Notes on Infant and Childhood Mortality Levels and Trends in Botswana

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Abstract

This paper is based on the Botswana Demographic Survey (2006), and the 2001 and 2011 Population and Housing Censuses (PHC) data. The 2011 census allows us to estimate the past and current levels of infant and childhood mortality. The paper explores whether there still exist mortality differentials between the urban and the rural areas. The data shows that infants and children in the urban areas enjoy higher chances of survival than their rural counterparts. The paper also explores at national and district level whether the girl child enjoys relatively higher chances of survival than the boy child as shown by findings from previous censuses.

Introduction

One of the demographic targets set in Botswana National Population Policy was to reduce infant mortality from 48 deaths per 1000 live births in 1991 to 27 deaths per 1000 live births in the year 2011 (Republic of Botswana 2010). The Revised National Population Policy seeks to reduce Infant Mortality and Under-five mortality to 0.023 and 0.029 by 2020 respectively (Republic of Botswana 2010). Therefore, this paper attempts to find out whether Botswana is on tract in regard to this national target. The target was based on the remarkable infant mortality declines recorded during the decade 1981 to 1991 and the reversal of the decline between 1991 and 2001. The paper also explores how far the country is in reaching that target. It may be imperative for government to re-draw the targets if there is no improvement during the decade 2001 to 2011.

The estimation of childhood mortality in the absence of reliable vital statistics is normally based on information collected from mothers about the number of children ever born and how many of these are still alive. Data on the average number of children ever born alive, by age of mother, and average number of children surviving at the time of the census or survey are employed to estimate the proportion of children who died. The estimation procedure is based on the assumptions that fertility and mortality levels and patterns have remained constant in the recent past and the risk of a child dying is a function only of the age of the child and not of other factors. The probabilities of dying between birth and certain ages can then be estimated based on the proportion dead among children ever borne by five year age groups of the mothers. (Note that the assumptions proposed could pose some problems if fertility and mortality levels and patterns have been changing in the recent past as was the case between 2001 and 2011).

Secondly estimates on infant and childhood mortality should be interpreted with caution. This is so because estimates on infant and childhood mortality for the recent past (2010-20011) are based on information obtained from women aged 15–19 years, and this group happens to experience heavier mortality because of their biological and socio-economic characteristics.

The estimates on infant and childhood mortality rates were obtained using computer software for the estimation of mortality called MORTPAK and Q5.The technique used here provides us with estimates of infant mortality rate (IMR), childhood mortality rate 4q1 and the probability of dying before age five (q5). In this paper we look at the estimates obtained using the 2001 census, the 2006 demographic survey and the 2011 census data.

The estimation of infant and childhood mortality is based on information collected from mothers

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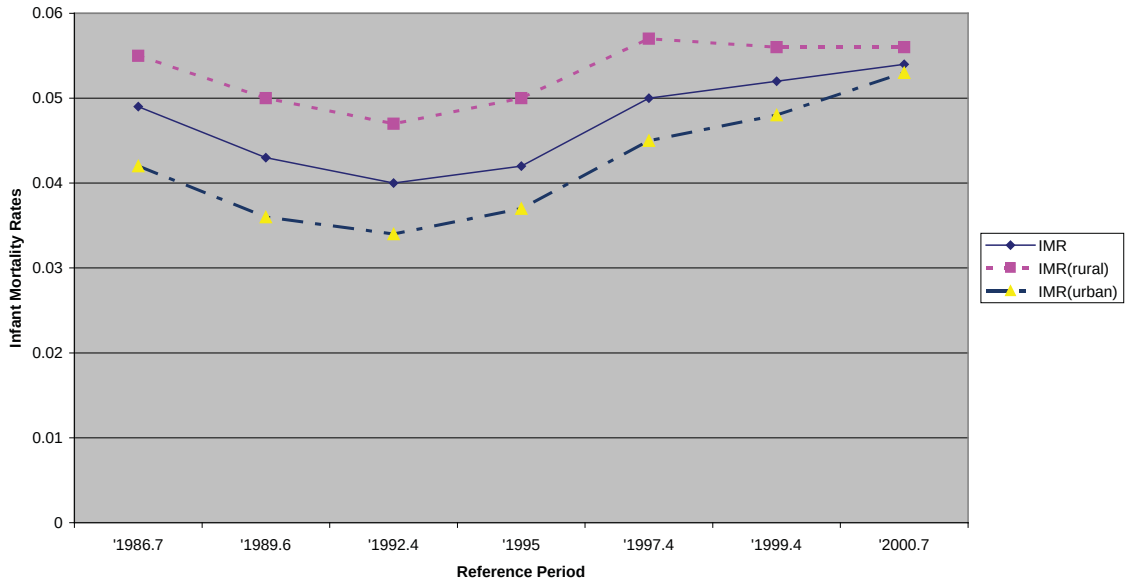
about the number of children ever born and how many of these are still alive. Data on the average number of children ever born alive, by age of mother, and average number of children dead at the time of the census can be employed to estimate infant and childhood mortality (under five mortality) at national and district level by gender using indirect estimation techniques if certain assumption holds. Unfortunately, for the 2011 census the estimates are highly biased because the assumption underlying the estimation techniques gives highly biased estimates as a result of recent drastic changes in mortality because of the success of the prevention of mother to child transmission programme, the national ARV programme and other government intervention measures aimed at improving the health and nutritional status of infants and children. We do not have any choice but to rely on direct estimates of infant and childhood mortality from the 2011 census.

Levels and Trends in Infant Mortality

We start by looking at the levels and trends in infant mortality estimated from the 2001 census data and the 2006 Botswana Demographic Health survey estimated using indirect estimation techniques. Figure1 and Table 1 below show the levels and trends in infant mortality rates for the national, rural and urban populations from 1986 to 2001 as estimated from the proportion dead among children ever born using the 2001 data. The estimates indicates that infant mortality rates for the national population dropped from 49 deaths per 1000 births in 1987 to 40 births per 1000 births in 1993, and increased to 54 deaths per 1000 births in 2001. The rural and urban populations experienced similar trends with the rural populations showing higher levels of infant mortality compared to the urban populations.

The gains in the chances of survival for infants experienced in the 1990's have been lost between 1991 and 2001 mainly due to the HIV/AIDS epidemic.

Figure 1. Levels and Trends in Ifant Mortality for National, Rural And Urban Populations, Botswana 1986 to 2001.

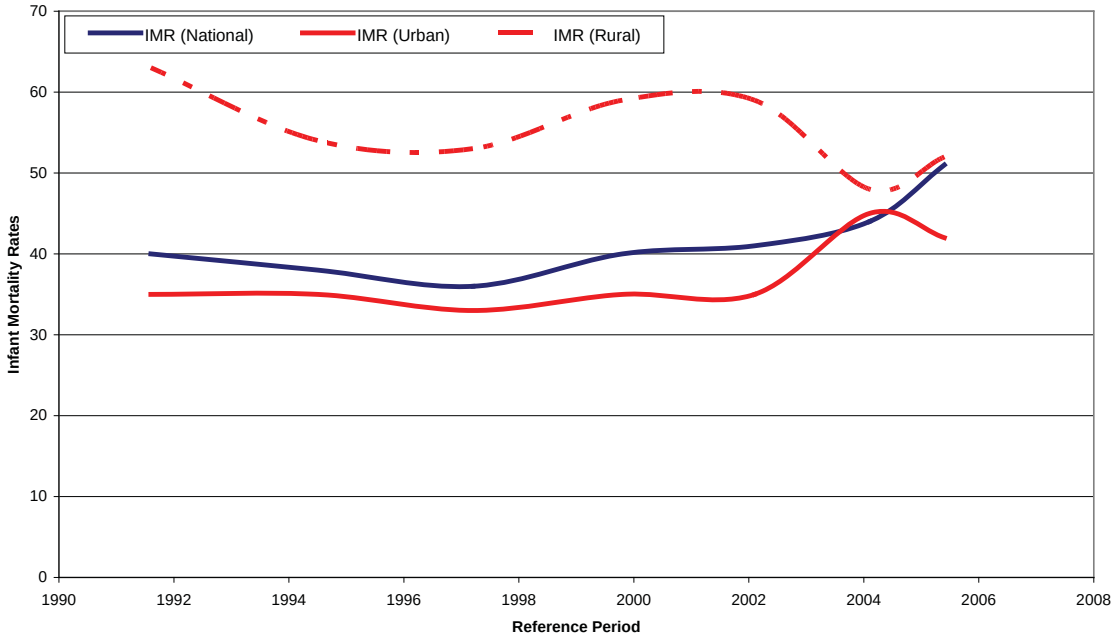


Source: Botswana Republic of Botswana (2001)

Figure 2 below shows the levels and trends in infant mortality rates for the national, rural and urban populations from 1992 to 2005 estimated from proportion dead among children ever born from the

Botswana Demographic Survey (Republic of Botswana 2006). The estimates indicate that infant mortality rates for the national population was estimated at 40 per 1000 in 1992, a figure which dropped to 38 and 36 per 1000 in 1994 and 1997 respectively. The year 2000 saw an increase in infant mortality rate by four points from the 1997 estimate of 36 per 1000. The increase is sustained over the period 2000 to 2005, reaching a high of 51 per 1000 in 2005. The rural and urban populations have also experienced similar trends. However, the rural population showed higher levels of infant mortality rates overtime when compared to the urban population.

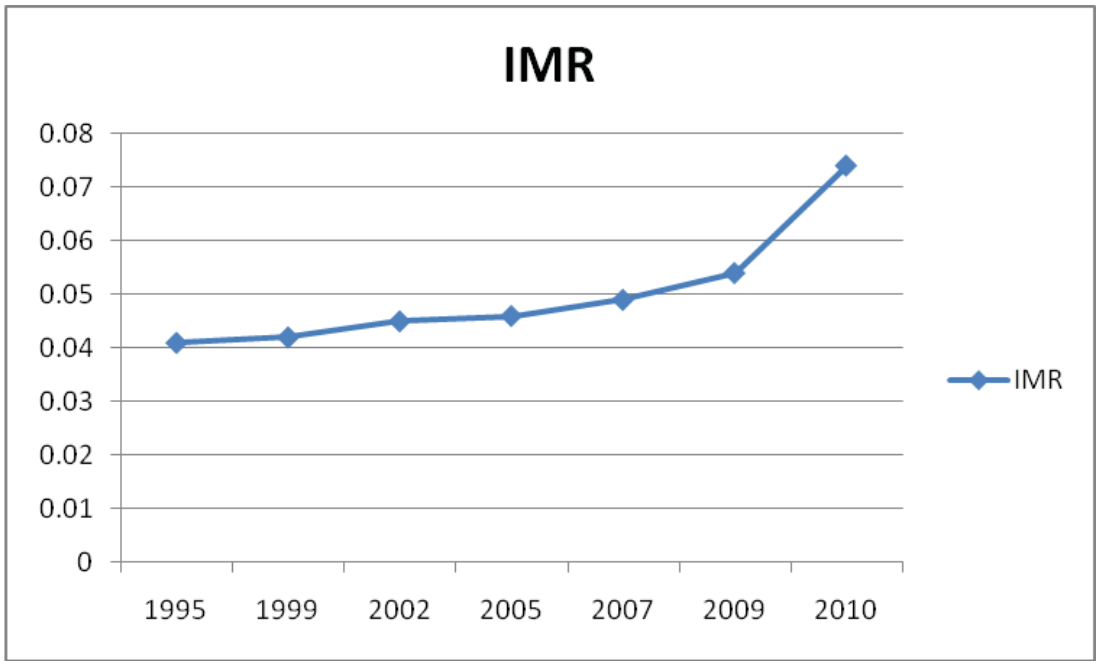
Figure 2: Levels and Trends in Infant Mortality Rates for National, Urban and Rural Population, Botswana 1992-2005



Source: Republic of Botswana (2006)

The 2011 census data yield based estimates of infant and childhood mortality using the same techniques employed using the 2001 census and the 2006 demographic survey data sets. The estimates of infant and childhood mortality increased from 1995 up to 2010. The levels and trends of infant and childhood mortality based on indirect techniques using proportion dead among children ever borne from the 2011 census should not be used. The reason why they should not be used is that there is evidence based on direct estimates which shows that mortality drastically declined from 2005 to 2010 rendering the use of such techniques questionable because as mentioned before, they only work is conditions where there was no change in fertility and mortality in the recent past. This is captured in Figure 3 below.

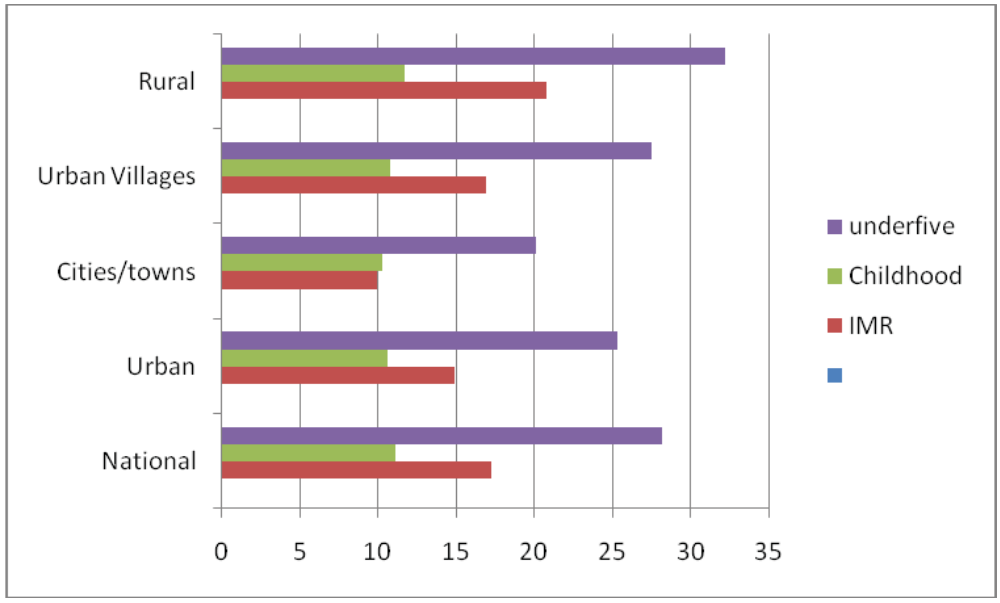
Figure 3: Trends and Levels Infant Mortality Rates Botswana 2011



Source: Statistics Botswana (2011)

Direct estimates of Infant mortality show that it now stands at 17 deaths per 1000 live births during the year preceding the 2011 population census. Level of IMR rate is higher in the rural areas at 21 compared to the urban areas where it is estimated to be 15. Infants in the cities and towns enjoy very low levels of chances of dying during the first year of life compared to rural villages where the estimates of IMR stands at 10 and 17 respectively as illustrated in Figure 4 below.

Figure 4: Estimates of Infant, Childhood and under-five mortality for Botswana and Type of Locality



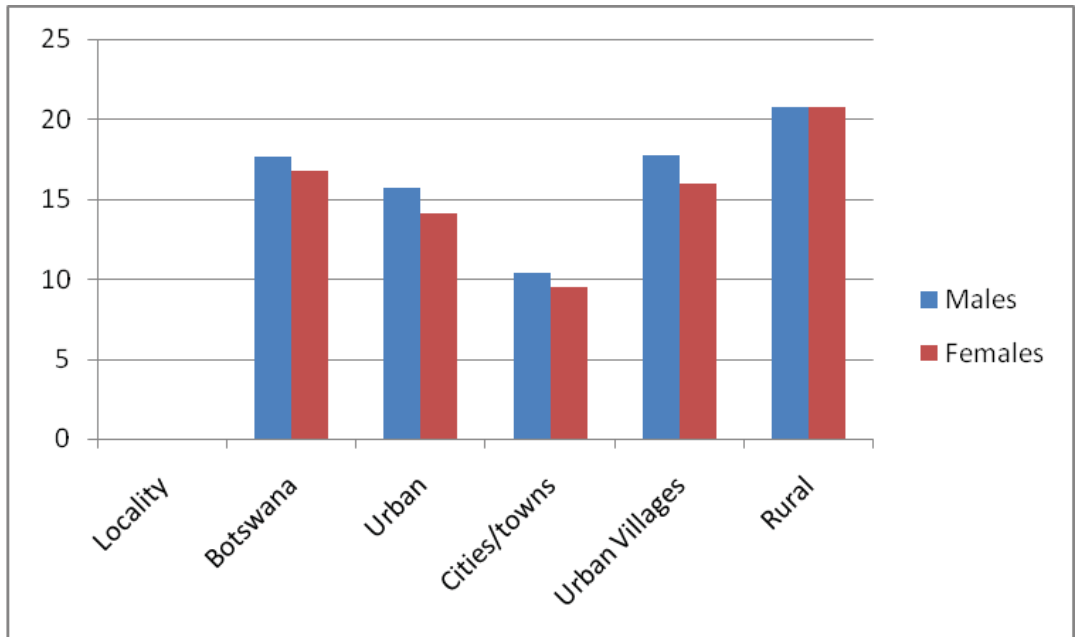
Source: Statistics Botswana (2011)

Sex Differentials in Infant Mortality

At national level Figure 5 below shows that the probability of dying before age one is slightly higher among males compared to females at 18 infants deaths per 1000 live births and 17 respectfully. Male infants in the rural areas experienced the same mortality level (21 deaths per 1000 births) as female infants during the year preceding the 2011 census. In the urban areas female infants experience lower mortality compared to male infants (with an infant mortality rate of 14 deaths per 1000 births and 16 per 1000 respectively).

Almost the same sex differentials are seen in cities/towns and urban villages with the gap been narrow in cities/towns.

Figure 5: Direct estimates of Infant Mortality (1q0) for Botswana and by type of locality



Source: Statistics Botswana (2011)

The 2011 data just like the previous data set shows that infant mortality also vary by districts. In Table 1 below the districts are ranked according to the level of infant mortality for both sexes combined starting with the districts with the lowest level of childhood mortality. Gaborone, South East, and Francistown reported the lowest level of infant mortality of 6, 9 and 11 deaths among infants during the 12 months preceding the 2011 census per 1000 live births respectively. Ngamiland, Kweneng West and Kgatleng had the highest level of infant mortality of 28, 25 and 23 deaths among infants during the 12 months preceding the 2011 census per 1000 live births respectively.

There exist sex differentials in the level of infant mortality by districts with females generally experiencing lower childhood mortality in some districts.

Table 1: Direct Estimates of Infant Mortality Rates by Sex and District

District	Males	Females	(both sexes)
Gaborone	6	6	6
South east	10	9	9
Francistown	10	11	11
Central Boteti	14	12	13

North east	19	10	14
Kweneng east	15	14	14
Ghanzi	16	15	16
Ngwaketse	18	17	17
Central Tutume	17	20	19
Lobatse	17	20	19
Selebi Pikwe	25	13	19
Kgalaga-di	19	21	20
Central Bobonong	20	20	20
Central Serowe Palapye	22	19	20
Barolong	18	24	21
Central Mahalapye	20	22	21
Kgatleng	24	19	22
Kweneng west	21	24	23
Ngamiland east	23	27	25
Ngamiland west	31	25	28

Source: Statistics Botswana (2011)

Levels and Differentials in Childhood Mortality

Childhood mortality is measured by the probability that a child reaching exact age one will die before reaching exact age five or the probability that a child reaching his or a first birth day will die before reaching the age five. Figure 6 below gives us estimates of childhood mortality per 1000 children reaching age one. Childhood mortality estimates show almost a similar pattern as infant mortality estimates by sex and type of locality.

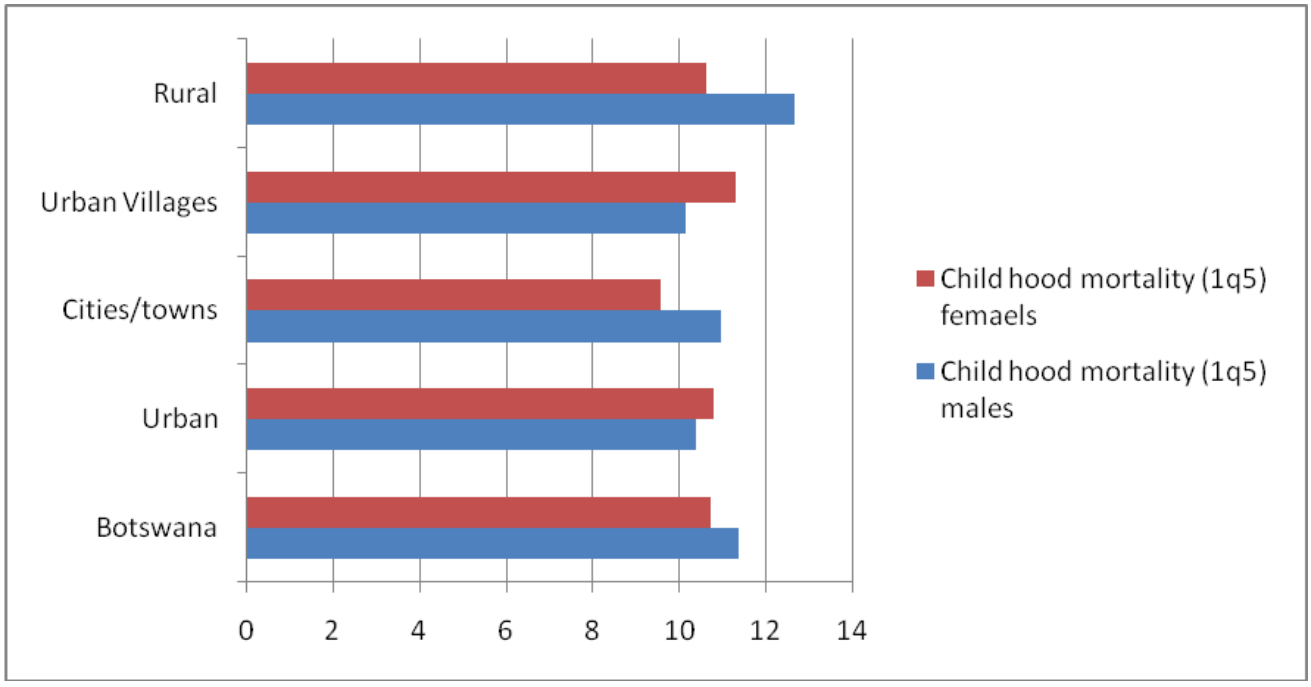
Nationally, the direct estimate of infant mortality for both sexes combined now stands at 1 children deaths per 1000 infants reaching age one will die before reaching age 5 (also see Figure 4 above).

Sex Differentials in Childhood Mortality

Figure 6 below shows that at the national level the probability of dying between exact age one and exact age five is the same for males and female children and it stands at 11. Male children in the rural areas experienced higher mortality level compared to female children (13 deaths per 1000 reaching age 1 dying before reaching age 5 and 11 per 1000 respectively) during the year preceding the 2011 census.

Generally, in urban areas female children experienced slightly higher mortality compared to male infants (11 and 10 respectively), the same applies to those who resided in urban villages. In cities/ towns male children experienced slightly higher mortality compared to female children over the same period (11 and 10 respectively) as Figure 6 demonstrates.

Figure 6: Direct Estimates of Childhood Mortality (5q1) for Botswana and by Type of Locality



Source: Statistics Botswana (2011)

Childhood Mortality by Districts

The 2011 data just like the previous data set shows that childhood mortality also vary by districts. In Table 2 below the districts are ranked according to the level of childhood mortality for both sexes combined starting with the districts with the lowest level of childhood mortality.

The South East District and the North East District experienced the lowest level of childhood mortality of seven deaths in the 12 months preceding the 2011 census followed by Selibe-Pikwe with 8 and Central Boteti, Kweneng West and Francistown with nine each. Lobatse reported the highest level of childhood mortality at 22 followed by Central Tutume with 17. The level of childhood mortality in all other districts ranged between 10 and 14.There exist sex differentials in the level of childhood mortality by districts with females generally experiencing lower childhood mortality in some districts.

In the following districts; Ghanzi, Ngamiland East, Ngwaketse, Central Mahalapye, Kweneng East, Francistown, South East and North East female children experienced higher mortality compared to male child over the same period.

Table 2: Direct Estimates of Childhood Mortality Rates (5q1) by Sex and District

District	males	females	Bothsexes
South East	6	8	7
North East	6	8	7
Selebi- Pikwe	10	6	8
Central Boteti	12	6	9
Francistown	7	10	9
Kweneng West	10	8	9
Central Serowe Palapye	11	8	10
Kweneng east	8	12	10

Central Bobonong	12	9	10
Kgatleng	15	6	11
Gaborone	13	10	11
Central Mahalapye	11	12	12
Central Tutume	13	12	12
Ngwaketse	9	18	14
Kgalagadi	21	8	14
Barolong	19	10	14
Ngamiland east	14	15	14
Ngamiland west	18	11	14
Ghanzi	15	19	17
Lobatse	25	18	22

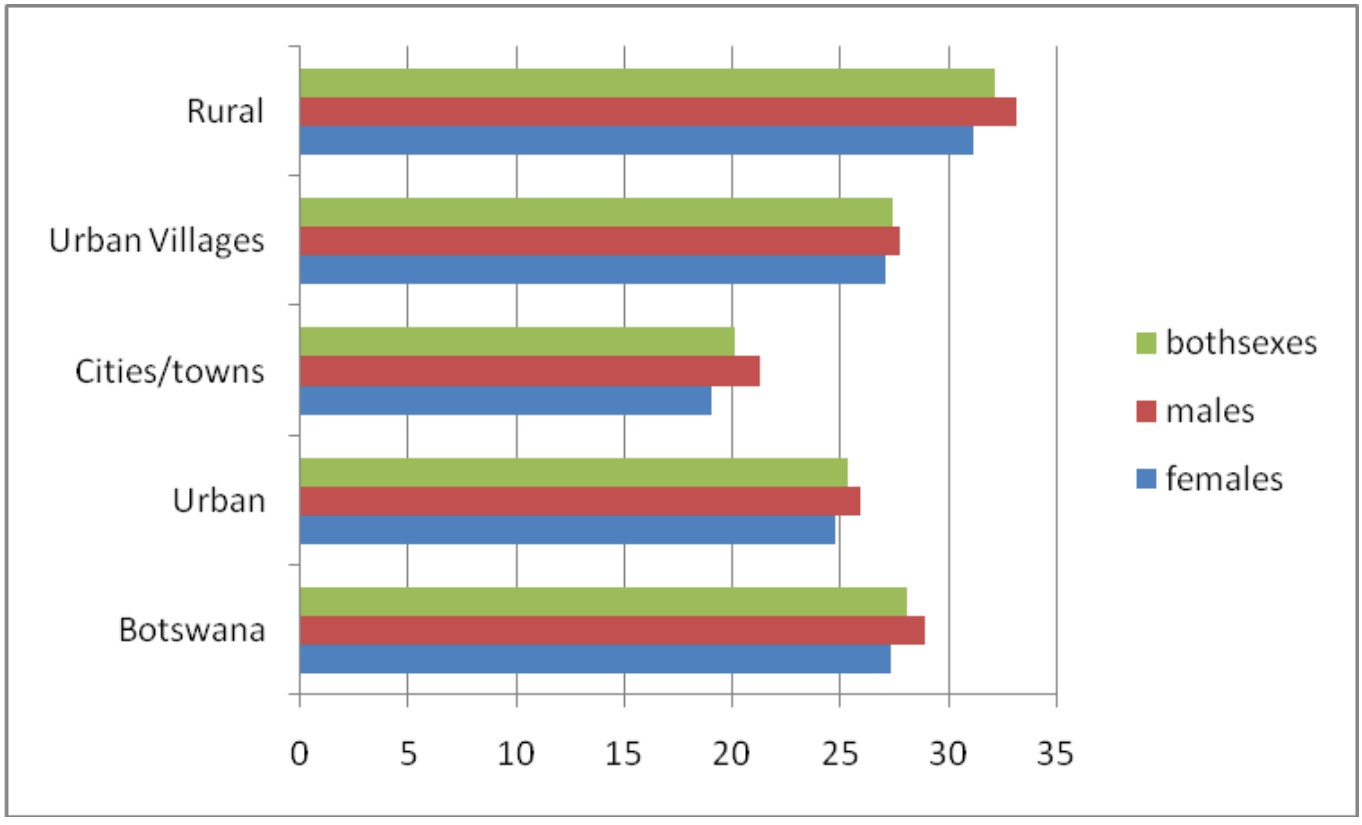
Source: Statistics Botswana (2011)

Levels and Differentials in Under-five Mortality

Under-five mortality is measured by the probability that a newly born child will die before reaching exact age five or the probability that a newly born child will die before reaching age 5. Figure 7 below gives us estimates of under-five mortality expressed per 1000 newly born babies.

Nationally, the direct estimate of under-five mortality for both sexes combined now stands at 28 deaths among infants and children under five years old per 1000 live births as shown in Figure 7. Under-five mortality is very high in the rural localities (32) and relatively low in Cities and Towns (20).

Figure7: Direct Estimates of Under-five Mortality for Botswana and Type of Locality



Source: Statistics Botswana (2011)

Sex Differentials in Under-five Mortality

Figure 7 also demonstrates that at national level the probability of dying between exact birth and exact age five is higher for the males (29) compared to the females. Male children in all locality types experienced higher under-five mortality level compared to female children.

Under-five Mortality by Districts

The 2011 data just like the previous data set shows that under-five mortality also varies by districts. Table 3 below shows districts ranked according to the level of under-five for both sexes combined starting with the districts with the lowest level of under-five mortality. The South East District (16), Gaborone (18) and Francistown (19) experienced under-five mortality level of less than 20. Ngamiland West and Lobatse reported the highest level of under-five mortality of 42 and 40 respectively followed by Ngamiland East with 39.

There exist sex differentials in the level of under-five mortality by districts some districts with females experiencing lower childhood mortality in some vice versa.

Table 3: Direct estimates of Under-five mortality rates by sex and District

	District	both sexes	females	Males
	South East	16	17	15
	Gaborone	18	16	19
	Francistown	19	21	17
	Central Boteti	21	17	26
	North East	21	18	25
	Kweneng East	24	25	23
	Selebi Pikwe	27	19	35
	Central Bobonong	30	29	32
	Central Serowe Palapye	30	27	33
	Central Tutume	31	32	30
	Ngwaketse	31	35	27
	Central Mahalapye	32	34	31
	Kgatleng	32	25	39
	Kweneng West	32	32	32
	Ghanzi	33	34	31
	Kgalagadi	34	29	39
	Barolong	35	33	36
	Ngamiland East	39	41	37
	Lobatse	40	38	42
	Ngamiland West	42	35	48

Source: Statistics Botswana (2011)

Conclusion

It is clear that infant and childhood mortality have gone down in Botswana across all districts and types of localities. Secondly, because of the decline in mortality the convention indirect estimation techniques using proportion dead among children ever cannot be used to analyse levels and trends of infant and childhood mortality. The estimates used relied heavily on life tables constructed from the reported distribution of deaths in the 12 months preceding the 2011 census. We could not assess how well these deaths were reported, but there is no doubt that deaths in Botswana have been generally well reported in surveys and censuses.

The rapid decline in infant and childhood mortality between 2001 and 2011 is not surprising. Over the decade 2001 to 2011 improved socio-economic status (education, employment etc.) of the population have led to increased access and utilisation of health services. Government programmes more especially, Prevention of Mother To Child Transmission (PMTCT), national ART programme and nutrition programmes contributed immensely to the declines in Infant and Childhood mortality.

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