ON RAPID INCREASE OF HOUSEHOLDS IN SOUTH AFRICA AND IMPLICATIONS ON MANAGEMENT OF DELIVERY OF BASIC SERVICES

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Abstract

Official sets of data from Statistics South Africa in the post-apartheid era suggest a general trend of rapidly increasing numbers of households against the population of individuals which is increasing at a decreasing growth-rate. Using multivariate statistical methods, this study investigates the interaction of demographic variables and their impact on the rapid increase in household numbers in South Africa. This study also examines the impact of the rapid increase of households to delivery of basic services. The results provide a scientific confirmation that the rapid increase could best be attributed to fragmentation of households. The paper recommends that the fast pace of household growth in South Africa should adequately be factored into household-based service delivery models of government at least to the next decade as the trend is expected to continue into the near future.

Keywords: Households, Population, Rapid Growth, Natural Increase, Net Migration, Household Size, Fragmentation, Service Delivery

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1. Introduction

The household is an important point of access to a number of essential services such as water, sanitation, housing, electricity amongst other services. Therefore, deeper understanding of the dynamics of household formation and dissolution in South Africa is vital for effective planning, monitoring and evaluation of service delivery especially for those services of which the household is the unit of access.

There are divergent views on the correct definition of the household. For the purpose of the article the working definition of household for the census and surveys given by Statistics South Africa (Stats SA) is adopted since most of the data sets for the analysis in the article are from Stats SA surveys.

"A household is a group of persons who live together and provide themselves jointly with food and/or other essentials for living, or a single person who lives alone (Statistics South Africa, 1995 - 2006)".

In the recent years, there has been a rapid increasing trend in household numbers in South Africa especially when compared with individual population. The 1996 census recorded about 9 million households, this number increased by almost 60% to about 14.4 million households in 2011 as revealed by the 2011 census while the individual population increased by about 28% from 40.5 million to 51.7 million over the same period (Statistics South Africa, 2012). The rapidly rising number of households puts increase on the yearly additional demand for household-based services.

The problem is not that households are increasing but rather the manner of increase in relation with the base population. Household numbers are bound to increase especially for a growing economy like South Africa where householders are increasingly getting empowered to leave home. Even in these instances, exponential growth pattern is a good subject for investigation. Some researchers on this issue opine that the exponential growth phenomena in the number of households in South Africa could best be attributed to household mitosis or fragmentation (van Aardt, 2007). This opinion could mainly have been out of mere observations from household data and thus a robust empirical verification becomes necessary. This paper explains how the interaction of various factors has played out through the main components of demographic change to influence the changing household structure and the rapid increase of households in South Africa and how the trends affects access to household-based services in recent times in South Africa.

In the light of the above discussion, the objectives of this article are:

- To explain the drivers of the rapidly increasing trends in household numbers in South Africa with regard to main components of demographic change.
- To elucidate the impacts of rapid increasing trends in household number would have on demand and access to essential services in South Africa.

The analysis is done using multivariate statistical method of least squares analysis; this is implemented on the platform of the Statistical Package for the Social Sciences (SPSS) regression models. The initial hypothetical postulation was that the rapid increase in household numbers in post-apartheid South Africa is driven by the main components of demographic change, namely; changes in the natural increase in the population and net migration.

This paper is organised into five sections. In section one the background of the paper and research objectives were provided, section two discusses changing household structure in South Africa linking the phenomenon to relevant literature and conceptual framework. The methodological approach to the study and data sources is presented in section three. Section four present dwells on the results of analysis and discussions around the results especially the impact of the findings on service delivery. Concluding remarks and recommendations are presented in section five.

2. Changing Household Structure in South Africa

For most instances of demographic study there has been little emphasis on the demographic unit (Household) intermediate between the individual and the larger community in an area, state, province, country or nation. Greater emphasis has been on two units; the individual and the general population. However, for certain demographic analysis an intermediate unit between the individual and the lager population remains very vital for development planning. For forecasts of total population, of the future labor force, of pension weight, of social grants, it is satisfactory to work at the level of individual unit. However, individual population information alone does not reveal how the general population fits into for instance the housing supply, water/sanitation demand and supply (van Imhoff *et al*, 1995).

During the apartheid era in South Africa restriction from geographical mobility and access to land were imposed onto the dominant black Africa race. This to a great extent changed the pre-colonial family and household formation system in South Africa. To this Amaoteng (2007) argues that the situation necessitated urban-rural homesteads and internal circular migration as a survival strategy especially for the migrant mine workers who were predominantly males. This created a deficit of males in the rural areas and thus marriage was either delayed or avoided. In the cases where there was marriage, the man often left the wife and children behind. The situation led to household/family patterns as female-headed households, out-of-wedlock births leading to unstable households among the dominant African population (Amaoteng, 2007).

Against this backdrop, a culture of tiny household pattern gradually became a norm against the African traditional setting in which households normally comprised of both nuclear and extended family members. The situation was further intensified with the attainment of democracy in 1994, the new sense of freedom meant massive movement of economic in-migrants into the urban cities leading to the formation of new households almost at an exponential rate as shown in Figure 1.

Figure 1. Household Trends in South Africa

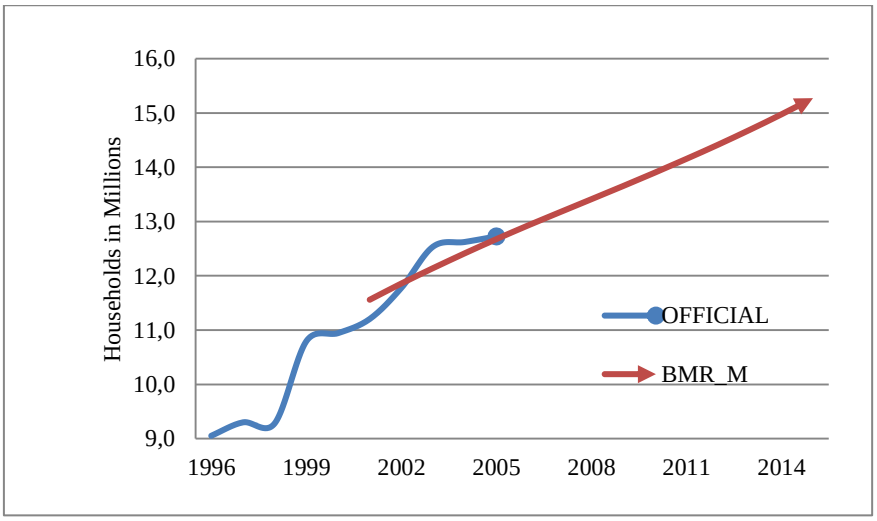
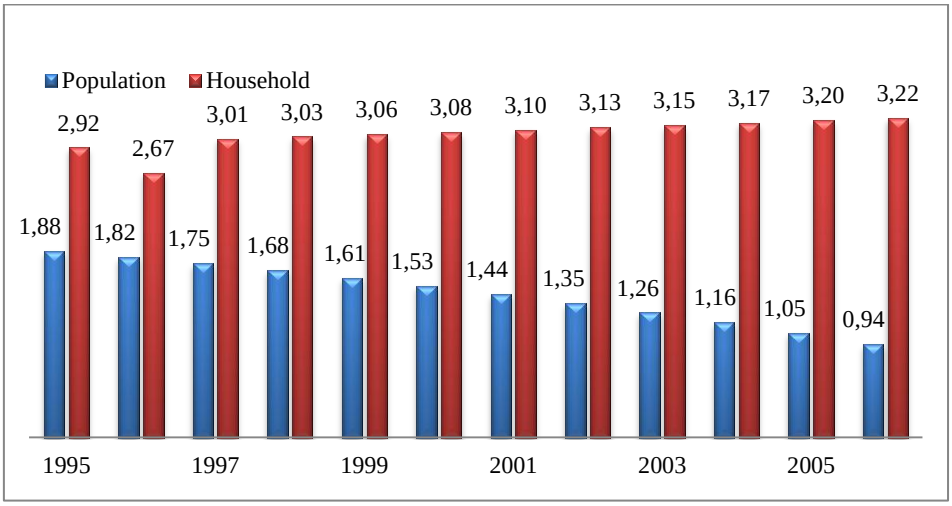


Figure 1 shows plots of total household numbers as obtained from the national surveys from Statistics South Africa 1995 to 2006 and household projection model (van Aardt, 2007) from the Bureau for Marketing Research (BMR). The general trend in Figure 1 shows almost an exponential pattern of growth of household number, however, the individual population has comparatively been growing almost at a steadily decreasing growth rate as shown in Figure 2.

Figure 2. Comparing Population and Household Growth Rates



The general trend in Figures 1 and 2 suggest a rapid increase in household numbers in the post-apartheid South Africa. This is supported by the empirical evidences from the works of Amoateng (2007) and van Aardt (2007) which reflect that in the post-apartheid era the proportion of one-person households has increased between the census period 1996-2001 from 15% to 16% respectively over the period. This increase is believed to have reached a high of almost 18% in 2007. Conversely while this remarkable increase is noted for single-person household, the proportion of couple-based households decreased from about 42% in 1996 to about 36% in 2001. A substantial increasing trend could also be noted for household type with nonrelated-persons which increased from about 1.5% in 1996 to almost 5% in 2006 (van Aardt, 2007). This implies that there could be an evolution of leaving arrangements that differ from the conventional status quo in the recent times in South Africa in which household size is getting smaller in time.

The declining household size and faster growth of households in South Africa is in conformity with the global trends. According to Bongaarts (2001) in the past century, household structures in both the developed and developing world have undergone much transformation. Household size declined from an average of 4.7 in 1900 to 2.5 in 2000 for the developed countries, while the decline for the developing countries is about 6.0 in 1900 to 4.3 in 2000 (Bongaarts, 2001).

Conceptually, the above phenomenon could be linked to global progression from the so-called The First Demographic Transition (FDT) to the Second Demographic Transition (SDT). Demographers argue that towards the end of the FDT households in all parts of the world would tend towards the nuclear type comprised of married couples and their children (Verdon, 1998). However, the SDT (current situation) is a new development that brings sustained sub-replacement fertility and less stability of households with an evolution of new living arrangements other than marriage and psychological detachment of marriage and procreation (Verdon, 1998). For South Africa these may have played out through a number of variables and recent events to produce the types of households as observed in the recent times as the child headed household, skip generation household, increasing single person household and even the so-called headless households (Cross, 2009). These could be linked to factors such as; the scourge of HIV and AIDS, increasing internal migration as people migrate in mass to urban and commercial cities for economic engagement, this is evident in the 2011 census report which reveals that the province of Gauteng has overtaken KwaZulu-Natal as the province with the largest population mainly due to massive internal migration to Johannesburg (Stats SA, 2012).

3. Data Sources & Methodology

This study is a secondary data analysis using quantitative methodology. The researcher collected historical quantitative data from different sources and synthesized them to establish trends and patterns of events in relation to household dynamics in South Africa and implications for service delivery.

3.1 Data and Data Sources

The bulk of data used for this study are from the South African national household surveys by Statistics South Africa, which have been accessed through the national data archive. The surveys collected household-based data on the following themes; demographics, household services, income, expenditure, land access and use and general perceptions of household dwellers. The surveys used are the October Household Surveys from 1994 to 1999, the General Household Surveys from 2002 to

2005, the Community Surveys of 2006 and 2007, the South African National Censuses of 1996 and 2001.

Information was also obtained from some local and international research bodies and institutions. These are the population and household projection data from the Bureau for Marketing Research at the University of South Africa date?, South African demographic data from the Population Reference Bureau (2000 to 2010) and South African migration data from the United States Census Bureau (1995 to 2008).

3.2 Fitting the Regression Model

This study basically uses multivariate statistical techniques to explore the relationship between the response variable and the control variables. The dependent variable is annual increase in household numbers while the independent variables are annual natural increase in the population, annual net-migration and the computed interacting variable for annual household fragmentation.

Exploring the data-sets, SPSS frequency tabulations and descriptive statistics were implemented. Basic computation of average household sizes and household headship rates were done to prepare the data for the analysis. The average household size is basically the quotient of total population and total household number for a given year. The headship rate gives an indication of the proportion of heads of households in a population for the year of interest. As each household is assumed to have just one head, the number of household heads in a state equals the number of households (O'Neill and Jiang, 2007). The rate can only be in the range 0 to 1 and calculated as follows:

$$Headship\ Rate = \frac{\text{Household Heads}}{\text{Population}} \quad (1)$$

and so total household would be

Total Households = (Headship Rate) x (Population) Total Households (2)

The headship rate and the average household size are used for the computation of the household fragmentation variable as explained later in this section. For investigation of the interaction of demographic variables and their impact on the rapid increase of household numbers in South Africa, we used the method of least squares through the SPSS multiple regression analysis.

The standard least squares model is given as

$$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots \beta_k x_{ki} + \epsilon_i \quad (3)$$

where y_i represent the response variable, the β_s represent the coefficients for the predicting variables the x_i, while $\boldsymbol{\epsilon}_i$ represents an error term (SPSS Inc, 1999). Ultimately we want to build a model for *y* with the line of best fit, i.e. of least (squared) residual between observed values and predicted values. For this analysis we would require consistent historical data on trends in household numbers, fertility, mortality, emigration and immigration. For the household numbers we use the national household survey data from the October Household Surveys (1994 - 1999) to the later General Household Surveys (2002 – 2005) from Statistics South Africa. Noting that the data from these surveys are inconsistent, outliers were replaced with imputed values. From the obtained consistent household numbers and mid-year population estimates, annual increase in household numbers, average household size and household headship rates are computed. The fertility and mortality data are obtained from mid-year population estimates from Statistics South Africa and the U.S Census Bureau. From these data sets we compute estimates for Natural Increase in the population for South Africa which is the difference between fertility and mortality for each year. The Net-migration (difference between immigration and emigration) data was obtained entirely from the U.S Census Bureau because there is a general lack of quality migration data from local sources in the developing countries. In Table 2 we present the input variables and data for the SPSS regression analysis.

Table 1. Variables and Data for the Least Square Model

Year	*Ad HH*	*NI*	*NM*	*HH Size*	*H Rate*
1995	393,522	687,000	-193,000	4.6000	0.2232
1996	410,616	655,000	-29,000	4.3793	0.2283
1997	428,452	612,000	-22,000	4.2811	0.2336
1998	447,063	560,000	-23,000	4.1852	0.2389
2000	466,482	500,000	37,000	4.0914	0.2444
2001	486,745	438,000	49,000	3.9997	0.2500
2002	507,888	373,000	143,000	3.8550	0.2594
2003	529,949	310,000	155,000	3.8406	0.2604
2004	552,969	257,000	214,000	3.8316	0.2610
2005	576,989	224,000	210,000	3.8278	0.2612
2006	602,052	106,000	247,000	3.8283	0.2612
2007	628,203	187,000	240,000	3.8333	0.2609
2008	655,491	161,000	243,000	3.8399	0.2604

Source: Computed from Stats SA Household Surveys 95 - 07

In Table 1 *Ad HH* represents estimates for annual additional households, *NI* represents estimates for natural increase in the population (the difference between total births and total mortality), *NM* represents estimates for net migration (the difference between immigration and emigration), *HH Size* represents average household size and *H Rate* represents the headship rates. It is notable that most of the variables in Table 1 are in the scale of hundreds of thousand therefore some transformation need to be done to reduce the data to a manageable scale for the SPSS regression model.

Table 2. Variables and Data for the Least Square Model

Year	*logAd_HH*	*logNI*	*logNM*	*HH_frag*
1995	5.5950	5.8370	3.8451	0.04853
1996	5.6134	5.8162	5.2330	0.05214
1997	5.6319	5.7868	5.2504	0.05456
1998	5.6504	5.7482	5.2480	0.05709
2000	5.6688	5.6990	5.3747	0.05974
2001	5.6873	5.6415	5.3962	0.06251
2002	5.7058	5.5717	5.5353	0.06729
2003	5.7242	5.4914	5.5502	0.06780
2004	5.7427	5.4099	5.6170	0.06811
2005	5.7612	5.3502	5.6128	0.06825
2006	5.7796	5.0253	5.6503	0.06823
2007	5.7981	5.2718	5.6435	0.06805
2008	5.8166	5.2068	5.6464	0.06782

Source: Computed from Stats SA Household Surveys 95 - 07

In Table 2 the data is reduced to a manageable scale for ease of computation and also to improve the normal spread of the data as a basic assumption of the regression model, we do a log transformation of the affected variables controlled for inconsistency. We also create an additional variable (*HH frag*) out of the variables representing household size and headship rates. The quotient of these two variables forms the additional variable which is an interaction variable that gives an indication of the influence of household fragmentation. It could be noted from Table 1 that some of the values for net-migration have negative values, a constant figure of 200,000 was added to each value in the series to control for the negative values before the log transform and this figure was chosen to be able to eliminate all the negative values in the series.

Graphs of lines of access to water, housing and sanitation and their respective backlogs were computed from census and household data as mentioned above, the lines were projected forward to 2010 using linear time series projection.

Pearson Correlation technique was also used to correlate the trend in annual additional household increase and annual backlogs for water, housing and sanitation services.

4. Results and Discussion

In the regression equation the variable *logAd HH* for annual additional household numbers is the dependent variable while the three other variables (*logNI, logNM* & *HH frag*) for natural population increase, net-migration and household fragmentation respectively are the predictors for increase in household numbers. In our case the regression equation is

$$Ad\_HH = \beta_0 + \beta \log NI + \beta \log NM + \beta \log HH\_frag + \epsilon_{i.} \quad (4)$$

Table 3. SPSS Output Results for the Multiple Regression Model

Variables	Coefficients	*β*	*Sig(α)*
Constant	6.215	22.537	0.000
Natural Increase	-0.145	-4.043	0.003
Net Migration	0.007	0.443	0.668
Fragmentation	4.272	2.608	0.028

Source: Computed from Stats SA Household Surveys 95 - 07

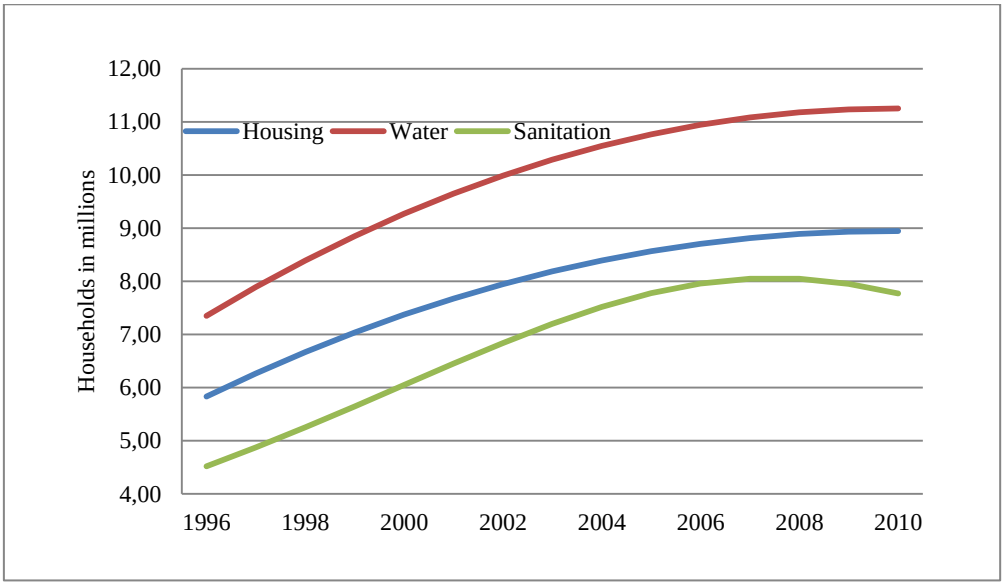
From the above results in Table 3 it could be observed that the partial regression coefficients were statistically significant for both Natural Increase (β = *-0.145*, t_{268} = *-4.043*, p < *0.05*) and Household

Fragmentation ($\beta = 4.272$, $t_{268} = 2.608$, $p < 0.05$), however, that negative value for the coefficient for natural increase and the negative partial correlation coefficient (-0.947) indicate an inverse relationship between the natural increase in the population of South Africa and the annual household increase. The partial regression coefficient for Net Migration ($\beta = 0.007$ & $p > 0.05$) indicates no statistically partial regression with annual household increase. The overall goodness of fit statistic ($R^2 = 0.954$, standard error of estimate = 0.017) indicate that the partial combination of the control variables in the model explains to a satisfactory measure the variability in annual household increase.

These outputs indicate that the main driver of the rapidly increasing household numbers in South Africa is most likely fragmentation or household mitosis. This is an empirical confirmation of the view of van Aardt, (2007). Even though net-migration appears to be statistically insignificant, one cannot rule out the influence of emigrants especially from the neighbouring Southern African countries in the light of the socioeconomic crisis in neighbouring Zimbabwe and the fact that South Africa is increasingly becoming a choice destination for economic migrants from the rest of Sub-Saharan Africa. This needs further research.

Regarding service delivery and the reporting of progress in service delivery, the fast growth of households as a result of fragmentation could imply that there could seemingly be a reflection of progress when the trends of access to household-based services are reported using percentage scores (as in most reports) as delivery is accelerated, but that may not translate to an equitable measure of progress when reported in real numbers as a result of the fast pace of increase in household numbers. For instance the 1996 census data show a backlog of about 18.8% of 9 million households in 1996 with regard to access to piped water; this translates to about 1.6 million households without piped water in 1996 (Statistics South Africa, 1998). The percentage score for 2007 using the 2007 CS data implies a substantial decrease in the deficit of piped water access to about 11.4%, but because of the fast pace of increase in household numbers the actual decrease is not commensurate with reported percentage scores. The actual situation in number terms is that 1.4 million households had no access to piped water in 2007 despite considerable efforts in the delivery of water (Statistics South Africa, 2008). Housing statistics present more clearly the effect of the rapid household growth on service delivery. The 1996 census shows that about 35.6% of 9 million households in 1996 had no access to formal housing (Statistics South Africa, 1998); this translates to about 3.2 million households without formal housing in 1996. The percentage score for 2007 implies a substantial decrease in the deficit of housing access to about 29.5%, but because of the fast pace of increase in household numbers (12.5 million in 2007) the actual situation in number terms is that 3.7 million households had no access to formal housing in 2007 which is actually an increase in housing backlogs in real terms from 1996 to 2007 despite considerable efforts in the delivery of housing as shown in Figure 3 below.

Figure 3. Lines of Access to Water, Housing and Sanitation

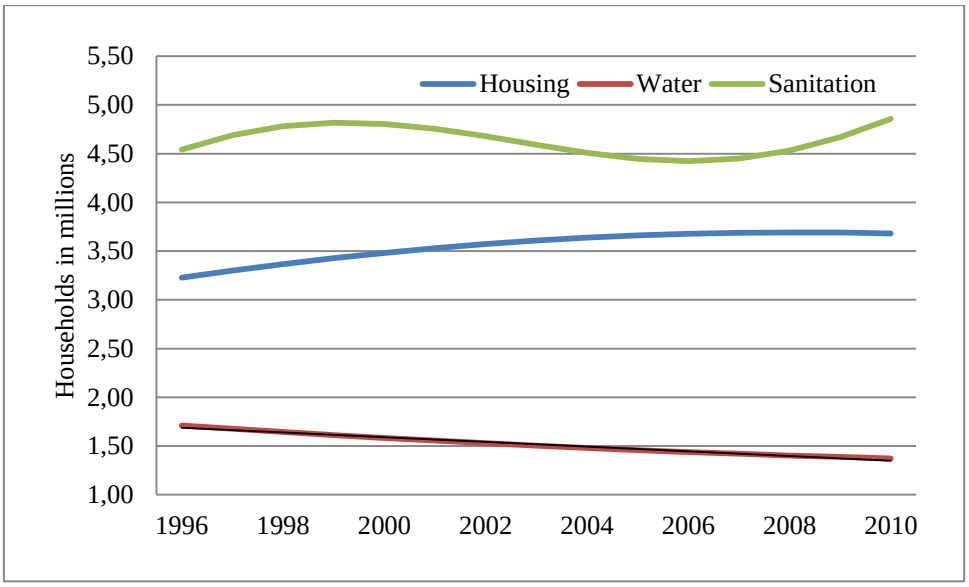


The lines of households access to water, housing and sanitation have shown remarkable increase over time. Access to water seems to have improved much more than housing and sanitation. Even though the advancement in water may be attributed to the fact that many households access water from community stand pipes which are less than 200 metres away as

opposed housing for instance which requires one housing unit to a specific household.

Looking at backlogs for water, housing and sanitation, Figure 4 for backlogs shows that housing backlogs have been on the increase over time from about 3.2 million households in 1996 to about 3.72 million in 2010. Sanitation recorded remarkable improvement during the first decade of democracy in South Africa. This could be partly due to the roll out of ventilated improved latrines (VIP) during the late 1990s and early 2000s. The recent fast increasing trend in sanitation backlog could be partly attributed to the fill-up of the VIP especially for area where maintenance and emptying of VIPs are lacking. The downwards trend in the water backlog as explained earlier could be attributed to many household accessing water from community stand pipes.

Figure 4. Lines of Backlog of Water, Housing and Sanitation



An important indicator of the ability of government and other stake holders towards achieving set targets in terms of various services is a measure of the relationship between backlog in those services and annual additional demand as a result of increasing household numbers.

Table 4. Correlating Annual Additional Households & Service Backlogs

		Ad_HH	Wat_Blg	House_Blg	Sani_Blg
Ad_HH	Pearson Correlation	1	-.988**	.958**	.883**
	Sig. (2-tailed)		0.00	0.00	0.00
	N	12	12	12	12

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4 indicates an inverse relationship (*Pearson Correlation = -0.988, p = 0.00*) between annual additional household and water access backlogs. This implies that water backlogs are decreasing as households increase in time. Therefore, with community standpipes within 200 metres from households as an acceptable operational standard for water access, government targets in the sector seem feasible to achieve. However, housing and sanitation backlogs show high positive correlations with annual additional households. The means that backlogs for housing and sanitation are increasing with increase in household numbers, for these services targets may not be reached without a significant increase in delivery that could mitigate the effect of rapidly increasing household numbers.

5. Conclusion

This paper emphasizes the importance of the household as a socioeconomic unit for demographic analysis and development planning. The paper further highlights the structural changes in household patterns in South Africa with the average household size getting smaller over time. Even though studies suggest that globally average household sizes are decreasing over time, the issue with South Africa is that the resulting (almost exponential) trend in the

household line of growth is not commensurate with the dynamics of the individual population.

This paper provides empirical evidence to the opinion of some scholars on the subject that the rapid growth in household numbers in South Africa could be attributed to household Mitosis. The concept of Mitosis or Fragmentation of households has not been previously tested against the main components of demographic change to explore their respective contributing effects on the rapid growth phenomena respect. The results confirm that indeed fragmentation of household is the main driver of the rapid increase in households in South Africa, while natural increase in the population has an inverse effect on the rapid increase of households. Even though net-migration reflected a statistically insignificant coefficient, the surge of migrants into South Africa cannot be overlooked; further research with most recent data is needed in this regard.

Service delivery evidently has received high priority in post-apartheid regimes. Rapid household growth puts enormous pressure on the service delivery programmes for household-based services. Understandably, the rapidly increasing trends may not continue forever, the trends may not change in the near future. Further studies are needed to investigate the possible saturation point and time to the saturation point. Meanwhile adequate provision should be made in the service delivery models of government and other stake holders for this rapidly increasing phenomenon into the near future in order for the various targets of universal access to basic services to be achieved in South Africa. This would in a nutshell entail the numerical apportionment of at least an average of three hundred thousand new delivery units per annum to compensate the additional households in addition to the annual delivery units that are directed towards dealing with historic backlogs especially for housing and sanitation delivery.

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