

Analysis Of Mortality Levels Trends And Differentials Census Data

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ANALYSIS OF MORTALITY LEVELS TRENDS AND DIFFERENTIALS IN SUDAN

Introduction

This paper presents the analysis of mortality data obtained from the 2008 population census. The analysis discusses the estimates of mortality indicators for national level, Northern Sudan, Southern Sudan and the states. The discussion includes mortality levels, trends and differentials derived from the final results of the 2008 population census. The mortality indicators presented in the paper are:

1. Probability of dying before age 1 $q(1)$, referred to as infant mortality rate, which indicates the infant health conditions as well as the socio-economic situation of the population.
2. Probability of dying before age 5 $q(5)$, referred to as under five mortality rate, which reflects the child health conditions.
3. Life expectancy at age 20 $e(20)$ which shows the adult health condition.
4. Life expectancy at birth $e(0)$ which indicates the general health conditions of population.
5. Crude Death Rate.
6. Abridged life table which presents a comprehensive conditions of mortality for different age levels.

The paper consists of five sections. In the first section a list of the data used to estimate mortality indicators is presented. In the second section an evaluation of some of these data is discussed. In the third section the methods of calculation of mortality indicators are illustrated. In the fourth section mortality levels trends and differentials shown from these indicators are analyzed. Finally the last section is a summary of results.

1. Data used

The data used to estimate mortality indicators presented in this paper are as follows:

1. The number of children ever born classified by sex and five-year age groups of mother.
2. The number of children surviving classified by sex and five-year age groups of mother.
3. The number of women classified by five-year age group.
4. Population by sex according to survival status of mother.
5. Number of births during the year preceding the census classified by five year age groups of mother.

2. Evaluation of the quality of data

Experience from previous censuses and surveys showed that data on children survival and parental orphanhood are more reliable to estimate mortality indicators by indirect techniques than deaths during 12 months preceding the census. However, these data are also subject to some errors. Some indicators may be used to evaluate the data on children ever born and female population. These indicators are the sex ratios of children ever born by age of mother and the average number of children ever born by age group of mother. Ideally the sex ratios of children ever born varies

between 102 sons per 100 daughters and 107 sons per 100 daughters, and the average parity of children ever born increases by age group of mother. For the first indicator it was found that the sex ratios of children ever born are somewhat out of the specified range. For the second indicator it was found that the average number of children ever-born, as expected, increase by age group of mother (See Annex (1) and Annex (2)).

3. Methods of estimation

Different methods of estimation are used to calculate mortality indicators listed as follows:

1. Brass method to estimate child mortality from data on children ever born and children surviving.
2. Brass method to estimate female adult mortality indicators from data on maternal orphanhood.
3. Estimation of male adult mortality from male & female child mortality and female adult mortality as used in CHADMOR computer package presented below.
4. Linkage method to construct life table by combination of child and adult mortality indicators using average child and adult mortality levels according to Regional Model Life Tables.
5. Finally, the adjusted mortality indicators are taken from the constructed life tables.

Brass methods

Brass was the first to develop a procedure for converting proportions of dead children ever born for women in age groups from 15-19 to 45-49 into estimates of probabilities of dying before attaining certain exact childhood ages. The basic form of the estimation equation is:

$$q(x) = k(i)D(i)$$

Where $D(i)$ denotes the proportion of dead children and $k(i)$ a multiplier to adjust for non-mortality factors and i stands for age groups from 15-19 ($\dot{i} = 1$) to 45-49 ($\dot{i} = 7$). The multipliers are calculated according to different set of coefficients classified by the four regions of the Coale-Demeny Regional Model Life Tables. The West Model and Trussel's coefficients are used in this respect.

The Brass method for adult mortality is the estimation of the probabilities of surviving from age 25 to upper ages from data on parental orphanhood. For more details of Brass mortality estimation methods go to United Nations Manual X.

Computer applications

CHADMOR, a computer package developed by Salih Hamza Abu-El-Yamen, was used for the calculation of child mortality indicators, female adult mortality indicators by Brass method and construction of life tables by linkage method. As data on paternal orphanhood was not available at the time of development of this software so the author programmed the package to estimate male adult mortality using male & female child mortality and female adult mortality on the assumption that the relationship between females' child and females' adult mortality is the same as that between males' child and males' adult mortality.

4. Mortality levels trends and differentials

Tables 1 shows the infant mortality rate, under five mortality rate, life expectancy at age 20 and life expectancy at birth by sex and residence for the total country, Northern Sudan and Southern Sudan as calculated from the 2008 population census data. Table 2 shows these indicators for Northern Sudan and urban areas of Southern Sudan compared to the same indicators from 1993 population census data. The tables from Table 3 to Table 6 show these indicators for the same areas by sex and residence. Finally Table 7 and Table 8 show these indicators for the different states of Sudan compared to the same indicators from 1993 population census data. The mortality levels, trends and sex & residence differentials reflected from this information are discussed below.

4.1 Mortality levels

With respect to infant mortality Table 1 shows that 86 per 1000 live births expected to die in Sudan before celebrating their first birth day. This figure reached to 79 per 1000 in Northern Sudan and 111 per 1000 in Southern Sudan. For under-five mortality The table indicates that 122 per 1000 live births die before reaching age five in Sudan, 111 in Northern Sudan and 161 in Southern Sudan. These levels of child mortality considered to be high compared to the average level in developing countries.

As for adult health conditions table 5 presents the life expectancy age 20 for the above mentioned regions. This indicator accounts for 48, 49 and 44 years in Sudan, Northern Sudan and Southern Sudan respectively.

The life expectancy at birth is used as an indicator for the general health of population. The figures in table 6 for this indicator show that the average expected years for a new born to be in life in Sudan according to the health conditions in the country in 2008 is 57 years. In Northern Sudan this indicator reached 60 years and in Southern Sudan 52 years (See Figure 1 and Figure 2). For complete structure of mortality levels by age see the Abridged Life Tables presented in Annex (3) through Annex (5).

Table (4. 1)
Mortality Levels from 2008 Population Census Data

Region	q(1) Per 1000	q(5) Per 1000	e ₂₀ Years	e ₀ Years
Sudan	86	122	48	57.1
Northern Sudan	79	111	49	59.8
Southern Sudan	111	161	44	51.6
CDR per 1000	15.9 Dead per 1000 Person Deaths During last 12 months Method			

Source: Calculated from 2008 population census data

Figure 1 - Child mortality for Sudan, Northern Sudan and Southern Sudan

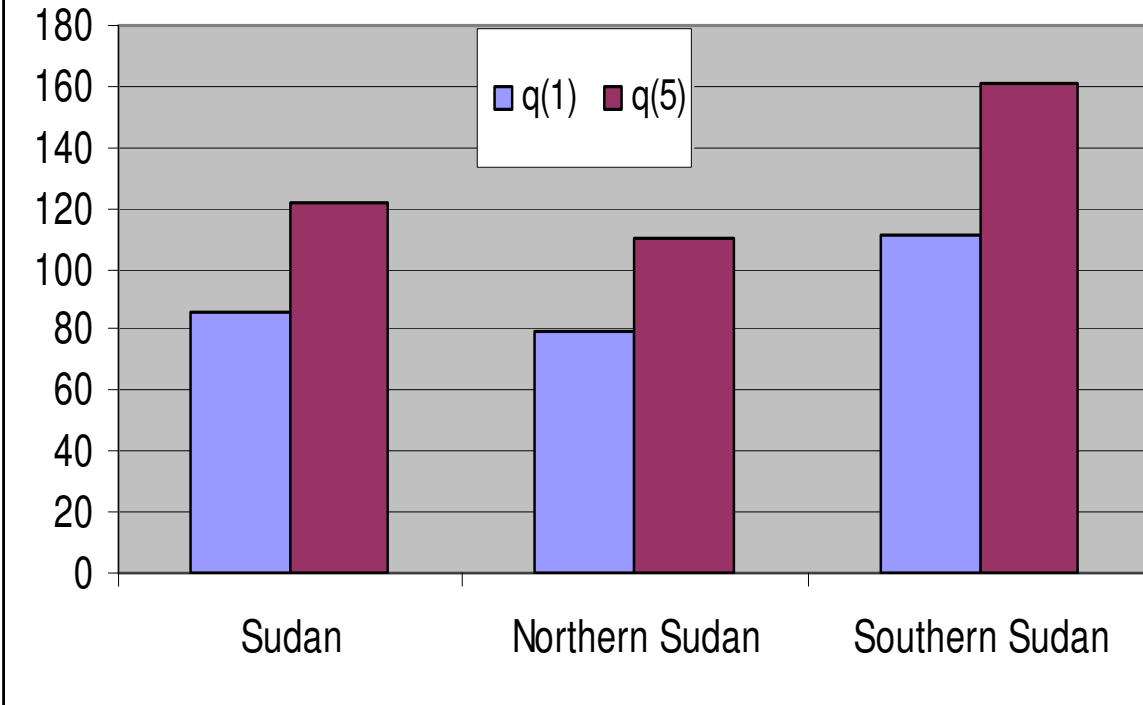
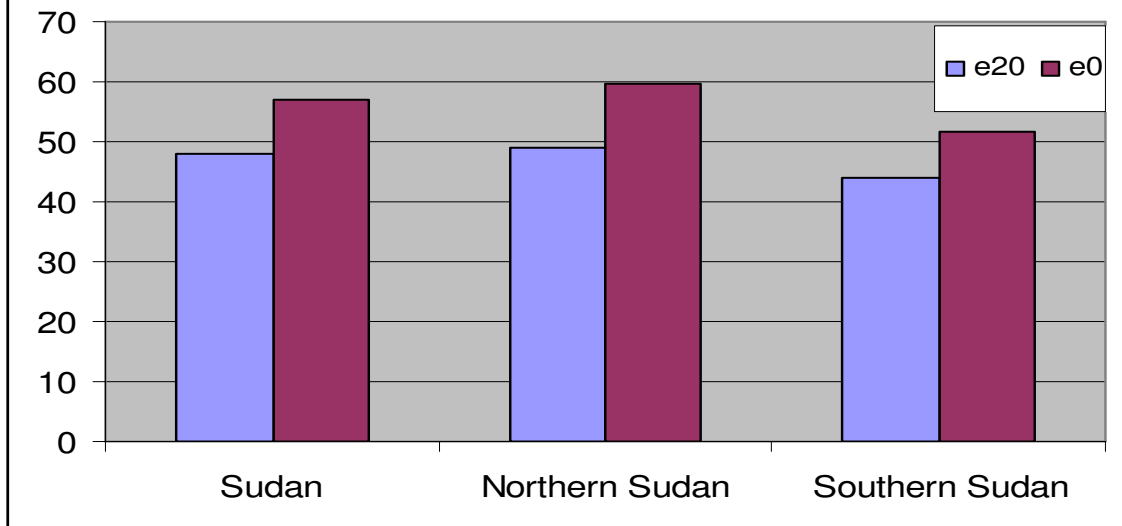


Figure 2 - Life expectancy at age 20 and at birth for Sudan, Northern Sudan and Southern Sudan



4.2 Mortality trends

The mortality trends may be traced by comparing the mortality indicators emerged from 2008 population census and the previous censuses and surveys. To attain more valid comparison in this respect we use the 1993 census indicators because their data were obtained from the same method of data collection, (i.e. a census) and they were calculated by the same techniques of calculation as for this census. As the 1993 census did not include the whole Southern Sudan region we will discuss the trends for the Northern Sudan and the urban areas of the Southern Sudan.

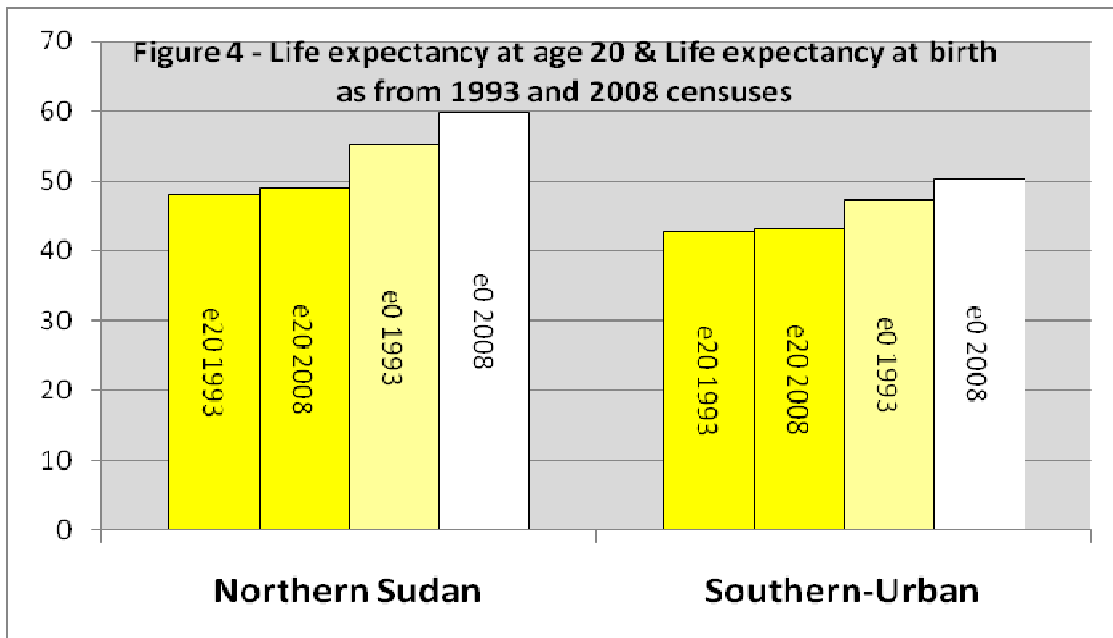
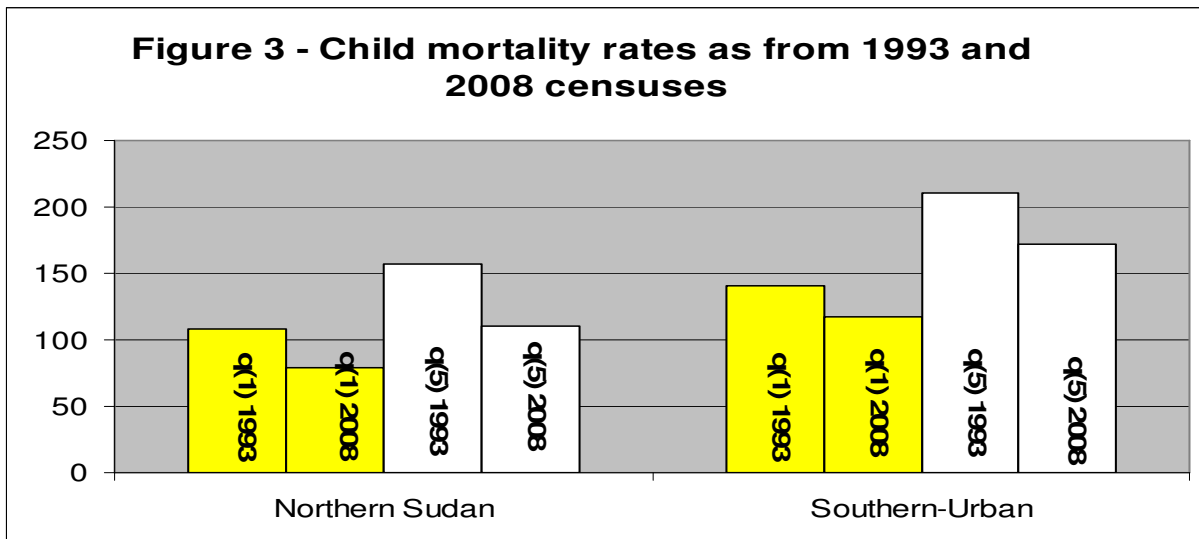
Table 2 indicates that in Northern Sudan the infant mortality indicator, $q(1)$, in 2008 decreased by 27% from that in 1993; and the under five mortality indicator, $q(5)$ decreased by 30%; which indicates a significant improvement in child health conditions during this period. As a result the life expectancy at birth increased by around 5 years during these 15 years in this region of the country. No significant change is observed in the life expectancy at age 20; an increase of only one year in this indicator indicates a tendency of leveling in the adult health conditions in Northern Sudan.

For Southern Sudan the 1993 census data include the major cities in the urban areas while the 2008 population census data includes all urban areas. However, the comparison between indicators from the two sources of data throws some light on mortality trends in the urban areas of this region. Table 2 indicates that the values of both infant and under five mortality indicators from the two censuses decreased by around 18%. If we assume that health conditions in major cities were better than other urban areas the percent decrease in child mortality levels in the urban areas of Southern Sudan during 1993 and 2008 would be more than this figure. The decrease in child mortality levels in urban areas of the Southern Sudan resulted in an increase in life expectancy at birth in this area by 3 years during this period, which also might be more than that under the above assumption. The same condition is reported with respect to adult mortality as the table shows. The life expectancy at age 20 increased by .5 years (See Figure 3 and Figure 4).

Table (4.2)
Mortality Trends from 1993 and 2008 Population Censuses Data

Region	q(1) Per 1000		q(5) Per 1000		e20 Years		e0 Years	
	1993*	2008	1993*	2008	1993*	2008	1993*	2008
Northern Sudan	108	79	157	111	48	49	55.1	59.8
Southern-Urban	141	117	210	172	42.8	43.3	47.3	50.4

* 1993 population census analytical report



4.3 Mortality differentials

In this section we discuss the sex differentials and urban/rural differentials. For sex mortality differentials the tables from Table 3 to Table 6 show that all indicators for all studied areas in Sudan, Northern Sudan and Southern Sudan show a better mortality conditions for females than males as established in the majority of populations in previous years (See Figure 5 and Figure 6). The inconsistency of sex distribution of children ever born discussed in the evaluation chapter may hinder a proper analysis of the size and trends of mortality gaps between males and females in the different areas.

As for urban rural differentials, before discussing mortality differentials in these areas, we have to note that the mortality levels in the nomadic rural areas have been found to be very low a thing which initiate some suspect on the quality of data of this group of population. For this reason we did not present the nomadic indicators in this paper leaving the subject for further investigation. If we assume that the quality of mortality data in nomadic population is not of good quality the

mortality levels for the total Sudan and the Northern Sudan presented here may be a little bit under estimated. However, since the proportion of nomadic population is small its effect on the whole data may not be significant. For the rural indicators we include only the settled rural.

Table 3, Table 4 and Table 5 show that no significant difference is noted between child and adult mortality levels in the urban areas and settled rural areas in the whole country and the Northern Sudan. But, for Southern Sudan these levels in rural areas are better than those in urban areas by significant amount. For the general health Table 6 shows that the life expectancy at birth in urban areas of both Northern and Southern Sudan lags behind that of rural areas in these areas by two years (57 years for urban versus 59 years for rural in Northern Sudan, and 50 years for urban versus 52 years for rural in Southern Sudan). See Figure 7, and Figure 8.

Table (4.3)
Infant mortality by Sex & Residence from 2008 Population Census Data

q(1) Per 1000 live births			
Region/Residence	Both Sexes	Males	Females
Sudan			
Total	86	93	79
Urban	87	97	78
Rural settled	89	89	83
Northern Sudan			
Total	79	86	72
Urban	83	92	74
Rural	82	96	75
Southern Sudan			
Total	111	118	104
Urban	117	129	106
Rural	109	115	103

Table (4.4)
Under-Five Mortality by Sex & Residence from 2008 Population Census Data

q(5) Per 1000 live births			
Region/Residence	Both Sexes	Males	Females
Sudan			
Total	122	128	115
Urban	124	135	113
Rural settled	127	133	121
Northern Sudan			
Total	110	117	104
Urban	117	127	106
Rural settled	116	123	109
Southern Sudan			
Total	161	167	156
Urban	172	184	159
Rural	159	163	155

Table (4.5)
Life Expectancy at Age 20 by Sex & Residence from 2008
Population Census Data

e₂₀ in years			
Region/Residence	Both Sexes	Males	Females
Sudan			
Total	48	47	49
Urban	48	47	50
Rural	48	46	49
Northern Sudan			
Total	49	48	50
Urban	46	45	48
Rural settled	47	47	50
Southern Sudan			
Total	44	43	45
Urban	43	42	49
Rural	44	43	45

Table (4.6)
Life Expectancy at Birth by Sex & Residence from 2008 Population Census Data

e₀ in years			
Region/Residence	Both Sexes	Males	Females
Sudan			
Total	57.1	56.6	59.6
Urban	58.2	56.1	60.4
Rural	57.2	55.8	58.7
Northern Sudan			
Total	59.8	58.1	61.4
Urban	57.1	55.3	59.0
Rural settled	59.2	57.6	60.9
Southern Sudan			
Total	51.6	50.6	52.6
Urban	50.4	48.7	52.2
Rural	51.9	51.1	52.8

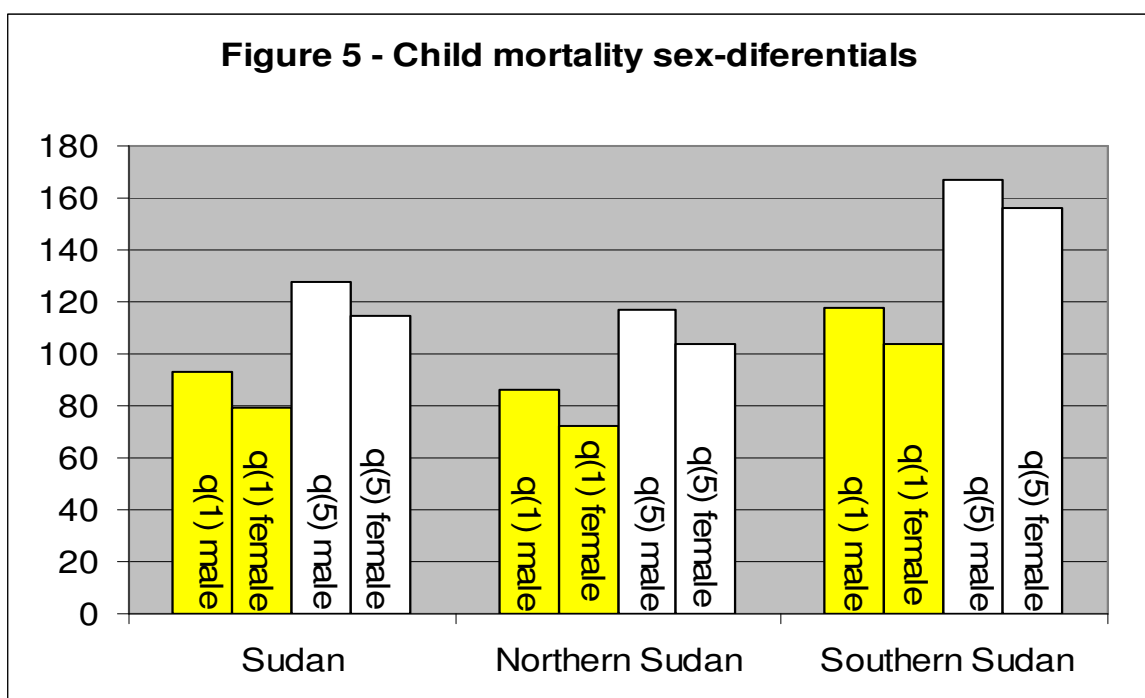


Figure 6 - e20 and e0 sex differentials

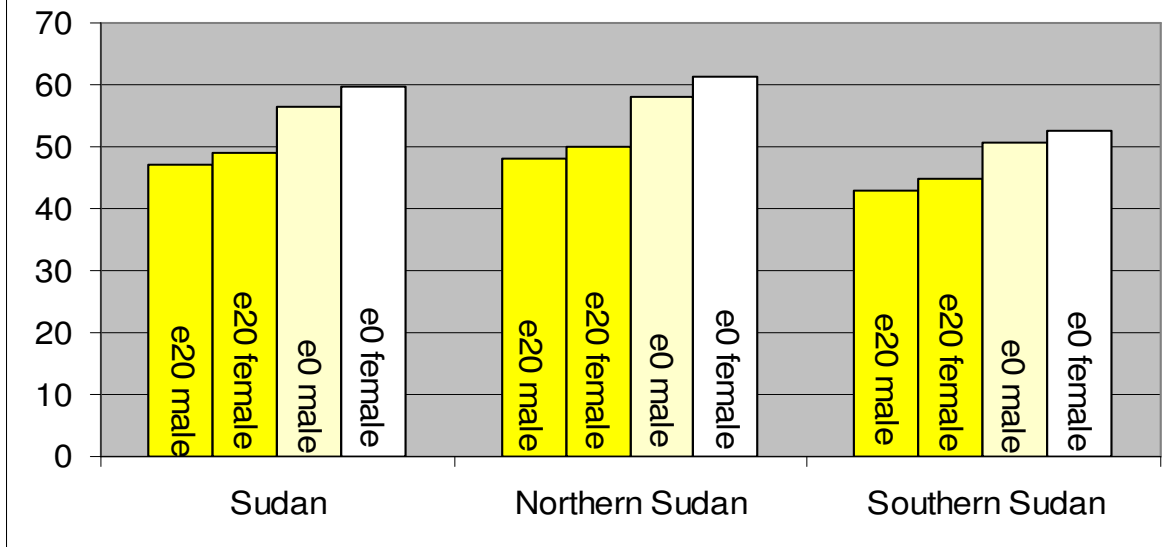
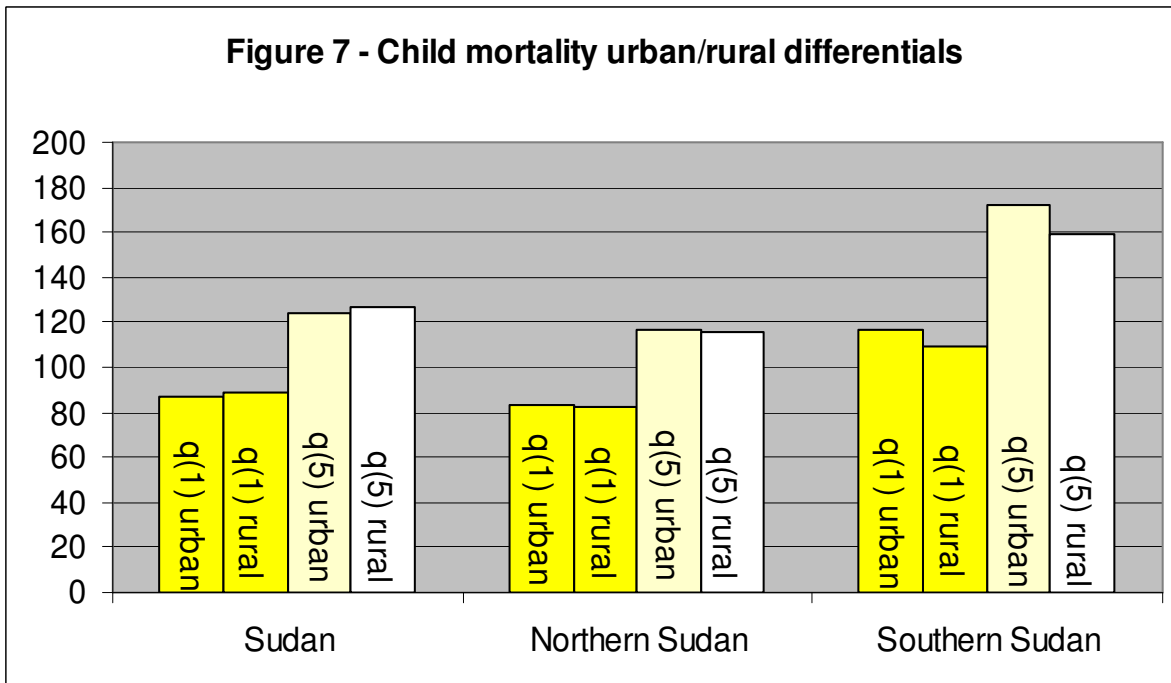
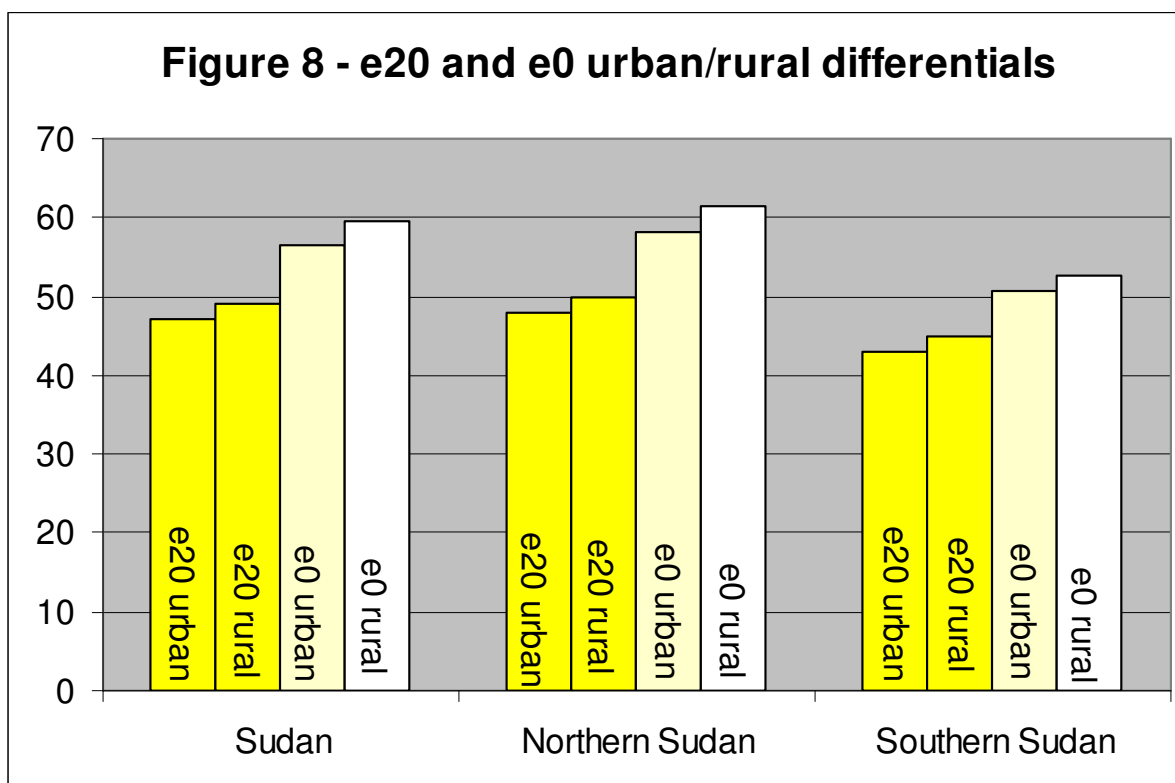


Figure 7 - Child mortality urban/rural differentials





4.4 Regional mortality differentials and trends

In this part of the section we are going to discuss the mortality differentials and trends in the Northern and Southern Sudan with their 25 states. First we start with the two North and South regions. The 2008 population census is the first census after 25 years that provides full data for all the country which enables studying mortality differentials between and within both the two parts of the country. However, still it is not possible to track the trends in mortality levels in the south in the recent years from censuses data because the previous census did not cover all the areas in Southern Sudan.

Going back to Table 1 we find that infant and under five mortality conditions in South Sudan in 2008 lagged with large difference behind that in the Northern region which indicates a retarded condition of child health in this region compared to the North. The adult health conditions measured by e20 and general health conditions measured by e0 is not an exception in this regard. The life expectancy at age 20 and the life expectancy at birth in the North are higher than that in the South by a difference of five years with respect to e20 and 8 years with respect to e0 according to the 2008 population census. The above results are well expected due to the deteriorated socioeconomic conditions in the South and the prolonged war in this region during the last decades.

With respect to states differentials Table 7 and Table 8 present the values of the discussed mortality indicators for the 15 states of Northern Sudan and the 10 states of the Southern Sudan as from 2008 census data. The tables also present the values of these indicators as obtained from 1993 census for the northern states so as to find the trend of mortality levels during the inter-census period in these areas. For the Southern states data are not available in this regard. Generally speaking Table 7 shows that there was a significant variation in child mortality levels among states. Unexpectedly, North Darfur and Red Sea states came in the three lowest child mortality levels among all states. q(1) in North Darfur registered only 59 per 1000 live births the lowest of all states. In Red Sea q(1) reached 66 per 1000 live births. The third state is the Northern state where q(1) was 65 per 1000 live births as the table shows. The observed socioeconomic conditions in addition to

the conflict in these two states specially North Darfur, do not support this result. One explanation of the lowest values of child mortality levels in these states may be, as discussed earlier, a reflection of the unexplained lower mortality levels among nomadic populations which constitutes high proportions in these two states. The highest infant mortality level was reported in North Bahrelgazal State in the Southern Region (151 per 1000 live births); the lowest $q(1)$ in this region reported in Jonglie state (89 per 1000 live births). The highest infant mortality level in Northern Sudan was in Blue Nile State (137 per 1000 live births). Infant mortality level in Khartoum State, the capital city, was relatively high (75 per 1000 live births). This can easily be justified by the large observed migration trends from other states to Khartoum State (See Figure 9 and Figure 10). The under-five mortality levels differentials are more or less the same as the infant mortality differentials. As for the general health Table 8 presents the life expectancy at birth for the different states. The highest value of e_0 among all states was shown in the Northern State and Darfur State (63 years in each state). The same justification of the lower level of child mortality in Northern Darfur State is also true here. The lowest e_0 among all states was registered in North Bahrelgazal State in the Southern Region (45.2 years). The highest e_0 in Southern Sudan was in Jonglie State (52.7 years). The lowest e_0 in Northern Sudan was in Blue Nile state (50.1 years) (See Figure 11 and Figure 12).

With respect to mortality trends in the Northern states Table 7 and Table 8 presents the change in mortality levels in these areas during the 15 years between 1993 and 2008 population censuses. Generally speaking all states experienced different levels of health improvement except Blue Nile State which, up normally, experienced retarded condition. Infant and under-five mortality rates in Blue Nile increased by an average of 6% and the life expectancy at birth leveled to 50.1 years during this period. The highest decrease in infant mortality indicated by the figures reported in Red Sea state (45%), North Darfur (44%) and South Darfur (38%). The effect of the lower levels of child mortality from the 2008 census data in Red Sea and North Darfur States discussed above is reflected in this result. The same explanation is also true for Southern Darfur. The highest decrease in $q(1)$ shown after the these three states in this period was in Northern State (38%) and North Kordofan State (30%). Khartoum state experienced the lowest decrease in infant mortality after Blue Nile as the table shows (18%). Under-five mortality changes in the states were almost the same as infant mortality. As for the general health the same trends also reflected in the difference of the e_0 values from 1993 census and 2008 census in the different states as Table 8 shows. The highest difference was 9.2 years in Red State which is far from other states' differences. Next comes North Darfur State (7.2 years) followed by South Darfur State (6.5 years). The lowest increase in e_0 during this period after Blue Nile State was registered in Gezira State (2.9 years) followed by Khartoum State (3.9 years).

Table (4. 7)
Infant and Under Five Mortality Rates by State as Obtained from 2008 and 1993 Population Censuses Data

State	q(1)			q(5)		
	2008*	1993**	% diff	2008*	1993**	% diff
Khartoum	75	92	-18	105	131	-20
Northern	65	99	-34	89	143	-38
Nahr el nil	69	92	-25	96	131	-27
Red sea	66	119	-45	91	175	-48
Kassala	76	102	-25	106	147	-28
Algadarif	102	128	-20	147	190	-23
Gazira	70	89	-21	97	126	-23
White Nile	79	105	-25	111	152	-27
Blue Nile	137	130	+5	205	192	+7
Sinnar	90	115	-22	128	168	-24
Northern kordofan	81	115	-30	114	168	-32
Southern kordofan	100	127	-21	143	189	-24
Northern Darfur	59	106	-44	80	153	-48
western Darfur	88	116	-24	125	170	-26
southern Darfur	70	112	-38	96	163	-41
Upper Nile	116			169		
Jungle	89			127		
Warrap	135			184		
North. Bhar Ghazal	151			225		
West. Bhar Ghazal	126			186		
Unity	96			138		
Central Equatoris	98			141		
Eastern Equatoria	97			139		
Western Equatoria	105			152		
Lakes	113			165		

Sources: *Calculated from 2008 population census data,
 ** 1993 population census analytical report

Table (4.8)
Life Expectancy at Age 20 and Life Expectancy at Birth as Obtained
from 2008 and 1993 Population Censuses Data

State	e ₂₀ in years			e ₀ in years		
	2008*	1993**	diff	2008*	1993**	Diff
Khartoum	50.3	48.2	2.1	61.4	57.5	3.9
Northern	50.5	48.4	2.1	63.0	56.7	6.3
Nahr el nil	49.9	48.6	1.3	61.7	57.9	3.8
Red sea	47.8	44.5	3.3	60.3	51.1	9.2
Kassala	46.8	46.0	0.8	58.3	54.5	3.8
Algardarif	47.7	46.5	1.2	55.9	51.1	4.8
Gazira	49.4	48.8	0.6	61.3	58.4	2.9
White Nile	49.4	48.5	0.9	60.2	56.1	4.1
Blue Nile	46.0	44.8	1.2	50.1	50.1	0
Sinnar	48.7	47.9	0.8	58.3	54.3	4
Northern kordofan	49.3	48.0	1.3	59.8	54.4	5.4
Southern kordofan	48.3	46.8	1.5	56.7	51.9	4.8
Northern Darfur	49.7	48.3	1.4	63.0	55.8	7.2
western Darfur	48.4	48.2	0.2	58.2	54.4	3.8
southern Darfur	49.5	48.1	1.4	61.4	54.9	6.5
Upper Nile	43.6			50.8		
Jungle	42.1			52.7		
Warrap	42.9			49.2		
North. Bhar Ghazal	41.4			45.2		
West. Bhar Ghazal	43.0			49.2		
Unity	43.8			53.2		
Central Equatoria	43.6			53.0		
Eastern Equatoria	44.0			53.4		
Western Equatoria	42.5			51.2		
Lakes	43.1			50.7		

Sources: *Calculated from 2008 population census data,

** 1993 population census analytical report

Figure 9 - q(1) and percent improvement in infant mortality between 1993 & 2008 in the Northern States of Sudan

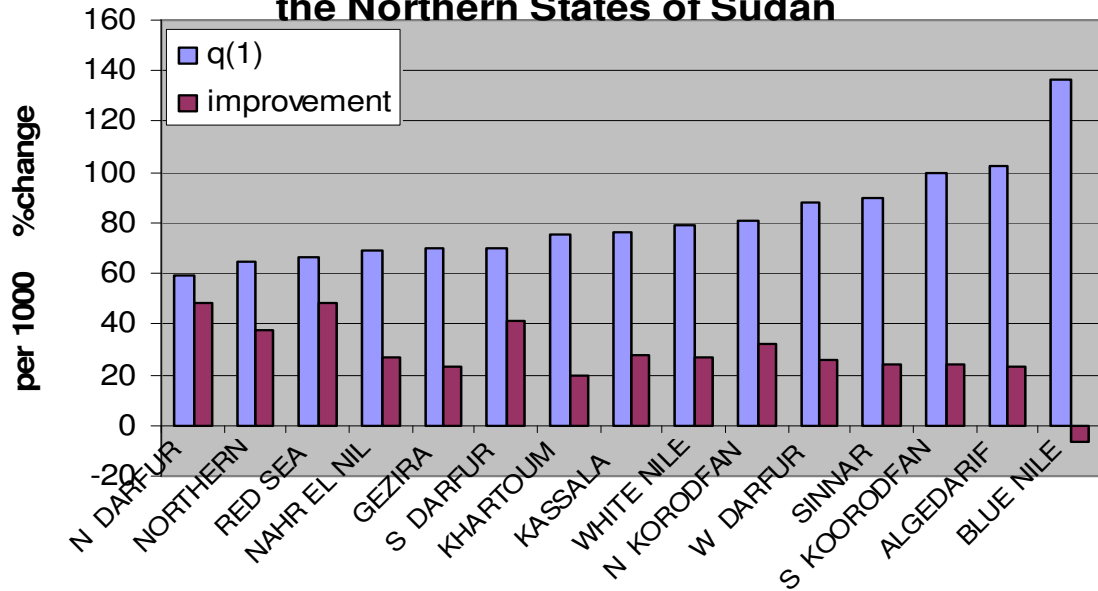


Figure 10 - Infant mortality rates in Southern Sudan States

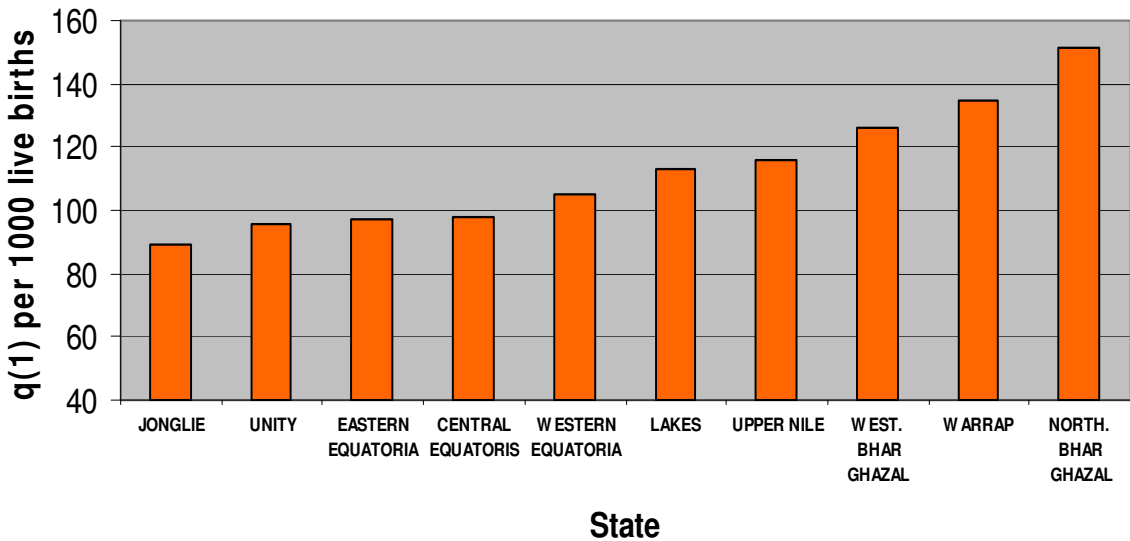


Figure 11 - e0 and increase in e0 between 1993 & 2008 in the Northern States of Sudan

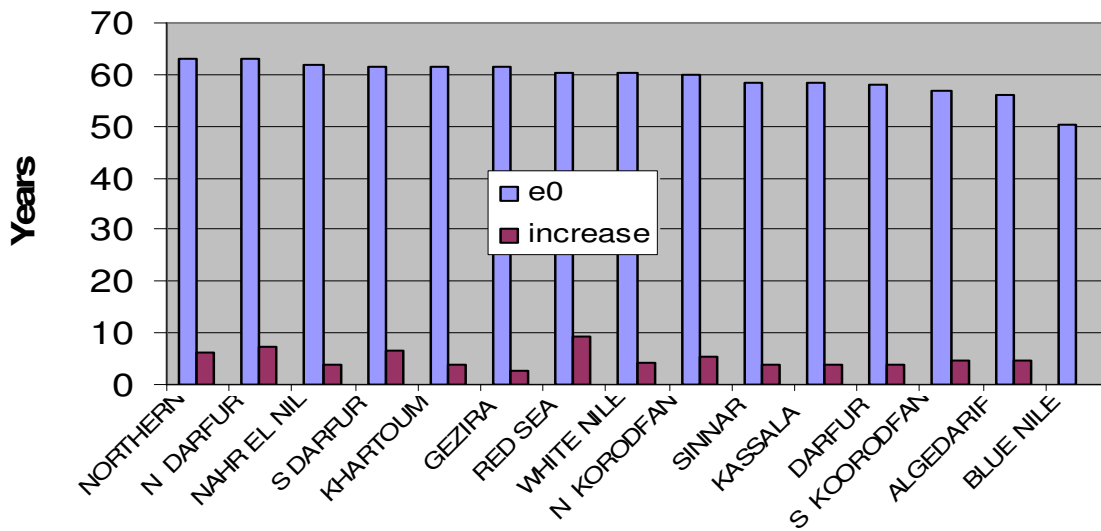
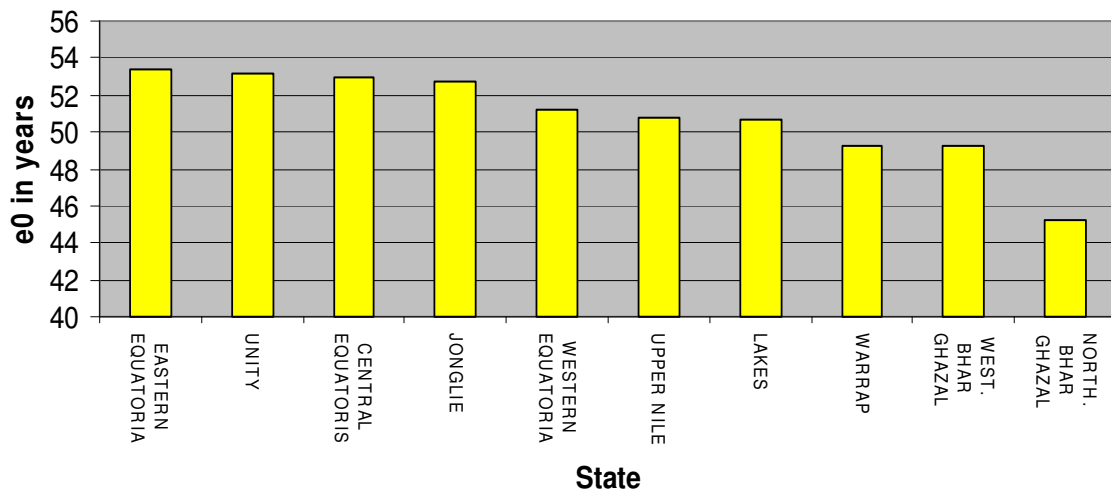


Figure 12 - Life expectancy at birth in the Southern States of Sudan



5. Summary of findings

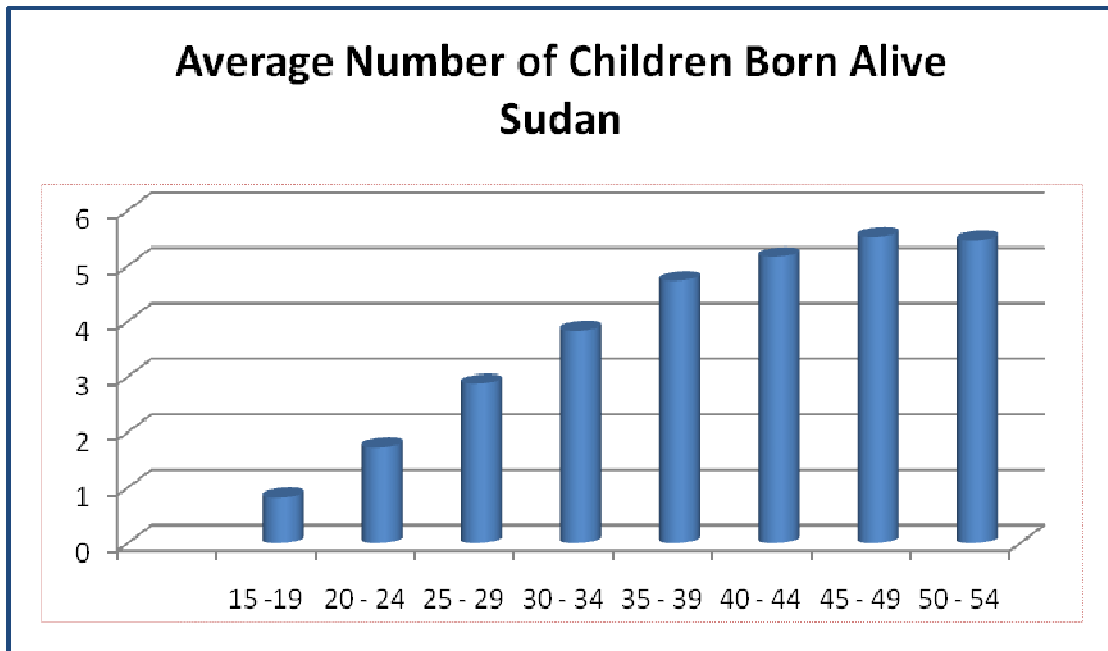
- The data quality indicators showed that the sex distribution of children ever born by age of mother did not come in the expected range while the average parity increases by age of mother as expected.
- The very low results of mortality levels in nomadic areas throw some suspects on the quality of data in these areas; accordingly the mortality levels in states with high proportions of nomadic population may be underestimated.
- Infant mortality rate $q(1)$, under five mortality rate $q(5)$, life expectancy at age 20 e_{20} , and life expectancy at birth e_0 in Sudan in 2008 was found to be as follows:
 - $q(1) = 86$ per 1000 live births
 - $q(5) = 122$ per 1000 live births
 - $e_{20} = 48$ years
 - $e_0 = 57$ years
- Mortality levels in Southern Sudan were far below that in Northern Sudan with a difference of 8 years in life expectancy at birth between the two regions. This may be explained by the retarded socioeconomic conditions in the South and the prolonged war took place in this part of the country.
- A considerable decrease is reported in mortality levels in Northern Sudan during 1993-2008 which indicates a considerable improvement in health conditions in this region. The values of mortality information in the urban of Southern Sudan also indicate improvement in mortality levels in this area during this period.
- Mortality levels among females were found to be lower than those among males in the whole country, Northern Sudan and Southern Sudan which indicates the persistence of the established condition of better life chances for females than males.
- No significant difference is noted between child and adult mortality levels in the urban areas and settled rural areas in the whole country and the Northern Sudan but for the Southern Sudan these levels in rural areas are better than those in urban areas by significant degree. With respect to general health conditions e_0 in urban areas of both Northern and Southern Sudan lagged behind that of rural areas in these regions by two years.
- In the northern states unexpectedly North Darfur and Red Sea States registered relatively very low mortality levels. With the exception of these two states the Northern state reported the lowest mortality levels among all northern states and Blue Nile state reported the highest.
- In the southern states North Bahrelgazel acquired the lowest mortality levels while Jongli State acquired the highest levels.
- All states of Northern Sudan experienced improvement in health conditions by different degrees during 1993-2008 except Blue Nile State which, up normally, experienced retarded condition.

Annex (4.1)
Children Born Alive by Sex and Sex Ratios by
Age Group of Mother

Age group 15 years+	No. of Children Born Alive	Daughters Born Alive	Sons Born Alive	Sex Ratio
Sudan				
15 -19	378456	182531	195924	107
20 - 24	1727969	815808	912161	112
25 - 29	3632716	1720669	1912047	111
30 - 34	4159387	1963445	2195942	112
35 - 39	5010440	2361272	2649169	112
40 - 44	4071602	1919079	2152523	112
45 - 49	3157701	1485009	1672692	113
50 - 54	2604399	1227560	1376839	112
Northern Sudan				
15 -19	309849	150209	159640	106
20 - 24	1326291	627074	699217	112
25 - 29	2761444	1308273	1453170	111
30 - 34	3225275	1523913	1701362	112
35 - 39	4015028	1891297	2123731	112
40 - 44	3330234	1571004	1759231	112
45 - 49	2569777	1208909	1360868	113
50 - 54	2197981	1035124	1162857	112
Southern Sudan				
15 -19	68607	32322	36284	112
20 - 24	401678	188735	212944	113
25 - 29	871272	412396	458877	111
30 - 34	934112	439532	494580	113
35 - 39	995413	469975	525438	112
40 - 44	741368	348075	393292	113
45 - 49	587923	276100	311823	113
50 - 54	406418	192436	213982	111

This table excludes

1. Institutional population.
2. Homeless population.
3. Night traveler's population
4. Cattle camp population in south Sudan



Annex (4.3)
Northern Sudan life table (Total) 2008

<i>age</i>	<i>l(x)</i>	<i>nqx</i>	<i>l_x</i>	<i>L_X</i>	<i>T_x</i>	<i>e_x</i>
0	1.0000	0.0790	100000	94470	5979202	59.8
1	0.9210	0.0345	92100	3620045	5884732	63.9
5	0.8892	0.0115	88923	442057	5522688	62.1
10	0.8790	0.0088	87900	437572	5080631	57.8
15	0.8713	0.0133	87129	432756	4643059	53.3
20	0.8597	0.0181	85974	425967	4210303	49.0
25	0.8441	0.0079	84413	420406	3784335	44.8
30	0.8375	0.0079	83749	417084	3363929	40.2
35	0.8308	0.0079	83085	413416	2946846	35.5
40	0.8228	0.0239	82282	406502	2522430	30.8
45	0.8032	0.0334	80319	394880	2126928	26.5
50	0.7763	0.0484	77633	378770	1732048	22.3
55	0.7387	0.0706	73875	356333	1353278	18.3
60	0.6866	0.1058	68658	325127	996945	14.5
65	0.6139	0.1596	61393	282467	671818	10.9
70	0.5159	0.2430	51594	226622	389351	7.5
70+	0.3905	1.0000	39055	162729	162729	4.2

Annex (4.4)
Northern Sudan life table (Female) 2008

<i>age</i>	<i>l(x)</i>	<i>nqx</i>	<i>l_x</i>	<i>L_X</i>	<i>T_x</i>	<i>e_x</i>
0	0.0000	0.0724	100000	94933	6143940	61.4
1	0.9276	0.0344	92761	364668	6049008	65.2
5	0.8957	0.0113	89572	445327	5684340	63.5
10	0.8856	0.0088	88558	440843	5239013	59.2
15	0.8778	0.0128	87779	436077	4798170	54.7
20	0.8665	0.0170	86652	429587	4362093	50.3
25	0.8518	0.0094	85183	423912	3932506	46.2
30	0.8438	0.0095	84382	419904	3508595	41.6
35	0.8358	0.0129	83580	415205	3088691	37.0
40	0.8250	0.0171	82502	408978	2673486	32.4
45	0.8109	0.0244	81089	400503	2264508	27.9
50	0.7911	0.0357	79112	388508	1864005	23.6
55	0.7629	0.0526	76291	371424	1475497	19.3
60	0.7228	0.0818	72279	346617	1104073	15.3
65	0.6637	0.1309	66368	310115	757456	11.4
70	0.5768	0.2116	57678	257874	447341	7.8
70+	0.4547	1.0000	45472	189467	189467	4.2

Annex (4.5)
Northern Sudan life table (Male), 2008

<i>age</i>	<i>l(x)</i>	<i>nqx</i>	<i>l_x</i>	<i>L_X</i>	<i>T_x</i>	<i>e_x</i>
0	0.0000	0.0856	100000	94006	5814465	58.1
1	0.9144	0.0346	91438	359422	5720459	62.6
5	0.8827	0.0117	88273	438788	5361037	60.7
10	0.8724	0.0088	87242	434302	4922249	56.4
15	0.8648	0.0137	86479	429436	4489749	51.9
20	0.8529	0.0194	85295	422348	4058511	47.6
25	0.8364	0.0063	83644	416900	3636164	43.5
30	0.8312	0.0063	83116	414263	3219264	38.7
35	0.8259	0.0064	82589	411627	2805001	34.0
40	0.8206	0.0306	82062	404026	2393374	29.2
45	0.7955	0.0427	79548	389257	1989348	25.0
50	0.7615	0.0617	79154	369032	1600092	21.0
55	0.7146	0.0899	71459	341241	1231060	17.2
60	0.6504	0.1326	65038	303638	889818	13.7
65	0.5642	0.1933	56417	254820	586181	10.4
70	0.4551	0.2829	45511	195370	331361	7.3
70+	0.3264	1.0000	32638	135990	135990	4.2