



University of Pretoria
Department of Economics Working Paper Series

**South African Trends in Health Outcomes and Health-related Behaviour:
Evidence from Repeated Cross-Sectional Surveys**

Kehinde Omotoso

University of Pretoria

Steven F. Koch

University of Pretoria

Working Paper: 2016-50

June 2016

Department of Economics
University of Pretoria
0002, Pretoria
South Africa
Tel: +27 12 420 2413

South African Trends in Health Outcomes and Health-related Behaviour: Evidence from Repeated Cross-Sectional Surveys*

Kehinde Omotoso[†] Steven F. Koch[‡]

June 6, 2016

Abstract

This study examines trends in ill-health status, medical aid coverage and public health care facility utilisation across a spectrum of socio-demographic variables, using population-weighted General Household Surveys (GHS) covering the years 2004-2014. As there are few obvious patterns in the raw health variables' time series, the analysis, which is descriptive in nature, relies upon both parametric and nonparametric analysis to smooth the time series in order to outline a few general trends. Over time, medical aid coverage and the general population's 'preference' for public health care decreased by 0.2% and 0.1% per year, respectively, while reports of ill-health status increased by 0.4% annually. Moreover, the probability that an individual, who is covered by a medical aid scheme, would utilize public health care decreased by 44%.

*The authors would like to thank the World Health Organization for their support. All conclusions and discussions represent the views of the authors, and not necessarily the WHO.

[†]Department of Economics, University of Pretoria, Private Bag X20, Hatfield 0028, Republic of South Africa. kehinde.omotoso@up.ac.za

[‡]Department of Economics, University of Pretoria, Pretoria, Republic of South Africa; (0) 27-12-420-5285, (F) 27-86-691-2749. steve.koch@up.ac.za

1 Introduction

The importance of measuring health outcomes and associated health-related behaviour for monitoring health care system performance is well-established (see Bradshaw, 2008; Bradshaw et al., 2000; Coovadia et al., 2009; Culyer and Wagstaff, 1993; Mackenbach et al., 2008). Health policies and reforms serve as significant and potent tools for improving health outcomes and health-related behaviour. In many cases, these policies are specifically targeted to improve sanitation and other social determinants of health, reduce the burden of disease, improve equitable access to basic health services and/or ensure universal health care coverage in an attempt to guarantee financial risk protection in health service utilisation. In order to understand which areas to target or which policies have been beneficial, proper and timely assessment of key health outcomes have the potential to underpin goal-setting and policy direction (see Kozhimannil et al., 2012; Rathod et al., 2014), and may represent valuable feedback for policymakers. In this research, we provide a dynamic assessment of key health outcomes in South Africa, with the primary purpose of indirectly assessing health sector performance. We also relate that performance to policy objectives over the time period to determine the level of concordance between broad outcomes and stated objectives.

South Africa is committed to the health of her citizens and equitable access to better health care services (Booyesen, 2003). This right to health is rooted in the South Africa's Constitution, which specifies that 'everyone has the right to have access to health care services, including reproductive health care' (see South Africa Constitution, 1996, Section 27(1)(a)). Since 1994, which marked the end of Apartheid, the South African government has embarked on a number of health care system reforms, including restructuring and re-engineering policy to redress some of the damaging impacts of Apartheid, and creating a more coherent and unified national health system. These reforms and policies have been documented systematically (see Chopra et al., 2009; Dhai, 2011; Govender et al., 2013; Harrison, 2009; Ruff et al., 2011), and prioritised in the South African government's development agenda; furthermore, an increasing share of general government expenditure is being allocated towards their implementation (Christian, 2014).

While it is obvious the South African government aims to improve health outcomes and achieve other health goals, such as equitable provision and financing, focussing on the availability and affordability of health care misses other vital issues that are relevant when describing the performance of the system. For example, from 1997 to 2006, mortality increased, although it

has been declining since 2006 (Statistics South Africa, 2014). Relatedly, the burden of disease associated with AIDS and TB, along with a persistently high fatality rate from injury, has been increasing. In other words, health outcomes in the country are poor, relative to total health expenditure (Bradshaw et al., 2003; Harrison, 2009). Within the context of affordability, even though some studies suggest that free primary health care, introduced in both 1994 and 1996, increased registration and facility utilisation (see Bayat and Cleaton-Jones, 2003; Harrison, 2009; McCoy and Khosa, 1996), more recent research suggests the policy did not translate as directly into increased utilisation when confronted by need, i.e., following illness or injury, (see Brink and Koch, 2015; Koch and Racine, forthcoming). Over time, the initial successes documented by McCoy and Khosa (1996) and Bayat and Cleaton-Jones (2003), amongst others, dissipated, given the resources available in the system (Harrison, 2009). Thus, it remains unclear, even, whether improved affordability has resulted in the improvements expected.

In many instances, policymakers are more concerned over availability and affordability than the more relevant question, which is whether or not users prefer to utilise such publicly-provided services in the event of illness, a concern that arises Brink and Koch's (2015) and Koch and Racine's (forthcoming) analysis. Given policymaker concerns, the demand-side health issues are largely pushed aside, noticeably absent from policy feedback and are, therefore, insufficiently researched (see Christian, 2014; McIntyre et al., 2009; Thiede et al., 2007). According to Christian (2014), this is particularly true with regard to the access dimension of the health care system. Although a number of studies (see Ataguba et al., 2011; Bradshaw, 2008; Burgard and Treiman, 2006; Christian, 2014; Gilson and McIntyre, 2007; Harris et al., 2011; Harrison, 2009; Koch, 2009; Nteta et al., 2010) have examined South Africa's health care system, little is known about demand-side behaviour, and even less is known about the dynamics of that behaviour.

Exceptions include: Bradshaw (2008) examined the trends in the broad determinants of health in South Africa. She found that extreme wealth inequalities and high levels of unemployment play an important role in the poor health outcomes; also Christian (2014) did some work.. we need to separate ourselves a bit better, I think here; Koch (2009) also has a bit to say, but not really so much. Although it is obvious that newer data is available and used for the first and last papers, what about the second (Christian)?

these studies seldom focus specifically on trends in health outcomes and health-related behaviour. Moreover, more recent data is available. Therefore, an examination of the trends and determinants could shed additional light. Hence, our focus in this study is on the patterns and

determinants of the demand-side issues associated with access to medical aid coverage, health status, health-seeking behaviour, as well as preference for the utilisation of public health care facility in the event of illness. In our analysis, we give some consideration for the peculiarity of the relationship between medical aid coverage status and choice of either public or private health care facility.

Examining trends in a set of health related variables across a range of socio-demographic variables, to some extent, provides a basis for measuring achievement, or otherwise, of the aforementioned goals of ensuring improved health and equitable access to better health care services. Moreover, if South Africa is to make progress towards the new Sustainable Development Goals (SDGs) and universal health care, deficiencies in the health care-related areas of the SDGs need to be identified for appropriate health policy interventions. In this study, particular attention is paid to trends and dynamics that are observed in health status (measured by ill-health), health treatment-seeking behaviour (measured by ‘stated preferences’ for public health facilities, rather than ‘revealed preferences’) and health insurance (measured by medical aid scheme coverage); post-Apartheid health reforms and policies serve as the backdrop to these dynamics, although it is not possible to uncover the causal relationship between any one policy and the health trends that are observed and described, below.

2 The Data

Data from the GHS were analyzed using Stata 14 (StataCorp, 2015). We do not worry about causality at this stage; rather, we focus on the patterns within the data over the surveys in an effort to uncover stylised facts that might be revealed. Empirical estimates include simple percentages, some graphed for ease of reference, along with parametric (logit) and nonparametric regression (lowess). Both the logit and lowess were used to examine medical aid coverage, ill-health status and preference for public health facility utilisation, which are all dichotomous variables. In the logit regression model, an additional set of parametric estimates included interaction terms, allowing for socio-demographic differentiation across the years. For the analysis, sample weights were used to reflect the survey methodology, and these weights were adjusted to account for pooling 13 years of data.

2.1 Data Source

The data used in this analysis was sourced from General Household Surveys (GHSs). The GHSs are repeated cross-sectional household surveys collected annually by the national statistical agency, Statistics South Africa (StatsSA), with new samples drawn each year (Statistics SA, 2014)¹. The annual survey collects a range of demographic and socio-economic information on households and individuals across the country’s nine provinces. Survey questions relate to housing services, social services, socio-demographic information, labour markets, and household tourism activities. Most pertinent to this analysis, there is a short series of health-related questions covering illness, injury, categories of disease/illness, health care treatment-seeking behaviour, the level of satisfaction with health facilities and access to medical aid coverage, amongst others.

Each year, the sample includes approximately 30,000 households, and that sample follows a multi-stage stratified design, such that, each sample is representative at both the national and provincial levels within any year; population weights are available in the surveys for both households and individuals. However, combining the data across the years does require care, due to differences in the underlying sample frame. For the 2002 to 2011 GHS datasets, demarcations for the 2001 census served as the basis for sampling design and enumeration areas, although there was a need to adjust due to provincial boundary changes in 2006 and 2011. The 2012-2014 GHS datasets incorporate the 2011 census. A two-stage weighting procedure was applied to the GHS datasets. Weighting and benchmarking were also adjusted for the provincial boundaries that came into effect in 2006 and 2011, making the data from GHS 2002 to GHS 2014 comparable (Statistics SA, 2014)². To account for the different survey designs among the datasets used in this paper, we use the adjusted survey weights provided by StatsSA, but modify them for use across multiple surveys.

As suggested earlier, this study utilized thirteen sequential survey waves (2002-2014)³. Information collected in the GHS that is consistent across all the surveys and relevant for the analysis includes: age; gender; race (African Black, Coloured, Asian/Indian and White); marital status (married, widow/widower, divorced/separated and single); household expenditure

¹The GHS datasets are publicly available and could be accessed from https://www.datafirst.uct.ac.za/dataportal/index.php/catalog/526/get_microdata

²For details on the derivation of the GHS weights and other adjustments made in the datasets, see respective survey metadata files and technical notes’ sections of the statistical release - <https://www.datafirst.uct.ac.za/dataportal/index.php/catalog>

³The datasets were cleaned by excluding “don’t know’s”, as well as other unspecified responses in variables relevant for our analysis

(in five quintiles);⁴ employment status; highest level of education completed (no schooling, less than diploma, diploma/certificate, university degree, and postgraduate degree); province; urban/rural setting; illness/injury status; categories of disease for the ill; health facilities utilisation/preference; disability and access to medical aid coverage.

In the surveys, health status is based on whether or not the respondent suffered from any illness or injury during the past month. Illness was further investigated by asking those who reported to have suffered from an illness to specify what type of illness or disease they suffered; they were able to select from a set of binary-coded categories of diseases. In the same vein, medical aid coverage status was measured by asking respondents whether they were currently covered by a medical aid or benefit scheme or other private health insurance at the time of the survey. Those answering in the affirmative are classified as medically insured, while those answering in the negative were categorized as uninsured.

Furthermore, in some years (2002-2008), respondents were asked if they sought treatment or consulted a health worker, e.g., a nurse, doctor or traditional healer, as a result of the illness. If treatment was sought, further probing occurred, as respondents were asked where the consultation took place; whether in private or public health facilities. Since this line of questioning was not consistent across the surveys, a different indicator of health facility ‘choice’ is examined, instead. Specifically, respondents (from 2004-2014) were asked if they would seek care in either a public or private health facility in times of illness. In this research, we refer to the responses received as a ‘preference’ for public or private care, even though it does not represent revealed preferences.⁵ Given that this latter query was available for more years, our analysis focuses on these ‘preferences’. In addition to questions about health facility usage or preference, there are a number of questions related to illness and disability.⁶ However, neither disabilities nor illnesses are incorporated in the following analysis. A number of other questions were also asked in these surveys that are related to health outcomes. For example, reasons

⁴Expenditure category values (R0 - R399, R400 - R799, R800 - R1199, R1200 - R1799, R1800 - R2499, R2500 - R4999, R5000 - R9999, R10000 or more per month) did not change over time in the surveys; thus, these are nominal. We used the quintiles values, rather than reported values for the analysis, which allows for the values to be interpreted as relative expenditure in any year. Intertemporal bracket creep, unfortunately, would incorporate both real gains and inflation.

⁵In reality, attendance decisions are affected by availability and cost, as well as views on quality; thus, responses do not represent actual preferences over the ownership of the health facility.

⁶For disability, a binary-response question was asked. Is the respondent limited in his/her daily activities, at home, at work or at school, because of a long-term physical, sensory, hearing, intellectual, or psychological condition, lasting six months or more? To further confirm the extent of the disability, respondents were requested to list the difficulties by answering a series of binary – yes/no – questions related to the difficulties encountered that have lasted for at least 6 months. Similar queries were in place regarding the type of illness suffered by the respondent.

for not consulting any health worker, if ill during the past month, were also requested in early surveys.

Despite consistency in the phrasing of many questions across the surveys, the potential for inconsistency in responses still exists. For example, surveyors could emphasise different sets of questions or responses in any survey or household; furthermore, surveyors or data capturers could miscode responses. Errors could also arise because of misunderstanding of the survey questions, or uncertainty about other household members⁷ or even deliberate distortion of responses (Baltagi, 2008). As long as the errors are randomly distributed over time and within surveys, the effects on what is reported below should be minimal; however, non-random errors, such as deliberate distortion or selective non-response, could lead to over (or under) reporting of certain events, which could yield higher (or lower) trends than actually occurred. Although it is not possible to address such concerns, we take cognizance of their existence during the analysis.

2.2 Data Summary

To get some idea of the variables in the data, before undertaking the analysis, we report summary statistics for the main variables. These are presented in Table 1, and cover the years 2002-2014. These are not separated by year, although such information can be requested from the authors. The main outcome variables, though, are presented across the years in Table A.1, and illustrated in Figure 1.

As can be seen in Figure 1, there are observable differences in medical aid coverage, ill-health and treatment-seeking behaviour, although there is no obvious increasing or decreasing pattern in any of these variables. Instead, there are peaks and valleys. Reported illness peaked in 2009, as did treatment-seeking, while medical aid coverage peaked in 2013. On the other hand, reported illness and treatment-seeking was lowest in 2013, the same year that medical aid coverage was highest, while the trough in medical aid coverage occurred in 2005. Generally, health care treatment-seeking behaviour is lower than reported illness, while treatment-seeking and medical aid cover do not obviously mirror each other, which does suggest that access to treatment is not, at least entirely, determined by private third-party payers. This might imply that Primary Health Care aimed at increasing access is, to some extent, effective, such that

⁷It should be understood that the surveys are completed by a responsible adult household member who is available, rather than by everyone.

more people, especially young children and pregnant women, are able to gain access to health care services without necessarily belonging to a medical aid scheme.

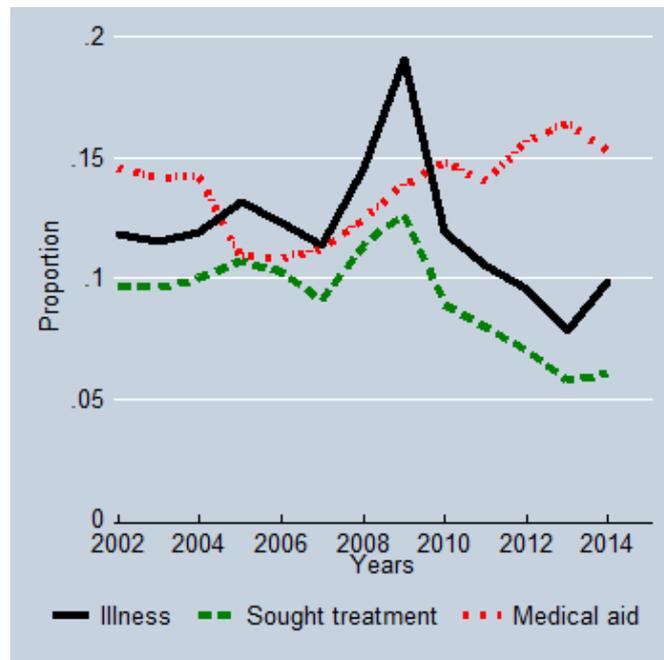


Figure 1: Trends in our key health-related variables in South Africa, GHS 2002-2014. The key variables are: medical aid coverage, reported illness and seeking treatment when ill. Proportions of these outcomes are illustrated for each year of the GHS.

Despite these peaks and troughs, we observe an overall improvement in health, as a smaller proportion of the population is reported ill in 2014 than in 2002. It is possible that the increase in ill-health between 2007 and 2010 are associated with the roll-out of ARVs – although the prevalence of HIV/AIDS may not have changed much in that time period, access to ARVs could have increased testing and the number of people reporting illness. Moreover, the increase could be linked with the emergence of drug-resistant TB in 2006 and the increased number of TB patients that sought treatment in 2009 (Churchyard et al., 2014). The decline from 2010, on the other hand, is at least in part, associated with the launch of the initiative to re-engineer Primary Health Care in 2010. As noted earlier, this re-engineering extended to chronic non-communicable diseases, and required Primary Health Care to assume a stronger preventive role in the health sector. With respect to medical aid coverage, the reversal of the drop in coverage up to 2005 can be attributed to the introduction of the Government Employees Medical scheme (GEMS), which extended coverage to previously uninsured government employees starting in 2005 (see Govender et al., 2013).

Table 1 presents sub-sample proportions across a wide-range of categorical variables. The sub-samples are those reported ill or injured in the last 30 days, those having medical aid

coverage and those who would (prefer to) use a public health facility, if they were ill.⁸

Table 1: Descriptive statistics, data from the 2002-2014 General Household Surveys.

Variables	<i>Ill-health status</i>		<i>Public health facility</i>		<i>Medical aid coverage</i>	
	Obs.	%	Obs.	%	Obs.	%
Age						
Less than 6 years	19,125	12.6	108,833	12.8	16,113	9.3
6-17 years	24,549	16.1	228,846	26.9	37,878	21.7
18-30 years	24,412	16	202,263	23.8	29,794	17.1
31-45 years	30,095	19.8	141,501	16.6	44,102	25.3
46-64 years	35,551	23.3	117,746	13.8	36,249	20.8
65 years +	18,609	12.2	51,585	6.1	10,042	5.8
Race						
African/Black	120,939	79.4	739,353	86.9	83,508	47.9
Coloured	16,889	11.1	91,810	10.8	24,477	14.1
Indian/Asian	3,039	2	9,777	1.1	9,519	5.5
White	11,474	7.5	9,834	1.2	56,674	32.5
Gender						
Male	63,498	41.7	394,036	46.3	84,332	48.4
Female	88,843	58.3	456,738	53.7	89,846	51.6
Marital Status						
Married	48,969	32.2	185,726	21.8	78,090	44.9
Widow/Widower	16,954	11.1	50,764	6	6,308	3.6
Divorced or Separated	5,171	3.4	14,882	1.8	4,243	2.4
Single	81,185	53.3	598,924	70.4	85,424	49.1
Education						
No Schooling	36,181	24	172,926	20.5	17,932	10.4
Less than Diploma	105,539	69.9	651,719	77.4	11,3194	65.6
Diploma/Certificate	5,641	3.7	13,333	1.6	21,924	12.7
Honours/Degree	3,090	2	3,798	0.5	16,555	9.6
Postgraduate	553	0.4	289	0.001	2,848	1.7
Employment status						
Employed	31,924	21	132,623	15.6	66,525	38.2
Not Employed	120, 417	79	71,8151	84.4	107,653	61.8
Metropolitan status						
Rural	61,742	40.5	433,448	50.9	27,767	15.9
Urban	90,599	59.5	417,326	49.1	146,411	84.1
Household expenditure						
Quantile 1	17,398	40.4	77,669	51.1	3,084	5.8
Quantile 2	6,651	15.5	28,696	18.9	2,837	5.3
Quantile 3	9,633	22.4	33,097	21.8	12,286	23.0
Quantile 4	9,362	21.7	12,552	8.3	35,203	65.9
Medical aid coverage						
Covered	26,406	17.31	30,051	3.55	174,178	13.68
Not covered	126,182	82.69	817,444	96.45	1,098,833	86.32

Descriptive statistics for three sub-samples (those reported ill in the 30 days prior to the survey, those having medical aid coverage and those with a 'preference' for public health care, when ill) taken from the pooled GHS data 2002-2014. Percentages are reported within each sub-sample. All observation numbers, except for expenditure, which is based on households, are presented at the individual-level

Given the structure of the sub-samples, relative comparisons are not particularly insightful.

Instead, the descriptive statistics provide some information regarding the relative proportions

⁸In the early years of the GHS, respondents would be asked questions focused more on revealed preferences. Specifically, if an individual reported an illness/injury, they would be asked if care was sought for the illness/injury. In those years, the number observed utilising public health facilities would necessarily be lower than the number reported ill. In 2004, the focus changed to scenario preferences – what would they do if they were ill/injured – and, therefore, the relative number of observations switched across the sub-samples. In subsequent analysis, we limit our attention to the years 2004-2014.

within a sub-sample. Therefore, we point out only a few within sub-sample comparisons. In particular, we see that the populace is relatively uneducated, is not working and is not covered by a medical aid scheme; however, we should keep in mind that our sub-samples include children who are currently in school, and, therefore, have not completed their schooling and are not working. Relatively speaking, within the ill-health status outcome, there are more observations (the data is not weighted here) in the 46-64 years of age bracket, African/blacks, female, single individuals, less educated, unemployed, urban dwellers, poorer individuals and not covered with medical aid. Within the public health facility ‘preferred’ sub-sample, the relative proportions of observations mirror what was seen for ill-health, except that we observe relatively more children in the age bracket 6-17 years and rural residents. Finally, with respect to medical aid coverage, it is highest amongst those in prime working age, 31-45 years, while and is primarily an urban phenomenon. The stylised fact that relatively few of those covered are employed presumably derives from policies that cover children and spouses.

3 A Description of the Trends

We continue with the analysis, breaking down the trends in our three primary outcome variables across a number of socio-economic categories.

3.1 Ill-health

One of the key components of population health, in our view, is reported illness. Thus, we begin our analysis with this component; see Figure 2.

We consider ill-health across the survey years, although illustrating only some of the years in order to keep the illustrations readable. Our initial focus is on illness by age. For the most part, the pattern is as expected; there is a notable U -shape to the age pattern of illness with a trough occurring between ages 10 and 20, although there is an unexpected inverse U -shape with a peak near 80 years of age in two of the illustrated surveys. As there are few observations in these age groups, this pattern may not necessarily reflect the true age distribution of illness at these ages. The results also mirror those from Figure 1, where self-reported ill-health was highest in 2009 and lowest in 2014.

The aforementioned age distribution of illness is also compared across a range of socio-demographic characteristics. Figure 3 presents the age-illness profile from the pooled sample,

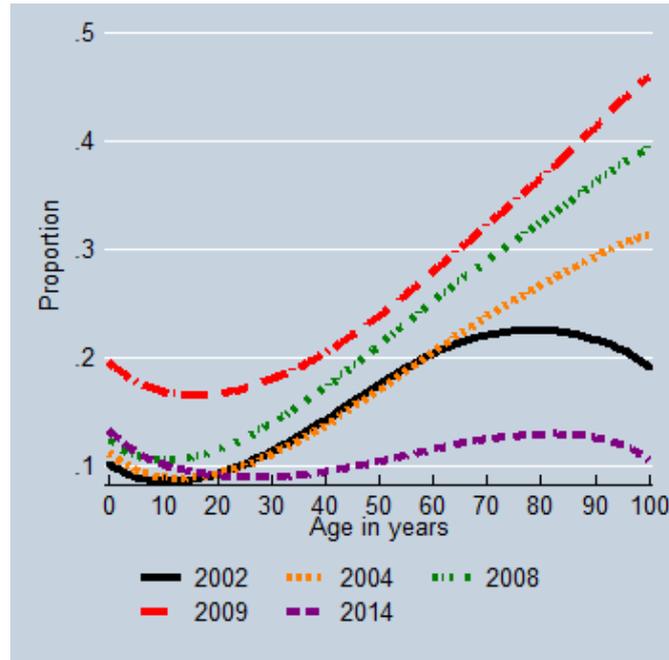


Figure 2: The age distribution of ill-health in South Africa for selected years from the GHS 2002-2014. Proportions are for those reporting being ill in the 30 days prior to the survey at any age. The illustrations are taken from lowest nonparametric regressions of illness on age in each year; thus, the pattern is smoothed.

rather than comparing across years. There are four panels in the figure. The top-left panel looks at differences by province, while the top-right illustrates the urban/rural divide in ill-health. In the bottom-left panel, male/female differences are illustrated, while racial differences are presented in the bottom-right panel.

At the youngest ages, the proportion reporting ill-health is highest in Gauteng compared to other provinces, higher in urban areas than rural areas and highest amongst the white population group. In the middle of the age range, women are more likely to report ill-health than men, although there are few obvious differences across provinces, races or the urban/rural split. For the elderly, again, there are few differences, although reported ill-health is higher in the Northern Cape than in other provinces. Regardless of socio-demographic split, the overall *U*-shape pattern for age and illness reported in Figure 2 is repeated.

3.2 Health facility preference

Given South Africa's health sector history (see Coovadia et al., 2009), as well as the differences in usage reported in previous research, it is no surprise that public health care is more likely to be 'preferred' to private health care (see Gilson and McIntyre, 2007), keeping in mind that these preferences are not revealed preferences. However, from 2006, there has been a steady

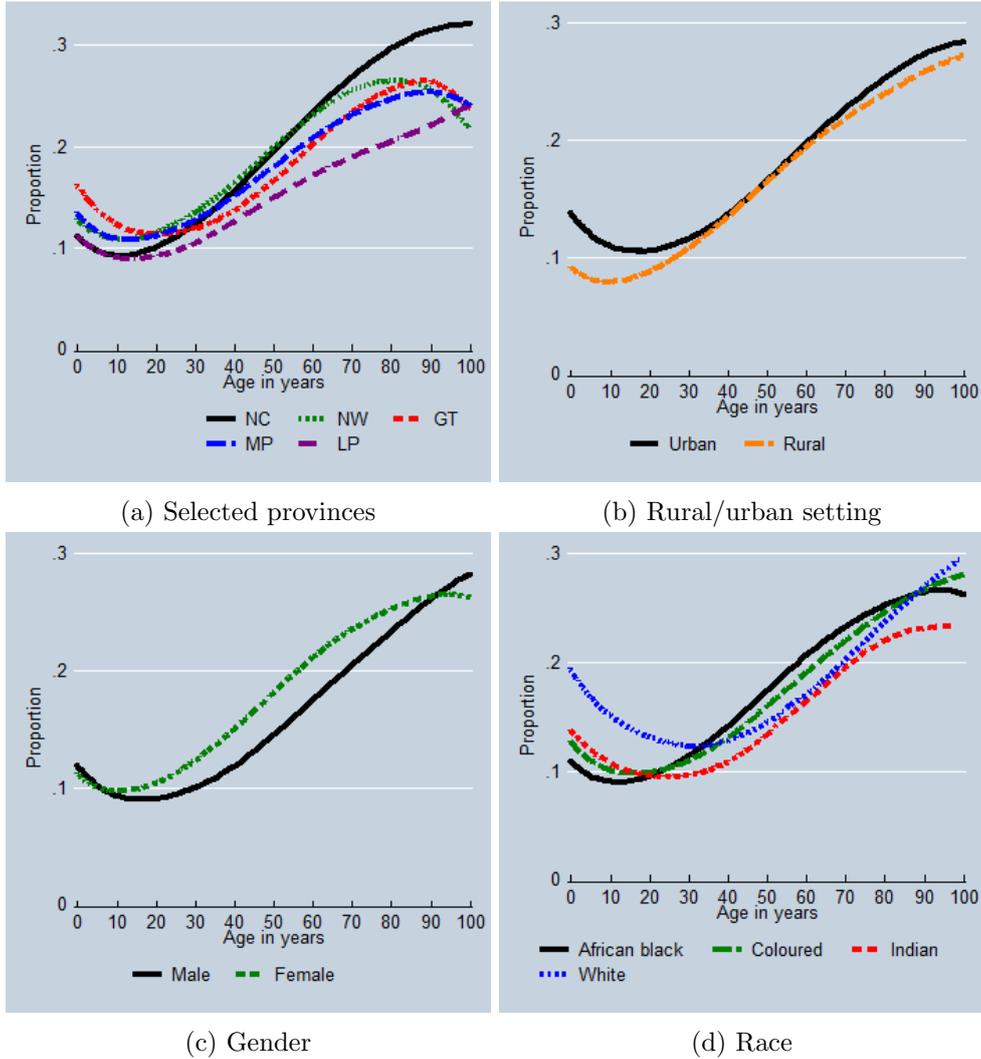


Figure 3: The age distribution of ill-health in South Africa for selected socio-demographic characteristics from the GHS 2002-2014. Proportions are for those reporting being ill in the 30 days prior to the survey at any age. The illustrations are taken from lowest nonparametric regressions of illness on age in each year; thus, the pattern is smoothed.

increase in the preference for private health care, possibly attributable to the introduction of GEMS. See Figure 4 for details.

Preferences are further broken down by age, across different surveys; we do not illustrate all survey years, in order to keep the illustrations presentable. Figure 5 presents these preferences; the left panel contains public care preferences, while the right panel focuses on the private sector. As should be the case, the two panels are mirror images. However, what was not expected was the rather distinct differences by age, even though public care preferences remain the norm. A preference for public care is lowest (highest) for those aged near 60 years, and is higher (lower) for ages above and below that. The U -shape (inverse U -shape) depicted suggests that those near the end of their working lives either place relatively greater trust in the private sector to

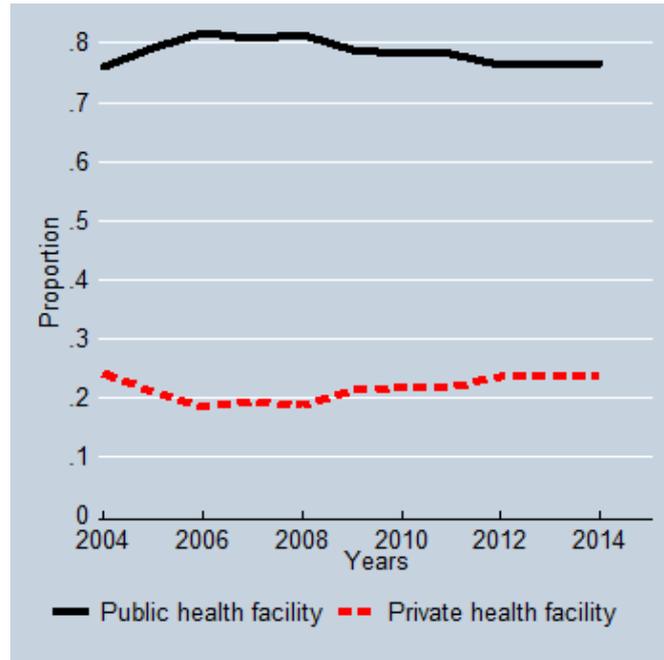
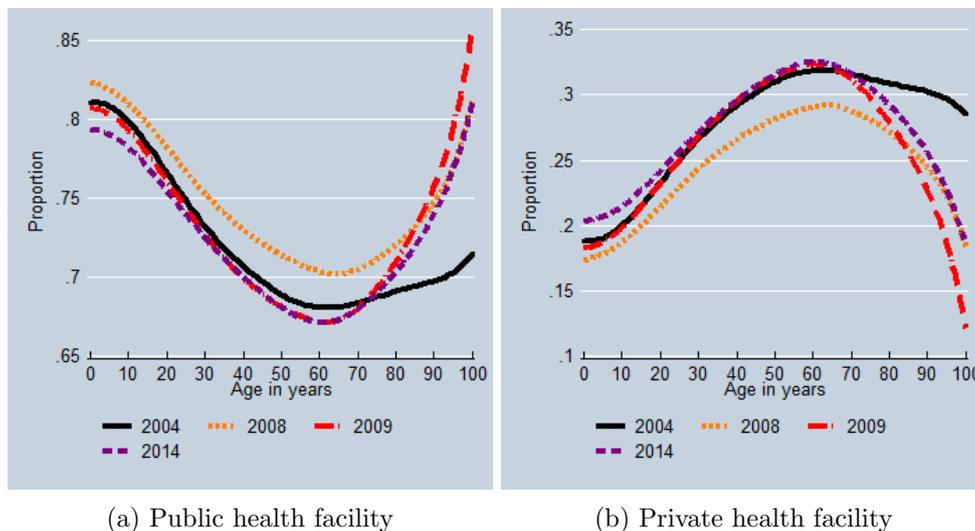


Figure 4: Preferences for private and public health care, if ill, in South Africa. Data sources from the GHS 2004-2014. Proportions are for those who utilise either public or private health care facility in the event of illness.

cope with the illnesses they expect to encounter or have greater access to the private health care sector.



(a) Public health facility

(b) Private health facility

Figure 5: The age distribution of public and private health care facility utilisation in South Africa for selected years from the GHS 2004-2014. Proportions are for those who utilised either public or private health care facility at any age. The illustrations are taken from lowest nonparametric regressions of each of public and private health care facility on age in each year; thus, the pattern is smoothed.

When comparisons are made across race and gender, we uncover both similarities and differences with respect to the location analysis; see Figure 6 for the comparisons. Firstly, the age-based U -shape to public and private care preferences are easily observed for men and

women, while the troughs (peaks) occur at an age near 60. Secondly, amongst males, there is a relatively strong preference for the private sector, partly because they have greater access to medical aid schemes. Thirdly, however, the pattern is not as easily observed across race groups. Although the U remains, the peaks (troughs) do not occur near age 60 for non-white population groups. Instead, for African blacks and coloureds, they are closer to age 40, which is also in line with their access to medical aid coverage.

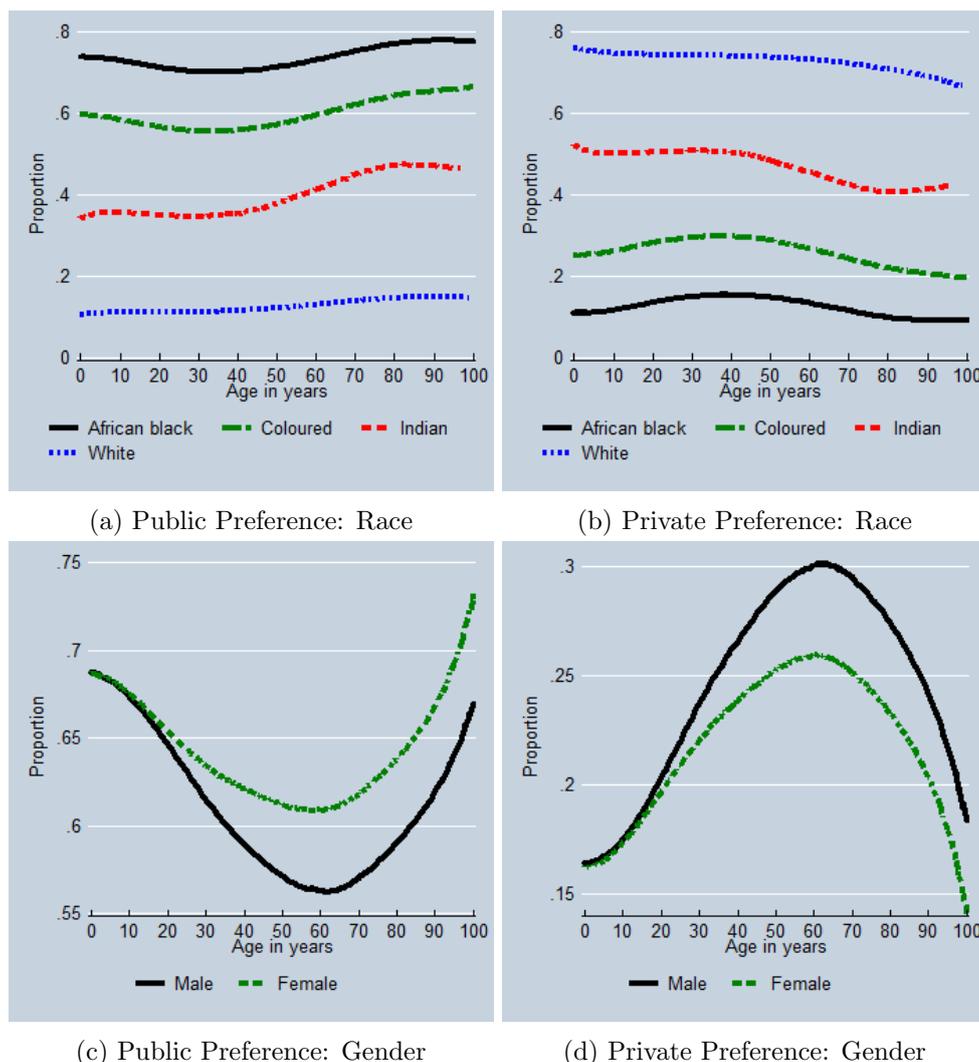
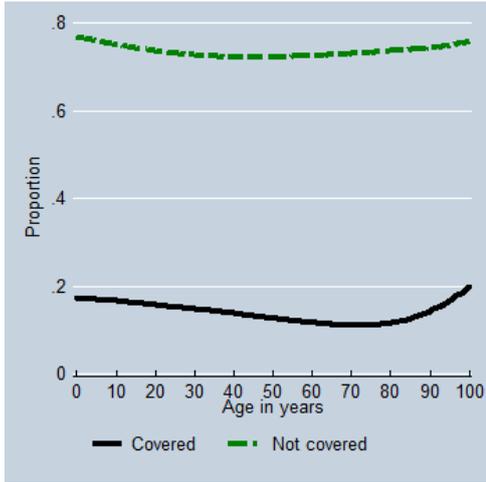


Figure 6: Preferences for private and public health care, if ill, in South Africa. The illustrations are separate for race (top-left and top-right) and gender (bottom-left and bottom-right). Proportions are for the racial groups and gender (male/female) at any age. The illustrations are taken from lowest nonparametric regressions of the above variables on age in each year; thus, the patterns are smoothed.

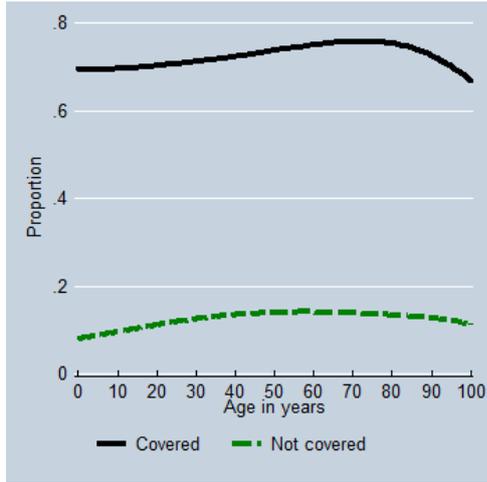
In addition to looking across the surveys, we examine differences in preferences for a range of socio-economic controls. Figures 7 and 6 contain differences across province, urban and rural locale, race, gender and access to medical aid coverage. When observed across provinces, access to medical aid coverage and urban/rural settings, see Figure 7, the U -shape is most obvious

among those covered by a medical aid scheme, those residing in urban settings, where private health facilities are mostly located, as well as in Gauteng, which is the richest and most urban province in the country. Furthermore, private health care facilities are most preferred amongst those covered by medical aid , urban residents and those living in Gauteng.⁹ As we will see below, these age differences in preferences closely follow the pattern of medical aid coverage by age.

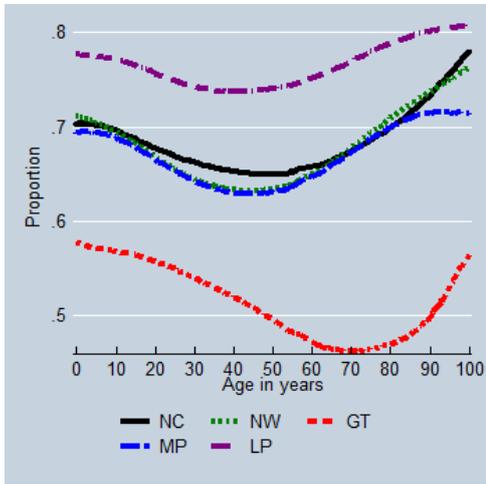
⁹A similar pattern would be observed for the Western Cape Province, which is relatively rich, and, like Gauteng, is well-endowed with private health care facilities.



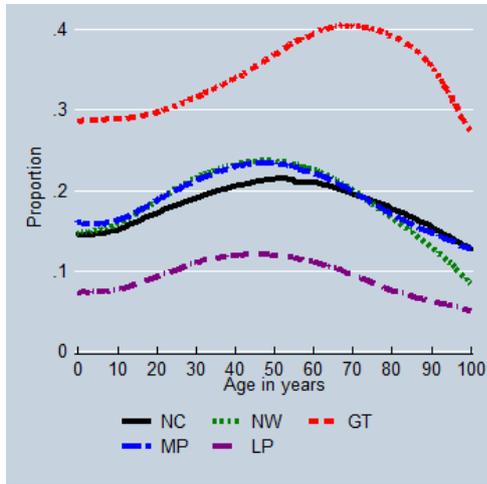
(a) Public Preference: Medical Aid Scheme Member



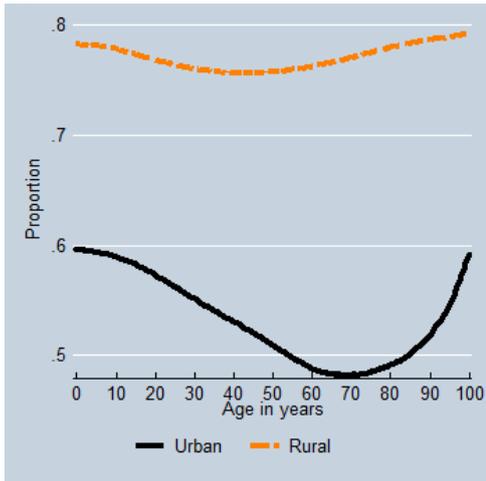
(b) Private Preference: Medical Aid Scheme Member



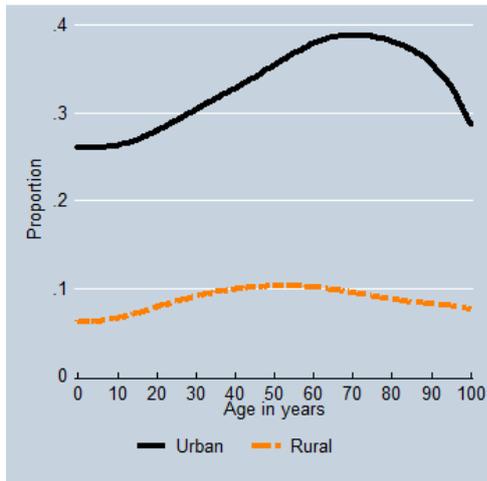
(c) Public Preference: Selected Provinces



(d) Private Preference: Selected Provinces



(e) Public Preference: Rural/Urban Locale



(f) Private Preference: Rural/Urban Locale

Figure 7: Preferences for private and public health care, if ill, in South Africa. The illustrations are separate for medical aid coverage (top-left and top-right), province (middle-left and middle-right) and rural/urban locale (bottom-left and bottom-right). Proportions are for those covered with medical aid, those in selected provinces, and rural/urban locale respectively, at any age. The illustrations are taken from lowess nonparametric regressions of the above variables on age in each year; thus, the patterns are smoothed.

3.3 Medical aid coverage

As shown in Figure 8, the age distribution of medical scheme coverage across the surveys is quite stable. Coverage peaks around the age of 60 in each of the survey years illustrated, and is lowest for the oldest individuals. As expected, given Figure 1, coverage is relatively higher in 2014 than it was in 2002. There is a noticeable inverted U -shape to the age distribution of medical aid coverage. Medical aid coverage increased steadily among young adults over the study periods, a time period that matches attachment to the labour force.

A comparison of the age distribution of medical aid coverage across socio-demographic variables was also illustrated; see Figure 9. Since Gauteng is the richest province in the country and contains a greater proportion of formally employed adults, medical coverage is highest there.

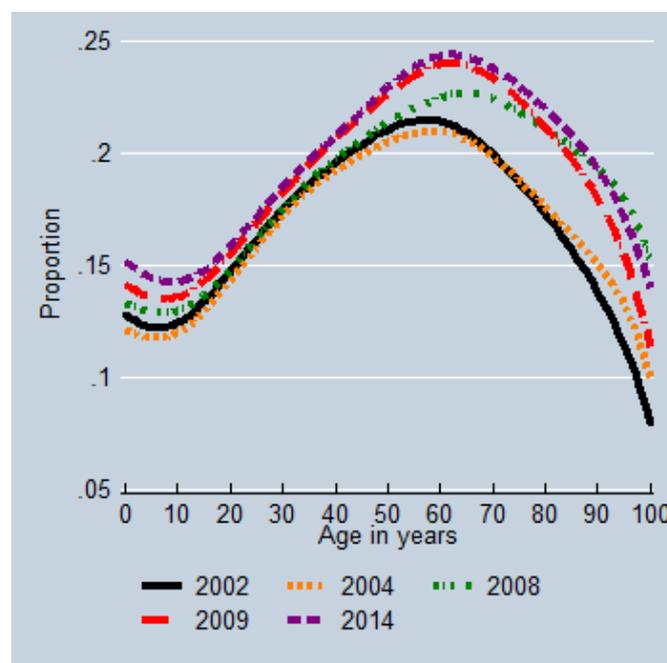


Figure 8: The age distribution of medical aid insurance in South Africa for selected years from the GHS 2002-2014. Proportions are for those who reported having medical aid coverage as at the date of the survey at any age. The illustrations are taken from lowest nonparametric regressions of medical aid coverage status on age in each year; thus, the pattern is smoothed.

For similar reasons, urbanites, men and white South Africans are more likely to have access to a medical aid scheme than their counterparts. As was the case, generally, within each survey, medical aid coverage peaks around the age of 60 across location, as well as for men and women. However, the peak occurs at lower ages within the African black and coloured populations in South Africa, while coverage appears highest amongst the young in the Indian population.

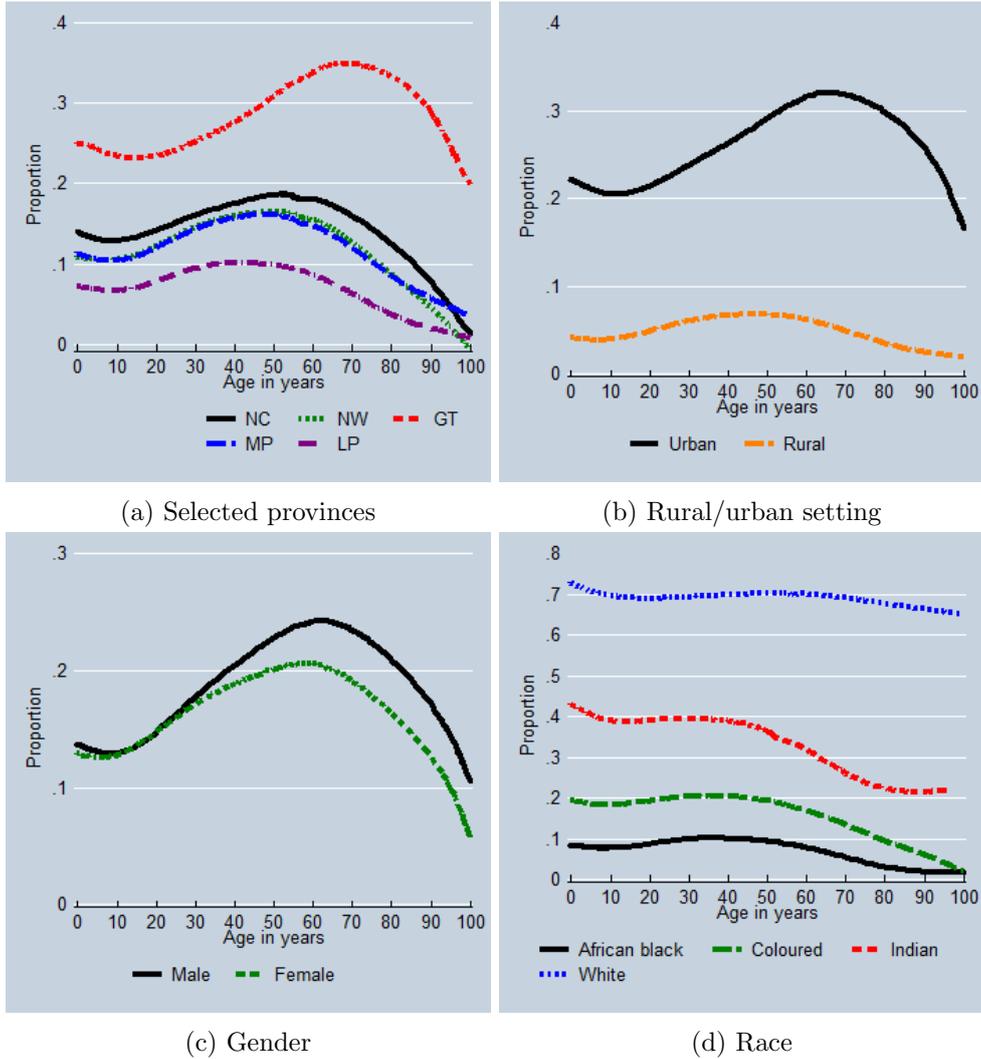


Figure 9: The age distribution of medical aid insurance in South Africa from the GHS 2002-2014. The distribution is separated by province, rural/urban locale, gender and race group. Proportions are for those who reported having medical aid coverage as at the date of the survey. The illustrations are taken from lowess nonparametric regressions of medical aid coverage status on age in each year; thus, the pattern is smoothed.

4 Estimating the Trends

As the preceding descriptive analysis suggests, there are potential socio-economic differences in key health variables, and those may not have been consistent over time. However, that analysis was fairly limited, in that it was primarily bivariate or, at most, trivariate. For that reason, the previous analysis was extended to account for multiple control variables at once. Specifically, we examined the determinants of our three health outcome measures, controlling for age, race, gender, marital status and location; the latter of which was interacted with the rural/urban control to allow for differences between urban and rural individuals within and across provinces.

Estimation was based on logit, and the marginal effects from the logit are included in Table 2.¹⁰

Recall, the primary purpose of the analysis was to determine if there are any discernible trends in health outcomes in South Africa. According to the results, reports of ill-health rose over time, while access to medical aid coverage and the general population's preference for choosing a public health care facility (if they were ill) fell. The probability of reporting illness increased by about 0.4% per year. On the other hand, the probability of preferring public health care in the event of illness, as well as being a member of a medical aid scheme, are decreasing over the time period. The decreases are around 0.1% and 0.2% per year, respectively. All of these trends are statistically significant.

Table 2: Marginal Effects for Models I (A - C)

Variables	<i>Ill-health status</i>	<i>Public health facility</i>	<i>Medical aid coverage</i>
	Model I-A	Model I-B	Model I-C
Trend (2004-2014)	0.004*** (0.000)	-0.001*** (0.000)	-0.002*** (0.000)
Age	0.000** (0.000)	0.002*** (0.000)	-0.006*** (0.000)
Age-squared	0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)
Race (African/Black)	0.001 (0.002)	0.473*** (0.004)	-0.479*** (0.003)
Gender (female=1)	0.018*** (0.001)	0.009*** (0.001)	0.004*** (0.001)
Marital status (married)	0.009*** (0.001)	-0.026*** (0.002)	0.081*** (0.002)
Education (Honours/degree)	-0.039*** (0.003)	-0.303*** (0.009)	0.494*** (0.007)
Employment status (employed=1)	-0.004*** (0.001)	-0.056*** (0.002)	0.049*** (0.001)
Metropolitan status (urban=1)	0.014*** (0.001)	-0.114*** (0.002)	0.113*** (0.001)
Type of dwelling (formal=1)	-0.003*** (0.001)		
Medical aid (coverage=1)		-0.440*** (0.002)	

Continued on next page...

¹⁰The actual regression estimates are presented in Table A.2. Estimation was weighted to the population in each year.

Marginal Effects for Models I (A - C): Continued

	<i>Ill-health status</i>	<i>Public health facility</i>	<i>Medical aid coverage</i>
Variables	Model I-A	Model I-B	Model I-C
Observation	1,064,453	1,064,453	1,064,453
R^2	0.03	0.36	0.29

Robust Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: This table contains marginal effects for ill-health, preference of public health facility utilisation, and medical aid coverage. The marginal effects are separate for ill-health (left), preference of public health facility utilisation (middle), and medical aid coverage (right). Marginal effect is a measure of the instantaneous effect that a change in an explanatory variable has on the predicted probability of the outcome variable (in this case, our outcome variables are ill-health, preference of public health facility utilisation, and medical aid coverage), when the other covariates are held constant.

With respect to ill-health, we find that females are 1.8% more likely to report an illness or injury than males. Furthermore, those who are single are less likely to report an illness; they are the reference group, while married individuals report illness 0.9% more often. Those residing in urban areas report illness 1.4% more often than those residing in rural areas. Compared to those residing in traditional dwellings, those who live in formal dwellings are 0.3% less likely to report an illness. than those who live in traditional dwellings. We also find that the formally educatare are 3.9% less likely to report an illness than those with no formal education. Finally, according to the age polynomial in the analysis, there is evidence of a U -shape in ill-health reports, once these additional controls have been included.

Preferences for the use of a public health facility in the event of an illness reveal relatively similar patterns, but with generally larger magnitudes. We find that medical aid coverage is associated with a 44% lower probability of preferring to utilise public health care in the event of illness; there are also large race and educational differences, many of which can be tied to the pattern of income and wealth in the country. African blacks are 47.3% more likely to prefer to a public health facility for medical treatment, compared to the white population, while married people (2.6%) are less likely to prefer a public health facility than single individuals. Females, compared to males, are 0.9% more likely to prefer to utilise public health care when ill. Furthermore, preferences for the employed are 5.6% lower than the unemployed, when it comes to potentially seeking care at a public facility, when ill. When considering education,

there is a 30.3% lower preference for utilising public health care amongst the formally educated, compared to those not formally educated. Finally, preferences in urban area are in favour of private facilities, as those in urban areas have an 11.4% lower probability of stating a willingness to seek medical treatment at a public health care facility, in times of illness.

As implied by the earlier analysis, medical aid coverage mirrors public health care preferences, at least partly due to the ability to pay for private health care through third party payees. African blacks have nearly a 50% lower coverage probability than Whites, while married individual coverage rates are 8.1% higher than for singles. Men have higher coverage rates than women, by approximately 0.4%. The probability of coverage is also higher amongst urbanites, the employed, and the formally educated. Urban area coverage is higher by 11.3%, while the employed have a 4.9% higher probability of being covered; for the formally educated, the probability is nearly 50% higher than it is for the uneducated.

5 Discussion and Conclusion

The preceding analysis has taken data from the General Household Surveys covering the years 2002-2014. The data has been pooled together, weighted to the population, and used for an analysis of key health variables in South Africa: ill-health, preferences for public care (loosely defined) and medical aid coverage. The analysis is primarily descriptive in nature, although one could argue that the control variables are primarily exogenous, with the exception of location. For that reason, we have not included variables such as income, which could both affect health and be affected by health.

Although the primary purpose of the analysis was to estimate trends in our key variables, a number of additional controls were included in the analysis, and are found to be statistically significant determinants of health, health care preferences and access to medical aid schemes (or health insurance) in South Africa. Strong evidence of a time trend was uncovered in the analysis, with ill-health increasing, on average, by 0.4% per year, while preferences for public health facilities and medical aid coverage has fallen by 0.1% and 0.2% annually respectively. The decrease in medical aid coverage is somewhat surprising given the implementation of the Government Employees Medical Scheme, which did open-up medical aid coverage to a much larger set of formally employed individuals in the country. However, the decrease could also relate to the fact that primary health care sector has been re-engineered (and improved), while

the direct costs of accessing primary health care have decreased due in part to user fee policy changes in 1994 and 1996. Although the decrease in coverage does signal the need to think carefully about health care financing, especially when one also keeps in mind the observed decrease in public health care preferences. These two trends - which operate together in this analysis - suggest that South Africans are not enamoured by the public health sector, even though they cannot afford the private sector. Thus, any implementation of a National Health Insurance (NHI) Scheme needs to address both the declining medical aid coverage rates and the reduced preference for the provision of health care by the public sector.

More worryingly, despite policies that have been targeted to the poor – primarily children, female, non-white and those living in rural areas – the overall picture does not suggest much change over the time period. It is these people we find to be ill, preferring to use the public sector and not having access to medical aid schemes. However, we note that further analysis within these and other sub-groups of the population are warranted. Our results, which are in line with other studies (see Bradshaw, 2008; Bradshaw et al., 2000), suggest the need for more policy engagement with respect to health in South Africa. While Primary Health Care reforms and other policies have impacted outcomes, further strengthening the promotive component of health care will likely lead to further improvements in health. Since access to appropriate health care services is fundamental to the choices that are made with respect to health facility in the event of illness or injury, and it is a feature of the constitution – “everyone has the right to have access to health care services, including reproductive health care” (see South Africa Constitution, 1996, Section 27(1)(a)) – ensuring access remains a policy priority.

Although the preceding analysis has not attempted to account for funding made available for public health and healthcare in the areas where respondents live in the year of the survey, it is likely that preferences for public sector health care delivery are related to improved regional funding or the ability of local management to adequately marshal the available resources for the benefit of the local populace. Thus, we infer that policymakers should continue to strive for adequate funding and appropriate monitoring of health care services for improved quality and service delivery.

References

- Ataguba, J. E., Akazili, J. and McIntyre, D. (2011), ‘Socioeconomic-related health inequality in South Africa: Evidence from general household surveys’, *International Journal of Equity Health* **10**(1), 48.
- Baltagi, B. (2008), *Econometric analysis of panel data*, John Wiley & Sons.
- Bayat, A. and Cleaton-Jones, P. (2003), ‘Dental clinic attendance in Soweto, South Africa, before and after the introduction of free primary dental services’, *Community Dentistry and Oral Epidemiology* **31**(2), 105–110.
- Booyesen, F. (2003), ‘Urban–rural inequalities in health care delivery in South Africa’, *Development Southern Africa* **20**(5), 659–673.
- Bradshaw, D. (2008), ‘Determinants of health and their trends: Primary health care: in context’, *South African Health Review* pp. 51–69.
- Bradshaw, D., Groenewald, P., Laubscher, R., Nannan, N., Nojilana, B., Norman, R., Pieterse, D., Schneider, M., Bourne, D. E., Timæus, I. M. et al. (2003), ‘Initial burden of disease estimates for South Africa, 2000’, *South African Medical Journal* **93**(9), 682–688.
- Bradshaw, D., Masiteng, K. and Nannan, N. (2000), ‘Health status and determinants: chapter 4’, *South African Health Review* pp. 89–124.
- Brink, A. S. and Koch, S. F. (2015), ‘User fee abolition in South Africa in 1994 and 1996: Difference-in-differences’, *Development Southern Africa* **32**(2), 170–192.
- Burgard, S. A. and Treiman, D. J. (2006), ‘Trends and racial differences in infant mortality in South Africa’, *Social Science & Medicine* **62**(5), 1126–1137.
- Chopra, M., Lawn, J. E., Sanders, D., Barron, P., Karim, S. S. A., Bradshaw, D., Jewkes, R., Karim, Q. A., Flisher, A. J., Mayosi, B. M. et al. (2009), ‘Achieving the health millennium development goals for South Africa: challenges and priorities’, *The Lancet* **374**(9694), 1023–1031.
- Christian, C. S. (2014), ‘Access in the South African public health system: factors that influenced access to health care in the South African public sector during the last decade’.

- Churchyard, G., Mametja, L., Mvusi, L., Ndjeka, N., Hesselning, A., Reid, A., Babatunde, S. and Pillay, Y. (2014), 'Tuberculosis control in South Africa: Successes, challenges and recommendations', *South African Medical Journal* **104**(3), 234–248.
- Coovadia, H., Jewkes, R., Barron, P., Sanders, D. and McIntyre, D. (2009), 'The health and health system of South Africa: historical roots of current public health challenges', *The Lancet* **374**(9692), 817–834.
- Culyer, A. J. and Wagstaff, A. (1993), 'Equity and equality in health and health care', *Journal of Health Economics* **12**(4), 431–457.
- Dhai, A. (2011), 'Healthcare reform in South Africa: a step in the direction of social justice: editorial', *South African Journal of Bioethics and Law* **4**(2), 48–49.
- Gilson, L. and McIntyre, D. (2007), 'Post-apartheid challenges: household access and use of health care in South Africa', *International Journal of Health Services* **37**(4), 673–691.
- Govender, V., Chersich, M. F., Harris, B., Alaba, O., Ataguba, J. E., Nxumalo, N. and Goudge, J. (2013), 'Moving towards universal coverage in South Africa? lessons from a voluntary government insurance scheme', *Global Health Action* **6**.
- Harris, B., Goudge, J., Ataguba, J. E., McIntyre, D., Nxumalo, N., Jikwana, S. and Chersich, M. (2011), 'Inequities in access to health care in South Africa', *Journal of Public Health Policy* pp. S102–S123.
- Harrison, D. (2009), 'An overview of health and health care in South Africa 1994–2010: Priorities, progress and prospects for new gains', *Washington, DC: Henry J Kaiser Family Foundation* .
- Koch, S. F. (2009), 'Equity in private health insurance coverage in South Africa: 2002-2007', *Forthcoming* .
- Koch, S. F. and Racine, J. S. (forthcoming), 'Healthcare facility choice and user fee abolition: Regression discontinuity in a multinomial choice setting', *Journal of the Royal Statistical Society, Series A* .
- URL:** <http://dx.doi.org/10.1111/rssa.12161>

- Kozhimannil, K. B., Abraham, J. M. and Virnig, B. A. (2012), ‘National trends in health insurance coverage of pregnant and reproductive-age women, 2000 to 2009’, *Women’s Health Issues* **22**(2), e135–e141.
- Mackenbach, J. P., Stirbu, I., Roskam, A.-J. R., Schaap, M. M., Menvielle, G., Leinsalu, M. and Kunst, A. E. (2008), ‘Socioeconomic inequalities in health in 22 European countries’, *New England Journal of Medicine* **358**(23), 2468–2481.
- McCoy, D. and Khosa, S. (1996), “Free health care” policies, in D. Harrison, P. Barron and J. Edwards, eds, ‘South African Health Review 1996’, Health Systems Trust and Henry J. Kaiser Family Foundation, pp. 157–165.
- McIntyre, D., Thiede, M. and Birch, S. (2009), ‘Access as a policy-relevant concept in low-and middle-income countries’, *Health Economics, Policy and Law* **4**(02), 179–193.
- Nteta, T. P., Mokgatle-Nthabu, M. and Oguntibeju, O. O. (2010), ‘Utilization of the primary health care services in the tshwane region of gauteng province, South Africa’, *PloS One* **5**(11), e13909.
- Rathod, S. D., Chi, B. H., Kusanthan, T., Chilopa, B., Levy, J., Sikazwe, I., Mwaba, P. and Stringer, J. S. (2014), ‘Trends in all-cause mortality during the scale-up of an antiretroviral therapy programme: A cross-sectional study in Lusaka, Zambia’, *Bulletin of the World Health Organization* **92**(10), 734–741.
- Ruff, B., Mzimba, M., Hendrie, S. and Broomberg, J. (2011), ‘Reflections on health-care reforms in South Africa’, *Journal of Public Health Policy* pp. S184–S192.
- South Africa Constitution, S. a. (1996), Constitution of the republic of South Africa (act 108 of 1996), Technical report, South Africa, Pretoria.
- StataCorp (2015), ‘Stata statistical software: Release 14’.
- Statistics SA, . (2014), General household survey 2014 statistical release p0138, Technical report, Pretoria, South Africa.
- Statistics South Africa (2014), Mortality and cause of death in South Africa, 2013: Findings from death notification, Technical report, Statistics South Africa, Pretoria.

Thiede, M., Akweongo, P., McIntyre, D., McIntyre, D. and Mooney, G. (2007), 'Exploring the dimensions of access', *The Economics of Health Equity* pp. 103–123.

Appendix A Descriptive statistics of Ill-health status, Public health care facility utilisation and Medical aid coverage

Table A.1: Descriptive statistics of Ill-health status, Public health facility utilisation and Medical aid coverage

Years	<i>Ill-health status</i>		<i>Public health facility</i>		<i>Medical aid coverage</i>	
	n	%	n	%	n	%
All	152,341	12	850,774	78.19	174,178	13.68
2002	12,116	11.9	5,669	5.5	14,907	14.6
2003	11,430	11.5	5,488	5.5	14,018	14.1
2004	11,571	11.9	73,506	75.8	13,788	14.2
2005	14,231	13.2	85,214	79.1	11,754	10.9
2006	12,981	12.3	86,140	81.7	11,421	10.8
2007	12,277	11.4	87,140	80.7	12,301	11.2
2008	13,817	14.6	76,717	81.3	11,765	12.4
2009	17,862	19.1	73,925	78.9	13,052	13.8
2010	11,274	11.9	73,876	78.3	14,172	14.8
2011	9,701	10.5	72,167	78.3	13,086	14
2012	8,681	9.6	69,116	76.4	14,351	15.7
2013	7,329	7.9	71,263	76.4	15,390	16.4
2014	9,071	9.8	70,553	76.5	14,173	15.3

The result indicates that, on average, about 12%, 78% and 14% reported being ill, stated that they prefer to use public health care, when ill, and reported that they are a member of a medical aid scheme, respectively. In 2009, almost 20% of the sampled population reported that they were ill in the one month preceding the actual survey. By 2010, that proportion had decreased considerably. In 2006, approximately 82% were more likely to prefer to seek treatment at a public health facility, when ill. From 2008, however, relatively fewer people affirmed that they would prefer to utilise public health care services, in the event of illness. Finally, the percentage of individuals who reported they were members of medical aid schemes remained relatively stable over the survey years. However, coverage increased in the last few survey years reported here.

Table A.2: Marginal Effects for Models III (A - C)

Variables	<i>Ill-health status</i>	<i>Public health facility</i>	<i>Medical aid coverage</i>
	Model III-A	Model III-B	Model III-C
2005	0.010*** (0.002)	-0.018*** (0.003)	-0.001 (0.002)
2006	0.009*** (0.002)	0.004 (0.003)	-0.002 (0.002)
2007	-0.003 (0.002)	-0.024*** (0.003)	0.003 (0.002)
2008	0.025*** (0.002)	0.008** (0.003)	0.020*** (0.002)
2009	0.073*** (0.002)	-0.010*** (0.003)	0.018*** (0.002)
2010	0.000 (0.002)	-0.024*** (0.003)	0.024*** (0.002)
2011	-0.016*** (0.002)	-0.017*** (0.003)	0.008*** (0.002)
2012	-0.021*** (0.002)	-0.028*** (0.003)	0.020*** (0.002)
2013	-0.039*** (0.002)	-0.011*** (0.003)	0.026*** (0.002)
2014	-0.017*** (0.002)	-0.013*** (0.003)	0.020*** (0.002)
Age	0.000 (0.000)	0.005*** (0.000)	-0.006*** (0.000)
Age-squared	0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)
African/Black	-0.001 (0.002)	0.625*** (0.003)	-0.473*** (0.003)
Coloured	0.002 (0.002)	0.510*** (0.003)	-0.390*** (0.004)
Indian/Asian	-0.002 (0.003)	0.274*** (0.006)	-0.298*** (0.005)
Female	0.017*** (0.001)	0.005*** (0.001)	0.004*** (0.001)
Married	0.011*** (0.001)	-0.070*** (0.002)	0.081*** (0.002)
Widow/widower	0.025***	0.001	0.008**

Continued on next page...

Marginal Effects for Models III (A - C): Continued

Variables	<i>Ill-health status</i>	<i>Public health facility</i>	<i>Medical aid coverage</i>
	Model III-A	Model III-B	Model III-C
	(0.002)	(0.004)	(0.003)
Divorce or separated	0.039***	-0.007	0.017***
	(0.003)	(0.005)	(0.003)
Less than diploma/certificate	-0.048***	-0.043***	0.039***
	(0.001)	(0.002)	(0.001)
Diploma/certificate	-0.043***	-0.397***	0.338***
	(0.003)	(0.005)	(0.005)
Honours/degree	-0.042***	-0.542***	0.484***
	(0.003)	(0.006)	(0.007)
Postgraduate degree	-0.049***	-0.594***	0.468***
	(0.007)	(0.018)	(0.028)
Employment status	-0.004***	-0.074***	0.047***
	(0.001)	(0.002)	(0.001)
Metropolitan status	0.014***	-0.150***	0.109***
	(0.001)	(0.002)	(0.001)
Observation	1,064,453	1,064,453	1,064,453
R^2	0.04	0.25	0.29

Robust Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$