



# **PROVINCIAL GOVERNMENT OF THE WESTERN CAPE**

## **Migration Study in the Western Cape 2001**

**Estimation of the extent of out-migration from the  
Western Cape 1999 -2001**

Prepared by RDorrington and TMoultrie

*June 2002*

The Migration Study in the Western Cape 2001 comprises of the following reports:

1. **Executive Summary by SBBekker (University of Stellenbosch).**
2. **Main Report by SBBekker (University of Stellenbosch)  
(a major contribution to this report was made by CCross of the HSRC)**
3. **The relationship between migration and the HIV -AIDS pandemic: a preliminary South African analysis by SBBekker and KSwart (University of Stellenbosch).**
4. **Foreign African migrants in the Western Cape by BBoaden (University of Cape Town).**
5. **Estimation of the extent of out -migration from the Western Cape 1999 -2001 by RDorrington and TMoultrie (University of Cape Town).**
6. **The influence of state educational and health facilities on migration into Western Cape, an Exploratory study by PCloete (University of Stellenbosch).**
7. **Resident's perceptions regarding migration and social service delivery (especially health and education): Case studies in George and Cape Town by Robert Mongwe (University of Stellenbosch)**
8. **Migration Monitoring Model: The establishment of techniques for local municipalities to monitor migration streams within the Western Cape Province by JDPaul and KSwart (University of Stellenbosch).**

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## **Synopsis**

This report uses two methods to estimate the levels of out-migration from the Western Cape. The first is based on data collected in a survey conducted in 2001. The second derives estimates of the levels of out-migration as the difference between the in-migration as estimated from the survey and the net in-migration as estimated from efforts to reconstruct the numbers in the population as at the census date in 1996.

Methodological and data problems mean that the results from the 2001 survey do not give reliable estimates of these levels. However, using other available data sources, we make estimates by using the second method.

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## 1. Introduction

This report documents efforts to estimate the extent and patterns of out-migration from the Western Cape. By its very nature (i.e. because the people one wants to enumerate are no longer in the survey area) out-migration is usually considered impossible to measure by a survey in the area from which the out-migration has occurred. However, for this project it was decided to experiment with a technique devised by Basia Zaba and Ken Hill (Zaba, 1985). Unfortunately the decision to measure out-migration was taken quite late in the planning of the survey and since we had neither experience with the technique nor any text describing the technique we were forced to contact Basia Zaba directly and ask her for the questions that should be included in the survey.

It was only upon receiving a copy of the text, a day before the questionnaire was due to be printed, that we realised that the questions would at best elicit long-term migration levels and patterns (an average of the previous 30 years or so). Thus it was somewhat hurriedly decided to include a couple of questions asking about migration in the previous 12 months. However, these questions had not proved to be very useful in the survey reported on by Zaba (1985) and are clearly biased to an unknown extent in that they cannot capture whole households that have migrated.

In addition to this the questions, which were originally designed to measure international emigration were modified to try to measure migration out of the province both to other provinces and to other countries. These modifications did not work for a number of reasons (some of which seem obvious in retrospect) as will be pointed out below.

In addition, there were a number of problems both with the conducting of the survey and with the processing of the results, which when added to the poor questions and the extremely limited size of the sample (at least in terms of measuring out-migration) suggest that no reliance can be placed on the results reported using this method. Thus in order to provide some sort of indication of the probable level of out-migration we also include estimates of out-migration based on the numbers of net in-migrants derived from reconciling the 1996 and 1991 population estimates by province, and the number of in-migrants estimated from the survey.

## 2. Method

### 2.1 Brief description of the method

#### *Data and weighting*

The survey asked respondents how many sons and how many daughters their mother had borne; where these children were living; if they had moved from the Western Cape in the previous 12 months; and how many of these children had died. From this, numbers of children ever borne to mothers, by age of respondent, can be derived.

The data need to be corrected for the fact that siblings living in the same household should, of course, report the same number of children borne by their mother. To avoid the bias introduced through this double-counting, the data were weighted by the reciprocal of the number of children borne by the respondent's mother who are resident in the Western Cape, an approach suggested by Zaba (1985).

Further, the survey did not employ a self-weighting sampling frame. Thus, where necessary, the data have been analysed along the lines suggested in the documentation accompanying the data. This involves estimating race-specific rates of migration for the Cape Metropolitan Area (CMA) and the rest of the province separately, and then aggregating these race-specific estimates, giving twice the weight to the CMA data than to the rest of the data on the basis that the population of the CMA is approximately twice that of the rest of the province.

#### *Recent out-migration from the Western Cape*

The first investigation reported on here is that into the recent out-migration of respondent's siblings from the Western Cape.

A crude estimate is derived from the division of the number of siblings who had left the Western Cape in the 12 months before the survey by the number of siblings living in the Western Cape 12 months before the survey:

$$\frac{\text{Siblings left WC in last 12 mo.}}{\text{Siblings living in WC 12 mo. ago}}$$

The numerator is calculated from the sum of siblings who left the Western Cape in the 12 months before the survey, and are now living elsewhere in South Africa or outside the country. The denominator is derived from the sum of the numerator and the number of siblings still living in the Western Cape.

This is only a rough estimate, since no information was collected on either the time, or place, of death of siblings. Consequently, dead siblings are included in neither the numerator nor the denominator. This leads to the rates being overstated but with the exception of the very old and very young this is unlikely to be a significant bias. More importantly, however, this method is biased in the opposite direction by not

counting siblings who left in the previous 12 months who had no siblings to report on them. This leads to the rates being underestimated.

### *Life-time migration rates*

The second investigation pursued was the application of Zaba's (1985) technique of estimating lifetime migration rates based on reported number of emigrant siblings. In addition to accommodating the bias introduced by respondents living in large families, the approach also allows estimation of the number of entire sibling groups that may have left the region, thereby biasing estimates of migration downwards.

Lifetime migration rates are derived from the weighted numbers of emigrant and resident siblings reported by survey respondents of a given age, and assuming that the number of emigrant siblings of respondents of a given age and family size follows a binomial distribution. Family size (i.e. the number of surviving siblings borne of the respondent's mother) is assumed not to affect the probability of migration, thereby allowing a mathematical simplification of the lifetime migration rates, based on the number of emigrant siblings among people of a given age with family size 2 (Zaba, 1985:63ff).

The number of emigrant siblings of respondents of family size 2 is small in the PAWC study. This is possibly because high fertility leads to family sizes somewhat larger than this (particularly among older respondents) and that even high adult mortality tends not to reduce family size (as defined) to this number. Zaba suggests that instead of using family size 2, an average of the age-specific migration rates could be calculated from various different values of the family size, but in all cases, the number of emigrant siblings is very small. Consequently, it is not possible to derive credible estimates of migration for any population group other than Africans (or even for Africans by sex, or by quinquennial age group) using this method.

Nevertheless, the results from this initial investigation indicate some interesting findings, as shown in Section 3.

## **2.2 Problems with the survey**

In addition to the methodological problems identified above, the following problems were encountered with the survey.

1. The sample size was far too small to be able to comment at all on the out-migration of whites and Asians. It was also too small, as it turned out, to comment on out-migration from the province to other provinces for the black African and coloured group. This was because of the complication introduced by attempting to apply a method designed to measure international migration to measure inter-provincial migration, namely, that the respondent may have recently moved to the Western Cape and the siblings being reported as living outside the province in fact may never have moved to the Western Cape and hence are not out-migrants. With a larger sample we could have confined the analysis to those born in the Western Cape, but in the case of black Africans, the number of such respondents in this survey was too small.

2. For reasons of cost the out-migration questions were not asked of black Africans on farms, so no comment can be made about out-migration of this important sub-group.
3. As indicated in Appendix A there were some problems with the design and administration of the questionnaire. Given the answers elicited to some of the questions one has to suspect that the fieldworkers did not properly understand what they were asking for.
4. Again, as described in Appendix A there were a number of problems with the data capture and cleaning.

## 2.3 Estimates of out-migration using estimates of net migration

These problems undermine the confidence in any results produced by these methods and thus we decided to include in this report estimates of the number of net in-migrants derived from a demographic modelling exercise.

### 2.3.1 Net migration by race and sex for the period between 1991 and 1996

The details of the method used to derive estimates of net migration by race and sex can be found in Appendix B. In essence it involves adjusting the 1996 census provincial population estimates for deficiencies identified in a reconstruction of the national population estimate, then deriving the extent of net migration from reconciling these estimates with estimates of the population by race in 1991 by the current provincial boundaries carried out by the Bureau of Market research (Steenkamp, 1997). These estimates then have to be adjusted for international migration which was apportioned to the provinces according to the proportions of international migrants recorded in the census. Inevitably, in such a process with such limited information one is forced to make some fairly heroic assumptions but we feel that at this stage these are the best estimates of inter-provincial net-migration.

### 2.3.2 Deriving estimates of out-migration

Details of the method of deriving estimates of out-migration are given in Appendix C. Briefly the method comprised the following:

1. Estimating the percentage of the 1996 population that were net in-migrants over the preceding three years.
2. Deriving the comparable estimate for in-migrants from the survey for both 1996 and 2001.
3. Calculating the rate of change in percentage of the population that were in-migrants between 1996 and 2001 and applying this to the net in-migrants for 1996 to derive an estimate of in-migrants for 1999-2001.
4. Deriving the number of out-migrants for 1999-2001 as the difference between these estimates of in-migration and net in-migration when applied to an estimate of the mid-year population in 2001 from Dorrington (2002).
5. These estimates of the number of in- and out-migrants were then apportioned to the provinces according to the numbers recorded for the three years preceding 1996, as recorded in the 1996 census.



6. International migration was assumed to be at the same level as that estimated by Dorrington (2002) for the three years prior to 1996.

### 3. Results

#### 3.1 From the survey

##### *Recent out-migration from the Western Cape*

The questions on which the analysis is based were uniformly badly answered. Only 0.50% of respondents (29 out of 5778) reported that a brother had left the Western Cape in the 12 months preceding the survey, while 0.57% of respondents (33 of 5778) reported the departure of a sister in the same period.

Once multiple responses from siblings has been accommodated, the proportion of respondents reporting the migration of a male sibling in the preceding 12 months is 0.58%, and that of a female sibling is 0.74%

Such small numbers make the analysis of short-term migration by race and place of residence very difficult. However, it is interesting to note that there is no obvious difference by gender in the reported proportions of siblings leaving the Western Cape in the preceding 12 months, and that – if anything – the rate of reported female migration is higher than that of male migration.

Due to the small number of “events” (that is, respondents reporting the migration of siblings in the previous year), a full analysis of migration by quinquennial age groups is not possible. Nevertheless, it is possible to estimate the proportion of Coloured and black African respondents’ siblings who migrated in the year before the survey by grouped age of respondent, the sex of the migrant, and whether or not the respondent lives in the Cape Metropolitan Area (CMA). Note, too, then, that the estimates presented below while specific to the sex of the migrant are analysed according to the residence and age of the respondent. Several biases may be introduced into these estimates as a result. First, a respondent living in the CMA may have reported siblings leaving the Western Cape who themselves were not resident in the CMA before their departure. Second, despite the broad age categories adopted, the age of migrants may differ quite markedly from the age of the respondent, especially among respondents with a large number of siblings. The survey collected no information against which the extent of these biases can be assessed. In addition there is the unquantifiable bias of not being able to capture migration of whole households who have left.

The estimated proportions of siblings migrating, by age, race and residence of respondent, and by sex of the migrant are shown in the tables below. (Data have been omitted in cases where there were fewer than 40 respondents in a category. Instances where no migrant siblings were reported are indicated by a “-”).

**Table 1 Migration of brothers of respondents, by respondents' age, race and residence**

Age of respondent	Resp. lives in CMA		Resp. does not live in CMA	
	Coloured	African	Coloured	African
0 -14	-	-	0.008	-
15 -29	-	-	0.002	0.017
30 -49	0.002	-	0.007	0.021
50 -64	-	-	0.009	0.041
65+			0.023	

Thus, according to these data, migration of men from the Western Cape is almost non-existent among the brothers of CMA-resident respondents. Among respondents not residing in the CMA, migration rates are higher, and follow an increasing trend with increasing age of the respondent.

Table 2 shows the equivalent data for the sisters of respondents.

**Table 2 Migration of sisters of respondents, by respondents' age, race and residence**

Age of respondent	Resp. lives in CMA		Resp. does not live in CMA	
	Coloured	African	Coloured	African
0 -14	-	-	0.003	0.004
15 -29	-	0.003	0.003	0.028
30 -49	0.006	0.009	0.001	0.044
50 -64	-	-	0.007	-
65+			-	

As with men, only low levels of migration were recorded among the sisters of Coloured and African respondents living in the CMA. Among respondents resident outside of the CMA, the sisters of Coloured respondents show a lower propensity to migrate than their brothers, while the reverse is true of African respondents.

Aggregate migration rates can also be derived by age and race of the respondent, allowing – as suggested by Simon Bekker – for the fact that the population of the CMS is approximately twice that of the population outside of the CMA. Appropriately weighting the data underlying Tables 1 and 2 leads to the aggregated estimates below.

**Table 3 Migration of siblings of respondents, by respondents' age, race and residence**

Age of respondent	Resp. lives in CMA		Resp. does not live in CMA		All Western Cape	
	Coloured	African	Coloured	African	Coloured	African
0 -14	-	-	0.005	0.002	0.003	0.001
15 -29	-	0.002	0.002	0.022	0.001	0.007
30 -49	0.004	0.004	0.004	0.033	0.004	0.015
50 -64	-	0.050	0.008	0.020	0.004	0.038
65+	0.004		0.012		0.008	0.111

Migration among Africans in the Western Cape appears to be substantially higher than that among Coloureds. Migration in the Western Cape is also strongly associated with the age of the respondent, showing a monotonic increase for Africans (both

sexes). Migration of Coloured respondents' siblings is lowest among respondents in their late teens and twenties.

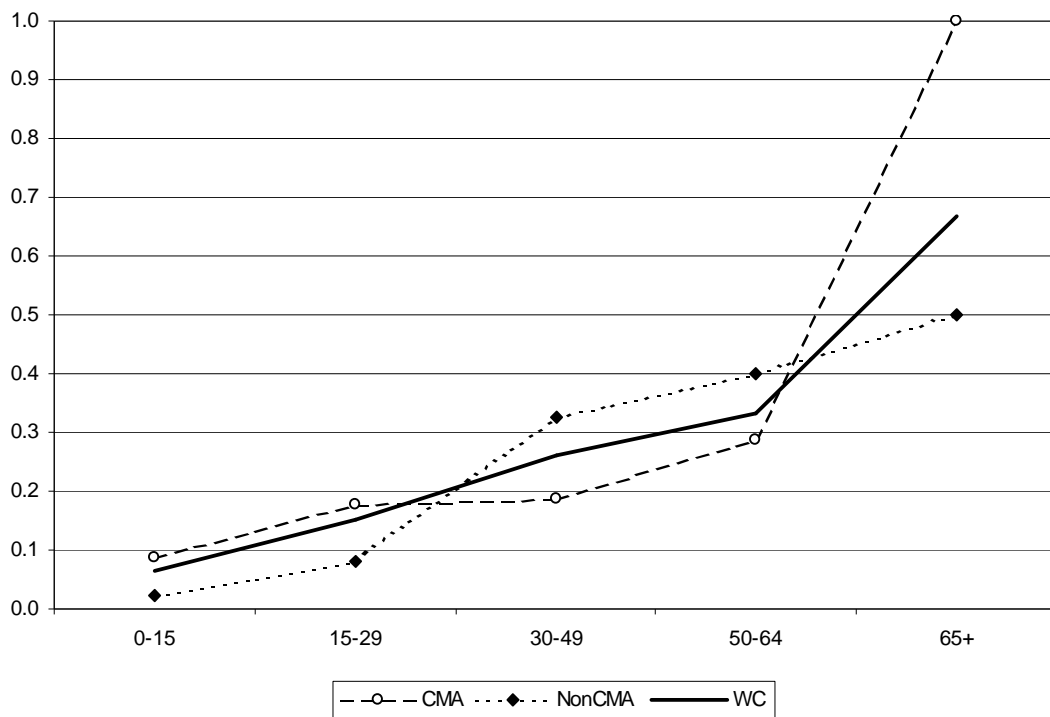
*Life-time migration rates over the long term*

Up until age 30, residents in the CMA appear to have higher rates of out-migration compared with residents outside the CMA. Between ages 30 and 50, this relationship is reversed. The steepest increase in out-migration among CMA residents occurs after the age of 65, while non-CMA residents are more likely to leave the province by age 30. In each case, though, the propensity to migrate increases with increasing age.

**Table 4** Age-specific probabilities of having left the province among Africans (both sexes), by age and residence of respondent

Age	Resident in CMA	Not Resident in CMA	Western Cape (weighted)
0-15	0.087	0.021	0.065
15-29	0.176	0.080	0.151
30-49	0.188	0.324	0.261
50-64	0.286	0.400	0.333
65+	1.000	0.500	0.667

These data are shown in the figure below.



**Figure 1.** Age-specific rates of out-migration based on the sibling data

Although we don't think the data warrant further detailed analysis to estimate the age-specific rates, inspection of the data used in Zaba (1985) suggests that the above data would imply an annual migration rate out of the non-CMA of about 2% for ages 15-49, and 1% or less for those younger or older.

### 3.2 Estimates of migration from reconstruction of the provincial populations

The estimates of the extent of net migration arising from the reconstruction and reconciliation of the provincial population estimates are given in Table 5 and Figures 2 and 3. As was pointed out earlier, deducting these numbers from estimates of the number of in-migrants will give an estimate of the number of out-migrants.

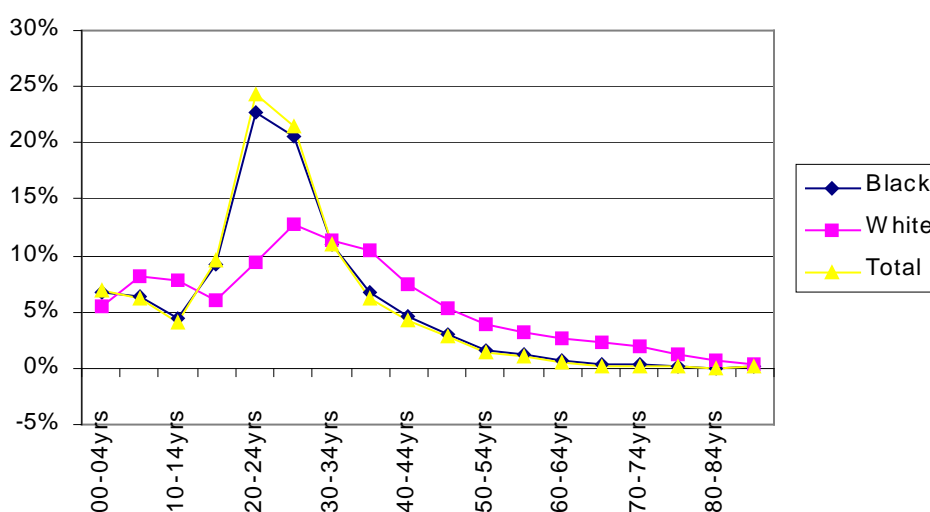
Table 6 presents the net in-migration rates for the province.

**Table 5: Numbers of international and inter-provincial net in-migrants by race and sex 1991 -96**

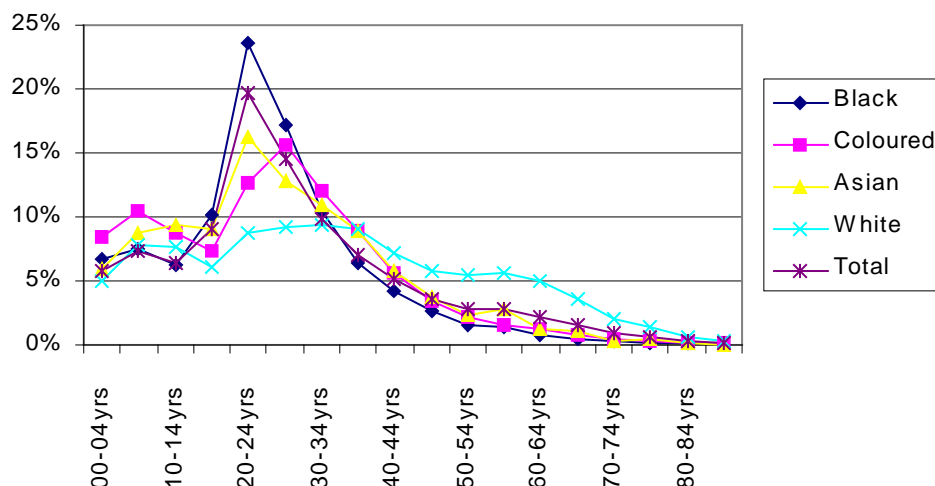
		Black	Coloured	Asian	White	Total
International	Male	21185	0	0	-2917	18268
	Female	28072	0	0	-2073	26000
	Total	49257	0	0	-4989	44268
Inter-provincial	Male	104126	-17656	4795	43641	134907
	Female	92036	-18329	4665	46635	125006
	Total	196162	-35985	9460	90276	259914
<b>Total</b>		<b>245420</b>	<b>-35985</b>	<b>9460</b>	<b>85287</b>	<b>304182</b>

**Table 6. Annual migration rates 1991 -96**

	Black	Coloured	Asian	White	Total
International	1.3%	0.0%	0.0%	-0.1%	0.2%
Inter-provincial	5.3%	-0.3%	5.6%	2.0%	1.4%
<b>Total</b>	<b>6.6%</b>	<b>-0.3%</b>	<b>5.6%</b>	<b>1.9%</b>	<b>1.6%</b>



**Figure 2. Aged distribution of international net in-migration (negative for whites)**



**Figure 3. Age distribution of inter -provincial net in -migration (negative for Coloureds)**

Combining these rates of migration with the rates implied by the results of the survey as shown in Appendix C produces the following estimates of annual migration rates for the period 1999 -2001.

**Table 7. Annual migration rates**

		<i>Black</i>	<i>Coloured</i>	<i>White</i>
<i>In</i>	<i>Domestic</i>	3.4%	0.8%	2.4%
	<i>International*</i>	1.0%		
<i>Out</i>	<i>Domestic</i>	0.6%	1.5%	0.6%
	<i>International*</i>			0.1%
<i>Net</i>		3.8%	-0.7%	1.7%

\*net of movements in the opposite direction

Although rates of migration and number of migrants are also presented in the appendix, random error in the estimates of the rate of in -migration from the survey mean that little reliability can be placed on any differences in level or pattern suggested in the results. Probably the best estimate is that the levels of male and female domestic migration is the same.

## 4. Conclusion

Unfortunately the two approaches (survey and reconciliation of in and net migration) do not produce similar results. The survey suggests that:

1. There is no difference by sex/gender
2. Out-migration is primarily from non -CMA for black Africans
3. African out -migration (at about 1,5% p.a.) is significantly greater than that of coloureds (at a little over 0,5% p.a.)
4. Migration rates increase with age

Unfortunately we are not of the opinion that one can attach any credibility to the migration rates estimated from the survey data. First, the data problems outlined earlier may be such that the data can under no circumstances be considered to offer a reasonable picture of the demography of the Western Cape, let alone the rates of migration from the province. Second, the very small numbers of respondents reporting siblings not resident in the Western Cape might point to further errors arising from lack of comprehension or misunderstandings on the part of the interviewers and/or respondents.

Third, the methods adopted here, particularly that of Zaba, have not been fully scrutinised to ascertain their validity in a South African context, particularly with respect to application at a provincial level. Certainly, some of the simplifying assumptions need to be verified, and sensitivity analyses should be conducted. The use of family size two to derive the age-specific migration probability estimates may be particularly problematic.

Fourth, the method itself may be problematic with respect to application to measure inter-provincial migration, since there is an implicit assumption in the method that all respondents (and their emigrant siblings) have been long-term residents in the Western Cape. This assumption arises from the design of the questions used to derive the data required: By asking local residents about the number of their absent siblings, the presumption is made that it is the siblings who have emigrated from the Western Cape, and not that it is the respondent who is the immigrant into the Western Cape, leaving the majority of his/hersiblings behind in the province of origin.

These issues demand closer consideration before the data can be interrogated and analysed further.

Given the method of estimation used to derive estimates of out-migration from net migration estimates, the above results must be treated with some degree of scepticism. Errors could have occurred in the estimation of the extent of in-migration and as a consequence estimates of the rate of change in in-migration between the 1991-96 period and the 1999-2001 period, as well as the extent of in-migration net of out migration. In the case of the estimates of in-migration the errors are likely to be sampling errors, while in the case of the estimate of net in-migration the errors arise from errors in the estimates of the population in each of the provinces – either the 1991 estimates or 1996 or both. Where international migration is insignificant, as is the case with the coloured population, population change nationally is dependent only on natural growth, so the errors are likely to be very small. Since in the case of the other two population group errors in estimates of international migration and hence the size of the domestic population could have occurred, there could be errors in the estimates of out-migration. However, given that it is a closed system that one is using to derive the estimates the errors are likely to be very small.

Given the size of the sample the errors in the estimate of the annual rate of in-migration could be of the order of 1% in the case of the black African and white groups and half a percent in the case of the coloured group the range of possible outcomes are as follows (best estimate in brackets):  
*Black African* : in-migration 2,5% -4,4% (3,4%); out-migration 0 -1,6% (0,6%);  
 immigration 0,5 -1,5% (1,0%)

*Coloured*: in-migration 0,4 –1,2% (0,8%); out -migration 1 –2% (1,5%)  
*Whites*: in -migration 1,6 –3,2% (2,4%); out -migration 0 –1,4% (0,6%); emigration 0 –0,5%

In the light of these observations, the likely underestimate of age specific rates of migration over the past 12 months as well as the implausible increase in migration rates with age, it is recommended that the best estimates of out -migration at this point in time, will be those derived from deducting the net in -migration numbers from estimates of gross in -migration.

The conclusion is that migration in the Western Cape is dominated by in -migration, particularly of black Africans, with only the coloured group showing any evidence of significant out -migration.

## 5. References

- Dorrington R.E. (2002) *Population projections for the Western Cape to 2025* . A report prepared for the PAWC, March, 2002.
- Steenkamp H.A. (1997) *Population estimates for the RSA by magisterial district and province*. Bureau of Market Research, Report No. 243, UNISA, Pretoria.
- Zaba, Basia. 1985. *Measurement of Emigration Using Indirect Techniques: Manual for the Collection and Analysis of Data on Residence of Relatives*. Liège, Belgium: Ordina Editions.



## Appendix A: Problems with the questionnaire, the asking of questions and the coding of the responses.

### Questionnaire:

Questions B16\_3\_1, B17\_3\_1, B 19\_3\_1 and B20\_3\_1. The question asks about children/siblings living outside of South Africa, and who left the Western Cape in the last 12 months. The variable label in the data substitutes “South Africa” for “Western Cape”. Clarification is required as to what form the question was actually asked, and whether this is simply a labelling problem.

### Household file: 1644 records

23 households do not have a questionnaire number (**queno**), although other information has been recorded.

### Individual file: 5778 records

There are 21 people missing an individual reference number (**idnr**). Furthermore, it is unclear what was done with the data on the 23 households mentioned above. There are no data in the individual file with missing **quenos**.

There are only 1513 individual s with **idnr**=1. Thus, data on a further 108 (i.e. 1644 - 23 - 1513) first respondents are missing from the survey data.

There are 113 households for which the count of **b7** (relationship to head of household = head) is not 1. Thus, according to the data 7% of households have either no head, or – in an extreme case – 6 heads (cf **queno** 1366).

Something appears to have gone wrong with the phrasing and responses to the questions on the number of children borne by the respondents' mother (Questions B16 and B17). If one adds up the total number of male and female children living in the Western Cape, outside the WC, outside South Africa, and dead, this will be the total number of children borne by the respondents' mother. Furthermore, if the respondent is male, the number of sons borne by the respondent's mother must be greater than or equal to one (and daughters equivalently for female respondents). A significant proportion of respondents of all races reported that their mother had not had any children of their own sex, as shown below.

	<i>Coloured</i>	<i>African</i>	<i>White</i>
No. Males	1308	896	533
% males reporting mother had no sons	15.29	25.67	11.63
No. Females	1444	1006	554
% females reporting mother had no daughters	17.11	27.34	11.19

In addition, there are further problems with these data. Implausible numbers of children ever borne by respondents' mothers are derived from the method above. In extremis, one woman was reported to have had 44 children (cf **queno** 1271).

### Derived variables

There seem to be problems with a number of the derived recode variables.

First, it is unclear how the “number of moves” variables were created, or what the base used in counting the number of moves was – birth or age 18? (It would appear that **nmoves** only relates to the number of moves after age 18). There are some individuals for whom the **nmoves** variable is set to 0, but who have clearly moved repeatedly through their lives.

Second, the algorithm for the recode of placenames may have errors. People born in Stellenbosch (or at least those with Stellenbosch in capitals in field **b8**) have not been allocated a recoded place of birth (coded missing). People born in Grabouw are recoded as born in the Overberg, but those born in Swellendam are recoded as born in the Boland. While each recode has not been examined, other errors have stood out: for example, Steynsburg has been placed in the Southern Peninsula (**queno** 1860 **idnr** 1). In other instances, the same location has been allocated to two different recode regions in different variables (e.g. in **queno** 1466, Merweville is allocated to Northern Cape in **d18pre1** [recode of residence at 18] and to Central Karoo in **a3rec1** [recode of current residence]).

### Other problems with the data

Instances have been identified where the same questionnaire number has been allocated to more than one household (e.g. **queno** 1366, 3 distinct households living in different areas), and where this error has been carried across to the individual level data. Thus in the screen-grabs below, three household heads are shown, living in three distinct areas, with a total of 17 people enumerated under **queno** 1366. This error in this questionnaire was picked up from a list of questionnaire numbers where there was either no, or more than one, reported head of household. There are 113 such cases, many of which report more than one head of household. A list of the affected questionnaire numbers is available. Our greatest concern is that errors of this form make it impossible to match data from the household file onto the individual file with any degree of certainty.

Selected data from the household file for questionnaire number 1366

```

. list queno idnr a1 a3 nmoves hhdsize b2 b3 b4 if queno==1366
Observation 738
  queno      1366      idnr      1      a1 EBEN BARNARD
  a3      DE RUST      nmoves      0      hhdsize      6
  b2      man      b3      64      b4      coloured

Observation 739
  queno      1366      idnr      1      a1 Johnny Mtge..
  a3      Dysselsdorp      nmoves      1      hhdsize      6
  b2      man      b3      42      b4      coloured

Observation 740
  queno      1366      idnr      3      a1
  a3      Oudtshoorn      nmoves      37      hhdsize      5
  b2      man      b3      37      b4      coloured

```

Selected data from the individuals file for questionnaire number 1366

```

. list idnr b2 b3 b7 b11 b8 if queno==1366

```

idnr	b2	b3	b7	b11	b8	
3045.	1	man	64	head of h	1	SPITZKOP
3046.	1	man	42	head of h	1977	Oudtshoorn (Rooiheuvel)
3047.	1	woman	21	partner/s	2000	Port Elizabeth
3048.	1	woman	61	partner/s	1	SPITZKOP
3049.	1	woman	39	partner/s	1977	Oudtshoorn (Matjiesrivier)
3050.	1	man	70	parent	1996	Suid-Wes
3051.	1	man	37	head of h	1	SPITZKOP
3052.	1	man	16	child	1985	Dysselsdorp
3053.	1	woman	60	parent	1996	Suid-Wes
3054.	1	man	26	head of h	1	SPITZKOP
3055.	1	man	11	child	1990	Dysselsdorp
3056.	1	man	25	head of h	2000	Suid-Wes
3057.	1	man	20	head of h	1	SPITZKOP
3058.	1	woman	20	child	1981	Dysselsdorp
3059.	1	woman	0	child	1	Oudtshoorn
3060.	1	man	15	grandchil	1	OUDTSHOORN
3061.	1	woman	7	child	1994	Dysselsdorp

## **Appendix B: Derivation of net migration by age from the reconciliation of the 1996 census results with the 1991 census results by the 1996 provincial boundaries**

Net migration into the provinces was estimated as follows:

### **1. Derive the 1996 mid -year provincial population estimates (by race, sex and age)**

1. Extract the 1996 provincial census numbers by race, sex and age.
2. Sum by province and compare to ASSA2000 full model numbers for national by race, sex and age.
3. Calculate the ratio of the ratio of the ASSA2000 national numbers by race, sex and age to those of the census.
4. Multiply the numbers in each province (by race, sex and age) by these ratios.

### **2. Derive the 1991 mid -year provincial population estimates (by race and sex)**

1. Use the Bureau of Market (Steenkamp, 1997) research estimates by province and race for 1991.
2. Scale these so that the sum by province equals the ASSA2000 full model for each race for the same year.
3. Split each provincial total into number of each sex in the same proportions as 1996 for each province.
4. Scale the number of males and females in each province so that the sum of each sex is the same as that in the ASSA2000 full model.

### **3. Derive the 1991 -96 net (of mortality and out migration) in migration (by province, race and sex)**

1. Make use of the fact that the total number of migrants between 1991 and 1996 equals the population in 1996 less the population in 1991 less the natural increase (i.e. the number births less the number of deaths between 1991 and 1996). This assumes that the number of migrants can be approximated by the number of surviving migrants (i.e. the effect of mortality over the five years is small).
2. Estimate the natural increase (births less deaths) for the provinces by estimating the ratio of natural increase to the average of the 1991 and 1996 populations for the total population by race and sex from the ASSA2000 full model and applying this to the average of the 1991 and 1996 populations for each of the provinces.
3. Derive the number of net in -migrants to each province by making use of the relationship in 1. above.

These totals represent the net international migration plus net provincial migration. Since the age distribution of international and provincial migration could be different, particularly if it is in opposite directions, we need to estimate them separately.

### *International migration*

#### **Black/Africans**

In the case of black Africans the net international in-migration is assumed to be positive (i.e. people are coming into the country). We assume that this holds at the provincial level as well. In order to estimate the number at a provincial level we assume:

1. that the age distribution is the same as that for those who in the census declared that they had moved to the province from outside the country in the years 1992 -96.
2. the extent of the undercount of these people is measured by the ratio of the total net in-migration (for each sex) from the ASSA2000 full model for 1991-95 to that of in-migration from the census 1992 -96.

#### **Whites**

In the case of whites, net international in-migration is assumed to be negative (i.e. people are assumed to be leaving the country). Now assume that this holds at the provincial level. Thence, in order to estimate the numbers at the provincial level we assume:

1. that the age distribution of net international in-migrants is the same as the sum of the provincial out-migrants 1992 -96.
2. the proportion of net international in-migration is proportional to the provincial out migration (i.e. calculate the ratio of ASSA2000 numbers of (?) each sex for 1991 -95 to the total (by sex) provincial out-migration from the census for 1992 -96). A major implied assumption is that the provincial net international in-migration is proportional to provincial out-migration.

#### **Asians and coloureds**

Net international in-migration is assumed to be zero (i.e. international out-migration = international in-migration or if not that the difference is negligible as a percentage of the population).

### *Provincial migration*

1. Determine the net provincial provincial in-migration (i.e. province to province migration) as net provincial in-migration less net international in-migration).
2. Distribute this figure for each province according to the provincial migration 1992 -96 in the same direction. (This effectively assumes that

net migration has the same age distribution as that of the dominant flow, which is reasonable unless the net migration is small, in which case it doesn't matter. In -and out -migration have very similar age profiles.)

#### **4. Derive black net international in -migration (by province, sex and age).**

1. Derive net international in -migration for 1991 -95 from the ASSA2000 model (by sex) .
2. Derive national black international in -migration for 1992 -96 from the census (by sex) (assumed to be equal to the sum of all movement into the province from outside the country).
3. Calculate the ratio of 1. to 2. (for each sex) and apply this to scale each provincial international in -migration (the unspecified were ignored).

#### **5. Derive the number of white net international in -migrants (negative) (by province and sex)**

1. The same as 4.1 above
2. Derive the sum of the provincial out -migration (by sex) (assumed to be equal to the sum of provincial out -movements for each province).
3. As per 4.3 above.

#### **6. Derive net domestic provincial in -migration (by province, race, sex and age)**

As described above.

#### **7. Determine the trend over time**

As we have no information about the patterns of provincial migration over time we simply assumed:

1. for the 1991 -95 period migration was the same in each year
2. for the 1985 -90 period the annual migration was the 1991 migration scaled in the same proportion as the 1985 -90 migration was to that for 1991 -95 for each race and sex from the ASSA2000 model.

## Appendix C: Method for estimating migration flows into and out of the Western Cape

Assume we are working with coloured migration over the period 1999 to 2001 inclusive. (The method is the same for other races, periods and divisions by sex.)

Define  $m_{ij}$  to be the number of migrants from province  $i$  to province  $j$  over the period, and assume, without loss of generality that the Western Cape is province number 1.

Define  $n_{ij}$  to be the net number of migrants from province  $i$  to province  $j$  over the period, i.e. the number moving from province  $i$  to province  $j$ , i.e.  $n_{ij} = m_{ij} - m_{ji}$

Now then net in-migration into the Western Cape,

$$n_{.1} = \sum_{i=2}^9 n_{i1} = \sum_{i=2}^9 m_{i1} - \sum_{j=2}^9 m_{1j} = m_{.1} - m_{1.}$$

So given an estimate of the number of in-migrants into the Western Cape,  $m_{.1}$ , and the number of net in-migrants (i.e. in-migrants net of out-migrants) into the Western Cape,  $n_{.1}$ , we can estimate the number of out-migrants from the Western Cape as

$$m_{1.} = m_{.1} - n_{.1}.$$

Now this holds for all migrants, i.e. international and domestic migrants combined, and for each separately. (Indeed one could simply treat international migrants as an additional 'province' in the above formulation.) For practical purposes we can assume (Assumption 1) the following about international migration:

*Coloured*: both immigration and emigration are insignificant

*African*: emigration is insignificant

*White*: immigration is insignificant

Now the survey was unable to identify African immigration, and we know that it was unable to successfully estimate the extent of white emigration (the survey was much too small to pick this up), estimates of international migration will have to be those estimated for the period between mid-1991 and mid-1996, multiplied by 0.6 (to allow for the fact that 1999-2001 covers only 3 years). Thus we are effectively assuming (Assumption 2) that international migration (of Africans, in, and whites, out) has remained constant over this period. This is of course a fairly heroic assumption, but without any other evidence to work with, one we are forced to make.

Thus from now on we can assume that we are working with net domestic (i.e. province to province) migration and we can proceed as follows:

1. Given, from the survey (Appendix D), a percentage of the population (at the time of the survey) whomigrated into the province over the 1999-2001 period,  $p$ , and an estimate of the population,  $P$ , from population projections for the province (Dorrington, 2002) we can estimate the number of in-migrants ( $m_{.1}$ )

over this period, i.e.,  $m_{i1} = pP$ . This is actually a slight under-estimate of the number of in-migrants in that it, by design, excludes in-migrants whomigrated out again before the survey, but we can assume (Assumption 3) that, given the fairly low levels of out-migration, for a period as near the survey date as the one under consideration, the level of out-migration in this group was negligible.

2. We can estimate numbers of in-migrants from each of the provinces,  $m_{i1}$ , by assuming (Assumption 4) that the extent of under (or over) recording of migration in the 1996 census was independent of the province of origin and that (Assumption 5) whatever trend in in-migration there has been between the dates of the census and the survey has been experienced by each province to the same extent. If these assumptions hold then we can simply apportion  $m_{i1}$  in the same proportions as the in-migration from each province into the Western Cape is to the total in-migration as recorded in the 1996 census data.
3. In order to estimate the out-migration to the various provinces one first needs to estimate the overall out-migration from the province,  $m_{11}$ . This is achieved by first estimating the net domestic in-migration,  $n_{11}$ , and then estimating  $m_{11} = m_{i1} - n_{11}$ . Net domestic in-migration can be estimated on several assumptions (Assumption 6). It could be assumed that the number of net domestic in-migrants remained constant, or that the rate of net migration remained at the same level as that estimated between 1991 and 1996 for the purposes of projecting the population of the Western Cape (Dorrington, 2002), which effectively assumes that in and out-migration changed to the same absolute extent between the two periods (1991-96 and 1999-2001). However, for this exercise we calculate the ratio of the % of the survey in-migrants over the period 1999-01 to those over the years 1992-1994, and apply this ratio to the number of net in-migrants 1992-1994 to get an estimate of the number in 1999-01. This effectively assumes that either out-migration is, relative to the level of in-migration, low (which is quite possible in the case of black Africans), or that it follows the same proportional change between the two periods as the in-migration (which seems less likely).
4. The numbers of out-migrants to each of the provinces,  $m_{1j}$ , can be estimated in a similar fashion to the number of in-migrants in 2 above (Assumptions 7 and 8).
5. Rates of migration can then be calculated by dividing the above numbers by 3 times the estimate of the population in 2000.



## Results

The rates per annum (averaged over the 1999 -2001 period) of in and out -migration are presented below, first in total, and then for each of the sexes. This is then followed by tables of the numbers of migrants. NOT THAT NUMBERS OF MALE AND FEMALE MIGRANTS DON'T SUM TO THE TOTAL NUMBER OF MIGRANTS DUE TO ROUNDING ERRORS IN THE ESTIMATES OF THE RATE OF IN - MIGRATION FROM THE SURVEY. In addition random fluctuation in these estimates mean that differences between male and female migration patterns are more likely to be apparent than real.

**Table C1 Migration rates in and out of the Western Cape**

Source/ Destination	African		Coloured		White	
	In- migration	Out- migration	In- migration	Out- migration	In- migration	Out- migration
EasternCape	3.20%	0.20%	0.30%	0.40%	0.40%	0.10%
NorthernCape	0.10%	0.00%	0.40%	0.40%	0.20%	0.00%
FreeState	0.00%	0.10%	0.00%	0.10%	0.20%	0.00%
KwaZulu-Natal	0.10%	0.10%	0.10%	0.10%	0.30%	0.00%
NorthWest	0.00%	0.10%	0.00%	0.10%	0.10%	0.10%
Gauteng	0.10%	0.20%	0.10%	0.30%	1.20%	0.20%
Mpumalanga	0.00%	0.00%	0.00%	0.10%	0.10%	0.00%
Limpopo	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Total</b>	<b>3.60%</b>	<b>0.60%</b>	<b>0.80%</b>	<b>1.50%</b>	<b>2.40%</b>	<b>0.60%</b>
Immigrants	0.90%					
Emigrants	0.10%					

**Table C2 Migration rates in and out of the Western Cape: Males**

Source/ Destination	African		Coloured		White	
	In- migration	Out- migration	In- migration	Out- migration	In- migration	Out- migration
EasternCape	3.00%	0.20%	0.30%	0.40%	0.30%	0.10%
NorthernCape	0.10%	0.00%	0.40%	0.50%	0.10%	0.00%
FreeState	0.00%	0.10%	0.00%	0.10%	0.20%	0.00%
KwaZulu-Natal	0.10%	0.00%	0.10%	0.10%	0.20%	0.00%
NorthWest	0.00%	0.10%	0.00%	0.20%	0.10%	0.10%
Gauteng	0.10%	0.10%	0.10%	0.40%	0.90%	0.10%
Mpumalanga	0.00%	0.00%	0.00%	0.10%	0.10%	0.00%
Limpopo	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Total</b>	<b>3.40%</b>	<b>0.50%</b>	<b>0.90%</b>	<b>1.70%</b>	<b>1.90%</b>	<b>0.40%</b>
Immigrants	0.70%					
Emigrants	0.10%					

**TableC3 MigrationratesinandoutoftheWesternCape:Females**

Source/ Destination	African		Coloured		White	
	In- migration	Out- migration	In- migration	Out- migration	In- migration	Out- migration
EasternCape	3.40%	0.20%	0.20%	0.30%	0.50%	0.20%
NorthernCape	0.10%	0.00%	0.30%	0.40%	0.20%	0.10%
FreeState	0.00%	0.00%	0.00%	0.00%	0.30%	0.10%
KwaZulu-Natal	0.00%	0.10%	0.00%	0.10%	0.40%	0.10%
NorthWest	0.00%	0.10%	0.00%	0.10%	0.10%	0.20%
Gauteng	0.10%	0.20%	0.10%	0.30%	1.60%	0.30%
Mpumalanga	0.00%	0.00%	0.00%	0.00%	0.10%	0.00%
Limpopo	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Total</b>	<b>3.70%</b>	<b>0.70%</b>	<b>0.70%</b>	<b>1.20%</b>	<b>3.20%</b>	<b>0.90%</b>
Immigrants	1.00%					
Emigrants						0.10%

**TableC4 NumbersofmigrantsinandoutoftheWesternCape**

Source/ Destination	African		Coloured		White	
	In- migration	Out- migration	In- migration	Out- migration	In- migration	Out- migration
EasternCape	110580	6346	19059	26036	11154	3077
NorthernCape	2405	910	25613	29091	5112	1481
FreeState	1183	2194	1375	4734	6082	1122
KwaZulu-Natal	1787	1720	3545	6083	9096	1487
NorthWest	412	1982	584	9602	2357	3037
Gauteng	4331	5764	7753	24214	36187	6108
Mpumalanga	379	1543	450	3546	1917	695
Limpopo	365	599	131	616	1120	134
<b>Total</b>	<b>121440</b>	<b>21057</b>	<b>58509</b>	<b>103921</b>	<b>73025</b>	<b>17141</b>
Immigrants	29554					
Emigrants						2994

**TableC5 NumbersofmigrantsinandoutoftheWestern Cape:Males**

Source/ Destination	African		Coloured		White	
	In- migration	Out- migration	In- migration	Out- migration	In- migration	Out- migration
EasternCape	53284	2690	10018	14620	4145	1059
NorthernCape	1109	375	13401	15625	1903	499
FreeState	608	1250	630	3175	2319	383
KwaZulu-Natal	974	716	1781	3778	3377	544
NorthWest	241	903	295	5145	909	1028
Gauteng	2396	2602	4317	13545	13745	2070
Mpumalanga	216	696	271	2211	758	249
Limpopo	233	320	102	342	444	41
<b>Total</b>	<b>59060</b>	<b>9552</b>	<b>30814</b>	<b>58439</b>	<b>27600</b>	<b>5875</b>
Immigrants	12711					
Emigrants						1750

**TableC6 NumbersofmigrantsinandoutoftheWesternCape:Females**

Source/ Destination	African		Coloured		White	
	In- migration	Out- migration	In- migration	Out- migration	In- migration	Out- migration
EasternCape	56172	3556	8608	11012	7769	2352
NorthernCape	1276	524	11616	12837	3554	1155
FreeState	560	813	693	1614	4134	866
KwaZulu-Natal	784	981	1664	2300	6342	1065
NorthWest	163	1029	273	4246	1584	2359
Gauteng	1861	3023	3315	10280	24684	4741
Mpumalanga	155	809	177	1335	1255	509
Limpopo	123	249	34	264	731	113
<b>Total</b>	<b>61095</b>	<b>10985</b>	<b>26380</b>	<b>43890</b>	<b>50052</b>	<b>13159</b>
Immigrants	16843					
Emigrants						1243

**Appendix D: Rates of in -migration into the Western Cape, by race group from the survey**

	Coloured(+I)	African	White
Born Western Cape and never left	85,4	17,1	44,5
Entered before 1986	7,2	21,8	21,6
1986-94	3,5	30,8	16,2
1995-98	1,7	21,1	11,3
1999+	2,2	9,2	6,4
n=	100% 676	100% 475	100% 463

*Survey executed from July – October 2001 = 8 months = 2/3 of a year      1999 - August 2001 = 2.67*  
*annualised rates in three periods:*

*0,43,41,8*

*0,45,32,8*

*0,83,42,4*

*Rates of in -migration into the Western Cape, by race group – Males only*

	Coloured(+I)	African	White
Born Western Cape and never left	86.0	15.4	45.6
Entered before 1986	7.0	22.3	21.4
1986-94	3.2	34.1	17.7
1995-98	1.4	19.5	10.3
1999+	2.4	8.7	5.0
	100%	100%	100%

*Rates of in -migration into the Western Cape, by race group – Females only*

	Coloured(+I)	African	White
Born Western Cape and never left	84.5	20.5	43.0
Entered before 1986	7.4	21.6	22.5
1986-94	4.0	25.5	11.9
1995-98	2.2	23.0	14.0
1999+	2.0	9.4	8.5
	100%	100%	100%