Levels and Trends of Adult Mortality in Namibia

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ABSTRACT

Despite the mounting need for accurate knowledge of adult mortality estimates in development sectors, the topic remained a neglected public health issue in comparison with the interest shown to the monitoring of child survival. The lack of adult mortality estimates particularly in developing countries has been partly attributed to inadequacy of vital registration and to technical limitations of the methods that can be used to investigate the subject retrospectively. Similar to other developing countries, adult mortality remained a neglected issue in Namibia even after independence in 1990. The census and DHS attempted to fill the gap, yet to date, little is known about patterns of adult mortality in Namibia. This paper analyses the orphanhood data from the 2001 census and applies the INDEPTH life tables to derive plausible estimates of adult mortality. The results show that though adult mortality declined in the early 1990s, it has been increasing since 1995.

Introduction

Good health is important in order to live a comfortable and productive life. Poor health caused by debilitating diseases reduces productivity and increases dependence and the cost of health services. Yet, many critical analyses of the WHO definition of health (1978) have pointed to the obstacles posed in the exercise of measuring the concept of health on the yardstick of the Alma Ata Declaration. For instance, Caldwell and Santow (1989), argue that the definition is too complex and multifaceted, and no single measure would do justice to its concepts. Indicators of mortality as measures of health have been criticised as measuring the extreme of aspect of ill health: death. Nonetheless, WHO argues that infant and child mortality indicators provide significant and useful information on the health status and accessibility of health care for the whole community (Katzenellenbogen, Joubert and Karim, 1997). Moreover, the emergence of the AIDS pandemic in recent years has turned adult mortality into a crucial indicator for health and development planners since human capital is highly specialised, scarce and not easily replaceable (Udjo, 2005; Bangha, 2008). The death of prime-adults has also been highly associated with eroded welfare of other household members. For instance, the results from recent studies on adult mortality indicate that the loss of prime-adults has a significant impact on children's health and education (Ainsworth, Beegle and Konda, 2005). Hence, similar to child survival, the indicators of adult mortality are fundamental in planning, monitoring and improvement of societal health status as they provide significant summary indices on the standard of living, socio-economic development and the prevalence of diseases as well as the community health system of a country.

Yet, despite the vital need for adult mortality indicators in health and other development sectors, adult mortality has remained a neglected public health issue in many developing countries in comparison with the overwhelming interest that has been shown towards the monitoring of child survival and its determinants (Hill, 2003; Bradshaw & Timaeus, 2006; Timaeus, 2008 and Piscoya-Dias & Queiroz, 2010). The lack of adult mortality in Sub-Saharan Africa has been attributed partly to inadequacy of vital registration and partly to technical limitations of the methods that can be used to investigate the subject retrospectively. A large proportion of surveys and other longitudinal studies used to derive estimates of child mortality usually cover too small

samples to be used to measure adult mortality directly, and many failed to collect data that can be used to estimate adult mortality indirectly (Timaeus, 1993:218-219).

In response to the problem of inadequate and limited data generally obtained from national surveys and censuses in developing countries, demographers have developed a variety of indirect techniques. These techniques utilise age-specific mortality patterns (model life tables) as a substitute for real information in projections and mortality estimations and include among others: United Nations model life tables (1955); Coale and Demeny (1966, 1983); Ledermann (1969), United Nations Model Life Tables for Developing Countries (1982) and Brass's Relational Life Tables (1968; 1971). The methods of indirect techniques for estimating adult mortality from surveys and census data use information on the survival of the spouse (widowhood method), parental survival, or survival of siblings (UN, 1983 & 2002; Hill, 2003). However, Hill (2003) has stressed that the accuracy of estimates produced by any of these methods depends on the assumptions and limitations on which it is based. For instance, the accurate reporting of parental survivorship status (used in the current study) is generally threatened by the "adoptive effect" of young orphaned children's whose biological parent may be reported as surviving if the adoptive parent is still alive. This practice will bias the number of the proportion of surviving parents upwards (UN, 2002; Grassly and Timaeus, 2003). There is also a wide perception that this assumption may also be violated in countries with high levels of mortality among young adults as is the case in countries affected by HIV/AIDS, in the sense that the current available model life tables (Brass and its variants) do not emulate the current mortality situation in AIDS affected countries. In recent years the INDEPTH Network has developed INDEPTH Model life tables that use Brass logit system to produce mortality models that are unique in the sense that they incorporated for the first time empirically accurate data from 19 demographic surveillance systems in Sub-Saharan Africa. These data represent the prevailing mortality patterns in developing countries, which take into account the effect of the HIV/AIDS epidemic (INDEPTH Network, 2004).

Similar to other Sub-Saharan African countries, adult mortality remained a neglected issue in Namibia even after independence. To date, little is known about the levels and trends of patterns of mortality in Namibia due to lack of reliable demographic data prior to its independence in

1990. This was particularly true for blacks for whom the registration of births and deaths was not compulsory and registration of black males only occurred when they entered the labour system (Spark and Green, 1992). Hence understanding the mortality pattern of Namibia is quite important as they experience a combination of factors that might have contributed to a mortality transition that is quite different from the experience of other Sub-Saharan African countries. Firstly the country has been subjected to segregation with disparity in the health service provision between blacks and white. Secondly, there has been a liberation war since the 1970s to 1989. Thirdly the country went through a transition period (as from 1990) after independence during which the post-independence government focused on creating an equitable socio-economic system. Unfortunately that period also coincides with the emergence of the AIDS epidemic in the country. Indeed the HIV prevalence rates among pregnant women gradually rose from 4.2% in 1992 to 22% in 2002 (Ministry of Health and Social Services, (MoHSS), 2010:12). Although the prevalence seems to have stabilised at about 19% since 2004, it is still high and its impact will continue for some years in the future (MoHSS, 2010:12).

This study examines the levels and trends of adult mortality in Namibia and compares the levels of mortality in the four former regional health directorates (RHDs)[1] based on the 2001 census using the orphanhood methods.

Background: Socio-economic and adult mortality in Namibia

Formerly known as South West Africa till its independence in 1990, the Republic of Namibia stretches along the Atlantic Ocean in the southwest of Africa. Its territory covers an area of approximately 823 144 km^2, with a total population of about 1.9 million (UN, Namibia, 2004; Inter-censal Demographic Survey, 2006). With an average of about US$5,155 per capita

[1] After independence, the health sector reform structured health service delivery in Namibia on two levels. The first level is the four Regional Health Directorates (RHDs) with a responsibility for a number of government administrative regions (GARs) ranging from two (2) to four (4) GARs per RHD. The 13 government administrative regions (GARs) were centralised into the four (4) RHDs as follows: 1) Northwest RHD consists four GARs: Ohangwena, Omusati, Oshana and Oshikoto; 2) the Northeast RHD includes two GARs: Caprivi and Kavango; 3) Central RHD includes four GARs: Erongo, Kunene, Omaheke and Otjozondjupa; and 4) the South RHD (Ministry of Health and Social Services (MoHSS), 1998). Thus on the second level (operational level) are 13 GARs with 'regional health teams' which are decentralised into districts. By the time this paper was written the four RHDs were already phased out under the decentralised policy in 1997-98 (Dovlo, 2001 and Bell et al., 2002). However for the sake of reducing the magnitude of the analyses, the mortality estimates in this paper were based on the four RHDs.

income, Namibia is categorised as a low middle income country (UNDP Namibia, 2009) Yet, given the history of apartheid, Namibia has been reported as a highly skewed income distributed country with a Gini coefficient[2] of 0.63 [Namibia Central Bureau of Statistics (CBS, 2008:35)]. About two-thirds of the population (67%) is rural, and the majority relies on subsistence agriculture or herding. Food insecurity for these populations is a major problem, given Namibia's vast deserts and arid climate.

The country has been a German colony from 1883 to 1918. After World War I the country was placed under the League of Nations Mandate System, and Britain was charged with supervisory responsibilities. In 1920, the South African government was delegated the supervisory responsibility to govern South West Africa (Namibia) on behalf of the British Government (Hishongwa, 1992). During the South African colonial regime, South Africa extended its own repressive apartheid policy (Hishongwa, 1992). The introduction of the apartheid policy (segregation and racism) created an inequitable socio-economic system between the white population and the black population, and the health sector was not an exception. The health system at that time was mainly curative and urban-based, and largely fragmented along racial and ethnic lines. When the indigenous people required health care services, the discriminatory allocation of the health care budget assured for medical facilities far inferior to those enjoyed by the white settlers (Gottschalk, 1988). The practice of labour migration at that time also negatively affected the health of women and children who were left to manage with inadequate food and negligible labour force in the 'homelands' while the men sought employment in mines, factories, on railways or as domestic servants for white families (Hishongwa, 1992). Companies and mining compounds and barracks for migrant workers were poorly designed, ill-ventilated and overcrowded. The hospitals for workers were in poor condition. The food for mine workers was so bad that they contracted scurvy, and year after year they fell ill and eventually died (Gottschalk, 1988:578). Besides deaths that resulted from poor health associated with poverty and poor environmental working conditions, many native people also died in the wars and massacres. For example, the liberation war between South Africa Defense Force and the People's Liberation Army of Namibia (PLAN) took approximately 24 years (1966-1990), with an estimated death toll of

[2] Gini Coefficient measures inequality in income distribution among a population. A Gini Coefficient of zero means a perfect equity, while a Gini Coefficient of one indicates a perfect inequality (Namibia Human Development Report, 2009).

between 20 000 and 25 000 (Dugdale-Pointon, 2002:1). However, in recent years AIDS has been cited as the leading cause of increments in the levels of adult mortality in Namibia since 1996 (Cohen, 1998; Notkola, Timaeus and Siiskonen, 2004).

At independence, Namibia's new government was faced with a challenge to develop an equitable national health care system and a comprehensive statistical base. To date two population censuses (1991, 2001) and three Demographic and Health Surveys (DHS 1992, 2000 and 2006) have attempted to fill the demographic data gap for successive time periods before and after independence.

Data

The data for the estimation of levels and trends of adult mortality are derived from the 2001 Census. The 2001 census was the second after the 1990 independence in a series undertaken after every decade. The first Namibian census after independence was undertaken in 1991. Efforts to access the 1991 datasets for this study from the Central Bureau of Statistics were unsuccessful. The enumeration for the 2001 census started on 28th of August and was completed by the 5th October 2001 with national coverage of 97.8% of all households. The instruments used in all the regions included pertinent Brass questions on parental survival.

Analytical Methods

The analytical methods in this paper are Brass method orphanhood questions (questions that establish the survival of each of the respondent's biological mother and father), but INDEPTH model life tables are used as a standard instead of Brass or Coale and Demeny or UN model life tables that do not take account of HIV/AIDS.

The estimates equation for the orphanhood method as proposed by Brass (1971) is:

$$\ell_{(x+n)}/\ell_{(x)} = W_{(n)}S_{(n-5)} + (1-W_{(n)})S_{(n)} \qquad (1)$$

Where $\ell_{(x+n)}/\ell_{(x)}$ is the probability of surviving from base age (x) to x + n, $S_{(n)}$ is the proportion of respondents aged n to n + 4 having a surviving parent, $S_{(x-5)}$ is the proportion in the age group (n-5) having a surviving parent, and $W_{(n)}$ is a weighting factor which depends on the (n) and the location of childbearing (M), represented by the model fertility schedules of fixed shape variable age locations.

The mean age of the mothers or fathers (as denoted by 'M') at the birth of a group of children (in the current study we refer to the children born a year before the 2001 census).

Since the fertility questions are not asked of males, the 'M' for males was calculated by adjusting the female 'M' using information on marital status. This was done by calculating the median age of the currently married population by sex. The difference between the male and female medians was added to the previously calculated female 'M' (equation 11) to obtain an estimate of the male 'M'. The strategy described above is used to make up for the fact that fathers are generally older at the birth of their children in comparison to mothers (see UN, 1983:102; 2002:56-72).

Each of the conditional adulthood survival probabilities (ℓ_{x+n}/ℓ_x) were translated into levels of adult mortality (α) as follows:

$$\alpha = -0.5\log_e[(1+\ell_{x+n}/\ell_x^{fit})-(1/(1/\ell_{x+n}/\ell_x^{ref}))] \qquad (2)$$

Where ℓ_{x+n}/ℓ_x^{fit} is the fitted life table ℓ_{x+n}/ℓ_x value, and $\ell_{x+n}/\ell x^{ref}$ is from the reference standard life table.

Assuming that adult mortality levels obtained in equation 1 has been changing regularly during the 15 to 20 years prior to the census (that is changing linearly on the logit scale), the time locations (t_x) to which levels of adult mortality refers were then calculated as follows:

$$t_{(n)} = n(1.0 - u_{(n)})/ 2.0 \qquad (3)$$

Where,

$$u_{(n)} = 0.3333 \log_e({}_{10}S_{n-5}) + Z_{(M+n)} + 0.0037(27-M), \qquad (4)$$

Where ${}_{10}S_{n-5}$ represents the proportion of respondents in age group from (n-5) to n + 4 with mother/father alive and 'n' is the mid-point of the 10-year group being considered. $Z_{(M+n)}$ was obtained by linear interpolation from the Z(x) table of standard functions. 'M' is mean age of mothers or fathers at the birth of their children (born a year before the survey/census). The 0.75 (representing three quarters of a year) was added to the paternal orphanhood equation to make allowance for the fact that a father must have been alive at the time of conception, but not necessarily at the time of the birth

of his offspring[3].

Limitations

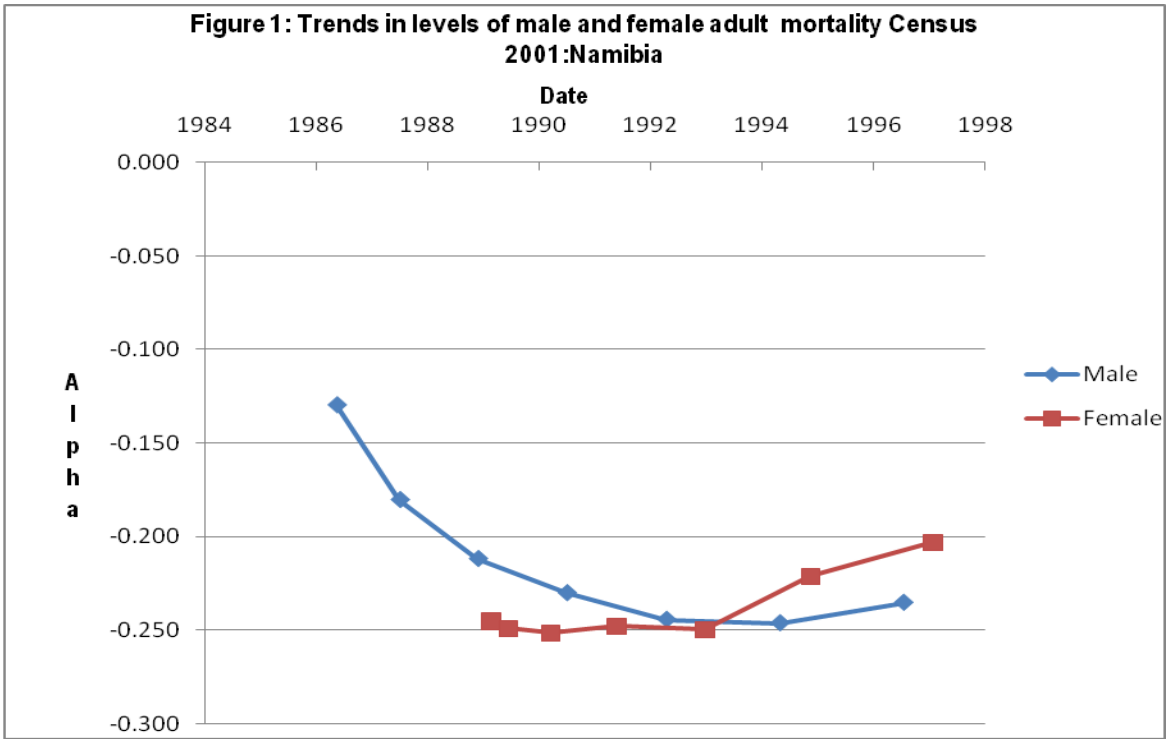
The methods of estimating mortality using census or vital registration data require the application of a variety of evaluation methods, such as the General Growth Balance and the Synthetic Extinct General methods. As the current paper only had access to one dataset (2001 Census), we could not evaluate the degree of coverage or identify errors in age reporting. The evaluation exercise allows the researcher to do corrections on the estimated levels of mortality where necessary. Consequently the estimates presented in this paper should be regarded as a rough indicator of levels and trends of adult mortality in Namibia.

Results

National

The results in Table 1 and Figure 1 below show that the overall levels of adult mortality in Namibia were high during the period before independence in the mid 1980s. Although female mortality only dated back to 1989 whereas the male mortality dated back to 1986, the results suggest that male mortality was significantly higher than the female mortality. While the results seem to conform to the conventional view that females generally have lower mortality than the males, the difference in this case seems large. Given that no evaluation exercise has been performed on the data, we can only make assertions on the basis of some available qualitative information. Firstly, the period of the 1980s was dominated by the liberation war; thus many males could have been killed as soldiers. Secondly, the majority of the respondents in the 25-39 age group during the 2001 census were born in exile (Table 1). Due to the war and other circumstances in the refugee camps in foreign countries, children were separated from their parents, particularly their fathers, up to the repatriation process in 1989. Consequently, some of the respondents in this age group (25-39) most probably did not know the whereabouts of their father and might have conveniently reported them as dead, even though they might still have been be alive.

[3] For more details on Brass' orphanhood methods see Blacker, 1977; UN, Manual X, 1983; UN, 2002



The results also show a gradual decline as from the early 1990s, probably due to a combination of rigorous socio-economic and health reform adopted after independence in 1990. However, adult mortality has been rising since 1995. These results are consistent with the gradual increments in the levels HIV prevalence which rose from 4.2% in 1992 to 22% in 2002. The National HIV sentinel survey also reports that AIDS became the leading cause of death in Namibia by 1996 (Cohen, 1998).

TABLE 1: ADULT MORTALITY FROM REPORT OF FATHER AND MOTHER ALIVE; CENSUS 2001: NAMIBIA

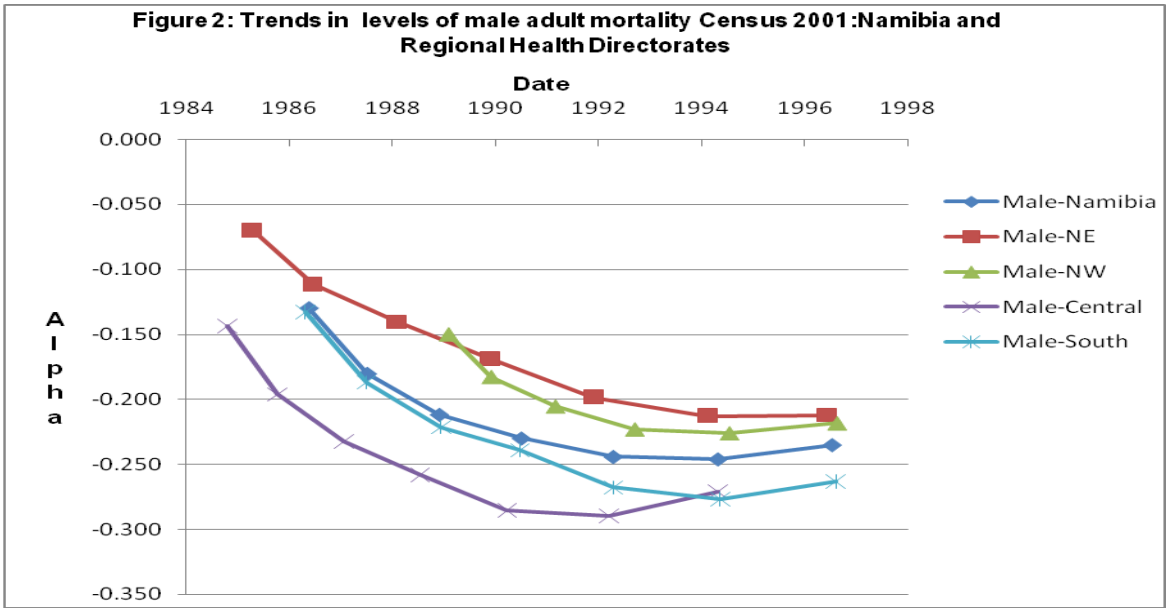
Age of respondents	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54
MALE										
Proportion with father alive	0.858	0.804	0.738	0.673	0.591	0.501	0.395	0.302	0.213	0.145
Central age	10	15	20	25	30	35	40	45	50	55
Age 35+N	45	50	55	60	65	70	75	80	85	90
$l_{35+n}/_{32.5}$	0.883	0.836	0.777	0.709	0.625	0.520	0.385	0.265	0.161	-
Alpha	-0.235	-0.246	-0.244	-0.230	-0.212	-0.180	-0.130	-0.088	-0.050	-
T_x	5.2	7.4	9.4	11.2	12.8	14.2	15.3			
Date	96.5	94.3	92.3	90.5	88.9	87.5	86.4			
M	32.6									
FEMALE										
Proportion with mother alive	0.927	0.904	0.879	0.846	0.801	0.749	0.661	0.578	0.473	0.383
Central age	10	15	20	25	30	35	40	45	50	55
Age 25+N	35	40	45	50	55	60	65	70	75	80
$l_{25+N}/_{25}$	0.946	0.922	0.919	0.878	0.848	0.806	0.754	0.662	0.560	0.436
Alpha	-0.202	-0.221	-0.250	-0.248	-0.251	-0.240	-0.245	-0.220	-0.201	-0.162
T_x	4.6	6.8	8.7	10.3	11.5	12.2	12.6			
Date	97.1	94.9	93.0	91.4	90.2	89.5	89.1			
M	27.7									

Furthermore, the results also indicate excess female adult mortality relative to adult male mortality. Generally, the validity of the orphanhood information from the younger persons (5-14) is doubted due to the "adoptive effect" which is usually associated with the biased maternal survival status rather than the paternal survival status (Bicego et al, 2003). However, the results in the current study are against the maternal 'adoptive effect' and can probably be taken as valid. The orphanhood study by Monasch and Boerma (2004) also found that in Namibia, children who lost their fathers were more likely to be with their mothers. However, only few of the maternal orphans were found in the care of the surviving fathers. The deterioration in the levels of female mortality is consistent with empirical evidence of relatively higher statistics of HIV infection among women than men in Namibia , which is attributed to biological and gender vulnerability (MoHSS, 2009).

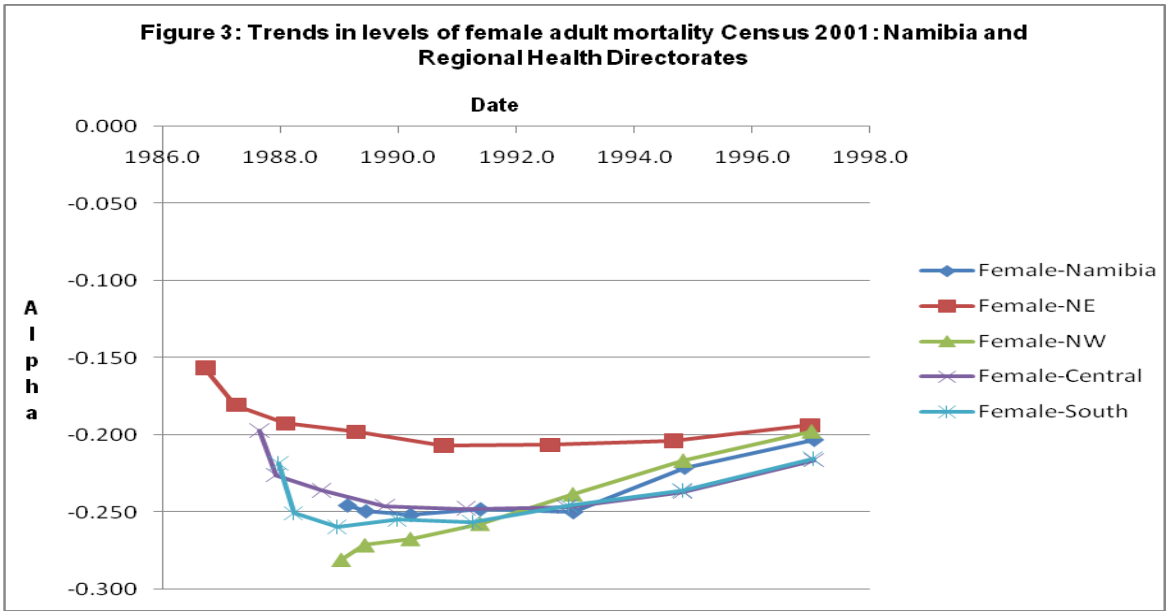
Regional Health Directorates (RHDS)

The trends of adult mortality from the RHDs follow the same pattern as the average on the national level (Tables 2-5); Figures 2 and 3). However, there are variations in the levels of both male and female adult mortality between regions. These variations are relatively more prominent in the levels of male mortality than female mortality. Firstly, the variations are indicating the conventional urban-

rural dichotomy. For example, from Figures 2 and 3 which show the levels of male adult mortality, two RHDs, namely the Northeast and Northwest which are dominantly rural, have excess mortality which is above the national average; whereas the levels of mortality in the Central and the South RHDs that have large urban structures are below the national average (Figures 1-3). An examination of the results also reveals that the levels of female adult mortality in the Central and South RHDs were nearly equal throughout the 1980s, and even overlapping in the 1990s. In terms of male mortality, males in the Central RHD had an advantage of high survival probability than their counterparts in the South RHDS. In contrast, the trends in the rural based RHDS, namely Northeast and Northwest are somehow diverse, with the lowest levels of adult survival observed in the Northeast RHD.



Though the variation between the two rural RHDs can be inferred to differentials in the resource allocation, it also underscores the cultural differentials as well as the variations in the disease burden as determined by geographical location.



Prominent from the levels of female mortality depicted in Figure 3 are the significant lower levels of female mortality in the Northwest in the late 1980s prior to independence. The pattern of female mortality is evidently inconsistent with the levels of male mortality observed in the same region during the same period, and is even quite below the levels of adult mortality observed in the two urban regions (Central and South). Given the intensity of the war at the northern borders and reports of poor socio-economic and health service provision portrayed in the literature for that time period, the results appear absurd (Spark and Green, 1992; Davies, 1994). The lower trends in the levels of adult female mortality in the Northwest RHD during the late 1980s are probably due to a bias in the reports of mothers alive by older respondents. However, it has been noted that the "adoptive effect" bias becomes lesser as a person becomes older as the chances that their adoptive parent as well as their biological parent is dead will increase. This is because for persons whose biological and adoptive parents are both dead for example, the report on survivorship of mother will be correct even if the respondent is reporting on the adoptive rather than the biological mother (UN, 2002:58). Nonetheless, Blacker (1977) suggests that the orphanhood method is sensitive to age exaggeration and male were found to have a greater tendency to exaggerate their ages than females. Given that the proportions of persons with mother/father fall rapidly with increasing age of the respondents, any exaggeration of reported ages will mean that the population with living parents will be biased upwards. The fact that the estimates of adult mortality in the current study were obtained from combined orphanhood reports of male and female respondents, it is possible that the male respondents could have introduced the age

exaggeration bias. From the foregoing, it is concluded that the most reliable estimates are usually those based on the information from female respondents (see Blacker, 1977; Udjo, 2005).

TABLE 2: ADULT MORTALITY FROM REPORT OF FATHER AND MOTHER ALIVE; CENSUS 2001: NORTHEAST

AGE OF RESPONDENTS	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54
MALE										
PROPORTION WITH FATHER ALIVE	0.823	0.752	0.671	0.587	0.504	0.422	0.326	0.262	0.186	0.131
CENTRAL AGE	10	15	20	25	30	35	40	45	50	55
AGE 35+N	45	50	55	60	65	70	75	80	85	90
$L_{35+N}/_{32.5}$	0.855	0.794	0.720	0.635	0.540	0.440	0.318	0.237	0.143	-
ALPHA	-0.212	-0.213	-0.198	-0.169	-0.140	-0.111	-0.062	-0.162	-0.033	
T_X	5.3	7.6	9.8	11.8	13.6	15.2	16.4	-	-	-
DATE	96.4	94.1	91.9	89.9	88.1	86.5	85.3	-	-	-
M	32.7									
FEMALE										
PROPORTION WITH MOTHER ALIVE	0.912	0.873	0.834	0.786	0.740	0.685	0.599	0.531	0.415	0.330
CENTRAL AGE	10	15	20	25	30	35	40	45	50	55
AGE 25+N	35	40	45	50	55	60	65	70	75	80
$L_{25+N}/_{25}$	0.934	0.900	0.865	0.827	0.781	0.735	0.674	0.585	0.485	0.361
ALPHA	-0.194	-0.204	-0.207	-0.207	-0.198	-0.193	-0.180	-0.156	-0.137	-0.095
T_X	4.7	7.0	9.1	10.9	12.4	13.6	14.5	15.0	-	-
DATE	97.0	94.7	92.6	90.8	89.3	88.1	87.2	86.7		
M	26.5									

TABLE 3: ADULT MORTALITY FROM REPORT OF FATHER AND MOTHER ALIVE; CENSUS 2001: NORTHWEST

AGE OF RESPONDENTS	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54
MALE										
PROPORTION WITH FATHER ALIVE	0.838	0.786	0.724	0.661	0.582	0.502	0.395	0.301	0.214	0.143
CENTRAL AGE	10	15	20	25	30	35	40	45	50	55
AGE 35+N	45	50	55	60	65	70	75	80	85	90
$L_{35+N}/_{32.5}$	0.862	0.810	0.750	0.679	0.589	0.484	0.341	0.239	0.155	0.105
ALPHA	-0.218	-0.226	-0.223	-0.205	-0.183	-0.150	-0.090	-0.064	-0.045	
T_X	5.1	7.2	9.0	10.5	11.8	12.6				
DATE	96.6	94.5	92.7	91.2	89.9	89.1				
M	36.8									
FEMALE										
PROPORTION WITH MOTHER ALIVE	0.919	0.906	0.890	0.865	0.828	0.789	0.716	0.638	0.543	0.449
CENTRAL AGE	10	15	20	25	30	35	40	45	50	55
AGE 25+N	35	40	45	50	55	60	65	70	75	80
$L_{25+N}/_{25}$	0.939	0.916	0.905	0.891	0.868	0.834	0.800	0.724		
ALPHA	-0.198	-0.216	-0.238	-0.257	-0.267	-0.271	0.281	-0.268	-0.257	-0.226
T_X	4.7	6.9	8.7	10.3	11.5	12.3	12.7			
DATE	97.0	94.8	93.0	91.4	90.2	89.4	89.0			
M	28.2									

TABLE 4: ADULT MORTALITY FROM REPORT OF FATHER AND MOTHER ALIVE; CENSUS 2001: CENTRAL

AGE OF RESPONDENTS	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54
MALE										
PROPORTION WITH FATHER ALIVE	0.912	0.865	0.779	0.701	0.612	0.518	0.410	0.310	0.229	164
CENTRAL AGE	10	15	20	25	30	35	40	45	50	55
AGE 35+N	45	50	55	60	65	70	75	80	85	90
$L_{35+N}/_{32.5}$	0.929	0.893	0.831	0.745	0.650	0.539	0.400	0.272	0.183	0.125
ALPHA	-0.271	-0.290	-0.285	-0.258	-0.232	-0.258	-0.143	-0.151	-0.71	-
T_X	7.4	9.5	11.5	13.2	14.6	15.9	16.9			
DATE	94.3	92.2	90.2	88.5	87,1	85.8	84.8			
M	32.7									
FEMALE										
PROPORTION WITH MOTHER ALIVE	0.948	0.920	0.879	0.839	0.784	0.724	0.633	0.541	0.430	0.341
CENTRAL AGE	10	15	20	25	30	35	40	45	50	55
AGE 25+N	35	40	45	50	55	60	65	70	75	80
$L_{25+N}/_{25}$	0.962	0.942	0.916	0.878	0.841	0.789	0.729	0.634	0.522	0.393
ALPHA	-0.216	-0.237	-0.248	-0.246	0.263	-0.226	-0.197	-0.169	-0.125	-0.103
T_X	4.7	6.9	8.9	10.6	11.9	13.0	13.8	14.1		
DATE	97.0	94.8	92.8	91.1	89.8	88.7	87.9	87.6		
M=	27.7									

TABLE 5: ADULT MORTALITY FROM REPORT OF FATHER AND MOTHER ALIVE; CENSUS 2001: SOUTH

Age of respondents	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54
MALE										
Proportion with mother alive	0.904	0.848	0.770	0.684	0.619	0.522	0.416	0.317	0.212	0.137
Central age	10	15	20	25	30	35	40	45	50	55
Age 35+N	45	50	55	60	65	70	75	80	85	90
$l_{35+n}/_{32.5}$	0.919	0.875	0.808	0.721	0.637	0.528	0.389	0.263	0.139	0.084
Alpha	-0.658	-0.277	-0.268	-0.239	-0.221	-0.187	-0.133	-0.086	-0.086	-
T_x	5.1	7.3	9.4	11.2	12.8	14.2	15.4			
Date	96.6	94.4	92.3	90.5	88.9	87.5	86.3			
M	31.7									
FEMALE										
Proportion with mother alive	0.947	0.917	0.890	0.850	0.814	0.753	0.658	0.560	0.444	0.335
Central age	10	15	20	25	30	35	40	45	50	55
Age 25+N	35	40	45	50	55	60	65	70	75	80
$l_{25+N}/_{25}$	0.961	0.941	0.915	0.890	0.852	0.819	0.761	0.660	0.543	0.263
Alpha	-0.215	-0.236	-0.246	-0.257	-0.255	-0.260	-0.251	-0.218	-0.187	-0.132
T_x	4.7	6.9	8.8	10.4	11.7	12.7	13.5	13.7		
Date	97,0	94.8	92.9	91.3	90.0	89.2	88.2	88.0		
M	27.8									

Discussions and conclusions

This paper applied Brass' orphanhood method (questions that establish the survival of each of the biological parents) to estimate adult mortality in Namibia using data from 2001 census. However, Hill (2003) has emphasised that any estimation procedure is no better than its assumptions and the quality of data on which it is based. Given that the data in the orphanhood method is based on the report of surviving children, the mortality experience of women [men] who have no surviving children will not be represented at all, while women [men] with more than one surviving child will be overrepresented in the proportion to the number of their children surviving. The main assumption of the method is that the errors incurred in this way will not significantly affect the results (UN, 2002). Yet, there is now a wide perception that this assumption may be violated in countries with high levels of mortality among young adults, as is the case in countries affected by HIV/AIDS. Hence, this study used the INDEPTH model life tables as a standard (Pattern 2) instead of Brass or its variants to derive levels of adult mortality (alpha values) that represent the prevailing mortality patterns in Namibia, taking into account the effect of the HIV/AIDS epidemic (INDEPTH Network, 2004].

Overall, there seems to be no indication of the "adoption effect" across the regions. However, there is an indication that the results were confounded by the "absentee effect" of the fathers and the age exaggeration bias from male respondents. These biases are prominent in the estimates of adult mortality from the Northwest RHD.

With the exception of female adult mortality in the Northwest RHD, the overall results show that the levels of adult mortality in Namibia were high during the period before independence in the mid-1980s (Figures 1-3). These results are evidence of the historical disparity in the health service provisioning between blacks and white which existed before independence in 1990. The inequitable socio-economic system adversely impacted on the health indicators of the black population, and even more on the health status of rural populations formerly known as "native reserves" and "homelands" (Spark and Green, 1992). According to Spark and Green (1992:148), respiratory diseases such as bronchitis and tuberculosis were prevalent in the 1980s. About 25% of the population in the drier southern parts of Namibia suffered from tuberculosis. In contrast, diseases such as malaria and bilharzias were common in the wetter northern regions of the former Ovambo and Kavango (these regions formed parts of the Northwest and Northeast RHDS respectively in post independence Namibia until the implementation of the 1997-08 decentralisation policy). Another threat to health in

the northern region was its situation as a battlefield of the war between the South Africa Defence Force and the People's Liberation Army of Namibia (PLAN). Lobstein (1988) reports that the intensification of the war during the 1980s disrupted mosquito control programs.

The overall national results also show a gradual decline as from the early 1990s which probably resulted from a combination of rigorous socio-economic and health reform adopted after independence in 1990 (Figures 1-3). Though the changes engineered through the restructuring process were virtually slow in terms of people's day-to-day activities, we can still pinpoint a number of factors that could have contributed to the decline in the early 1990s. 1) The restructuring of the health care services on non-racial lines in 1990 indirectly increased accessibility to health care facilities for the black people, particularly in the urban areas as they were now able to utilise all the health care facilities including those which were reserved for whites only. 2) The number of health care facilities has also been steadily increasing since 1990/91. For example, the number of clinics in Namibia increased from 191 in 1989/90 to 226 in 1994/95, while the number of health centers has increased from zero in 1989/90 to 29 in 1989/94 (Adkisson, 1995:73). 3) Moreover, the level of estimated HIV prevalence rates at that time was still low, at about 4.2% in 1992 (MoHSS 2010:12).

The results indicate that adult mortality has been rising since 1995 (Figure 1-3). These results are consistent with the gradual increment in the levels HIV prevalence which rose from 4.2% in 1992 to 22% in 2002. The National HIV sentinel survey also reports that AIDS became the leading cause of death by 1996 (Cohen, 1998). In 1996 the rate of HIV prevalence among women at antenatal clinics was estimated at 15.4%. The spreading of the HIV/AID epidemic in Namibia has been explained on the basis of its historical, political and economic context. It is assumed that colonialism and apartheid rule in particular may have been instrumental in setting the stage for an epidemic of this magnitude. Forced labor migration, segregation of men from their families and communities, institutionalised racism, and imposed poverty are believed to have contributed to the spread of HIV to its current proportions, as did years of civil strife within Namibia and in neighboring countries (MoHSS 2009:1). The spread of HIV/AIDS is also linked to high levels of population mobility. Namibia's reliance on the mining and fishing industry, as well as on seasonal agricultural production, requires regular population displacement. Frequent population movement encourages the maintenance of multiple and concurrent partnerships (MoHSS, 2007).

The results suggest that female adult mortality has been accelerating faster than the male adult mortality (figure 1-3). Besides the biological vulnerability, there is some evidence that suggests that young women are socially at high risk of acquiring HIV. The practice of inter-generational sex exposes adolescents and young adults to partners who, by virtue of their age, are more likely to be HIV positive. Additionally, the widespread practice among men, of maintaining multiple relationships also contributes to the high levels of HIV infection among young women (MoHSS, 2009). Another reason that may explain the acceleration in the levels of female adult mortality could be the observed increments in the rate of maternal mortality (MMR) during the past years. The national estimated rate was 225 per 100 000 births for the period 1983-92 and increased to 271 during the period 1991-2000, and has almost doubled to 449 for the period 1998-2007 (NDHS, 1992:88; 2006/7:113).

Given the history of exclusionary apartheid policies, Namibia has pursued economic and social policies which are urban based. The biases in policies had always favoured those who lived in and worked in cities at the expense of rural populations (Cohen, 1996). This phenomenon explains the observed differentials in the levels of adult mortality between urban and rural based regions (Figures 2-3). For example, the two rural regions (Northeast and Northwest) host 57% of Namibia's population. Nevertheless, due to limited employment opportunities in these regions, the economic feature of migrant labour is still continuing after independence, and even though it has been altered in many ways, its basic element - the absence of labourers from the family and low wages - is still negatively impacting on the agricultural activities, food security and social structures in the two RHDs (Hishongwa, 1992). Consequently these regions also have the highest levels of poverty and the largest share of poor households. According to the 2010 sentinel survey the northern regions also have the highest HIV prevalence rates. In 2010, the estimated prevalence ranged between 4.2% in the Rehoboth district in the South RHD to the highest rate of 36% in Katima Mulilo district located in the Northeast RHDs. In the Northwest RHD, the prevalence rates ranged between 11% in Eenhana to 26% in Tsandi district (MoHSS 2010:12). Hence, the HIV epidemic in the two northern is fuelled by poverty, the continual system of labour migration and their geographical location with neighbouring countries (MoHSS, 2009). Due to the warm humid climate during the rainy season, malaria is the most common cause of mortality for both adult and children in the Northwest and Northeast RHD. By

contrast incidences of diarrhoea and cholera, are prevalent during the dry season when the water quality in the villages is worst just before the rainy season (MoHSS, 2008).

To the contrary, the composite lower levels of adult mortality observed in the Central and South RHDs obscure inequalities between the rich and the poor within the two RHDs. Similar to other socio-economic indicators, the high levels of survival probability in the two dominant urban RHDs is inflated by the presence of the previously advantaged white populations. Although the two regions have low levels of poverty, they have been reported as a highly skewed with a Gini coefficient of 0.69 in the Hardap GAR located in the Central RHD and a Gini coefficient of 0.64 in the Omaheke GAR located in the South RHD (CBS, 2008:35-36).

Although the estimates in this paper are based on only one cross-sectional dataset, it provides a rough indicator of the trends in the levels of adult mortality from the late 1980s to the mid 1990s We conclude that the observed shifts in the trends of adult mortality were influenced by a number of factors that include the entrenched features of apartheid policies that created a highly inequitable society, the war which intensified during the 1970s and ended with independence in 1990, the economic restructuring and health reform policies that were implemented after independence and the HIV/AIDs epidemic which has now caused a reversal in the transition since the mid 1990s. The reference period for the alpha values estimated in this paper could be bracketed between ±1985 and 1997 (Tables 1-5 and Figures 1-3). Thus, the reference period covered by the estimates in this paper is well before the anti-retroviral (ARV) government intervention launched in 2003. It is therefore impossible to make assertions on the impact of the ARV intervention on the basis of current estimates. In order to assess the impact of ARV, there is a need for studies on adult mortality that use data collected in recent years. There is no doubt that health care in Namibia has improved since independence but there is still a challenge to reduce the socio-economic gap between urban and rural populations and between the rich and the poor.

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