninfected partner, using a condom every time, and abstaining from sex. The results are presented in Table 11.4.

About four out of ten interviewed women (39 per cent) indicated that transmission of HIV could be prevented by having only one faithful uninfected sex partner. Approximately one out of ten women (9.2 per cent) suggested use of condom as an important way of preventing of HIV transmission while 11.2 per cent of interviewed women indicated abstaining from sex as another method of prevention. However, only 4 per cent of women knew all three ways (i.e. having only one faithful uninfected partner, using a condom every time, and abstaining from sex) of preventing HIV transmission. A considerable proportion (44.5 per cent) of the women knew at least one of the ways of preventing HIV transmission while a high proportion of women (55.4 per cent) did not know any way of preventing HIV transmission.

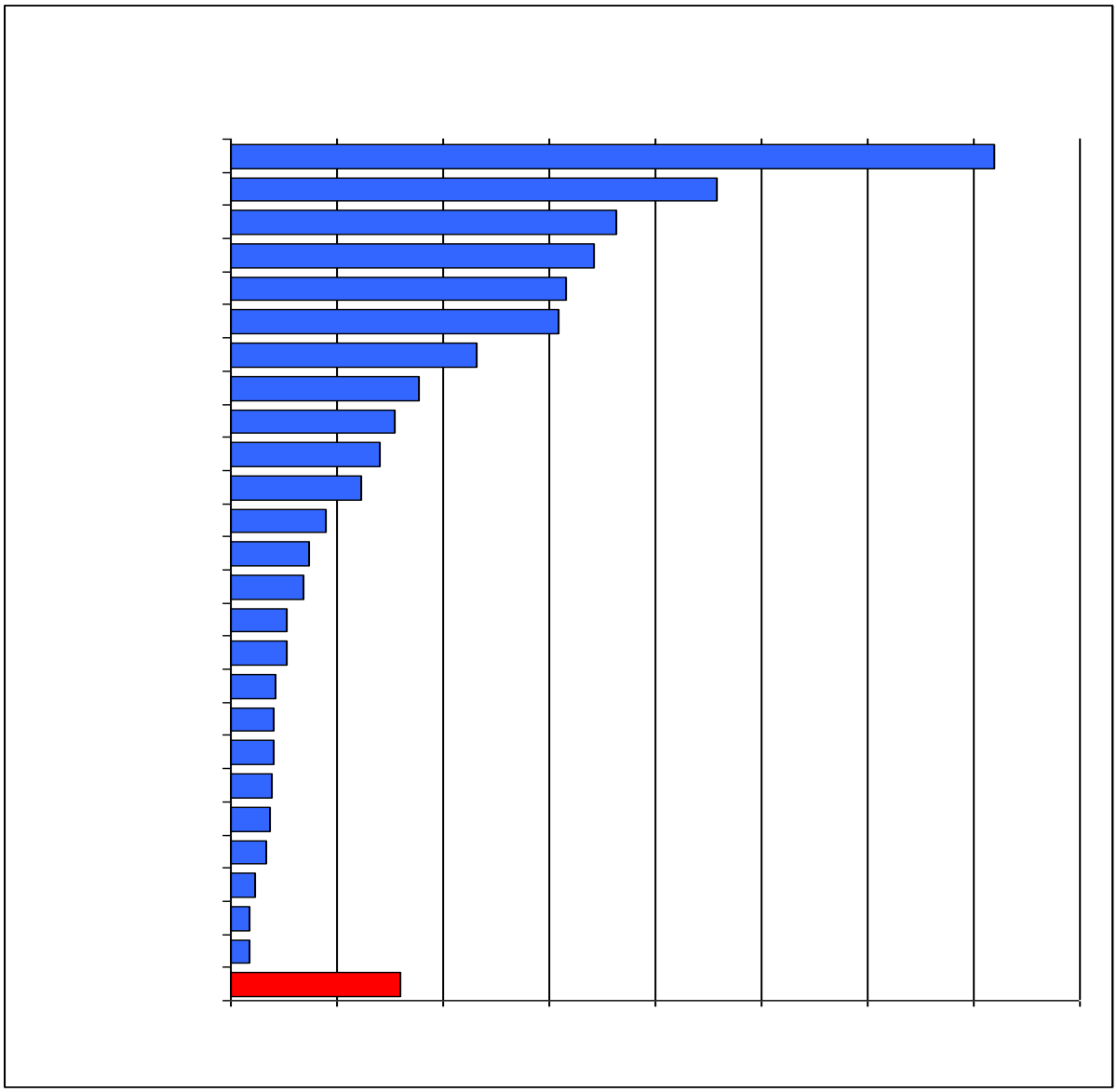
The percentage of women who had correct knowledge of the main ways of preventing HIV transmission varied with women's educational level and economic status of the households. For instance, only 22.2 per cent of women with no education believed that one could prevent HIV transmission by having one faithful uninfected sex partner as compared to 54.1 per cent among women with primary education and 62.6 per cent among those with secondary or higher education. The percentage of women who believed that one could avoid AIDS by having one uninfected partner was only 18 among the poorest households compared to 62.4 among women from the richest households. Similarly, the percentage of women who knew at least one of the ways of preventing HIV transmission ranged from 25 per cent among those with no education to 62 per cent among those with primary education and 72.4 per cent among those with secondary or higher education. This percentage ranged from 20.6 among women from the poorest households to 72.9 among those belonging to the richest households.

Knowledge of two effective ways of preventing HIV transmision

Table 11.5 presents the percentage of women who knew two of the most effective ways (i.e. having one uninfected partner and using a condom correctly every time) of preventing HIV transmission and AIDS. The percentage of women who knew both these ways was fairly low (8 per cent) although there are differences by state of residence, ranging from 36 per cent in Central Equatoria State to 0.9 per cent in Sinnar State.

As expected, the percentage of women with the knowledge of the two effective ways of avoiding AIDS increases with the woman's education level (Figure 11.1), increasing from 6 per cent among women with no education to 16.3 per cent among women with secondary or higher education. The percentage of women with the knowledge of the two effective ways of avoiding AIDS also

increases with the economic level of the household, increasing from 5.7 per cent among women from the poorest households to 11.9 per cent among those from the richest households.



Knowledge of mother-to-child transmission of HIV

Knowledge of mother-to-child transmission of HIV is an important first step for women to seek HIV testing when they are pregnant to avoid infection in the baby. Women should know that HIV can be transmitted during pregnancy, delivery, and through breastfeeding.

The level of knowledge among women age 15-49 years concerning mother-to-child transmission is presented in Table 11.6. Overall, 54 per cent of women knew that HIV could be transmitted from mother to child. The percentage of women who know all three ways of mother-to-child transmission was 26.4 per cent, while 17.2 per cent of women did not know of any specific way.

The percentage of women who knew that AIDS can be transmitted from mother to child increases with the woman's education level, being 29.7 among women with no education to 76.5 among those with primary education and to 85 among women with secondary or higher education. Similarly, the percentage of women who knew all three ways of HIV transmission from mother to child was only 14 among women with no education as compared to 39.6 among women with primary education and 34 among women with secondary or higher education; and the percent age

of women who did not know any specific way to prevent HIV transmission from mother-to-child decreases from 20.9 among women with no education to 14.4 among with primary education and 8.9 among women with secondary or higher education.

The percentage of women who knew that AIDS can be transmitted from mother to child also increases with the economic level of the household, being 22.2 among women from the poorest households and 87.5 among those from the richest households. Similarly, the percentage of women who knew all three ways of HIV transmission from mother to child increases from 9.4 among women from the poorest households to 39 among those from the richest households.The percentage of women who did not know any specific way to prevent HIV transmission from mother-to-child decreases from 18.3 among women from the poorest households to 9.9 among those from the richest households.

XII. Food Security [5]

Food consumption patterns

Diets in Sudan are extremely diverse, linked in large part to its highly diversified climate and resource base. The climate ranges from hyper-arid in the north to the sub-humid in the south. Given the conditions, diets in the North tend to be less diverse than diets in the south. Conversely, the amount consumed tends to be higher in the north than in the south. Generally speaking, though, the main staples of the Sudanese diet are sorghum and millet. In certain areas, especially in pastoral areas, there is a significant amount of meat and milk consumed as well.

Food consumption score

Studies have shown that there is a significant correlation between diet diversity and nutrient adequacy, children's and women's anthropometry and socio-economic status (Ruel, 2003)[6]. The World Food Programme (WFP),, building on this work, has created a custom dietary diversity tool intended to capture different consumption patterns, in terms of both the number and frequency of food groups consumed. The "food consumption score" is calculated by examining the number of times certain foods (grouped into basic food groups) are eaten in the seven days preceding the survey and then weighting them by approximate nutrient density values. The food categories created and their corresponding weights are shown in Table 12.1.

Cereals and tubers (sorghum, millet, maize, cassava, yams and sweet potato)	2
Pulses (beans, sesame, groundnuts)	3
Meats (beef, poultry, fish, eggs and wild game)	4
Milk/ milk products (ghii)	4
Fruits and vegetables (leaves, fruits and greens)	1
Oil and fat	0.5
Sugar	0.5

Then the food consumption (FC) score was calculated as follows:

FC score= (number of time cereal eaten*2) + (number of time pulses eaten*2) + (number of times meats eaten*4) + (number of time dairy eaten*4) + (number of times veggies eaten*1) + (number of times fruits eaten*1)

It may be noted that the number of times any particular item was eaten was capped at 7 per week. This calculation provides each household a food consumption score, ranging from 1 to 105. Households are then categorized into three food consumption groups according to their score: Poor food consumption, Borderline food consumption, and Good food consumption. To define these categories, two standard thresholds have been identified.

[6] Ruel M., 2003. *Operationalizing dietary diversity: a review of measurement issues and research priorities*. Journal of Nutrition 133:3922S-3926S.

A score of 21 has been determined as the minimum consumption score for either a borderline or good diet. The value comes from an expected consumption of staple foods (frequency * weight, 7 * 2 = 14) and vegetables (7 * 1 = 7). If the consumption score is below 21, a household is expected NOT to eat at least staple and vegetables on a daily base and therefore considered to have poor food consumption. These households can be considered chronically food insecure. The second threshold was set at 35, being composed by daily consumption of staple and vegetables complemented by a frequent (4 day/week) consumption of oil and pulses (staple*weight + vegetables*weight + oil*weight + pulses*weight = 7*2+7*1+4*0.5+4*3=35). Between 21 and 35, households can be assumed to have borderline food consumption, meaning that they are vulnerable to becoming food insecure should a small decrease in their access to food occur. Households that score above 35 are estimated to have an acceptable food consumption consisting of sufficient dietary diversity for a healthy life[7].

In countries with daily oil, fat, butter and sugar consumption, scores are artificially elevated. To account for this, minimum cutoffs are raised by 7 points (oil and fat*weight+ sugar*weight, 7*0.5 + 7*0.5=7), from 21 to 28 and from 35 to 42. Each set of cutoffs is shown in Table 12.2.

In Sudan, the determination of which cut-offs to use was complicated, because sugar and oil consumptions are rare (0-2 times per week) in southern Sudan compared to 6-7 times per week in the rest of Sudan. . Thus, while the use of the lower cut-offs provides an accurate assessment of the prevalence of poor food consumption in southern Sudan, the use of lower cut-offs is likely to underestimate the prevalence of poor food consumption in other parts of the country. Conversely, the use of the higher cut-offs, would have the opposite effect. Since it is likely to significantly overestimate the prevalence poor food consumption in Southern Sudan while providing a more accurate assessment of the prevalence of poor food consumption in the rest of Sudan . In both cases, the overall effect is the same—to spuriously inflate differences in the prevalence of poor food consumption between various parts of Sudan.

To deal with this a decision was made to use 21-35 cutoffs and not include oils, fats, butter and sugar in the calculation of the food consumption score. This was ultimately considered to be the best option for two reasons. First, the nutrient density of these food items is not significant enough to change the quality of diets. Second, while potentially a measure of the differing levels of market access between north and southern Sudan and the rest of the country, this difference was hypothesized, after consultation with VAM officers in southern Sudan, to be due in large part to preference as opposed to any other reason (for e.g, households in the north have a heavy coffee and tea consumption and sugar is commonly consumed).

The overall methodology (the calculation of food consumption scores, the use of these weighting values, and the cutoffs values, etc) was developed by WFP, and has been used effectively in

[7] "Standard" food group weights and score thresholds have been pilot tested and used in a few WFP assessments. External validations are currently underway at Tufts University and IFPRI. Results might lead to a different use of the food consumption score indicator.

southern Africa and other countries. The removal of oil and sugars from the calculations is not unprecedented in countries with very large differences in consumption which is based largely on preference. Formal guidelines detailing the use of this methodology are currently being prepared and will be "published" in late 2007.

Household food consumption score

Following the methodology described above, households can be classified into three main consumption groups according to their food consumption score.

It should be stressed that this classification is a snapshot of the food consumption situation at the moment of the data collection and it cannot be considered representative of what households consume at other times of the year. Given livestock migration and agricultural patterns as well as the fluid security situation, the proportion of households in different food consumption groups in Sudan is likely to vary depending on both time of year and what is actually happening on the ground at the time of the survey.

Food security profiling

The purpose of this section is to describe typical food insecure households and also to pinpoint particular groups with higher food insecurity rates.

Distribution of household food security status

To determine the current food security status, households with borderline and poor food consumption were classified as being "food insecure". Table 12.3 shows the percentage of food insecure households in Sudan.

West Darfur, Northern Bahr El Ghazal, Warap and Jonglei states are the most food insecure states since 40-60 per cent of households in these states are found to have poor food consumption. Likewise, 20-40per cent of all households in North Darfur State and the states in southern Sudan (with the exception of Central Equatoria state) are found have poor food consumption. The percentages of households with poor food consumption are found be less than 20 in the rest of the states of Sudan (with the exception of South Kordofan).

In Southern Sudan, wealth was the strongest predictor of food security status. Present and former IDP households were found to be more at risk of food insecurity than settled residents. Households affected by shocks (particularly one or two shocks) appeared to be more vulnerable to food insecurity than households affected by no shocks.

In Darfur, female headed households, IDP households, and households experiencing shocks were significantly more likely to be food insecure. Even in the severely conflict- affected areas of Darfur, wealth remains the strongest predictor of food security status.

In the rest of Sudan, female headed households, households with high dependency ratios, IDPs, and households experiencing shocks were more likely to be food insecure. As in southern Sudan and in Darfur, wealth, more than any other factor, was found to be the most significant determinant of food security status among households in the rest of Sudan.

Underlying causes of food insecurity

This section explores the immediate and underlying causes of food insecurity in Sudan. To assess these causes, probit models were developed using the dichotomous food secure (yes/no) variable as the dependent variable and various demographic, household and socio-economic characteristics (previously determined to be associated with food insecurity in bivariate comparisons) as the independent variables. Stata 9.2 was used for this analysis. To ensure correct estimation of standard errors (ie to properly take account of clustering effects inherent in the sample design), Stata's "robust cluster" command was utilized in the analysis [8].

Persistent high rates of food insecurity throughout Sudan have historically been conflict related. This is reflected by the distribution of food insecurity by region, with households in areas disproportionately war affected (Southern Sudan and Greater Darfur) having the largest percentage of food insecure households. In the rest of Sudan, however, most states (with the exception of the "three areas") have escaped significant and direct impacts of the conflict. This is reflected in the comparably low rates of food insecurity here (5-10%). On the whole, the rest of Sudan is more industrialized, more urbanized, wealthier, and less reliant on agriculture. Given these distinctions, food insecurity in the region is likely due to poverty, livelihoods, or shocks (food price changes, illnesses, deaths, crop loss, etc).

Given this, the independent variables examined were: sex of head of household, dependency ratio, household displacement status, wealth index, livelihood strategies, and exposure to shocks (by number and type of shock). For this analysis, several regression models were developed, as the inclusion of each of these variables into the same model would result in problems with collinearity (two variables explaining the same effect, ie. wealth status and livelihoods, as wealth is correlated with livelihoods). Thus, the first step was to assess whether characteristics of typically vulnerable households (female headed households, households with a high dependency ratio, and displaced—IDP or refugee households, households experiencing shocks) were associated with food insecurity. The next step was to examine (taking account of these basic households characteristics) the relationship between asset wealth and food security status, assessing whether any of these basic household characteristics modified wealth's effect on food security status. Given that food security determinants are likely different by place or residence, each analysis was conducted separately for urban and rural areas. The last step was to assess the relationship between household livelihoods and food insecurity. Here, interactions between basic household characteristics and livelihood strategies were assessed as well. The models assessed are shown below:

Probit= b0 + b1(female hhh) + b2(high dependency ratio) + b3(IDP hhs) + b4(refugee hhs) + b5(returned IDPs) + b6(returned refugees) + b7(hh experience one shock) + b8(hh experienced two shocks) + b9(household experienced three shocks)

Probit= b0 + b1(female hhh) + b2(high dependency ratio) + b3(IDP hhs) + b4(refugee hhs) + b5(returned IDPs) + b6(returned refugees) + b7(hh experienced sickness/death) + b8(hh

[8] The "robust cluster" command allows the inherent similarities between households within clusters to be taken into account during the analysis. By accounting for similarities within clusters, proper standard errors (and thus 95% confidence intervals, p-values etc) can be calculated. Importantly, accounting for the effects of clustering does not affect the coefficients—or magnitude of effect of each variable in the model. To illustrate, lets say agricultural households—according to regular linear regressions—have a food consumption score 10 points lower than pastoral households, with a p-value of 0.030. Linear regression using the "robust cluster" command will show the same differential in terms of food consumption scores (agricultural households are 10 points lower), but in this case, given the clustering effects, the p-value may rise to 0.05, 0.10 (or even higher depending on how strong the clustering effects are).

experienced agricultural shock) + b9(household experienced insecurity shock) + b10(household experienced price shock)

Probit= b0 + b1(female hhh) + b2(high dependency ratio) + b3(IDP hhs) + b4(refugee hhs) + b5(returned IDPs) + b6(returned refugees) + b7(hh experience one shock) + b8(hh experienced two shocks) + b9(household experienced three shocks) + b10(hh wealth index)

Probit= b0 + b1(female hhh) + b2(high dependency ratio) + b3(IDP hhs) + b4(refugee hhs) + b5(returned IDPs) + b6(returned refugees) + b7(hh experience one shock) + b8(hh experienced two shocks) + b9(household experienced three shocks) + b10(agricultural, fishing and hunting hhs) + b11(agropastoralist hhs) + b12(pastoralist) + b13(unskilled labour hhs) + b14(skilled labour hhs) + b15(employee hhs) + b16(petty trade hhs) + b17(handicraft) + b18(collection) + b19(food aid assistance hhs) + b20(other activity hhs)

In Southern Sudan, wealth was the strongest predictor of food security status. Present and former IDP households were both found to be more at risk of food insecurity than settled residents. Households affected by shocks (particularly one or two shocks) appeared to be more vulnerable to food insecurity than households affected by no shocks.

In Darfur, female headed households, IDP households, and households experiencing shocks were significantly more likely to be food insecure. Even in severly conflict affected areas of Darfur, wealth remains the strongest predictor of food security status.

In the rest of Sudan, female headed households, households with high dependency ratios, IDPs, and households experiencing shocks were all more likely to be food insecure. As in Southern Sudan and in Darfur, wealth, more than any other factor, was the most significant determinant of food security status among households in the rest of Sudan (Table 12.4).

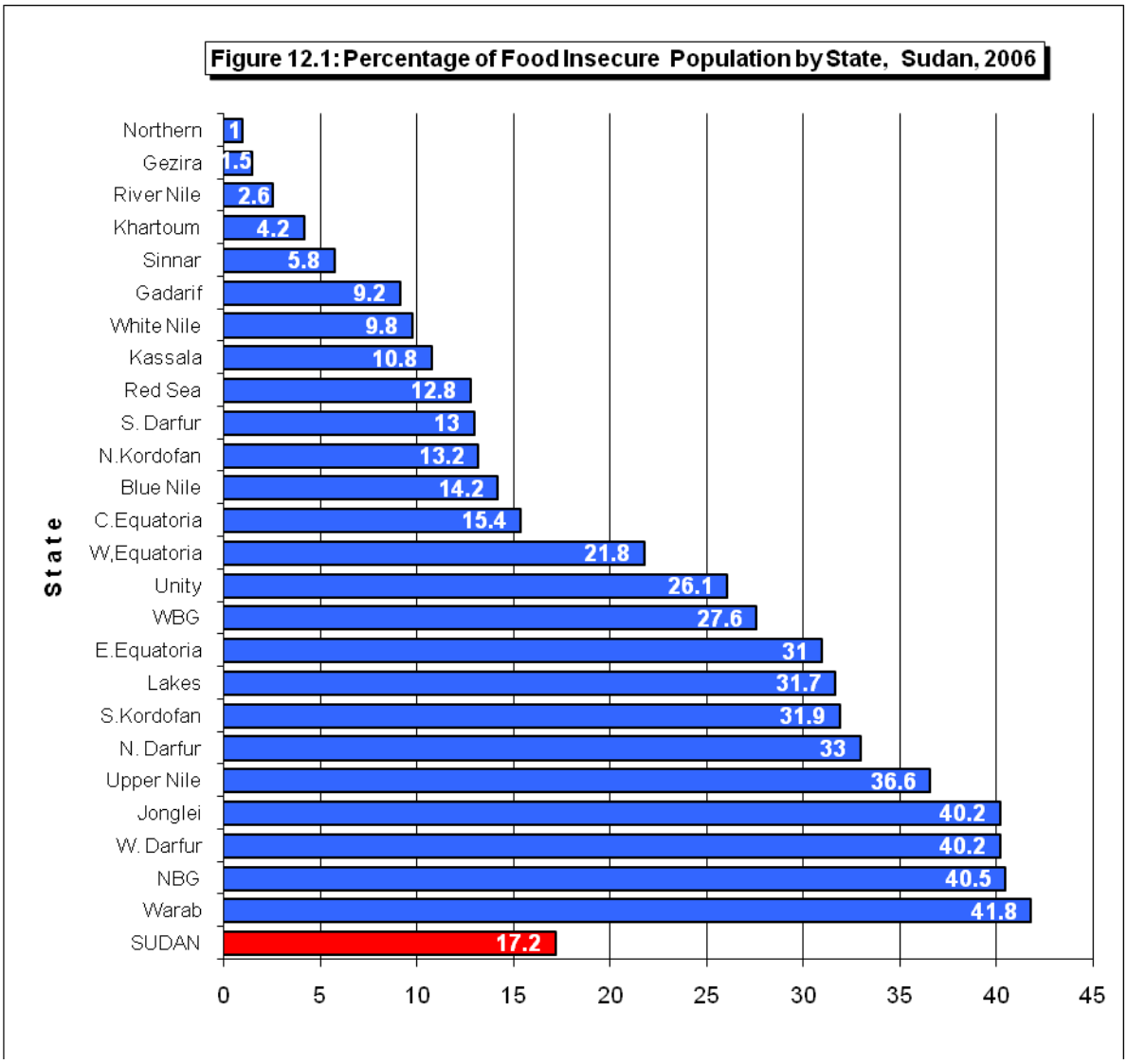


Figure 12.1: Percentage of Food Insecure Population by State, Sudan, 2006
State
Northern 1
Gezira 1.5
River Nile 2.6
Khartoum 4.2
Sinnar 5.8
Gadarif 9.2
White Nile 9.8
Kassala 10.8
Red Sea 12.8
S. Darfur 13
N.Kordofan 13.2
Blue Nile 14.2
C.Equatoria 15.4
W,Equatoria 21.8
Unity 26.1
WBG 27.6
E.Equatoria 31
Lakes 31.7
S.Kordofan 31.9
N. Darfur 33
Upper Nile 36.6
Jonglei 40.2
W. Darfur 40.2
NBG 40.5
Warab 41.8
SUDAN 17.2
0 5 10 15 20 25 30 35 40 45

	South Sudan	Darfur	Rest of Sudan

XIII. Female genital mutilation/cutting indicators, north specific

Female genital mutilation/cutting (FGM/C) is the partial or total removal of the female external genitalia or other injury to the female genital organs. FGM/C is always traumatic with immediate complications including excruciating pain, shock, urine retention, ulceration of the genitals and injury to adjacent tissue. Other complications include septicaemia, infertility, obstructed labour, and even death. The procedure is generally carried out on girls between the ages of 5 and 15 years. It is often performed by traditional practitioners, including midwives.

FGM/C is a fundamental violation of human rights. In the absence of any perceived medical necessity, it subjects girls and women to health risks and has life-threatening consequences, violating their rights to the highest attainable standard of health and to bodily integrity. Furthermore, it could be argued that girls (under 18) cannot be said to give informed consent to such a potentially damaging practice as FGM/C. This chapter discusses the prevalence of FGM/C and attitude towards it by using the data collected during the SHHS in 15 states. The key SHHS indicators relating to FGM/C include the following:

Prevalence of female genital mutilation/cutting (FGM/C): Proportion of women aged 15-49 years who reported undergoing any form of genital mutilation/cutting;

Approval for FGM/C by women aged 15-49 years: Proportion of women aged 15-49 years favouring the continuation of female genital mutilation/cutting;

Approval for FGM/C by ever married women aged 15-49 years: Proportion of ever married women aged 15-49 years favouring the continuation of female genital mutilation/cutting;

Ever-married women aged 15-49 years who intend to circumcise their daughters: Proportion of ever married women aged 15-49 years favouring circumcision of their daughters.

Prevalence of FGM/C

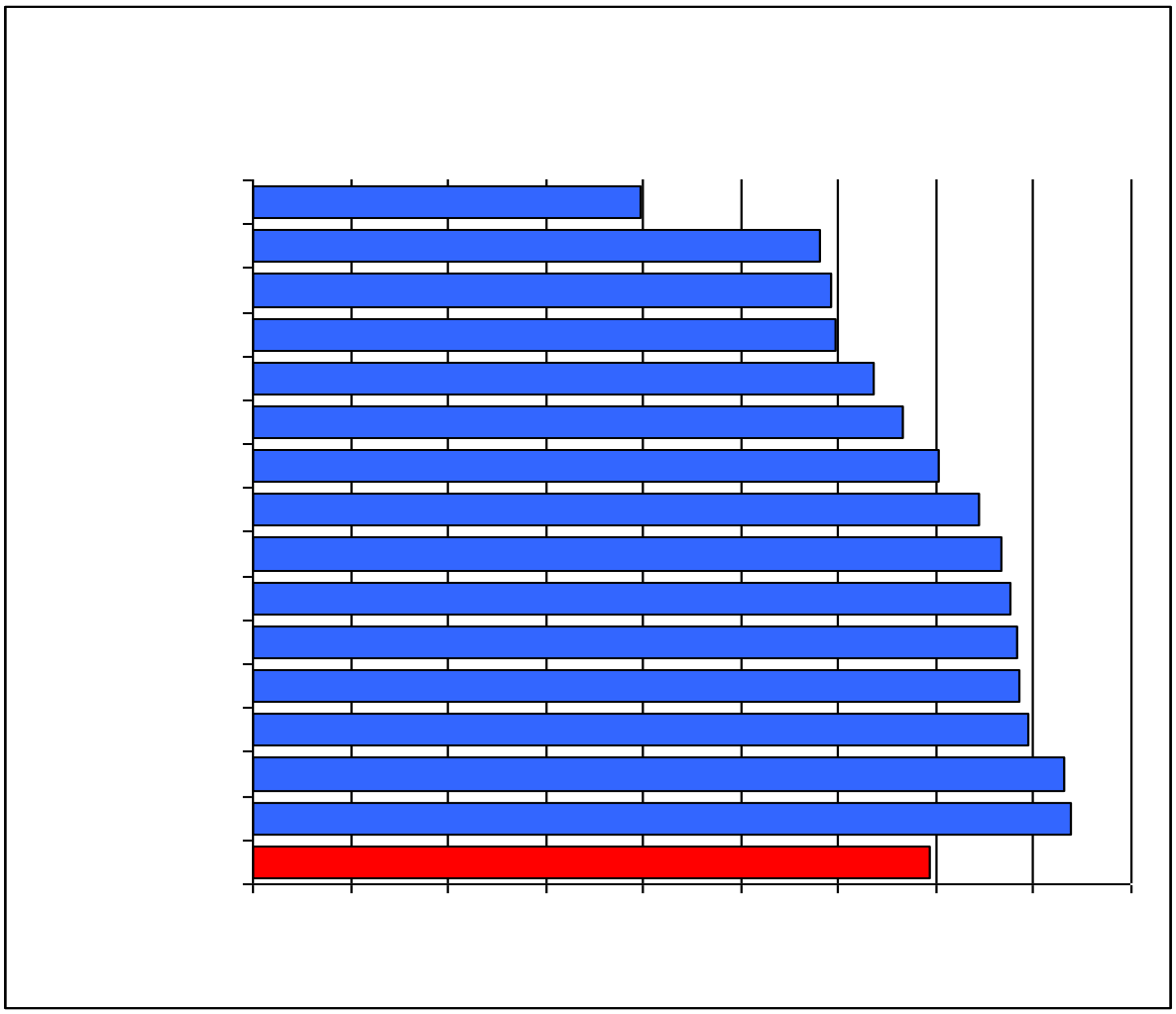
During the SHHS, a series of questions were added to the data collection in the 15 states of Sudan (where the practice of FGM/C is more common) to determine the prevalence of FGM/C and women's attitude towards this practice among women aged 15-49 years. The ten states of Southern Sudan were excluded from the collection of this data. The results presented in Table 13.1 indicate that the average FGM/C prevalence rate (proportion of women aged 15-49 years who reported undergoing any form of genital mutilation/cutting) in the 15 states surveyed was 69.4 per cent, ranging from 39.8 per cent in West Darfur State to 83.9 per cent in River Nile State (Figure 13.1).

prevalence

The percentage of women who had been subjected to FGM/C was highest (90.6) among women in the age group 35-39 years and lowest (11.3) among girls in the age group 0-4 years. In addition to the age group 35-39 years, the FGM/C prevalence was over 90 per cent among the age groups 30-34 years (91.5 per cent), 40-44 years (90.4 years) and 45-49 years (90.5 per cent).

As regards the FGM/C prevalence among under-five children, the percentage of girls who had any form of female genital mutilation/cutting was lowest (6 per cent) among girls aged under one and highest (18 per cent) among girls aged 4 years. The prevalence rate was 8.6 per cent among girls aged 1 year, 10.6 per cent among girls aged 2 years, and 14.8 per cent among those aged 3 years.

Surprisingly, the FGM/C prevalence appears to be linked to the economic level of the household. While the percentage of women aged 15-49 years who had any form of FGM/C was 57 among those from the poorest households, it was 77.6 among those belonging to the richest households. The educational level of woman does not appear to have any impact on the FGM/C prevalence rate.



Attitude towards FGM/C

The SHHS included questions designed to assess the attitude of women aged 15-49 years towards whether the practice of FGM/C should be continued or discontinued. The data collected from 15 states of Sudan (where the practice of FGM/C is more common) indicated that 44.9 per cent of women aged 15-49 years in these states believed that the practice of FGM/C should be continued (Table 13.2). The percentage of women who believed that the practice of FGM/C should be continued was lowest in Khartoum State (26.9 per cent) and highest in North Darfur State (62.9 per cent) followed by 61 per cent in South Darfur State. This percentage ranged between 50 and 60 in three states and between 40 and 50 in nine states.

The attitude of women towards whether the practice of FGM/C should be continued or discontinued appears to be linked to the woman's educational level and the economic level of the household (Figure 13.2). While the percentage of women who believed that the practice of FGM/C should be continued was 62.4 among women with no education, it was only 38.6 among women with primary education and 17.6 among women with secondary or higher education. The percentage of women who believed that the practice of FGM/C should be continued was only 23.7

among women from the richest households compared to 63.3 among women belonging to the poorest households.

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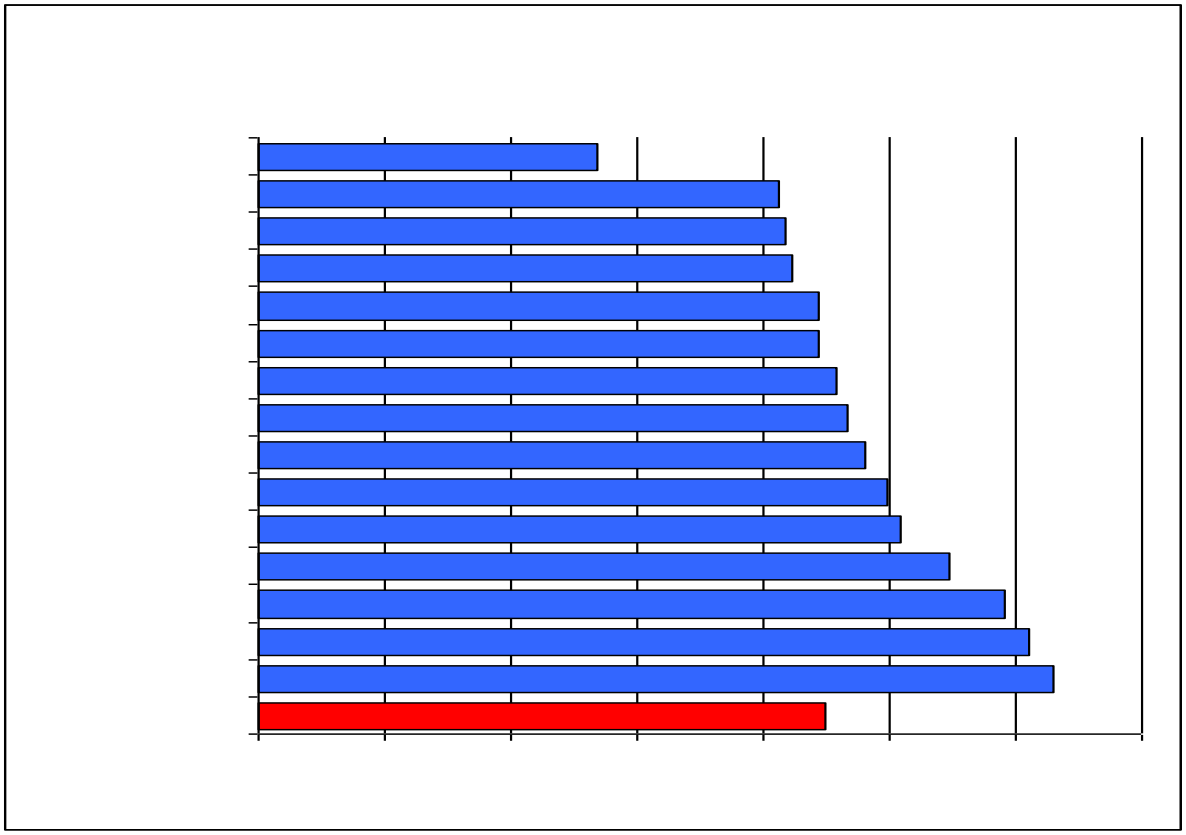

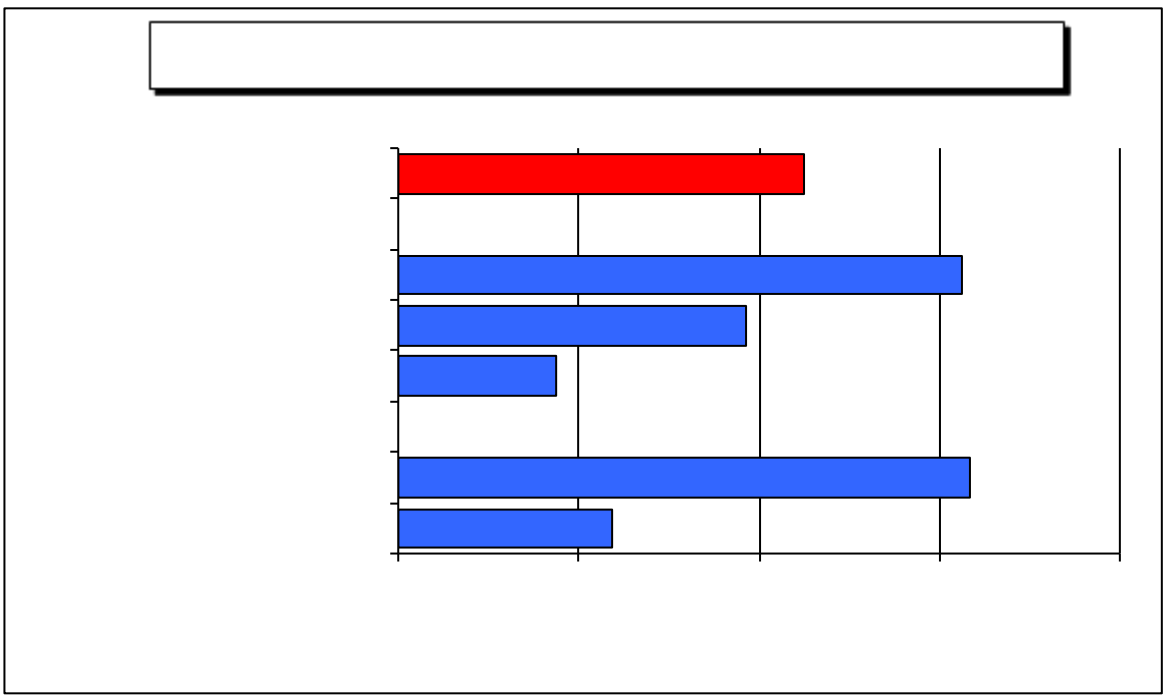

Persons performing female circumcision

Female circumcision is performed mainly by the traditional circumciser and nurses/midwives. The SHHS results indicate that out of the circumcised females, 53.5 per cent of them were circumcised by a traditional circumciser while 41.5 per cent of them were circumcised by a nurse/midwife (Table 13.4).

Women intending to circumcise their daughters

The SHHS also sought to assess the proportion of ever-married women aged 15-49 years who intended or not intended to circumcise their daughters. The data collected from 15 states of Sudan indicated that on an average, 53.6 per cent ever-married women aged 15-49 years in these states intended to circumcise their daughters (Table 13.5). This percentage was lowest in Khartoum State (38.6 per cent) and highest in Kassala State (69 per cent).

The intention of ever-married women aged 15-49 years to circumcise their daughters appears to have a linkage with the woman's educational level and the economic level of the household (Figure 13.4). The percentage of ever-married women who intended to circumcise their daughters was 63.9 among women with no education as compared to 46.5 among women with primary education and 28.3 among women with secondary or higher education. The percentage of ever-

married women who intended to circumcise their daughters was only 33.1 among women from the richest households compared to 65.8 among women belonging to the poorest households.

.5: Women intending to circumcise their daughters

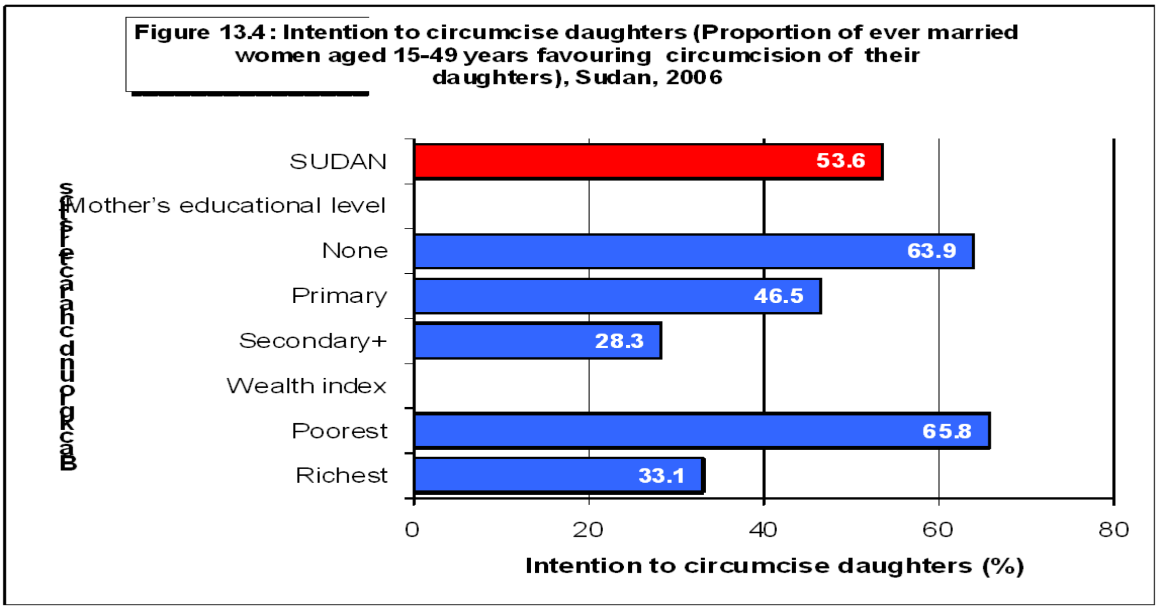

Figure 13.4: Intention to circumcise daughters (Proportion of ever married women aged 15-49 years favouring circumcision of their daughters), Sudan, 2006

XIV. Conclusions and recommendations

The Sudan Household Health Survey (SHHS) was designed to provide estimates on some key indicators on the situation of children and women at the national level and for 25 states of Sudan. Major findings of the SHHS show that the current status in regard to most of these indicators is far from being satisfactory. The survey provides valuable information which could be used as a basis for the formulation of policies and programmes to improve the situation of children and women in all parts of the country and to facilitate the achievement of the United Nations Millennium Development Goals (MDGs) as well as the World Fit for Children (WFFC) goals and targets through national action and international cooperation.

Some of the observations and conclusions emerging from the SHHS results/findings include the following:

The SHHS results indicate that there exist pronounced variations among states in terms of the current situation in regard to most of the SHHS indicators. The results bring into focus the need to develop state-specifc plans and programmes designed to promote rapid acceleration of social and economic development with special emphasis on reducing disparities between states, if Sudan is to make progress towards achievement of the MDGs and other social development goals and targets pursued through national and state-development plans.

The SHHS results also indicate the strong linkages between the achievement levels in regard to several key child-survival, reproductive-health and child protection-related indicators and the education level of the mothers/women. This highlights the importance of accelerating progress in regard to participation by all school-age children and adolescents, especially girls, in basic education and participation of out-of-school adolescents in appropriate learning and life skills programmes, inorder to ensure substantial and sustainable progress towards achievement of some of the child survival, reproductive health and child protection-related goals and targets.

The findings of the survey also indicate the association between the achievement levels in regard to most of the SHHS indicators and the economic level of the household. This bring into focus the need to initiate affirmative actions and upscale ongoing programmes to reduce poverty among populations in disadvantaged areas along with programmes to ensure access to basic social services for all to achieve rapid progress towards achievement of some of the social development goals and targets.

The goal of reducing the infant and under-five mortality rates remains a principal challenge in Sudan. One of the overarching Millennium Development Goals (MDGs) is to reduce infant and under-five mortality by two-thirds between 1990 and 2015. The World Fit for Children (WFFC) goal target is to achieve reduction in the infant and under five mortality rate by at least one third during 2000-2010, in pursuit of the goal of reducing it by two thirds by 2015. The large differentials in IMR and U5MR by state highlights the importance of promoting an accelerated child survival initiative involving a package of child health/survival interventions with state-specific targets and interventions aimed at substantially reducing preventable mortality among children in all parts of the country in general and in states/areas with higher IMR and U5MR in particular.

One of the Millennium Development Goal (MDG) targets is to reduce by half the proportion of people who suffer from hunger between 1990 and 2015. The World Fit for Children (WFFC) goal target is to reduce the prevalence of malnutrition among children under five years of age by at least one-third (between 2000 and 2010), with special attention to children under 2 years of age. A key indicator for assessing progress towards meeting these MDG and WFFC targets is the underweight prevalence among under-five children. Sudan seems to be on-track to meet the MDG and WFFC targets relating to child malnutrition. To make further progress towards the MDG targets, it will be necessary to sustain the current level of progress in states with an

underweight prevalence rate of less than ten per cent and supporting multi-sectoral interventions involving household food security and support to populations suffering from severe food shortages, promotion of adequate caring practices, and increasing access to integrated and effective health, nutrition and child care in families, communities, schools and primary health-care facilities, to improve the nutrition status of mothers and children.

Childhood illnesses and inadequate infant feeding practices are the major contributing factors to the high levels of chronic malnutrition. WHO/UNICEF feeding recommendations include exclusive breastfeeding for first six months, continued breastfeeding for two years or more and appropriate and adequate complementary foods beginning at 6 months. The low rates in regard to exclusive breast feeding, timely complementary feeding and continued breastfeeding revealed by SHHS highlight the importance of undertaking area and target group-specific interventions and behaviour change communication activities for promoting adequate child feeding practices in general and for promoting and supporting exclusive breastfeeding of infants for six months and continued breastfeeding with complementary feeding up to 2 years of age or beyond, in particular.

Another WFFC goal target is to achieve sustainable elimination of vitamin A deficiency by 2010. In view of the critical role of vitamin A for child health and immune function, it is essential to make control of vitamin A deficiency a primary component of all child survival efforts. Effective implementation of the recommendations that all children aged 6-11 months be given one high dose vitamin A capsules and children aged 12-59 months given a high dose vitamin A capsule once in every 6 months will go a long way in eliminating vitamin A deficiency among under-five children in all parts of Sudan. The fact that giving vitamin A to new mothers who are breastfeeding helps protect their children during the first months of life and helps to replenish the mother's stores of vitamin A, which get depleted during pregnancy and lactation, also makes it imperative that appropriate plans and programmes are designed and implemented to ensure that all mothers be given a vitamin A supplement within eight weeks of giving birth.

An important WFFC goal is to achieve sustainable elimination of iodine deficiency disorders. The very low levels of household consumption of iodized salt in most of the states brings into focus the need to expand iodized salt production from the main sources set up and establish an appropriate distribution network to achieve the use of iodized salt by 100 per cent of households within the shortest possible time period along with the effective implementation of legislation for banning of production and sale of non-iodized salt in all parts of the country.

Immunization plays a key part towards achieving the goal of reducing infant and under-five mortality rates. According to UNICEF and WHO guidelines, a child should receive a Bacillis-Cereus-Geuerin (BCG) vaccination to protect against tuberculosis, three doses of DPT to protect against diphtheria, pertussis, and tetanus, three doses of polio vaccine, and a measles vaccination by the age of 12 months. The large differentials in vaccination coverage by state calls for immediate actions to reduce disparities in vaccination coverage rates by ensuring full immunization of children under one year of age at 90 per cent nationally, with at least 80 per cent coverage in every locality/county as an integral part of the accelerated child survival initiative in order to achieve substantial reduction in tuberculosis deaths and prevalence and deaths due to measles and to prevent mortality due to vaccine preventable diseases.

The elimination of maternal and neonatal tetanus constitutes an important global and national goal. Prevention of maternal and neonatal tetanus requires that all pregnant women be given at least two doses of tetanus toxoid (TT) vaccine within the appropriate interval prior to giving birth. In view of the low TT vaccination coverage, it is essential that appropriate programmes are planned and implemented to ensure that the incidence of neonatal tetanus is reduced to less than 1 case per 1,000 live births in every locality/county within the next two or three years.

Diarrhoea is the second leading cause of death worldwide among children under five years of age worldwide. Pneumonia is another leading cause of death in children. The higher

prevalence of diarrhoea and the low level of knowledge related to the signs of pneumonia revealed by SHHS data calls for systematic efforts to pursue the WFFC goals of reducing by one half deaths due to diarrhoea among children under five by 2010 compared to 2000 level and reducing by one-third deaths due to acute respiratory infections.

Malaria is endemic to most parts of Sudan and epidemic in other areas, causing a major burden among both children and adults. Malaria continues to be a leading cause of death among children under five years of age in Sudan. Maternal malaria remains a major factor contributing to maternal mortality. Halting and reversing the incidence of malaria is an important MDG target. A World Fit for Children goal is to reduce by one half the burden of disease associated with malaria, especially among children and women. Preventive measures, especially sleeping under insecticide-treated nets (ITNs), are found to dramatically reduce mortality rates among children caused by malaria. Reducing the burden of disease associated with malaria will require making substantial progress towards the WFFC goal of ensuring that 60 per cent of all people at risk of malaria, especially children and women, sleep under insecticide-treated bednets. The low level of anti-malarial treatment revealed by the SHHS highlights that in areas where malaria is common, it will be necessary to improve access to anti-malarial drugs for timely treatment of children with suspected malaria within the shortest possible time after the onset of symptoms.

Increasing access to safe drinking water and sanitary means of excreta disposal is key to preventing water-borne and water-related diseases, reducing diseases caused by insanitary conditions and to reducing infant and under-five mortality and morbidity. A key MDG target is to halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation. A WFFC goal is to achieve reduction in the proportion of households without access to hygienic sanitation facilities and affordable and safe drinking water by at least one third during 2000-2010. The wide disparities between states in the proportion of household members using improved sources of drinking water and sanitary means of excreta disposal calls for substantial expansion of improved water supply and sanitation facilities with special attention to unserved or underserved areas along with efforts to improve water and sanitation sector capacity and to build family and community capacity for the operation, maintenance and management of the existing and newly established water supply systems and promoting behavioural change through health and hygiene education.

One of the MDG targets is to ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling. The WFFC target in support of this target is to reduce the number of primary school-age children who are out of school by 50 per cent and increase net primary school enrolment or participation in alternative, good quality primary education programmes to at least 90 per cent by 2010. Another MDG target in relation to education is to eliminate gender disparity in primary and secondary education. The WFFC target also envisages elimination of gender disparities in primary and secondary education with a focus on ensuring girls' full and equal access to and achievement in basic education of good quality. The relatively lower net attendance in many states and the low gender parity index in some of the states revealed by the SHHS data and the low basic/primary school completion rates call for complementary measures for (i) ensuring and sustaining an adequate supply of schooling for making basic education accessible to all school-age children, especially for girls and in unserved/under-served areas and locations inhabited by IDPs and areas of return of IDPs and refugees; expanding educational facilities for nomadic children ; and expanding the coverage of basic and life skills education for out-of-school adolescents; (ii) improving quality and relevance of education with special focus on improving the school infrastructure to promote a child friendly, secure, protective, healthy, and psychologically supportive learning environment; and improving the learning contents and teaching-learning processes in schools in order to ensure that all pupils achieve the expected/specified learning outcomes; (iii) stimulating and sustaining the demand for, and utilization of, educational

services, with a special emphasis on the enrolment and completion rates for girls, by reducing the financial burden on families to educate their children; and (iv) strengthening human and institutional capacities to improve planning and management of basic education at the state/locality level, and establishing a monitoring and reporting system to assure accountability.

The fact that more than two-thirds of children under-five years of age did not have their birth registered indicates that they are deprived of their identity. This calls for urgent action at the national, state, locality/county levels to develop and expand systems that ensure the registration of every child at or shortly after birth, in accordance with national laws and relevant international instruments, and to remove barriers to timely registration of birth of all children.

The inadequacy in the coverage and quality of maternal health-care services in Sudan is reflected by the inadequate coverage of antenatal care (ANC), inadequate services provided as a part of ANC, the low proportion of births attended by a qualified health staff and the low proportion of births delivered in a health facility. Births attended by skilled health personnel plays a key part in reducing maternal mortality. A WFFC goal is to ensure that women have ready and affordable access to skilled attendance at delivery. The SHHS findings bring into focus the need to expand the cadre of trained health personnel to ensure that all expectant mothers have access to quality ANC and skilled attendance at delivery, especially for populations in unserved areas. Since appropriate family planning is important to the health of women and children since it prevents pregnancies that are too early or too late, actions are also required to ensure access by all couples to information and services to prevent pregnancies that are too early and too closely spaced.

The goal of reducing the maternal mortality ratio remains a major challenge in Sudan. The MDG target is to reduce the maternal mortality ratio (MMR) by three quarters, between 1990 and 2015. The WFFC target is to achieve reduction in the maternal mortality ratio by at least one third during 200-2010, in pursuit of the goal of reducing it by three quarters by 2015. The high MMR and the large differentials in MMR by state bring into focus the need to make reduction of maternal mortality a high health sector priority, especially in states with high MMR. It calls for redoubled efforts to ensure that all women, especially expectant mothers have affordable access to essential obstetric care, good quality maternal health-care services, skilled attendance at delivery, emergency obstetric care, effective referral and transport to higher levels of care when necessary, post-partum care and family planning to promote safe motherhood.

With porous borders with its neighbours, many with higher HIV prevalence rates, the lack of information and knowledge required to prevent HIV transmission and increased mobility of people within the country renders the general population in Sudan more vulnerable to the risks of HIV/AIDS. Returning refugees from high HIV/AIDS prevalence countries will provide added impetus to the epidemic within Sudan. One of the most important prerequisites for reducing the rate of HIV infection is accurate knowledge of how HIV is transmitted and knowledge of the strategies for preventing HIV transmission. Halting by 2015 and beginning to reverse the spread of HIV/AIDS is an important MDG target. One of the key indicators for assessing progress towards the MDG target is the proportion of population aged 15-24 years with comprehensive and correct knowledge of HIV/AIDS. To avert the substantial risk of HIV transmission, to improve the level of knowledge of HIV and its prevention and to change behaviours of young people to prevent further spread of the disease, special efforts involving appropriate behaviour change communication activities will be needed to ensure that at least 95 per cent of young men and women have access to the information, education, including peer education and youth specific HIV education, and services necessary to develop the knowledge and life skills required to reduce their vulnerability to HIV infection and to prevent further spread of the disease.

The task of reducing and eventually eliminating the practice of female genital mutilation/cutting which violates the rights of girls and women remains a major challenge in Sudan. Female genital mutilation/cutting (FGM/C) continues to affect hundreds of thousands of girls in Sudan. Since the year 2001, a national campaign involving the federal and state governments and civil society has been organized to eradicate the practice of female genital mutilation/cutting. This campaign seems to be producing some positive results as some decline is noticed in the prevalence of FGM/C, albeit very slowly. However, the fact that 44.9 per cent of women aged 15-49 years in the 15 states of Sudan (where the practice of FGM/C is more common) surveyed during the SHHS believed that the practice of FGM/C should be continued and that 53.6 per cent ever-married women aged 15-49 years in these states intended to circumcise their daughters highlights the importance of formulating and implementing appropriate policies/programmes and community-based approaches and target group-specific interventions, including effective behaviour change communication activities, in partnership with all concerned agencies/organisations, including religious and community leaders, NGOs and media, to substantially reduce and eventually end the practice of female genital mutilation/cutting with special focus on states which are characterized by relatively higher FGM/C prevalence rates.

The SHHS findings bring into focus the need to ensure rapid acceleration of social and economic development in all parts of the country

Improving the status of children and women in Sudan will require not only renewed political will and support, but also the mobilization and allocation of adequate financial and human resources at the national and state levels for undertaking large scale social sector programmes taking into account the gravity of the situation in regard to some of the key indicators and the urgency of making substantial progress in meeting the needs of children and women in all parts of the country in the shortest possible time period as well as of fulfilling national obligations and international commitments.

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List of Appendixes

Appendix A. Sample Design

Sample design

The sample for the Sudan Household Health Survey (SHHS) was designed to provide estimates on some key indicators on the situation of children and women at the national level and for 25 states (Northern , River Nile, Red Sea, Kassala, Gedarif, Khartoum, Gezira, Sinnar, Blue Nile, White Nile, North Kordofan, South Kordofan, North Darfur, West Darfur, South Darfur, Jonglei, Upper Nile, Unity, Warap, Northern Bahr El Ghazal, Western Bahr El Ghazal, Lakes, Western Equatoria, Central Equatoria and Eastern Equatoria) of Sudan. The target universe for the SHHS includes the households and members of individual households, including nomadic households camping at a location/place at the time of the survey. The units of analysis for the SHHS, therefore, are the individual households and members within these households. Some questionnaire modules correspond to particular subgroups of the population, such as women between the ages of 15 and 49 years, and children under the age of 5 years. The population living in institutions and group quarters such as hospitals, military bases and prisons, were excluded from the sampling frame. The states were identified as the main sampling domains and a stratified multi-stage sample design was used for the SHHS.

Sample size and sample allocation

The sample size for the survey was determined by the degree of precision required for the survey results/estimates for each domain, as well as by the resource and operational constraints. The sample size was also determined by the geographic levels at which the survey data were to be tabulated. Since reliable estimates for key indicators were needed for each of the 25 states of Sudan, it was considered necessary to ensure that each state had a sufficient sample size.

The number of sample PSUs for the SHHS, and the number of households selected within each sample village and/or quarter (for urban areas) was determined keeping in view the survey objectives. It was recognized that for estimates at the national level, it would be more efficient to have a proportional allocation of the sample to the states based on their approximate population. However, it was noted that these population estimates were only approximate, and might be over-estimated, and therefore, given the large variability in the population by state, the sample size for the smallest states based on a proportional allocation would be too small to produce reliable results. Since a similar level of precision was required for the survey results from each state, it was decided to use an equal allocation of 40 sample segments (clusters) per state. Considering the nature of the survey as well as the logistics, cost of the field operations, and the transportation and communication constraints, it was decided to select 25 households per segment.

$$n = \frac{\qquad\qquad\qquad\qquad\qquad\qquad}{}$$

For the calculation of the sample size, p was assumed to be 5 percent. The value of *deff* (design effect) was taken as 2 based on estimates from previous surveys, and average household size was taken as 6 . The estimated sample size was 4,841 or approximately 807 households per state. Though an effective sample size of 900 households was considered sufficient for most state-level estimates, it was decided to target 1,000 households in each state, thus yielding a total of about 25,000 households nationally

The average cluster size in the SHHS was determined as 25 households, based on a number of considerations, including the budget available, and the time that would be needed per team to complete data collection in one cluster. Equal allocation of the total sample size to the 25 states was targeted. Therefore, 40 clusters were allocated to each state, with the final sample size calculated at 25,000 households (i.e., 40 clusters x 25 states x 25 households per cluster).

Sampling frame and units of analysis

One of the challenging aspects of planning for the SHHS was compiling a sampling frame with as complete a coverage of the Sudan population as possible. For the SHHS, a frame of villages/quarter was developed for each state indicating the approximate population or number of households in each village. The list of villages was compiled from different sources. The last population Census in Sudan was conducted during a period of conflict in 1993,and so in Southern Sudan only the garrison towns of Juba, Malakal and Wau and a few other selected areas were enumerated. Therefore, various other sources of geographic, village and population information were examined. One of the sources with the best coverage in Southern Sudan was the list of villages and estimated population developed by the Expanded Programme of Immunization (EPI) for the National Immunization Days (NIDs) campaign. The population estimates were, however, a rough demographic estimate based on the number of under-five children identified for the Expanded Programme on Immunization (EPI). The list of villages and estimated population developed for the NIDs campaign was also used for compiling the sampling frame for three more states, namely North Darfur, West Darfur and South Darfur. Thus, the sampling frames for three states of North Darfur, West Darfur and South Darfur and for all the ten states in Southern Sudan were compiled using the list of villages and estimated population developed by the Expanded Programme of Immunization (EPI) for the National Immunization Days (NIDs) campaign whilst the sampling frame for the remaining 12 states (Northern, River Nile, Red Sea, Kassala, Gedarif, Khartoum, Gezira, Sinnar, Blue Nile, White Nile, North Kordofan and South Kordofan) was compiled using the list of villages and estimated population updated by the Central Bureau of Statistics (CBS) on the basis of the updated frame from the pre-census field operations for the year 2005.

Stratification

One of the most important features of the sample design for the SHHS was the stratification of the sampling frame into homogeneous areas. The sample selection was carried out independently within each stratum. The nature of the stratification depended on the most important characteristics to be measured in the survey and the available information, as well as the domains of analysis.

The first level of stratification corresponded to the major geographic domains defined for the SHHS, i.e., the 25 states in Sudan. In the case of 12 states (Northern, River Nile, Red Sea, Kassala, Gadarif, Khartoum, Gezira, Sinnar, Blue Nile, White Nile, North Kordofan, South Kordofan states) which had one or more towns with a population of 50,000 or more, it was considered necessary to establish a separate stratum for the towns (urban areas) and for the remainder of the state. In these 12 states, the primary sampling units were distributed to urban and rural domains, proportional to the size of urban and rural populations in these states, but in the case of the three states namely North Darfur, West Darfur and South Darfur, and all the ten states in Southern Sudan, stratification on the urban and rural level could not be done and clusters were distributed to the state domain proportional to the size of the primary sampling units (PSUs) directly.

Within each state, the PSUs were ordered geographically by locality/county to ensure a good geographic distribution of the sample through implicit stratification when the sample PSUs was selected systematically with Probability Proportional to Size (PPS).

Sample selection procedures

The sample selection methodology for the 2006 SHHS was based on a stratified multi-stage sample design. In the first stage, the primary sampling units (PSUs) were the quarters in urban areas and the villages or Payams in rural areas. In the second stage, the secondary sampling units (SSUs) were the segments within quarters and villages or Payams. The steps involved in the sample selection included the following:

Selection of Primary Sampling Units: For the first stage of selection of the sample for the SHHS, a frame of PSUs which covered as much of the population as possible was established. The PSU was defined as the smallest area or administrative unit which could be identified in the field with commonly recognised boundaries. Any areas that could not be included in the survey because of problems of security or accessibility were excluded from the frame before the first stage selection of sample PSUs. The villages or quarters (in urban areas) constituted the PSUs for the SHHS. Therefore, the list of villages/quarters was used as the most effective sampling frame of PSUs for the first stage of sampling. For some states, the list of villages/quarters appeared to be fairly complete, and population estimates were available for all villages/quarters, so this frame was used for the first stage selection of villages/quarters. In the case of these states, at the first sampling stage, the sample PSUs within each state were selected with probability proportional to size (PPS) for each stratum, where the measure of size was based on the estimated total population. When most of the villages/quarters in the state had population estimates but figures were missing for some villages/quarters, an average measure of size was imputed for these villages/quarters; in this way such villages had an equal probability of selection in the frame. In other words, the sampling frame of villages/quarters was compiled separately for each state based on the best available sources. In the case of a few states, where the sampling frame did not include population estimates, it was decided to select the sample villages/quarters with equal probability. There were four states in Southern Sudan (Upper Nile, Jonglei, Unity and Lakes) that did not have population measures in the frame. In these four states the sample villages were selected systematically with equal probability. Each village in these states was assigned a measure of size of 1. In cases where a selected village/quarter could not be found in the field or could not be reached because of security or access problems, it was replaced by a neighboring village/quarter in the sampling frame. All 40 selected villages/quarters in each state were fully covered with the exception of only 14 segments in two states in Southern Sudan (7 segments in Upper Nile and 5 in Western Bahr El Gazal states) and two segments in South Kordofan that had to be substituted due to insecurity influencing accessibility during the fieldwork period.

The steps/procedures involved for the first stage sample selection of primary sampling units (PSUs) within each stratum (state) include the following:

(i) Cumulate the measures of size (estimated population) down the ordered list of villages within the stratum. The final cumulated measure of size was the estimated total population in the stratum (M_h).

(ii) To obtain the sampling interval for stratum h (I_h), divide M_h by the total number of villages or clusters to be selected in stratum h (n_h): $I_h = M_h / n_h$.

(iii) To Select a random number (R_h) between 0 and I_h. The sample villages in stratum h were identified by the following selection numbers:

Rounded up,

Where i = 1, 2... n_h

The i-th selected village is the one with a cumulated measure of size closest to S_{hi} but not less than S_{hi}.

An Excel file was used for selecting the sample of villages/quarters in each state for the SHHS following these procedures, based on the allocation of 40 sample villages/quarters per state. The Excel file included a separate spreadsheet for each state, showing the ordered frame of villages with the corresponding information on population estimates from the sample frame used. As indicated earlier, when the estimated population was not available, an average measure of size was imputed and the sample villages were selected systematically with equal probability. In cases where a selected village could not be found in the field or could not be reached because of security or access problems, it was replaced by a neighbouring village in the sampling frame.

Segmenting of large sample villages/quarters: In the case of a sample village/quarter with a large number of households (for example, greater than 200), the village/quarter was subdivided into smaller segments of similar size (with about 80 to 120 households each) with clear defined boundaries in order to facilitate the listing process and avoid coverage problems. Following this, one sample segment was selected at random with equal probability for the listing of households at the second sampling stage.

Listing of households and selection of households within sample villages or segments: A listing of the households was undertaken in each sample segment prior to data collection in order to enumerate all housing units and households within the boundaries of each sample village/quarter or segment. At the last sampling stage, a sample of 25 households was selected using the simple random technique from the household listing for each sample segment. The supervisor referred to the sample selection table on an excel spreadsheet to find the row corresponding to the total number of households listed; this row identified the 25 household numbers selected. The supervisor was responsible for verifying the boundaries of the sample village or segment in order to ensure good coverage of the sample households.

The steps/procedures involved in the second stage sample selection of households within each village/quarter include the following:

(i) All the households listed within a sample village or segment were assigned a serial number from 1 to K_{hi}, the total number of households listed in the segment.

(ii) In the household selection table, a separate row was produced for each value of M_{hi}. To obtain the sampling interval for the selection of households within the sample village or segment (I_{hi}), K_{hi} was divided by 25, maintaining 2 decimal places.

(iii) A random number (R_{hi}) with 2 decimal places, between 0.01 and I_{hi}, was generated for each value of K_{hi}. The sample households within a sample village with K_{hi} households listed were identified by the following selection numbers:

, rounded up to the next integer,

where j = 1, 2, 3,..., 25

The j-th selected household is the one with a serial number equal to S_{hij}. The random start identified the first selected household, then the sampling interval was added to the random start to identify the second sample household; successive multiples of the sampling intervals are added until 25 households were selected.

Sample weights and weighting procedures

Although each state sample can be considered as self-weighting, the total sample for Sudan was not self-weighting since a fixed sample of households was drawn from each state, irrespective of its population size. Essentially, by allocating equal numbers of households to each of the states, different sampling fractions were used in each state since the population size of the states varied. Therefore, to derive estimates for Sudan as a whole it was necessary to assign a weight to each state-level sample. For reporting national level results, appropriate weights were applied to the sample data based on the probabilities of selection. Measures of sampling variability for key survey estimates were also calculated. Sample weights were calculated for each state-level sample and these were used in the analyses of the survey data.

Calculation of Sample Weights

The major component of the weight is the reciprocal of the sampling fraction employed in selecting the number of sample households in that particular sampling domain:

$$W_h = 1 / f_h$$

The term *fh*, the sampling fraction at the *h-th* stratum, is the product of probabilities of selection at every stage in each sampling domain:

$$f_h = P_{1h} * P_{2h} * P_{3h}$$

Where P_{ih} is the probability of selection of the sampling unit in the *i-th* stage for the *h-th* sampling domain.

Since the estimated numbers of households per enumeration area prior to the first stage selection (selection of primary sampling units) and the updated number of households per enumeration area were different, individual sampling fractions for households in each enumeration area (cluster) were calculated. The sampling fractions for households in each enumeration area (cluster) therefore included the probability of selection of the enumeration area in that particular

sampling domain and the probability of selection of a household in the sample enumeration area (cluster).

A second component which has to be taken into account in the calculation of sample weights is the level of non-response for the household and individual interviews. The adjustment for household non-response is equal to the inverse value of:

RR = Number of interviewed households / Number of occupied households listed

After the completion of fieldwork, response rates were calculated for each sampling domain. These were used to adjust the sample weights calculated for each cluster. Response rates in the SHHS are shown in Table HH.1 in this report.

Similarly, the adjustment for non-response at the individual level (women and under-5 children) is equal to the inverse value of:

RR = Completed women's (or under-5's) questionnaires / Eligible women (or under-5s)

Numbers of eligible women and under-5 children were obtained from the household listing in the Household Questionnaire in households where interviews were completed.

The unadjusted weights for the households were calculated by multiplying the above factors for each enumeration area. These weights were then standardized (or normalized) with a view to making the sum of the interviewed sample units equal the total sample size at the national level. Normalization was performed by multiplying the aforementioned unadjusted weights by the ratio of the number of completed households to the total unadjusted weighted number of households. A similar standardization procedure was followed in obtaining standardized weights for the women's and under-5's questionnaires.

Sample weights were appended to all data sets and analyses were performed by weighting each household, woman or under-5 with these sample weights.

Appendix B. List of Institutions Involved in the Survey

Steering Committee Members:

Federal Minister of Health	Chair person
Survey National Coordinator	Secretary
Minister of MOSW-GONU	Member
Minister of Education-GONU	Member
Minister of Health -GOSS	Member
CBS Director, Survey Technical Coordinator	Member
Undersecretary FMOH	Member
Undersecretary GOSS	Member
UNFPA Representative	Member
WHO Representative	Member
UNICEF Representative	Member
WFP Representative	Member
Arab League Representative	Member
NPC Secretary General	Member
CWFC Secretary General	Member
Director of National Water Corporation	Member
SSCCSE Representative	Member

Technical Committee Structures (technical working group)

Undersecretary FMOH; chair person
Experts and technical persons from CBS& SSCCSE
Experts and technical persons from FMOH& Ministry of Health GSS
Representatives from:

- MOSW
- NPC
- NCCW
- Water Corporation
- UNFPA
- UNICEF
- WHO
- WFP
- Arab League
- USAIDS
- Federal Ministry of Education

Survey Executive Director
Survey National Director

Sudan household Health Survey States' Management teams at national and state level

White Nile State:
Dr. Elhadi IbrahimMiskeen
Dr. Mohammed Awadallah Bannaga
Mr. Galal Eldin Hamid

Nothern State:
Mr Mohammed Yahia Idris
Dr. Khalid Hussein Abdelrahman
Ms Howeida Mohammed Jomma'a

River Nile State:
Dr. Yasir Salih Elsammani
Dr. Nazar Ahmed Eltaeb
Mr. Musa Gangei Fadlallh

Red Sea State:
Mr. Alamin Osman Mohammed
Dr. Zeinab Bashir Khalil
Ms Salwa Abdelrahim Sorkatti
Mr. Onor Osham Omer

Kassala State:
Dr. Hiba Sir Elkhatim
Mr. Shakir Yousif
Mr. Salih Ahmed Mohammed

Gadarif State:
Dr. Ahmed Omer Ahmed
Mr. Ali Suliman Ali
Dr. Maha Eltahir

Khartoum State:
Dr. Mohammed Omer Attia
Mr. Kamal Ahmed Ismail
Dr. Abdelrahman Ela'sha

Gezira State:
Dr. Hamadnallah Sir Elkhatim
Mr Mustafa Eljak Mustafa
Dr. Mohammed Elamin

Sinnr State:
Dr. Hamza Eltigani
Mr Siddiq Elamin Ahmed
Mr Ibrahim Ahmed Hassan

Blue Nile State:
Mr. Elsheikh Eltigani Elsheikh
Mr. Abdullah Elsheikh Mohammed Elhassan
Ms Hanan Ali Elsheikh

North Kordofan State:
Mrs Amina Omer
Mr Suliman Adam Eldai
Mr Ahmed Ali Ihaimir

South Kordofan State:
Dr. Mohammed Saeed Elfakki
Mr. Abdullah Hussein Kartor
Mr. Ali Toro

North Darfur State:
Mr. Eisa Ali Bakr
Dr. Ali Elsayed
Ms Sumaia Abdullah

West Darfur State:
Dr. Tariq Abdullah Ahmed
Mr. Abdelsalam Mustafa Salih
Ms Wafa Hassan

South Darfur State:
Dr. Gayath Mohammed Abbas
Mr Abdelmoneim Ahmed Idris
Mohammed Ahmed Adam

Jonglei State:
Mr.Abraham Dau Riak
Mr.Philip Dau
Mr.Madio Kumliek

Upper Nile State
Mr. William Apar Othouk
Mr.Acwil Odyang
Mr.John Opiti

Unity State:
Mr.Jany Bol Ruay
Mr.David Miang
Mr.Samuel Reath

Warap State:
Mr.Stephen Chol
Mr.Philip Dau
Miss.Susan Akol

North Bahr El Ghazal State
Mr.William Garang
Mr.Philip Dau
Mr.William Aken Dut

West Bahr El Ghazal State:
Mr.Daniel Ollum
Mr..Philip Dau
Mr.Martin Kuol Dumo/Marlin James

Lakes State:
Mr.Jacob Makur
Mr.John Kulang
Mr.Majok Bol

West Equatoria State:
Mr.Augustino Ndikiri
Dr.Oliva Lomoro
Mr.John Friday
Central Equatoria State:
Mr.Valeriano Lagu
Mr.Eliaba Damundu
Mr.Robert Malis

East Equatoria State:
Dr.Oliva Lomoro / Dr.Luka Biong
Mr.Aquilino Michael Oduma
Mr.Daniel Arop

Sudan household Health Survey headquarter office team

Dr. Mohammed Ali Yahia Elabassi	Director General
Dr. Igbal Ahmed Bashir	Deputy, Director General
Dr. Muna Hassan Mustafa	Assistant, Director General
Mr. Ahmed Mansour	Administrative Director
Mr. Ali Ibrahim Ali	Supply Director
Mr. Adil Mohammed Ali	Accountant
Miss Zeinab Abdulla Elhasein	Documentation
Miss Nisrin Elamin	Secretariat
Mr. Haytham Abdelal	General Relations
Mr. Hisham Mohemmed Taha	Financial Control

National supervisors

Mohammed Ali Yahia Elabassi
Ashraf Ebaid Abdel Hadi
Muna Hassan Mustafa
Bashir Fadl Elmola
Deng Meloweth Niang
Faisal Ishag Abdulla
Mohammed Sid Ahmed
Mohammes Saeed
Ibrahim Subaé
Yahia Manzol
Bashir Elnor
Gamal Hamid
Mohammed Ali Mohammed Elamin
Mohammed Osman Hamid
Abdulbari Hassan Nasr
Sid Ahmed Mohammed Ahmed
Abutalib Elsheikh Idris
Zeinab Bashir

Hashim Elamin Salim
Abdelaal Abdellatif Abdelaal
Abd Elbagi Sheikh Eldeen Habeeb Allah
Abdelbasit Elsir Abdelrahman
Abutalib Elsheikh Idris
Khalid Hashim Ebrahim

Editors

Deng Meloweth Niang
Beshir Elnour Beshir
Beshir Fadlalmoula
Hashim Douad Saaad
Sara Awad Ahmed
Hashim El Amin Salim
Abdelbagi Shekh Eldin
Abutalib Elshekh Edres
Abdelaal Abdelateef Abdelaal
Wesal Hassan Elmardi
Abdelbaset Elsir
Khalid Hashim Ibrahim
Arafa Eldeseas
Dalia Ahmed Musaad
Esam Yasin
Eihab Ibrahim
Muada Ali Yusif
Murwa Osman
Arafa Ali Abdelrahman
Manal Mohamed Abdella
Enaam Mubarak Mustafa
Gamal Hamid
Mai Osman
Tasneem Ahmed
Ensaf Abdelrahman
Tarig Hamad
Hassan Fadel Almola

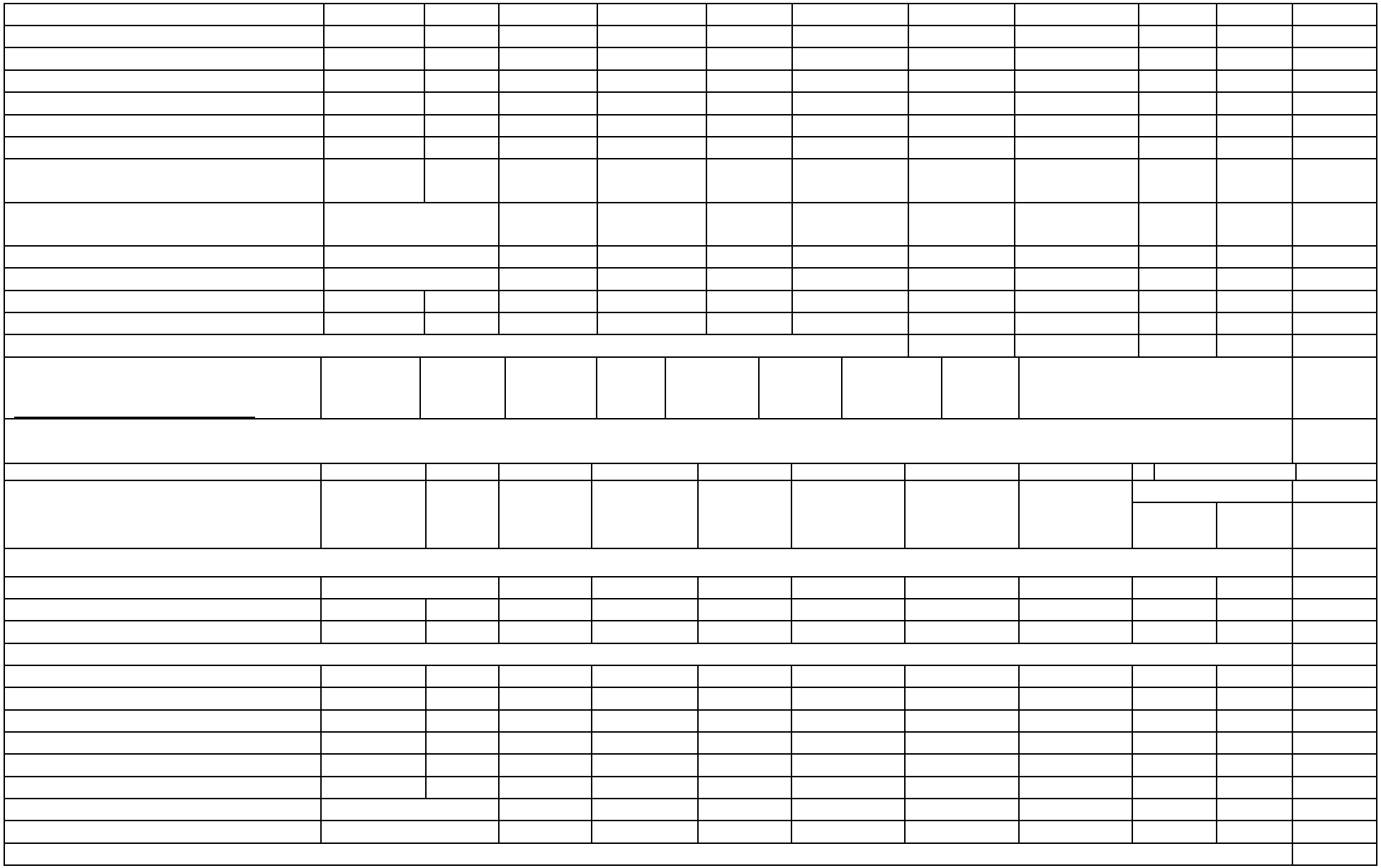
Sampling and analysis group

Analysis group

Report writing group

Eliaba Damundu
K. Ramachandran UNICEF

Appendix C. Estimates of Sampling Errors



Appendix D. Data Quality Tables

Tables					
		Male		Female	
		Number	Percent	Number	Percent
Age	0	660,939	3.3	623,775	3.1
	1	581,323	2.9	544,158	2.7
	2	663,036	3.3	595,998	3.0
	3	647,996	3.2	634,603	3.2
	4	505,358	2.5	498,026	2.5
	5	670,108	3.3	623,139	3.1
	6	804,199	4.0	715,549	3.6
	7	617,966	3.1	661,837	3.3
	8	698,560	3.5	668,282	3.3
	9	553,795	2.8	509,429	2.5
	10	718,094	3.6	694,204	3.5
	11	455,504	2.3	439,839	2.2
	12	688,945	3.4	606,905	3.0
	13	450,925	2.2	457,148	2.3
	14	458,615	2.3	632,223	3.1
	15	515,603	2.6	314,122	1.6
	16	447,399	2.2	386,432	1.9
	17	359,673	1.8	344,697	1.7
	18	508,678	2.5	490,251	2.4
	19	262,775	1.3	287,691	1.4
	20	491,024	2.4	559,960	2.8
	21	213,595	1.1	252,159	1.3
	22	330,332	1.6	359,986	1.8
	23	230,511	1.1	278,525	1.4
	24	210,280	1.0	285,194	1.4
	25	424,000	2.1	568,796	2.8
	26	203,858	1.0	340,595	1.7
	27	222,845	1.1	290,346	1.4
	28	279,027	1.4	391,710	1.9
	29	130,979	0.7	202,219	1.0
	30	498,734	2.5	612,339	3.0
	31	102,675	0.5	136,756	0.7
	32	202,945	1.0	224,512	1.1
	33	123,232	0.6	147,915	0.7
	34	100,001	0.5	134,253	0.7
	35	521,557	2.6	461,640	2.3
	36	123,418	0.6	210,746	1.0
	37	162,980	0.8	168,159	0.8
	38	174,711	0.9	232,798	1.2
	39	95,631	0.5	117,898	0.6
	40	507,251	2.5	353,049	1.8
	41	60,333	0.3	90,335	0.4
	42	133,765	0.7	115,723	0.6

	43	78,929	0.4	79,977	0.4
	44	32,124	0.2	52,635	0.3
	45	416,309	2.1	214,657	1.1
	46	61,107	0.3	75,786	0.4
	47	75,116	0.4	57,535	0.3
	48	121,190	0.6	86,404	0.4
	49	70,709	0.4	42,980	0.2
	50	348,956	1.7	577,896	2.9
	51	37,229	0.2	111,160	0.6
	52	96,215	0.5	166,495	0.8
	53	50,872	0.3	75,064	0.4
	54	47,819	0.2	51,674	0.3
	55	232,748	1.2	243,374	1.2
	56	53,146	0.3	46,419	0.2
	57	37,790	0.2	32,175	0.2
	58	50,618	0.3	46,610	0.2
	59	29,552	0.1	24,136	0.1
	60	354,092	1.8	228,969	1.1
	61	20,916	0.1	12,705	0.1
	62	51,064	0.3	25,938	0.1
	63	35,639	0.2	18,917	0.1
	64	22,024	0.1	9,549	0.0
	65	196,465	1.0	119,344	0.6
	66	16,675	0.1	8,446	0.0
	67	22,326	0.1	11,870	0.1
	68	24,968	0.1	16,438	0.1
	69	13,397	0.1	7,000	0.0
	70	188,752	0.9	127,084	0.6
	71	10,052	0.1	5,788	0.0
	72	17,031	0.1	12,055	0.1
	73	18,865	0.1	8,627	0.0
	74	7,884	0.0	3,180	0.0
	75	88,571	0.4	59,470	0.3
	76	10,211	0.1	6,014	0.0
	77	5,796	0.0	3,596	0.0
	78	10,386	0.1	6,333	0.0
	79	5,118	0.0	5,204	0.0
	80+	143,560	0.7	123,729	0.6
	DK/missing	135,112	0.7	48,338	0.2
Total		20,052,504	100.0	20,117,491	100.0

Table DQ.2: Age distribution of eligible and interviewed women
Household population of women age 10-54, interviewed women age 15-49, and percentage of eligible women who were interviewed (weighted), by five-year age group, Country, Year

		Household population of women age 10-54	Interviewed women age 15-49		Percentage of eligible women interviewed
		Number	Number	Percent	
Age	10-14	2,830,319	.	.	.
	15-19	1,823,193	1,418,705	18.4	77.8
	20-24	1,735,824	1,440,409	18.7	83.0
	25-29	1,793,666	1,574,020	20.4	87.8
	30-34	1,255,774	1,130,670	14.7	90.0
	35-39	1,191,241	1,085,636	14.1	91.1
	40-44	691,719	631,703	8.2	91.3
	45-49	477,363	423,537	5.5	88.7
	50-54	982,290	.	.	.
15-49		8,968,779	7,704,915	100.0	85.9

Table DQ.3: Age distribution of eligible and interviewed under-5s
Household population of children age 0-7, children whose mothers/caretakers were interviewed and percentage of under-5 children whose mothers/caretakers were interviewed (weighted), by five-year age group, Country, Year

		Household population of children age 0-7	Interviewed children age 0-4		Percentage of eligible children interviewed
		Number	Number	Percent	
Age	0	1,284,713	1,197,581	21.9	93.2
	1	1,125,481	1,049,453	19.2	93.2
	2	1,259,034	1,154,063	21.1	91.7
	3	1,282,599	1,185,297	21.7	92.4
	4	1,003,384	884,635	16.2	88.2
	5	1,293,247	.	.	.
	6	1,519,748	.	.	.
	7	1,279,803	.	.	.
0-4		5,955,210	5,471,030	100.0	91.9

Table DQ.4: Age distribution of under-5 children
Age distribution of under-5 children by 3-month groups (weighted), Country, Year

		Male		Female		Total	
		Number	Percent	Number	Percent	Number	Percent
Age in months	0-2	140,563	4.6	139,622	4.8	280,185	4.7
	3-5	186,560	6.1	156,887	5.4	343,447	5.8
	6-8	161,279	5.3	170,187	5.9	331,466	5.6
	9-11	158,077	5.2	142,006	4.9	300,083	5.0
	12-14	218,695	7.1	203,545	7.0	422,240	7.1
	15-17	146,817	4.8	138,491	4.8	285,308	4.8
	18-20	120,197	3.9	113,922	3.9	234,119	3.9
	21-23	103,988	3.4	91,262	3.2	195,250	3.3
	24-26	294,168	9.6	267,479	9.2	561,647	9.4
	27-29	146,673	4.8	118,686	4.1	265,359	4.5
	30-32	113,498	3.7	102,636	3.5	216,134	3.6
	33-35	98,183	3.2	95,372	3.3	193,555	3.2
	36-38	304,499	9.9	316,921	10.9	621,420	10.4
	39-41	134,361	4.4	128,249	4.4	262,610	4.4
	42-44	89,860	2.9	89,367	3.1	179,227	3.0
	45-47	90,649	3.0	74,163	2.6	164,812	2.8
	48-50	294,141	9.6	293,083	10.1	587,225	9.9
	51-53	93,922	3.1	89,109	3.1	183,031	3.1
	54-56	48,942	1.6	44,339	1.5	93,282	1.6
	57-59	38,759	1.3	44,426	1.5	83,185	1.4
	23.00	285	0.0	0	0.0	285	0.0
	25.00	315	0.0	0	0.0	315	0.0
	26.00	0	0.0	564	0.0	564	0.0
	29.00	298	0.0	0	0.0	298	0.0
	32.00	127	0.0	0	0.0	127	0.0
	33.00	0	0.0	347	0.0	347	0.0
	35.00	347	0.0	0	0.0	347	0.0
	44.00	127	0.0	0	0.0	127	0.0
	45.00	127	0.0	0	0.0	127	0.0
	46.00	862	0.0	0	0.0	862	0.0
	47.00	0	0.0	298	0.0	298	0.0
	48.00	564	0.0	170	0.0	734	0.0
	49.00	1,324	0.0	1,271	0.0	2,595	0.0
	50.00	1,300	0.0	888	0.0	2,188	0.0
	51.00	681	0.0	443	0.0	1,123	0.0
	53.00	0	0.0	380	0.0	380	0.0
	61.00	438	0.0	438	0.0	876	0.0
	62.00	0	0.0	987	0.0	987	0.0
	63.00	0	0.0	599	0.0	599	0.0
	72.00	327	0.0	0	0.0	327	0.0
	74.00	0	0.0	1,415	0.0	1,415	0.0
	75.00	0	0.0	127	0.0	127	0.0
	83.00	298	0.0	0	0.0	298	0.0
	87.00	0	0.0	127	0.0	127	0.0
	91.00	285	0.0	0	0.0	285	0.0
	92.00	0	0.0	298	0.0	298	0.0
	96.00	2,471	0.1	1,697	0.1	4,168	0.1
	97.00	4,160	0.1	3,210	0.1	7,369	0.1

	98.00	2,147	0.1	3,482	0.1	5,629	0.1
	99.00	2,296	0.1	5,094	0.2	7,390	0.1
	104.00	327	0.0	0	0.0	327	0.0
	105.00	380	0.0	161	0.0	542	0.0
	106.00	460	0.0	126	0.0	585	0.0
	107.00	612	0.0	0	0.0	612	0.0
	108.00	0	0.0	438	0.0	438	0.0
	110.00	987	0.0	0	0.0	987	0.0
	112.00	298	0.0	0	0.0	298	0.0
	115.00	0	0.0	380	0.0	380	0.0
	136.00	298	0.0	0	0.0	298	0.0
	142.00	0	0.0	114	0.0	114	0.0
	143.00	0	0.0	187	0.0	187	0.0
	144.00	7,672	0.3	4,794	0.2	12,466	0.2
	145.00	6,063	0.2	6,530	0.2	12,593	0.2
	146.00	3,438	0.1	6,265	0.2	9,703	0.2
	147.00	8,959	0.3	7,597	0.3	16,556	0.3
	153.00	0	0.0	380	0.0	380	0.0
	154.00	0	0.0	987	0.0	987	0.0
	156.00	455	0.0	0	0.0	455	0.0
	157.00	1,117	0.0	1,799	0.1	2,915	0.0
	158.00	0	0.0	818	0.0	818	0.0
	159.00	565	0.0	0	0.0	565	0.0
	163.00	0	0.0	380	0.0	380	0.0
	164.00	127	0.0	0	0.0	127	0.0
	168.00	612	0.0	0	0.0	612	0.0
	192.00	2,696	0.1	2,059	0.1	4,755	0.1
	193.00	5,202	0.2	5,476	0.2	10,678	0.2
	194.00	5,127	0.2	5,873	0.2	11,000	0.2
	195.00	10,135	0.3	5,365	0.2	15,500	0.3
	196.00	127	0.0	0	0.0	127	0.0
	197.00	0	0.0	298	0.0	298	0.0
	201.00	209	0.0	0	0.0	209	0.0
	202.00	285	0.0	987	0.0	1,272	0.0
	203.00	0	0.0	405	0.0	405	0.0
	204.00	0	0.0	1,367	0.0	1,367	0.0
	205.00	0	0.0	438	0.0	438	0.0
	206.00	0	0.0	679	0.0	679	0.0
	207.00	1,156	0.0	0	0.0	1,156	0.0
	209.00	380	0.0	0	0.0	380	0.0
Total		3,060,302	100.0	2,895,494	100.0	5,955,796	100.0

Table DQ.5: Heaping on ages and periods
Age and period ratios at boundaries of eligibility by type of information collected (Household questionnaire, weighted), Country, Year

	Age and period ratios		Total
	Male	Female	
1	0.92	0.93	0.92
2	1.05	1.01	1.03
3	1.07	1.10	1.09
4	0.83	0.85	0.84
5	1.02	1.02	1.02
6	1.15	1.07	1.11
.	.	.	.
8	1.12	1.09	1.11
9	0.84	0.82	0.83
10	1.25	1.27	1.26
.	.	.	.
13	0.85	0.81	0.83
14	0.97	1.35	1.16
15	1.09	0.71	0.90
16	1.01	1.11	1.06
17	0.82	0.85	0.83
18	0.95	0.92	0.94
.	.	.	.
23	0.90	0.90	0.90
24	0.73	0.76	0.74
25	1.52	1.43	1.47
.	.	.	.
48	1.36	1.39	1.37
49	0.39	0.18	0.27
50	2.29	2.37	2.34

Table DQ.5: Heaping on ages and periods
Age and period ratios at boundaries of eligibility by type of information collected (Women's questionnaire, weighted), Country, Year

	Age and period ratios
	Female
23	0.90
24	0.76
25	1.40

Table DQ.6: Percentage of observations missing information for selected questions and indicators (Household questionnaire, weighted), Country, Year

	Percent with missing information	Number
Salt testing	0.3	6,588,113

Table DQ.6: Percentage of observations missing information for selected questions and indicators (Under-5 questionnaire, weighted), Country, Year

	Percent with missing information	Number
Month of birth under-5 only	2.5	5,955,796
Month and year of birth under-5	0.1	5,955,796
Weight	10.9	5,955,796
Height	10.5	5,955,796
Height or weight	11.7	5,955,796

Table DQ.7: Presence of mother in the household and the person interviewed for the under-5 questionnaire
Distribution of children under five by whether the mother lives in the same household, and the person interviewed for the under-5 questionnaire (weighted), Country, Year

		Mother in the household						Mother not in the household					Total	Number of children aged 0-4 years
		Mother interviewed	Father interviewed	Other adult female interviewed	Other adult male interviewed	Child (<15) interviewed	Other person interviewed	Father interviewed	Other adult female interviewed	Other adult male interviewed	Child (<15) interviewed	Other person interviewed		
Age	0	94.5	0.1	0.6	0.1	0.1	0.1	0.0	3.4	0.4	0.1	0.5	100.0	1,284,713
	1	92.9	0.5	0.4	0.1	0.1	0.2	0.1	4.3	0.6	0.1	0.8	100.0	1,125,481
	2	91.1	0.4	0.6	0.1	0.3	0.2	0.1	5.3	0.5	0.3	1.1	100.0	1,259,034
	3	90.7	0.4	0.7	0.1	0.2	0.1	0.1	5.7	0.6	0.3	0.9	100.0	1,282,599
	4	90.1	0.2	0.4	0.2	0.2	0.3	0.2	6.5	0.6	0.2	1.2	100.0	1,003,384
Total		91.9	0.3	0.6	0.1	0.2	0.2	0.1	5.0	0.5	0.2	0.9	100.0	5,955,210

Table DQ.8: School attendance by single age
Distribution of household population age 5-24 by educational level and grade attended in the current year, Country, Year

		Preschool/kindergarten	Primary										
				1	2	3	4	5	6	7	8	98	99
6	5	13.6	0.1	3.2	1.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	6	11.0	0.2	10.4	3.8	0.8	0.3	0.0	0.1	0.1	0.0	0.0	0.0
	7	5.5	0.2	17.0	13.9	2.8	0.4	0.2	0.0	0.0	0.0	0.0	0.0
	8	2.4	0.2	13.0	17.3	9.3	2.4	0.6	0.1	0.1	0.1	0.1	0.1
	9	0.3	0.0	10.5	15.5	17.9	9.9	2.9	0.8	0.2	0.1	0.0	0.1
	10	0.3	0.1	7.9	10.6	13.8	13.6	8.6	2.7	0.5	0.1	0.0	0.0
	11	0.1	0.1	5.0	7.2	10.6	15.7	15.9	10.3	3.5	0.7	0.0	0.0
	12	0.3	0.0	3.6	5.4	7.8	11.0	11.5	12.4	8.2	2.4	0.1	0.0
	13	0.2	0.0	2.9	3.5	5.4	7.2	10.0	12.7	12.4	9.9	0.0	0.1
	14	0.2	0.1	3.1	2.5	3.2	4.9	7.2	8.8	10.1	12.2	0.1	0.1
	15	0.1	0.1	3.0	2.1	3.6	3.9	5.6	6.5	8.5	13.3	0.1	0.1
	16	0.2	0.1	2.5	1.8	3.4	1.7	2.7	4.3	6.4	11.4	0.2	0.2
	17	0.1	0.0	1.7	2.4	2.9	1.6	2.1	2.4	4.7	8.3	0.2	0.1
	18	0.1	0.1	1.8	1.2	2.0	1.0	1.8	1.7	2.0	4.7	0.2	0.1
	19	0.1	0.1	1.5	0.9	3.4	0.7	0.9	1.5	1.4	2.9	0.2	0.1
	20	0.1	0.0	0.8	1.1	2.2	0.6	1.0	0.9	0.6	1.9	0.2	0.0
	21	0.0	0.0	0.7	0.9	1.3	0.8	1.0	1.4	0.3	1.2	0.1	0.1
	22	0.0	0.0	1.1	0.3	1.7	0.6	0.7	0.7	0.4	0.6	0.3	0.1
	23	0.0	0.2	0.6	0.6	1.1	0.4	0.6	0.4	0.4	0.8	0.3	0.1
	24	0.1	0.0	0.4	0.5	0.8	0.6	0.8	0.4	0.2	0.6	0.2	0.0
Total		2.4	0.1	5.6	5.6	5.3	4.3	4.0	3.5	3.0	3.3	0.1	0.1

Table DQ.8: School attendance by single age
Distribution of household population age 5-24 by educational level and grade attended in the current year, Country, Year

Intermediate									Secondary	Post Secondary Diploma	University	Non-standard curriculum	Adult education	DK	Not attending school	Total	Total
Age			1	2	3	4	98	99									
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.1	81.2	100.0	1,293,247
	6	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.1	72.4	100.0	1,519,748
	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.6	0.3	0.1	58.6	100.0	1,279,803
	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.5	0.1	52.7	100.0	1,366,842
	9	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.8	0.6	0.1	39.8	100.0	1,063,224
	10	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.7	0.7	0.4	39.7	100.0	1,412,298
	11	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.9	0.4	0.1	29.1	100.0	895,343
	12	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.6	0.5	0.2	35.1	100.0	1,295,850
	13	0.0	0.0	0.2	0.0	0.0	0.0	0.0	2.0	0.0	0.1	0.9	0.6	0.3	31.4	100.0	908,073
	14	0.0	0.0	0.2	0.1	0.0	0.0	0.0	7.7	0.2	0.0	0.7	0.5	0.2	38.1	100.0	1,090,839
	15	0.0	0.1	0.2	0.2	0.0	0.0	0.1	11.8	0.1	0.1	0.9	0.5	0.4	38.6	100.0	829,725
	16	0.0	0.0	0.1	0.0	0.0	0.0	0.0	22.2	0.0	0.6	0.4	0.3	0.2	41.1	100.0	833,831
	17	0.0	0.2	0.1	0.0	0.0	0.0	0.0	24.8	0.1	2.1	0.6	0.4	0.1	45.3	100.0	704,370
	18	0.0	0.0	0.1	0.1	0.0	0.0	0.0	18.9	0.2	4.5	0.4	0.3	0.2	58.4	100.0	998,929
	19	0.0	0.0	0.2	0.1	0.0	0.0	0.0	19.2	0.1	8.7	0.1	0.4	0.1	57.4	100.0	550,466
	20	0.0	0.0	0.1	0.1	0.0	0.0	0.0	10.5	0.2	7.8	0.2	0.2	0.2	71.3	100.0	1,050,984
	21	0.0	0.0	0.1	0.1	0.0	0.1	0.0	11.7	0.3	15.2	0.1	0.0	0.2	64.5	100.0	465,753
	22	0.0	0.1	0.1	0.1	0.0	0.0	0.0	7.5	0.5	10.2	0.3	0.1	0.1	74.7	100.0	690,318
	23	0.0	0.3	0.0	0.0	0.0	0.0	0.0	6.8	0.2	13.5	0.1	0.1	0.5	73.2	100.0	509,036
	24	0.0	0.0	0.0	0.1	0.0	0.0	0.0	4.5	0.4	6.9	0.0	0.0	0.2	83.3	100.0	495,474
Total		0.0	0.0	0.1	0.0	0.0	0.0	0.0	6.0	0.1	2.3	0.5	0.4	0.2	53.1	100.0	19,254,154

Appendix E. SHHS Indicators: Numerators and Denominators

SHHS Indicators: Numerators and Denominators		
SHHS indicator	**Numerator**	**Denominator**
Neonatal mortality rate	Probability of infants dying during the first 28 completed days of life, per 1000 live births	
Post neo-natal mortality rate	Probability of infants dying between one month and exactly one year of age, per 1000 live births	
Infant mortality rate	Probability of dying between birth and exactly one year of age, per 1000 live births	
Child mortality rate	Probability of dying between the first and fifth birth days, per 1000 live births	
Under-five mortality rate	Probability of dying between birth and exactly five years of age, per 1000 live births	
Underweight prevalence (moderate and severe)	Number of under-five children who fall below minus two standard deviations from the median weight for age of the NCHS/WHO standard (moderate and severe)	Total number of under-five children who were weighed
Underweight prevalence (severe)	Number of under-five children who fall below minus three standard deviations from the median weight for age of the NCHS/WHO standard (severe)	Total number of under-five children who were weighed
Stunting prevalence (moderate and severe)	Number of under-five children whot fall below minus two standard deviations from the median height for age of the NCHS/WHO standard (moderate and severe)	Total number of under-five children measured
Stunting prevalence (severe)	Number of under-five children who fall below minus three standard deviations from the median height for age of the NCHS/WHO standard (severe)	Total number of under-five children measured
Wasting prevalence (moderate and severe)	Number of of under-five children who fall below minus two standard deviations from the median weight for height of the NCHS/WHO standard (moderate and severe)	Total number of under-five children measured
Wasting prevalence (severe)	Number of under-five children who fall below minus three standard deviations from the median weight for height of the NCHS/WHO standard (severe)	Total number of under-five children measured
Overweight prevalence	Number of children under age five whose weight for height is above 2 standard deviations from the median weight for height of the reference population	Total number of under-five children measured
Exclusive breastfeeding rate (0-5 months)	Number of infants 0-5 months (less than 180 days) of age who are exclusively breastfed	Total number of infants 0-5 months of age surveyed
Timely complementary feeding rate (6-9 months)	Number of infants 6-9 months (180 to 299 days) of age who are receiving breastmilk and complementary food at least twice in 24 hours prior to the survey	Total number of infants aged 6-9 months surveyed
Continued breastfeeding rate (12-15 months)	Number of children 12-15 months of age who are breastfeeding at the time of the survey	Total number of children aged 12-15 months surveyed
Continued breastfeeding rate (20-23 months)	Number of children 20-23 months of age who are breastfeeding at the time of the survey	Total number of children aged 20-23 months surveyed
Frequency of complementary feeding (6-11 months)	Number of infants 6-11 months of age who receive breastmilk and complementary food at least the minimum recommended number of times per day (two times per day for infants aged 6-8 months, three times per day for infants aged 9-11 months)	Total number of infants aged 6-11 months surveyed
Adequately fed infants (0-11 months)	Number of infants aged 0-11 months who are appropriately fed, i.e. number of infants aged 0-5 months who are exclusively breastfed and number of infants aged 6-11 months who are breastfed and ate solid or semi-solid food at least the minimum recommended number of times (two times per day	Total number of infants aged 0-11 months surveyed

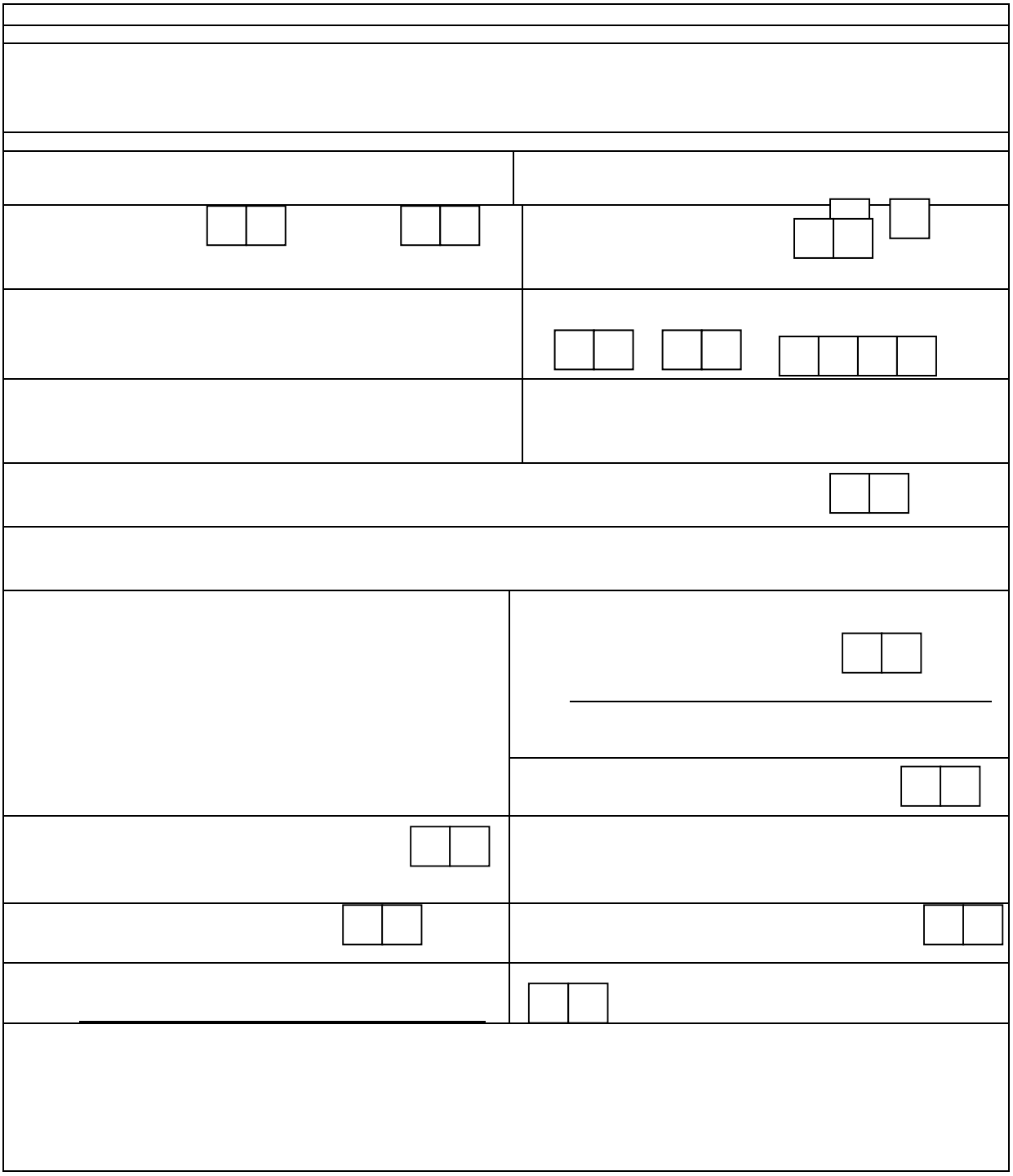
	for infants aged 6-8 months, three times per day for infants aged 9-11 months) on the previous day	
Iodised salt consumption	Number of households consuming adequately iodized salt, i.e., number of households with salt testing 15 parts per million or more of iodine/iodate	Total number of households surveyed
Vitamin A supplementation (under-fives)	Number of children 6-59 months of age who have received at least one high-dose vitamin A supplement in the 6 months prior to the survey	Total number of children aged 6-59 months surveyed
Vitamin A supplementation (post-partum mothers)	Number of women aged 15-49 years with a live birth in the 2 years preceding the survey who have received a high dose vitamin A supplement within eight weeks after birth	Total number of women that had a live birth in the 2 years preceding the survey
Tuberculosis immunization coverage (by 12 months of age)	Number of children 12-23 months of age who were vaccinated against Tuberculosis by 12 months of age, i.e. number of children aged 12-23 months who received BCG vaccine before their first birthday)	Total number of children aged 12-23 months surveyed
Tuberculosis immunization coverage (at any time up to the date of the survey)	Number of children 12-23 months of age who received BCG vaccine at any time up to the date of the survey	Total number of children aged 12-23 months surveyed
Immunization coverage for diphtheria, pertussis and tetanus (DPT) (by 12 months of age)	Number of children 12-23 months of age who were vaccinated against diphtheria, pertussis and tetanus by 12 months of age, i.e. nmber of children aged 12-23 months who received DPT3 vaccine before their first birthday)	Total number of children aged 12-23 months surveyed
Immunization coverage for diphtheria, pertussis and tetanus (DPT) (at any time up to the date of the survey)	Number of children 12-23 months of age who received DPT3 vaccine at any time up to the date of the survey	Total number of children aged 12-23 months surveyed
Polio immunization coverage (by 12 months of age)	Number of children 12-23 months of age who were vaccinated against polio by 12 months of age, i.e. nmber of children aged 12-23 months who receieved OPV3 vaccine before their first birthday)	Total number of children aged 12-23 months surveyed
Polio immunization coverage (at any time up to the date of the survey)	Number of children 12-23 months of age who received OPV3 at any time up to the date of the survey	Total number of children aged 12-23 months surveyed
Measles immunization coverage (by 12 months of age)	Number of children 12-23 months of age who were vaccinated against measles by 12 months of age, i.e. nmber of children aged 12-23 months who received measles vaccine before their first birthday)	Total number of children aged 12-23 months surveyed
Measles immunization coverage (at any time up to the date of the survey)	Number of children 12-23 months of age who received measles vaccine at any time up to the date of the survey	Total number of children aged 12-23 months surveyed
Fully immunized children (by 12 months of age)	Number of children 12-23 months of age who were vaccinated against childhood diseases by 12 months of age, i.e. nmber of children aged 12-23 months who received BCG, DPT1-3, OPV-1-3, and measles vaccine before their first birth day	Total number of children aged 12-23 months surveyed
Fully immunized children (at any time up to the date of the survey)	Number of children 12-23 months of age who receieved BCG, DPT1-3, OPV1-3, and measles vaccine at any time up to the date of the survey	Total number of children aged 12-23 months surveyed
Neonatal tetanus protection	Number of mothers with live births in the previous year who were given at least two doses of tetanus toxoid (TT) vaccine within the appropriate interval prior to giving birth	Total number of women surveyed aged 15-49 years with a birth in the year preceding the survey
Under fives with diarrhoea	Number of children 0-59 months of age who had diarrhoea in the last two weeks preceding the survey	Total number of children aged 0-59 months surveyed
Oral Rehydration Therapy (ORT)use rate	Number of children aged 0-59 months (with diarrhoea in the previous two weeks) who received oral rehydration salts and/or an appropriate household solution	Total number of children aged 0-59 months with diarrhoea in the previous 2 weeks

Home management of diarrhoea	Number of children aged 0-59 months (with diarrhoea in the previous two weeks) who received more fluids AND continued eating somewhat less, the same or more food	Total number of children aged 0-59 months with diarrhoea in the previous 2 weeks
Received ORT or increased fluids, and continued feeding	Number of children aged 0-59 months (with diarrhoea in the last two weeks) who received ORT (oral rehydration salts or an appropriate household solution) or received more fluids AND continued eating somewhat less, the same or more food during the episode of diarrhoea	Total number of children aged 0-59 months with diarrhoea in the previous 2 weeks
Under fives with suspected pneumonia	Number of children 0-59 months of age with suspected pneumonia (cough and fast or difficult breathing) in the last two weeks preceding the survey)	Total number of children aged 0-59 months surveyed
Care-seeking for suspected pneumonia	Number of children aged 0-59 months with suspected pneumonia in the last two weeks preceding the survey who were taken to an appropriate health provider	Total number of children aged 0-59 months with suspected pneumonia in the previous 2 weeks
Knowledge of the two danger signs of pneumonia	Number of mothers/caretakers of children aged 0-59 months who recognize fast and difficult breathing as signs of pneumonia for seeking care immediately	Total number of mothers/caretakers of children aged 0-59 months surveyed
Use of solid fuels	Number of residents in households who use solid fuels (wood, charcoal, crop residues and dung) as the primary source of domestic energy for cooking	Total number of residents in households surveyed
Household availability of bednets	Number of households with at least one bed net	Total number of households surveyed
Household availability of insecticide-treated nets (ITNs)	Number of households with at least one insecticide-treated net, either permanently treated or treated within the previous year	Total number of households surveyed
Under-fives sleeping under insecticide-treated nets	Number of children 0-59 months of age who slept under an insecticide-treated net the previous night of the survey	Total number of children aged 0-59 months surveyed
Under fives with fever in the last two weeks preceding the survey	Number of children 0-59 months of age reported to have had fever in the last two weeks preceding the survey	Total number of children aged 0-59 months surveyed
Antimalarial treatment (under-fives)	Number of children 0-59 months of age reported to have had fever in the previous two weeks and were treated with an appropriate antimalarial drug	Total number of children aged 0-59 months reported to have had fever in the previous 2 weeks
Antimalarial treatment within 24 hours of onset of symptoms of malaria	Number of children aged 0-59 months reported to have had fever in the two weeks preceding the survey and were treated with an appropriate anti-malarial drug within 24 hours of onset of symptoms of malaria	Total number of children aged 0-59 months reported to have had fever in the previous 2 weeks
Use of improved drinking water sources	Number of household members living in households using improved sources of drinking water (piped water; public tap; borehole/pump; protected well; protected spring; rainwater)	Total number of household members in households surveyed
Appropriate water treatment	Number of household members living in households using water that has been treated	Total number of household members in households surveyed
Mean time to drinking water source	Total time (in minutes) taken by all households to go to source of drinking water, collect water and return to house (i.e., total time taken by households which have drinking water source on premises, and by households which take less than 15 minutes, 15 minutes to less than 30 minutes, 30 minutes to less than 1 hour or 1 hour or more to go to source of drinking water, collect water and return)	Total number of households surveyed
Use of sanitary means of excreta disposal	Number of household members using sanitary means of excreta disposal (toilet connected to sewage system; any other flush toilet; ventilated improved pit latrine; traditional pit latrine)	Total number of household members in households surveyed
Use of both improved	Number of household members living in households	Total number of household members

drinking water sources and sanitary means of excreta disposal	using both improved drinking water sources and sanitary means of excreta disposal	in households surveyed
Net intake rate in primary education	Number of children of primary school-entry age attending first grade in primary school	Total number of children of primary-school entry age surveyed
Net attendance rate of primary school-age children	Number of primary school-age children attending primary or secondary school	Total number of children of primary-school age surveyed
Gender parity index	Proportion of primary school-age girls attending primary school	Proportion of boys attending primary education
Secondary school net attendance rate	Number of children of secondary-school age attending secondary school or higher-level institutions	Total number of children of secondary-school age surveyed
Primary school attendance rate of children of secondary school age	Number of children of secondary-school age attending primary school	Total number of children of secondary-school age surveyed
Children reaching grade five	Number of children entering first grade of primary school in a given school year who eventually reach grade five (i.e., number of a cohort of pupils enrolled in the first grade of primary school in a given school year who move to each successive grade and reach grade 5)	Number of children entering first grade of primary school in a given school year (i.e., number of a cohort of pupils enrolled in the first grade of primary school in a given school year)
Primary completion rate	Number of children of primary school completion age attending the last grade (grade 8) of primary school	Total number of children of primary school completion age surveyed
Transition rate to secondary school	Number of children who were in the last grade of primary school during the previous school year attending secondary school	Total number of children that were in the last grade of primary school during the previous school year surveyed
Birth registration	Number of children aged 0-59 months whose births are reported registered	Total number of children aged 0-59 months surveyed
Marriage before age 15	Number of women aged 15-49 years who were first married or in union by the exact age of 15 years	Total number of women aged 15-49 years and 20-49 years surveyed, by age groups
Marriage before age 18	Number of women aged 20-49 years who were first married or in union by the exact age of 18 years	Total number of women aged 20-49 years surveyed
Young women aged 15-19 currently married/in union	Number of women aged 15-19 years who were married or in union at the time of the survey	Total number of women aged 15-19 years surveyed
Polygyny	Number of women aged 15-49 years in a polygynous union	Total number of women (aged 15-49 years surveyed) who are currently married or in union
Children's living arrangements (not living with a biological parent)	Number of children aged 0-17 years not living with a biological parent	Total number of children aged 0-17 years surveyed
Prevalence of orphans	Number of children under age 18 with at least one dead parent	Total number of children under age 18 surveyed
Scool attendance of double orphans (10-14 years)	Number of double orphans (i.e., children aged 10-14 years whose both parents are dead) attending school -- boys and girls combined	Total number of double orphan (children aged 10-14 whose both parents are dead) surveyed
School attendance of non orphans (10-14 years)	Number of children aged 10-14 (whose both parents are both alive and who live with at least one parent) attending school -- boys and girls combined	Total number of children (aged 10-14 years) whose both parents are still alive and who live with at least one parent
Double Orphan to non-orphan school attendance ratio	Proportion of double orphans (i.e., children aged 10-14 years whose both parents are dead) attending school -- boys and girls combined	Proportion of children aged 10-14 years, both of whose parents are alive, and who are living with at least one parent and are attending school -- boys and girls combined
Contraceptive prevalence	Number of women aged 15-49 years currently married or in union who are using (or whose partner	Total number of women aged 15-49 years who are currently married or

	is using) a contraceptive method (either modern or traditional	in union
Unmet need for family planning	Number of women aged 15-49 years currently married or in union who want to space their births or limit the number of children and who are not currently using contraception	Total number of women (who are currently married or in union) interviewed
Antenatal care	Number of women aged 15-49 years (with a live birth in the 2 years preceding the survey) who received antenatal care during the last pregnancy	Total number of women aged 15-49 years (with a birth in the 2 years preceding the survey) surveyed
Provider of antenatal care	Number of women aged 15-49 years attended at least once during pregnancy in the two years preceding the survey by a skilled health personnel (doctor, nurse or midwife)	Total number of women surveyed aged 15-49 years with a birth in the 2 years preceding the survey
Births attended by a qualified/skilled health personnel	Number of women aged 15-49 years (with a birth in the 2 years preceding the survey) who were attended during childbirth by a qualified/skilled health personnel	Total number of women surveyed aged 15-49 years with a birth in the 2 years preceding the survey
Institutional deliveries	Number of women aged 15-49 years (with a birth in the two years preceding the survey) who delivered in a health facility	Total number of women aged 15-49 years with a birth in the two years preceding the survey
Maternal mortality ratio	Number of deaths of women from pregnancy related causes, when pregnant or within 42 days of termination of pregnancy, per 100,000 live births	
Awareness about AIDS among women	Number of women in the age group 15-49 years who have heard of AIDS	Total number of women aged 15-49 years surveyed
Knowledge about HIV prevention	Number of women aged 15-49 years who correctly who correctly identify two main ways of avoiding HIV infection (having only one uninfected partner and using condoms)	Total number of women aged 15-24 years surveyed
Awareness about mother-to-child transmission of HIV	Number of women aged 15-49 years who know that AIDS can be transmitted from mother to child	Total number of women aged 15-49 years surveyed
Knowledge of means of mother-to-child transmission of HIV	Number of women aged 15-49 years who correctly identify three means of vertical transmission (HIV transmission from mother to child)	Total number of women aged 15-49 years surveyed

Appendix F: Questionnaires



Then ask:). If yes, complete listing.

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Then ask:). If yes, complete listing.

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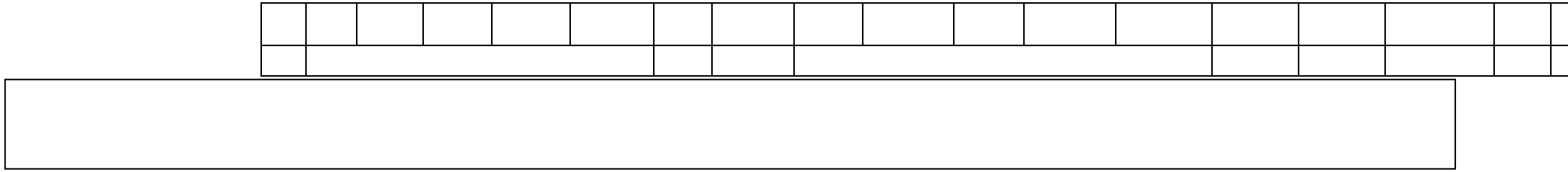

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GO TO FINAL HOUSEHOLD INSTRUCTIONS (FH)		

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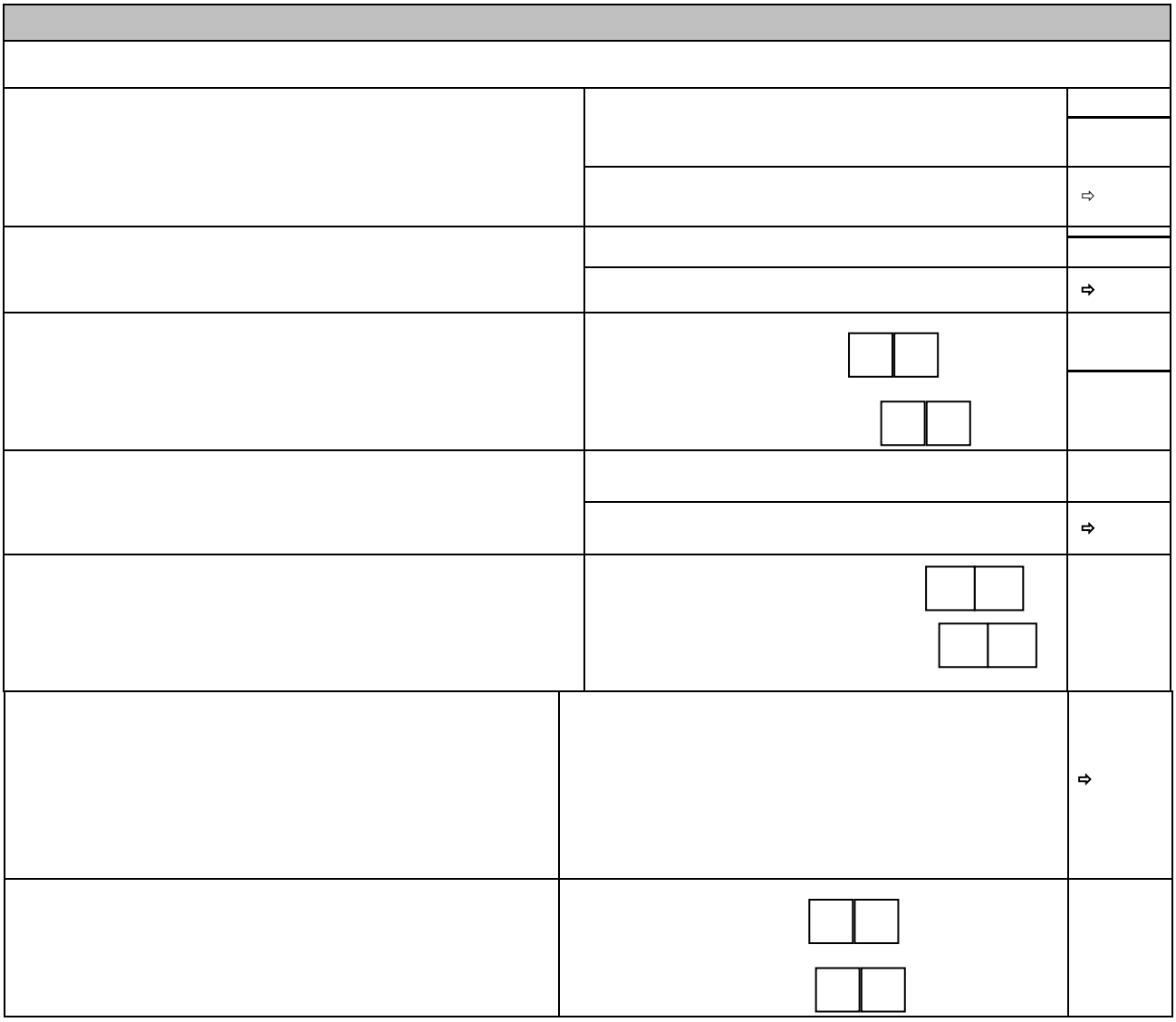

CHECK THE TOTAL OF BH1, WHEHER IT IS EQUAL TO CM8
YES, GO TO THE NEXT MODULE
NO, REVIEW CM3A THROUGH CM7B AND BH2 TO RESOLVE CONFLICT

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