Population modelling for a small area: a comparative analysis of census and demographic surveillance system data in South Africa

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Abstract

Accurate and reliable small-area statistics are useful for planning and decision making. However, such data are usually not rigorously interrogated for their reliability. As a result little is known about the potential bias of using such data as a basis for decision-making. This paper is based on a comparative analysis of census and demographic surveillance data, as basis for resource allocation and development planning at a local level. For the study area the published census population undercounted the true population by between 15-20 per cent, but this undercount was not evenly distributed by age and sex. Despite the almost universal participation rates of the studied population in the longitudinal demographic surveillance, we still find evidence of under enumeration of children. We show that census data after adjustment may bear no resemblance to the actual local area population. Possible sources of bias in census data and their consequences are discussed.

1. BACKGROUND

Accurate and reliable small-area statistics, are useful for business planning, service provision, project management and policy formulation at the local level (Smith *et al.*, 2002). In most countries the major source of data for local areas as well as nationally is the census. However, such data are usually not rigorously interrogated for their reliability. As a result little is known about the potential bias of using such data as a basis for decision-making.

Censuses are subject to well-described sources of error (e.g Cleland, 1996). Content errors emanate from the recording or imputation of erroneous characteristics about the population; whereas coverage errors refer to errors of omission or double-counting (Siegel & Swanson, 2004). It is accepted that censuses, especially in developing countries, fail to enumerate all individuals or households. To measure and adjust census counts for coverage errors, post-enumeration surveys (PESs) are conducted on a sample of the target population immediately following the count. The census count is then adjusted if significant errors are found. PESs can also be used as a tool for evaluating some of the content of the census, that is, to assess the quality of the information collected in the census count (Cronje & Budlender, 2004; Statistics South Africa, 2004b).

Immediately following the 2001 census, Statistics South Africa (StatsSA) carried out a PES, from which it was estimated that the 2001 South African census undercounted the South African population by about 17.6 per cent. The highest provincial undercount rate (22.5 per cent) was for KwaZulu Natal province (Statistics South Africa, 2003). That is, over 1 in 5 people were not counted in the census in the province in which the area of focus of this study is located.

A demographic surveillance system (DSS) collects demographic and health data from the entire population in a well defined area. This information is then routinely updated at scheduled repeat visits to the study population.

In this paper, a comparison is made between two potential sources of data, census and DSS, for decision-making and planning in business, service provision, management, resource allocation and development planning at a local level. The objective of this study is to investigate the potential impact of adjusting census data for coverage errors on the quality and accuracy of the data at a sub-national level. The longitudinal nature and scope of demographic surveillance data offer a valuable opportunity to cross-check the reliability and accuracy of census data in a small area.

The next section describes the methods used to derive the population distributions used in the analyses. A results section follows immediately after. The penultimate section is a discussion of the findings, and conclusions make up the final section of this paper.

2. METHODS

The area used for this analysis is the demographic surveillance area (DSA) covered by the Africa Centre Demographic Information System (ACDIS), located within the Hlabisa and KwaMsane municipalities in KwaZulu Natal province, South Africa. The area is characterised by a high level of circular migration (Lurie *et al.*, 1997; Hosegood & Timæus, 2006), which may result in major differences in the size and distribution of the enumerated population depending on methodologies used.

ACDIS enumerates both the population resident within the DSA and people non-resident in the area provided they maintain household membership within the DSA. The average population size under surveillance

is about 90,000 persons, with about one-thirds of them resident outside the DSA. In order to achieve comparability with the census, the analysis here was restricted to residents only.

During the 2001 South African census, the country was demarcated into hierarchical spatial or geographical units (Statistics South Africa, 2004a). One hierarchical structure divides the country in descending order into provinces; district or metropolitan council area; municipalities (this includes metropolitan substructures, district management areas (DMAs) and local municipalities); main-place; sub-place; and enumeration areas (EAs). In all hierarchical structures, an enumeration area is the smallest unit into which the country is divided and usually consists of 100 to 250 households (Statistics South Africa, 2003, 2004b).

……..Figure 1 here……..…..

Due to concerns about confidentiality, the lowest level at which census data are published by StatsSA is at the sub-place[1] level. The sub-places for which census data are published do not correspond exactly with the DSA. The first step of this study was therefore to estimate as accurately as possible the census population that overlaps with the resident DSA population.

2.1 Mapping of census data onto the DSA

The DSA was mapped onto the 2001 census data by making use of Geographical Information System (GIS) data collected as part of the ACDIS. The GIS mapping showed the enumeration areas that constitute each of the census sub-places that overlap with the DSA (Tanser, personal communication). Using these overlaid boundaries, we estimated the

[1] This is the next higher spatial level from an EA and corresponds to a suburb, ward, village, farm or informal settlement (see Figure 1).

proportion of each census enumeration area that falls within the DSA. The source of the census data is Statistics South Africa, as published in the Supercross tables (Space Time Research, 2006). Overlaying the DSA onto census data showed that a total of 21 sub-place areas were overlapping with the DSA. It was further observed that these sub-place areas contain 77 enumeration areas (EAs). 47 of these enumeration areas are completely within the DSA, while 30 lie only partially within the DSA.

For sub-places whose EAs overlap with areas outside the DSA, an average of the proportions that falls within the DSA of the EAs constituting the given sub-place was derived. The implicit assumption in this estimation is that the population of each EA is uniformly distributed in the sub-place in terms of density. This was a reasonable assumption to make given that most of the overlapping sub-places had a bigger proportion (over 95 per cent) falling within the DSA. Only 3 sub-places had less than 95 per cent of their respective areas falling within the DSA. Hence the impact of the bias that may be introduced by this assumption is likely to be minimal.

The census population mapped onto the DSA was obtained as a product of the population in each sub-place and the estimated proportion falling within the DSA (Table A-1 and Table A-2).

2.2 Reconstruction of enumerated census population

StatsSA used the estimated undercount rates from the PES to adjust the enumerated census population (Statistics South Africa, 2003). For purposes of this discussion the census population derived from the Supercross tables will be referred to as the “published census”, while the census population estimated using adjustment factors we derived (as explained later) will be referred to as the “reconstructed enumerated census” population.

The adjustment factors used by StatsSA were derived for broad adjustment classes (or stratifying variables) according to province, EA type, population group and broad age groups (0-19, 20-44, and 45 and over). These adjustment classes were then assumed to have a uniform coverage rate, a uniform undercount rate and hence a uniform adjustment factor was applied to each class. Adjustment factors were defined as the reciprocal of one minus the undercount rate (Statistics South Africa, 2004b). The census population was then adjusted by multiplying the enumerated population by the adjustment factor. This adjusted census population is then the one that was made available or published.

Given that the census population actually enumerated is not made available by StatsSA, we approximated the enumerated population using our derivation of the most probable adjustment factors used by Stats SA (Table 1), to generate a "reconstructed enumerated census" population. Our adjustment factors were calculated on the basis of an examination of the 10 per cent census sample for the municipalities of Hlabisa and Mtubatuba (municipal codes 535 and 536, respectively). The mean weights in the 10 per cent sample and their standard deviations (which were all very close to zero, as would have been expected[2]) were derived for combinations of the stratifying variables.

……..…..Table 1 here…….……

[2] The standard deviations were sometimes not exactly equal to zero because even if a stratifying variable was changed in the data cleaning editing process, the adjustment factor was applied to the unadjusted data. Hence someone aged 20, recoded as 19 in the edited data would have the weight of a 20 year old, not a 19 year old. This rather curious phenomenon would appear to arise from the fact that weights were derived by StatsSA were applied to the data before the editing procedures. Ideally, they should have been implemented in the opposite order.

Using the ACDIS demographic and geographic data, EAs were categorised as rural or urban. In the ACDIS, a rural area is defined as an area with less than 400 residents per square kilometre; an area with greater than 400 residents per square kilometre is classified as peri-urban; whereas an urban area is any area formally defined as such by the registrar general (Tanser, 2006; Tanser *et al.*, 2006). The enumerated census population was then reconstructed for the study area from the published census population estimated to be overlapping with the study area by dividing the reported population by age and the EA type by the relevant adjustment factor. The reconstructed enumerated census is presented in Table 2.

In using the ACDIS data as a standard we considered the reliability of ACDIS data. Regular quality control, error checking and repeated visits to the same households at least twice a year over 15 rounds and a very low refusal rate were the basis for privileging the ACDIS data. Evidence from the ACDIS indicates that only less than one per cent of the households refuse to participate in the study (Herbst, personal communication).

3. RESULTS

The published census population is compared to the reconstructed enumerated census population, and both of these distributions to the ACDIS resident population on the day of the census, 10 October 2001. The three population distributions illustrated in Figure 2 through to Figure 5 are presented in Table 2.

……..Figure 2 here……

…….Figure 3 here……..

In Figure 2 and Figure 3 the census population mapped onto the DSA from the Supercross database is compared to the reconstructed enumerated census population. As a percentage of the published census population, the reconstructed enumerated census population for the DSA is about 20 per cent less than the published census population. The differences between these two distributions are widest among the population below age 20 years.

Figure 2 and Figure 3 on their own, however, are not enough to reach firm conclusions on which of the two population distributions would be appropriate for modelling the small area population for use in planning and decision-making. Figure 4 and Figure 5 take the populations illustrated in Figure 2 and Figure 3, and adds in the ACDIS resident population.

……Figure 4 here……

……Figure 5 here……

Some observations can be made from Figure 4 and Figure 5. The first is that despite the published census suggesting a larger overall population than the resident ACDIS population, the population at the very youngest ages (under 5 years) is smaller in the census than in the ACDIS population. Second, between age 5 and age 10 years the published census population matches very closely the ACDIS population both for males and females. Third, between ages 10 and 55 years the published census shows more people than does ACDIS. In the old ages, after age 60 years for males and age 50 years for females, the fact that the adjustment factors applied to reconstruct the enumerated population are close to one coupled with the very small numbers in these particular ages resulted in the reconstructed enumerated census appearing to be essentially the same as the published

census even though the magnitude of the adjustment is of the order of 20 per cent.

A comparison of the reconstructed enumerated census population to the ACDIS resident population suggests that the census undercounts the resident ACDIS population below age 15 years. On the other hand, among males, the reconstructed enumerated census population shows more people in the age range 15 to 30 years than in the ACDIS population. Beyond age 30 years, the reconstructed enumerated census population distribution closely matches the resident adult ACDIS population. The slight differences observed can be attributed to random fluctuations and small numbers in these particular ages.

The absolute percentage error[3] between the reconstructed enumerated census population and the resident ACDIS population at census date was about 8 per cent compared to about 15.5 per cent between the recorded census population mapped onto the DSA and the ACDIS resident population.

Comparisons of the 1996 and 2001 census populations mapped onto the DSA suggest an inter-censal growth rate in the DSA of 7.14 per cent per annum. This is implausibly high and even more so for a population characterised by high out migration, high mortality (Hosegood *et al.*, 2004; Garrib *et al.*, 2006), and falling fertility (Camlin *et al.*, 2004) . The observed growth rate suggests one or both of the census populations mapped onto the DSA may be substantially flawed. Possible explanations for this and other observations from the above results are discussed in the next section.

[3] Calculated as, $APE_t = |(P_t - P_t)/ P_t |*100$. Where, P_t is the census population; P_t is the resident ACDIS population and t is the year.

4. DISCUSSION

We argue here that the higher percentage error between the 2001 published census and the resident ACDIS population compared to the 2001 reconstructed enumerated census and the ACDIS resident population is more likely to have resulted from the adjustment of the census data on the basis of the PES. Given the intensity and rigour with which ACDIS is conducted, the alternative explanation of the ACDIS significantly underestimating the study area's population is highly unlikely. Many households in the study area by the time of the 2001 census had already been through four to six rounds of demographic surveillance and therefore, the population of the study area by the time of the census had had extensive experience of providing demographic information.

Studies have demonstrated deficiencies in the coverage and content of both the 1996 and the 2001 South African censuses (Moultrie & Timæus, 2002; Dorrington *et al.*, 2004; Moultrie & Dorrington, 2004). In a detailed analysis of the 2001 census coverage, Dorrington, Budlender and Moultrie (2003) demonstrate that there was underestimation of the population aged 0-4 years in both the 1996 and 2001 censuses; there was overcount of the population aged 10-19 years; and undercount of men relative to women in the 60-74 age category, possibly due to age exaggeration. The inability of censuses in Southern Africa to adequately enumerate very young children was first identified by van de Walle in 1968, and continues to be a common problem of developing country censuses (Brass *et al.*, 1968; Brass, 1996).

Figure 4 and Figure 5 are strongly indicative of a significant undercount of young children in the area in the census. One might expect that, given the continuous collection of demographic data in the study area coupled with the good response that this surveillance study has had, the census enumeration

in the area would be more accurate than in other, otherwise similar, areas of the province.

Another explanation contributing to differences in the ACDIS population and the census population may be differential enumeration of migration in the ACDIS and the census. According to Lurie et al. (1997), most censuses do not accurately measure migration prevalence, especially if the migrants still maintain ties with their areas of origin. They also show the importance of probing about residency as the migration destination is viewed as only temporary by most migrants.

This is likely to be a source of problems for the population in the age range 15-30 years, who are more likely to be recent out-migrants and therefore, are more likely to still be recorded in the household (Hosegood & Timæus, 2006). Unlike in a DSS, the census is not able to probe further about people temporarily away but still considered as household members. It has also been observed that household membership is not tied to residency in the study area (Hosegood *et al.*, 2005). Under such circumstances the census count is likely to result in less accurate population estimates compared to demographic surveillance.

Migration has been shown to be high in the study area especially among males in early adulthood ages. Hosegood & Timæus (2006) show that on January 1, 2001, only 59 per cent of the adult men compared to 74 per cent of adult women registered in the ACDIS were resident in the area. Therefore, some of the implied over count in the 2001 census relative to the resident ACDIS population after childhood is likely to have resulted from the under reporting of out-migrants in the census.

Our findings suggest that the levels of under-enumeration in the study area were most likely lower than for the rest of KwaZulu Natal. Figure 4 and

Figure 5 suggest that the area's population was accurately enumerated in the census from about age 15 years onwards. While the StatsSA adjustment process would appear to adequately correct for the under enumeration of the number of children under age ten, it resulted in an over estimation of the population after around age 10 into adult ages. Thus adjustments were more necessary for the childhood ages, but less so after childhood ages.

Our findings suggest that applying adjustment factors estimated at a higher geographical unit to a smaller area may result in a distortion of that area's population size and distribution.

5. CONCLUSIONS

In this paper we have compared three different populations for the study area as at 10 October 2001. We highlight the issue of under enumeration of children in censuses and assert that there is need for careful investigation of why children continue to be heavily undercounted in African censuses. The undercount of children is particularly surprising in this rural area of South Africa, given a population highly compliant vis-à-vis demographic data collection; a population characterised by the widespread registration of births and appreciation of the importance and use of identity documents (Case *et al.*, 2005).

This is an area that requires urgent research, not least for the apparent lack of progress in this regard in the last thirty-five years, but also for its implications for our ability to understand and measure child mortality, the reduction of which is one of the Millennium Development Goals.

We conclude that methods used by the census agency to adjust for under count in the census can create instability in the population estimates for small areas. Census counts at a level of disaggregation lower than that used

to correct for undercounts by means of a PES will, by definition, inaccurately reflect the population of those smaller units. There is, therefore, need for careful application of adjustment factors estimated at a higher geographical unit when attempting to correct for coverage errors for a smaller area, as the coverage rate in the latter may be significantly different from the larger unit at which these factors are estimated. This is noteworthy because many entrepreneurs, local authorities, and even lay-people make use of census data for small areas without being aware of their limitations, and that the estimates may bear no resemblance to the true population size and distribution. Our results show that the census population was away from the true population by between 15 and 20 per cent and that this disparity was not evenly distributed across all age groups.

Any decisions that need to take into account the demographics of the population when based on such data are therefore more likely to be flawed and thus result in significant misplacement of resources.

References

Brass, W. 1996. "Demographic data analysis in less developed countries: 1946-1996", *POpulation Studies* **50**(3):451-467.

Brass, W, Coale, A J, Demeny, P, Heisel, D F, Lorimer, F, Romaniuk, A and Walle, E v d. 1968. *The demography of tropical Africa.* New Jersey: Princeton University Press.

Camlin, C S, Garenne, M and Moultrie, T A. 2004. "Fertility trend and pattern in a rural area of South Africa in the context of HIV/AIDS", *African Journal of Reproductive Health* **8**(2):39-54.

Case, A, Hosegood, V and Lund, F. 2005. "The reach and impact of Child Support Grants: evidence from KwaZulu Natal", *Development Southern Africa* **22**(4):467-482.

Cleland, J. 1996. "Demographic data collection in less developed countries 1946-1996", *Population Studies* **50**(3):433-450.

Cronje, M and Budlender, D. 2004. "Comparing Census 1996 with Census 2001: An operational perspective", *Southern African Journal of Demography* **9**(1):67-90.

Dorrington, R, Budlender, D and Moultrie, T. 2003. *Census 2001 Group 3 Report: Are the numbers what we expect?* Pretoria: Statistics Council.

Dorrington, R, Moultrie, T A and Timæus, I M. 2004. *Estimation of mortality using the South African census 2001 data*. Cape Town: Centre for Actuarial Research.

Garrib, A, Jaffar, S, Knight, S, Bradshaw, D and Bennish, M L. 2006. "Rates and causes of child mortality in an area of high HIV prevalence in rural South Africa", *Tropical Medicine and International Health* **2**(12):1-8.

Hosegood, V, Benzler, J and Solarsh, G C. 2005. "Population mobility and household dynamics in rural South Africa: implications for demographic and health research", *Southern African Journal of Demography* **10**(1&2):43-67.

Hosegood, V and Timæus, I M. 2006. "Household Composition and Dynamics in KwaZulu Natal, South Africa: Mirroring social reality in longitudinal data collection," in Walle, E v d (ed). *African Households: Censuses and Surveys*. New York: M.E. Sharpe, Inc., pp. 58-77.

Hosegood, V, Vanneste, A and Timæus, I M. 2004. "Levels and causes of adult mortality in rural South Africa: the impact of AIDS", *AIDS* **18**:663-671.

Lurie, M, Harrison, A, Wilkinson, D and Karim, S A. 1997. "Circular migration and sexual networking in rural KwaZulu/Natal: implications for the spread of HIV and other sexually transmitted diseases", *Health Transition Review, Supplement 3* **7**:17-27.

Moultrie, T A and Dorrington, R. 2004. *Estimation of fertility from the 2001 South African census data*. Cape Town: Centre for Actuarial Research.

Moultrie, T A and Timæus, I M. 2002. *An analysis of the 1996 Census and the 1998 Demographic and Health Survey*. Cape Town: Medical Research Council.

Siegel, J S and Swanson, D A (eds). 2004. *The methods and materials of demography*. London, UK: Elsevier Academic Press,

Smith, S K, Tayman, J and Swanson, D A. 2002. *State and local population projections: methodology and analysis.* New York: Kluwer Academic Publishers.

Space Time Research. 2006. *SuperCROSS, Community profiles tables*. Pretoria: Statistics South Africa. www.str.com.au.

Statistics South Africa. 2001. *Census 2001: metadata*. Pretoria: Statistics South Africa.

Statistics South Africa. 2003. *Census 2001: How the count was done*. Pretoria: Statistics South Africa (StatsSA).

Statistics South Africa. 2004a. *Census 2001: Concepts and definitions*. Pretoria: Statistics South Africa.

Statistics South Africa. 2004b. *Post-enumeration survey: Results and methodology*. Pretoria: Statistics South Africa.

Tanser, F. 2006. "Geographical information systems (GIS) innovations for primary health care in developing countries", *Innovations: Technology, Governance and Globalization* **1**(2):106-122.

Tanser, F, Gijsbertsen, B and Herbst, K. 2006. "Modelling and understanding primary health care accessibility and utilization in rural South Africa: An exploration using a geographical information system", *Social Science and Medicine* **63**:691-705.

Table 1: Adjustment factors for broad age groups by EA type and sex, Census 2001

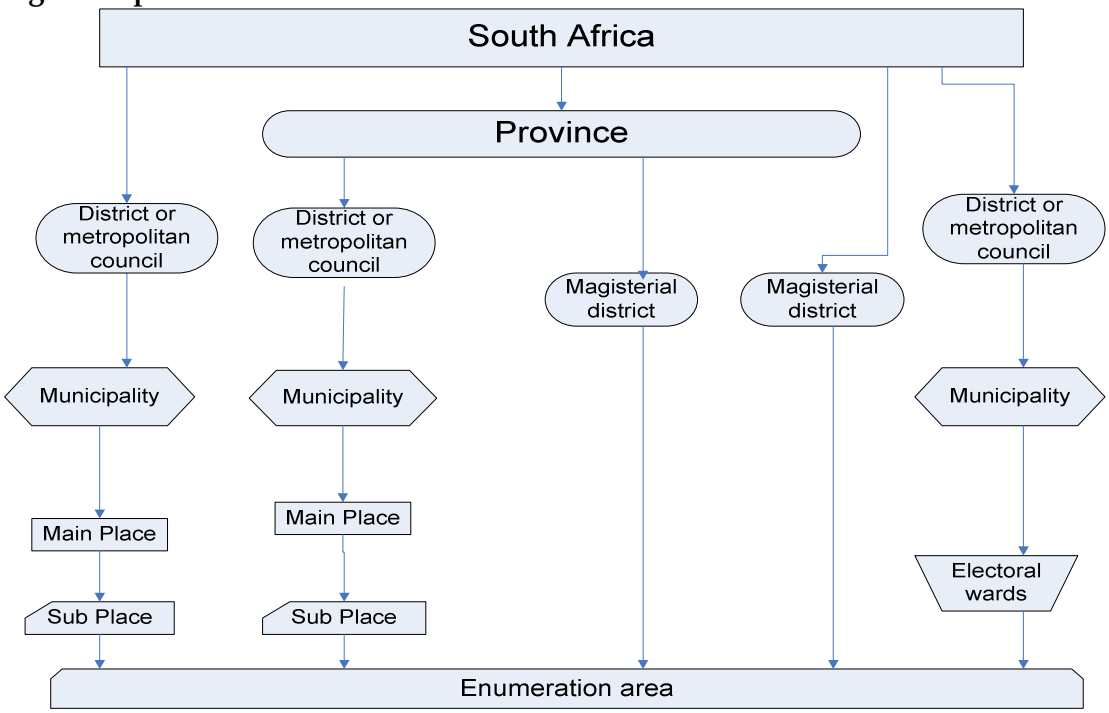
	Rural		Urban	
Age in years	**Male**	**Female**	**Male**	**Female**
0-19	1.2571	1.2568	1.2342	1.2333
20-44	1.2569	1.2582	1.4021	1.3157
45+	1.2152	1.2132	1.3044	1.1854

Table 2: Population distributions by age and sex as at 2001 census date corresponding to the DSA

	Published census[4]		Reconstructed enumerated census		ACDIS	
Age	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
00-04	4 693	4 694	3 747	3 749	4 830	4 757
05-09	5 404	5 322	4 312	4 249	5 152	5 228
10-14	5 726	5 590	4 569	4 463	5 056	5 044
15-19	5 261	5 537	4 198	4 420	3 596	4 197
20-24	3 037	3 798	2 363	2 986	1 972	2 851
25-29	2 241	3 143	1 727	2 466	1 659	2 583
30-34	1 690	2 468	1 295	1 936	1 398	2 121
35-39	1 524	2 212	1 171	1 737	1 204	1 950
40-44	1 251	2 014	966	1 584	1 022	1 864
45-49	1 045	1 428	846	1 182	864	1 261
50-54	799	1 134	648	938	612	1 130
55-59	611	843	498	698	506	780
60-64	589	1 090	481	901	495	977
65-69	383	831	314	687	300	764
70-74	371	768	302	635	329	751
75-79	183	286	150	236	159	296
80-84	115	235	94	194	97	211
85+	58	158	48	130	54	186
Total	**34 982**	**41 551**	**27 730**	**33 192**	**29 305**	**36 951**

[4] The slight differences between the census populations are due to rounding off errors.

Figure 1: Spatial demarcation of South Africa for census 2001 enumeration



Based on: Statistics South Africa (2001)

Figure 2: Population distribution mapped onto DSA, census 2001, Males

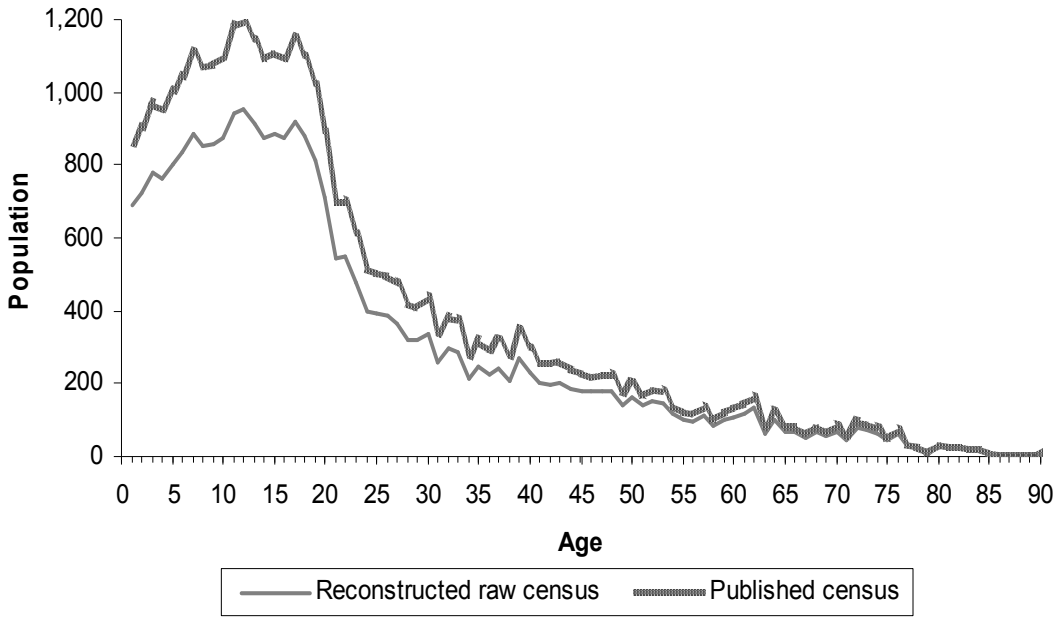


Figure 3: Population distribution mapped onto DSA, census 2001, Females

Figure 4: Comparison of the population distributions as at 2001 census date, Males

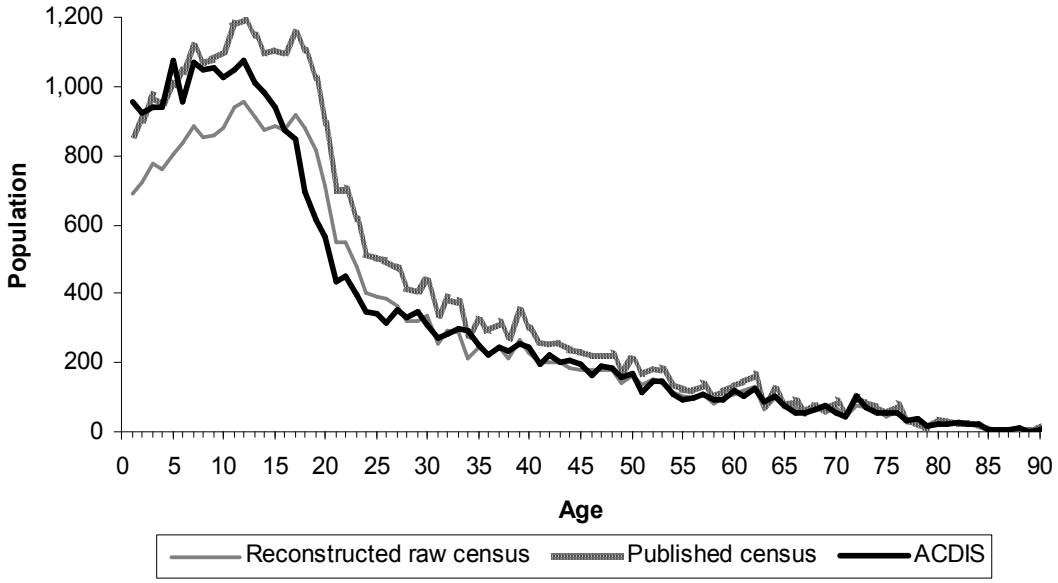
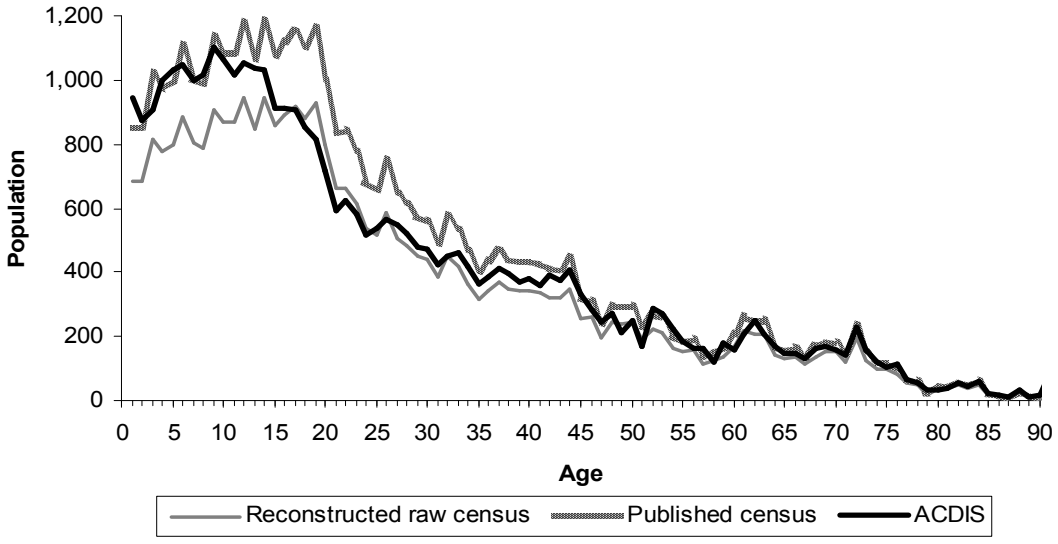


Figure 5: Comparison of the population distributions as at 2001 census date, Females



Appendices

Table A- 1: Mapping of 2001 census population onto DSA from Sub-place data

Sub-place name	Proportion of Sub-place in DSA	Population in Sub-place	Census population mapped onto DSA
Ebaswazini	1.0000	3,108	3,108
Enqupheni	0.9794	3,378	3,308
Ensolweni	0.9989	2,565	2,562
Esiyembeni	0.9828	1,900	1,867
Gunjaneni	1.0000	2,224	2,224
Hoho	0.9687	2,114	2,048
KwaSithole	1.0000	2,049	2,049
Machibini	1.0000	4,174	4,174
Makhambane	0.9979	4,535	4,525
Mapheleni	0.5356	2,563	1,373
Mhujini	0.9998	3,026	3,025
Mshaya	0.9559	1,693	1,618
Myeki	0.9999	4,271	4,271
Nkatha	0.9945	5,282	5,253
Nkolokotho	0.9540	3,752	3,579
Nkombose	0.9506	7,632	7,255
Nsolweni	0.4087	5,830	2,383
Ogengele	1.0000	3,702	3,702
Shikishela	0.2996	8,795	2,635
KwaMsane	0.9640	10,641	10,258
Msane SP	1.0000	5,233	5,233
Total		88,467	76,451

Table A- 2: Mapping of 1996 census population onto DSA from Sub-place data

Sub-place name	Proportion of Sub-place in DSA	Population in Sub-place	Census population mapped onto DSA
Ebaswazini	1.0000	2,435	2,435
Enqupheni	0.9863	2,450	2,416
Ensolweni	0.9507	3,477	3,305
Esiyembeni	0.9834	2,160	2,124
Gunjaneni	1.0000	3,533	3,533
Hlabisa NU	0.0248	252	6
Hoho	0.9607	2,135	2,051
KwaMsane	1.0000	4,384	4,384
Machibini	1.0000	5,483	5,483
Makhambane	0.9971	2,087	2,081
Mapheleni	0.5933	901	535
Mhujini	1.0000	778	778
Msane SP	0.9472	4,599	4,356
Mshaya	0.9593	2,169	2,081
Myeki	0.9995	4,269	4,267
Nkolokotho	0.9454	4,966	4,695
Nkombose	0.9999	901	901
Ogengele	1.0000	4,131	4,131
Phaphasi	1.0000	3,617	3,617
Shikishela	0.3484	834	291
Total		55,561	53,470