Extended Abstract for PAA 2019

Household Estimation in South Africa: Assessment of the Headship Method

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The number of households in a country at different geographical levels is an integral measure for planning, resource allocation and the equitable share. The number of households in a population is also used for the weighting of household surveys. This paper assesses the headship method utilized in household estimates by, (i) utilizing a constant rate or a regression; (ii) the effect of inclusion and exclusion of the institutional population, and (iii) the adoption of household or person weights. Consideration is given to using a single Census method or all three Census points. The outcome of this research is to determine the most suitable way to estimate the number of households, and to determine the average household size. As a country of destination, the study assesses the effect of migration on household size, as well as the growth of single person households in the country.

The headship rate specific for sex and age at time *t*, $h_{i,j,t}$ is expressed by the following formula:

$$h_{i,j,t} = \frac{H_{i,j,y}}{P_{i,j,t}}$$

Where $P_{i,j,t}$ is the mid-year population by sex *i*, age *j* and at time *t* and

$H_{i,j,t}$ is the number of heads of households by sex *i*, age *j* and at time *t*

In our calculations we used the ages 10 years and older. Age groups 10-19, 20-34, 35-49, 50-64 and 65+ are used. The main methodological problem in the headship rate method of projections is how to estimate accurately future levels of headship rates for sex and age. The basic assumptions about the future trends of the rate may be classified within the following four categories:

(a) Constant rate method;

(b) Extrapolative method by using annual average rates or by applying a simple mathematical formula on the basis of past trends;

(c) Regression method by using either cross-sectional or sub-national data on headship rates on the one hand, and economic and social indicators on the other;
(d) Normative approach in the Government's housing policy in accordance with its social and economic developments programmes.

Headships were available for Census1996, Census 2001 and Census 2011 (b) above. Mid-year population estimates are used for 2002-2021.In total we had three data points to work with (1996, 2001 and 2011). For each age group and males and females separately we fitted a line to the three points. The regression line obtained, where then use for interpolation (years between 2011 and 2021).

Suppose that for year t+x (x years for the base) the population projections by age and sex have already being prepared and the sex-age rates have been estimated (interpolated as indicated above), then the number of households for year *t+x* can be obtained by the following equation:

$$\sum_i \sum_j H_{i,j,t+x} = \sum_i \sum_j P_{i,j,t+x} h_{i,j,t+x}$$

The number of households was in the first place estimated for the four population groups separately to obtain the total households in South Africa in the given sex and age groups (national). For the provinces we did not include population group as the mid-year pop estimates are not projected in that way, but estimated the number of households in every province and age group. The provincial data were adjusted in each sex and age group to add to the total estimates (obtained from national population group estimates).

For the district municipality and metros, we estimated the number of households in every municipality and metro by sex and age group. The municipality and metro data were adjusted in each age group and sex to add to the provincial estimates (as calculated above). For the local municipality, we estimated the number of households in every local municipality by sex and age group. The local municipality was adjusted in each age group and sex to add to the district estimates (as calculated above). The mid-year population estimate (MYPE) is used in the method of calculating the household estimate

(HHE). The MYPE includes institutional populations. Consideration must then be given when using Census data on whether institutional population is included or excluded. The tendency may be toward excluding the institutional population and focusing on housing units as the focus in on head of households. However, one should consider that the MYPE accounts for all housing units and all populations.

Methods considered

Four applications where considered in this exercise:

1. Using a constant rate which is calculated from Census 2011, which includes institutions
2. Using a constant rate which is calculated from Census 2011, which excludes institutions
3. Using the regression headship method using Censuses 1996, 2001 and 2011, which includes institutions
4. Using the regression headship method using Censuses 1996, 2001 and 2011, which excludes institutions

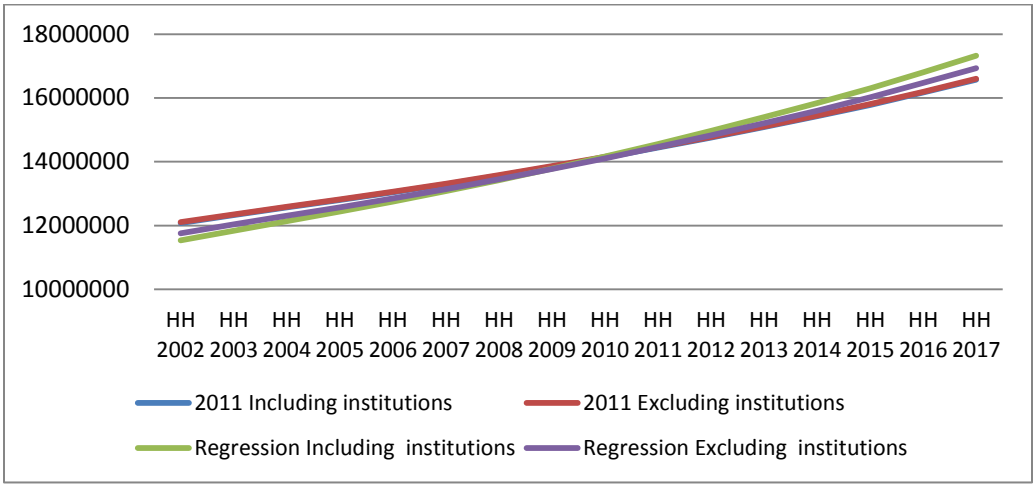
Table 1 indicates the growth rates of households from 2002 to 2017 and Figure 1 shows the number of households from 2002 to 2017. The growth rate from application 1 and 2 (using a constant rate which is calculated from Census 2011, including and excluding institutions) led to similar growth rates, which are lower than when applying 3 and 4.

Table 1: Growth rate using different methods to calculate household estimates

Application	**Growth 2002-17**
1. 2011 Including institutions	0,37
2. 2011 Excluding institutions	0,37
3. Regression Including institutions	0,50
4. Regression Excluding institutions	0,44

The estimates from application 1 and 2 are almost similar hence then lines fall on each other. However, it can be seen that application of 3 and 4 lead to a steeper growth.

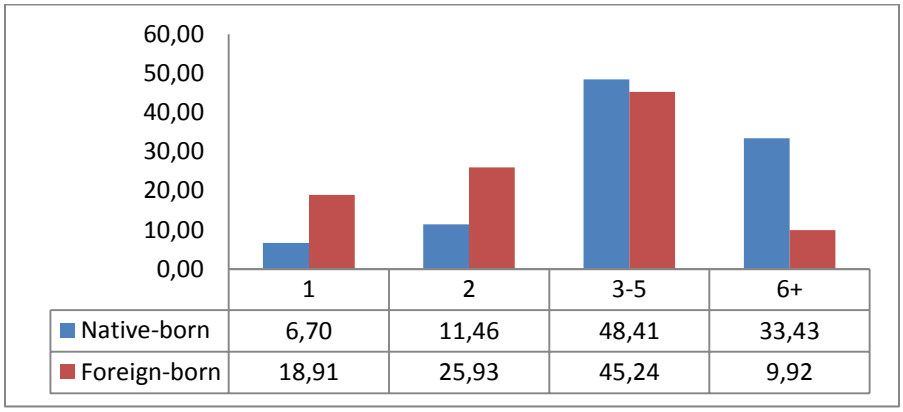
Figure 1: Number of households from 2002 to 2017 using the different applications



Household size

Results from Figure 2 indicate that a higher proportion of the foreign-born population (18,91%) than native-born adolescents (6,70%) lived in single-person households. This trend is also true for 2-person households. A higher proportion of native-born population however, lived in households of six persons or more (33,43%) than foreign-born population (9,92%). This indicates that the native-born population lived in more crowded households than their foreign-born counterparts. It can be deduced then that migrant housing selectivity will increase the number of households in South Africa.

Figure 2: Distribution of native and foreign-born populations by household size, Community Survey 2016



	1	2	3-5	6+
Native-born	6,70	11,46	48,41	33,43
Foreign-born	18,91	25,93	45,24	9,92