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# AN INVESTIGATION OF THE EFFECT OF SOCIAL SOLIDARITY REFORMS ON THE AFFORDABILITY OF MEDICAL SCHEME COVER FOR SOUTH AFRICAN HOUSEHOLDS

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A Dissertation submitted to the Faculty of Science, University of the Witwatersrand, Johannesburg, in fullfillment of the requirements for the degree of Master of Science

Johannesburg, 2018

# Declaration

I declare that this dissertation is my own unaided work. It is being submitted for the degree of Master of Science at the University of the Witwatersrand, Johannesburg. It has not been submitted for any degree or examination at any other university.



Date: 31 May 2019

# Abstract

Medical schemes operate based on social solidarity, which is established through community rating, open enrolment and Prescribed Minimum Benefits. However, social solidarity is limited by adverse section, risk selection and limited income cross-subsidies among medical scheme numbers. Reforms consisting of a per-capita subsidy, risk equalisation and mandatory coverage have been proposed to increase social solidarity. This dissertation investigated the effects of these proposed reforms on the affordability of medical schemes for South African households. Publicly available data sources were used to investigate the household profiles of medical scheme beneficiaries, project contributions of medical scheme options under the reforms and assess the affordability of projected contributions for different household profiles. The dissertation found that medical scheme coverage is unaffordable for low-income members, especially pensioners. Coverage is affordable for members with higher incomes but affordability may depend on the option chosen and the threshold set for affordability. Affordability was found to not differ significantly for different household compositions. The current tax subsidy increases affordability for low-income members but not for members below the tax threshold. The replacement of the current tax subsidy with a per-capita subsidy would increase affordability for members below the tax threshold. Risk equalisation would introduce greater risk cross-subsidies between options but would decrease affordability for low-income households. Greater income cross-subsidies would thus need to accompany risk equalisation. Mandatory contributions related to incomes would introduce greater income cross-subsidies and make coverage affordable for low-income households. Increases in contributions would be relatively small for high-income households if coverage is mandatory only for taxpayers. Mandatory contributions for all income earners and for the full population would decrease affordability for members which may limit the extent to which mandatory coverage can be expanded. These results show that social solidarity reforms can increase the affordability of medical scheme coverage, which is relevant for current healthcare financing reforms.

# Acknowledgements

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# List of acronyms

| | |
|---|---|
| AD | Adult Dependent |
| AIC | Akaike Information Criterion |
| AMTC | Additional Medical Scheme Fees Tax Credit |
| ANOVA | Analysis of Variance |
| ASR | Annual Statutory Return |
| ASSA | Actuarial Society of South Africa |
| CD | Child Dependent |
| CDL | Chronic Disease List |
| CMS | Council for Medical Schemes |
| COICOP | Classification of Individual Consumption by Purpose |
| CPI | Consumer Price Index |
| DoH | Department of Health |
| DoSD | Department of Social Development |
| DSP | Designated Service Provider |
| DTP | Diagnosis and Treatment Pairs |
| EDO | Efficiency Discount Option |
| HMI | Health Market Inquiry |
| ITA | Income Tax Act (Act 58 of 1962) |
| LCS | 2014/2015 Living Conditions Survey |
| MSA | Medical Schemes Act (Act 131 of 1998) |
| MTC | Medical Scheme Fees Tax Credit |
| NHI | National Health Insurance |
| OOP | Out of pocket payments |
| PBPM | Per beneficiary per month |
| PM | Principal Member |
| PMB | Prescribed Minimum Benefit |
| REF | Risk Equalisation Fund |
| RETAP | Risk Equalisation Technical Advisory Panel |
| SARB | South African Reserve Bank |
| SARS | South African Revenue Service |
| SRM | Scheme Risk Measurement |
| StatsSA | Statistics South Africa |

# Glossary

| | |
|---|---|
| Adverse selection | The propensity for members to seek cover when they are high risk. |
| Beneficiary | An individual covered by a medical scheme who is able to claim benefits in return for contributions. |
| Benefit | Healthcare services covered by a medical scheme, which can include hospital and day to day healthcare services. |
| Community rating | Charging of contribution rates based on overall claims experience rather than on claims experience of an individual or group. |
| Contribution | The amount paid by a medical scheme member to a scheme monthly. |
| Cost curve | The cost of a set of benefits by characteristics such as age and sex. |
| Council for Medical Schemes | A statutory body that was established by the Medical Schemes Act to regulate medical schemes. |
| Cross-subsidies | The charging of higher contributions to one group to artificially lower contributions for another group. |
| Dependent | A beneficiary covered under a Principal Member defined in terms of legislation or scheme rules. The beneficiary may be a Child Dependent or an Adult Dependent. |
| Efficiency Discount Option | Variation of an existing option that charges members discounted contributions in return for a restriction to use cost-efficient providers. |
| Health Market Inquiry | The Competition Commission inquiry into private healthcare costs in South Africa that is underway |
| Household composition | The mix of adults and children in a household |
| Income rating | The differentiation of contributions based on incomes using income bands, with lower contribution rates for members in lower income bands. |

| | |
|---|---|
| Late joiner penalties | Penalties in contributions for individuals who join schemes after breaks in coverage, applied as a loading to contributions. |
| Mandatory contributions | Compulsory contributions for individuals, regardless of whether they select to be covered. |
| Mandatory coverage | The requirement for an individual to purchase coverage, rather than coverage being voluntary. |
| Medical schemes | Private health insurance funds in South Africa that reimburse members for actual expenditure on health. Medical schemes are governed under the Medical Schemes Act. |
| National Healthcare Insurance | The national healthcare financing system that is being introduced in South Africa |
| Open enrolment | The requirement for medical schemes to accept entry of all applicants. |
| Option | A package of benefits defined by the rules of a medical scheme that must include Prescribed Minimum Benefits. A scheme may have one or multiple options and members can choose which option to join, usually on an annual basis. |
| Prescribed Minimum Benefits | A minimum package of benefits to be provided by all options, required by the Medical Schemes Act. |
| Principal Member | The person responsible for paying contributions to the medical scheme. |
| Risk | The probability of an event which results in high claims. |
| Risk equalisation | Transfers between different risk pools to avoid loading of contributions according to the risk profiles of each risk pool. |
| Risk selection | The selection of members based on risk characteristics in order to attain a risk profile that is expected to have low claims. |

| | |
|---|---|
| Social solidarity | Insurance in which members share costs rather than pay for costs based on risk. |
| Tax subsidy | A deduction from a taxpayer's normal tax payable to provide aid for medical scheme contributions. |
| Tax threshold | The income level at which an individual begins to pay income tax. |
| Taxpayer | An individual that is required to pay tax in terms of the Income Tax Act as a result of having an income above the tax threshold. |
| The ITA | The Income Tax Act (Act 58 of 1962). |
| The MSA | The Medical Schemes Act (Act 131 of 1998). |
| Underwriting | A prospective assessment of risk to determine an individual's contribution level or eligibility for membership or benefits. |
| Waiting period | The period during which medical scheme members are not entitled to claim benefits after enrolment or breaks in coverage. |

# 1 Introduction

## 1.1 Background

Medical schemes covered 8.9 million beneficiaries in 2017 (Council for Medical Schemes, 2018) and are the predominant method of private healthcare financing in South Africa (National Treasury, 2012). However, medical scheme contributions are unaffordable for low-income households which limits the number of households that are covered (Fish and Ramjee, 2007; McLeod and Ramjee, 2007; Broomberg, 2006). Medical scheme members also reduce their levels of coverage due to unaffordability as members select options with less comprehensive benefits and do not cover dependents due to unaffordable contributions (McLeod and Ramjee, 2007).

Affordability of medical schemes is being considered in current healthcare financing reforms in South Africa. The National Health Insurance White Paper criticised the high cost of medical scheme coverage and listed affordability as one of the principles on which National Health Insurance will be based (Government Notice 627, 2017). The Competition Commission Health Market Inquiry into private sector healthcare costs included unaffordability of private healthcare in its terms of reference. The Health Market Inquiry stated that one of its purposes is "to establish a factual basis for recommendations that support the achievement of accessible, affordable… private healthcare in South Africa" (Government Notice 1166, 2013).

Medical schemes operate based on social solidarity, which requires that members share costs rather than pay for costs based on risk (McLeod, 2005). Social solidarity is achieved through risk and income cross-subsidies among members. Risk cross-subsidies are implemented through community rating, open enrolment and Prescribed Minimum Benefits (PMBs) (McLeod and Ramjee, 2007; van den Heever, 2012). Income cross-subsidies are implemented through the ability of medical schemes to differentiate contributions based on incomes and a tax subsidy in respect of medical scheme contributions (McLeod and Ramjee, 2007).

However, social solidarity among medical scheme members is not complete. Risk cross-subsidies are limited by adverse selection (McLeod and Ramjee, 2007; Ramjee and Vieyra, 2014) and a lack of risk cross-subsidies between medical schemes and options (McLeod and Ramjee, 2007; Ramjee and Vieyra, 2014). Income cross-subsidies are limited by few schemes using their ability to differentiate contributions based on incomes (McLeod and Ramjee, 2007) and a lack of subsidies for medical scheme members who are not taxpayers (McLeod, 2005).

The existing social solidarity regulations were intended to be the first phase in a framework of social solidarity reforms and additional reforms are needed to increase social solidarity (McLeod, 2005; McIntyre and van den Heever, 2007; Ramjee and Vieyra, 2014). The Department of Social Development (DoSD) and Department of Health (DoH) published discussion documents which outlined a set of reforms that aimed to address the limitations to social solidarity. Additional reforms included the introduction of subsidies to all members including those who are not taxpayers, risk equalisation between medical schemes, mandatory income-related contributions and mandatory medical scheme membership (DoSD, 2002; DoH, 2002).

## 1.2 Purpose of the research

This dissertation investigates the effect of the additional social solidarity reforms on the affordability of medical scheme coverage for South African households. It aims to update past research using recent publicly available data and to extend past research by assessing affordability for a broader range of household profiles. This research may assist policymakers in assessing social solidarity reforms for medical schemes in current healthcare financing reforms.

The dissertation addressed the following research questions:

- What are medical scheme members' household compositions, demographics, incomes and expenditures on medical scheme contributions?
- How are contributions of medical scheme options projected to change with social solidarity reforms?
- Will medical scheme coverage be affordable for different household profiles under social solidarity reforms?
- What do the results suggest for healthcare reform in South Africa?

## 1.3 Structure of the dissertation

The dissertation is structured as follows. Chapter 2 is a literature review that reviews social solidarity in the medical scheme environment and studies of affordability of medical scheme contributions. Chapters 3 and 4 describe the data sources and the statistical methods that were used in this dissertation. Chapter 5 investigates the household profiles of medical scheme members. Chapter 6 projects contributions of medical scheme options with social solidarity reforms, namely changes in tax subsidies, risk equalisation and mandatory income-related contributions. Chapter 7 projects the affordability of medical scheme coverage for households under social solidarity reforms using results of Chapters 5 and 6. Chapter 8 discusses the results of the analysis, draws recommendations for healthcare reforms and gives limitations of this study and areas for further work.

# 2 Literature review

The literature review consists of two sections: a review of social solidarity in the medical scheme environment in Section 2.1 and a review of studies of affordability of medical scheme contributions in Section 2.2.

## 2.1 Medical scheme social solidarity

Medical schemes operate based on social solidarity which requires that members share costs rather than paying for costs based on risk (McLeod, 2005). Social solidarity is achieved through risk and income cross-subsidies among members. This section discusses risk cross-subsidies, income cross-subsidies, limitations to the cross-subsidies, proposed additional social solidarity reforms and the relation between social solidarity of medical schemes and social security.

### 2.1.1 Risk cross-subsidies

The Medical Schemes Act (Act 131 of 1998) ('the MSA') introduced three reforms that establish risk cross-subsidies between medical scheme members: community rating, open enrolment and Prescribed Minimum Benefits (McLeod, 2005; van den Heever, 2012).

#### 2.1.1.1 Community rating

The MSA requires that medical schemes charge all members of an option the same contribution, termed the community rate. Contributions may be differentiated on incomes and the numbers and types of dependents of members but not on any other characteristics, including age, sex, past and present state of health of the member or dependents and past claims experience of the member or dependents[1]. Community rating creates cross-subsidies from low- to high-risk members as schemes cannot underwrite contributions based on risk.

[1] MSA 29(1)(n)

#### 2.1.1.2 Open enrolment

The MSA requires that medical schemes accept all applicants as members, termed open enrolment. Medical schemes' rules may not exclude any applicant or dependents, except where a scheme is a restricted scheme[2]. A restricted scheme is a scheme whose rules restrict eligibility for membership to employment or former employment in a profession, industry, trade or calling[3]. Schemes that are not restricted are termed open schemes. Open enrolment prevents medical schemes from underwriting the entry of members based on risk.

#### 2.1.1.3 Prescribed Minimum Benefits

The MSA requires all medical schemes to cover a minimum package of benefits on all options[4], termed Prescribed Minimum Benefits (PMBs)[5]. Payment for PMBs must include the costs of diagnosis and treatment and must be paid in full and without co-payments or deductibles[6]. Medical schemes may appoint Designated Service Providers (DSPs) for the treatment of PMBs and co-payments and deductibles may be charged if members receive services from providers who are not DSPs unless services are obtained involuntarily[7]. PMBs are identified using three sets of criteria: medical conditions that are identified by conditions and accompanying treatments, called Diagnosis and Treatment Pairs (DTPs); emergency medical conditions; and chronic conditions listed in a Chronic Disease List (CDL)[8]. There are 270 DTPs, identified by ICD-10 and CPT-4 codes listed in the MSA and 25 CDL conditions listed in the MSA[9]. PMBs ensure that all members receive a minimum level of benefits and are covered for catastrophic healthcare costs.

[2] MSA 29(3)(a)
[3] MSA 1(1)
[4] MSA 29(1)(o)
[5] MSA Regulations 7
[6] MSA Regulations 8(1)
[7] MSA Regulations 8(2)
[8] MSA Regulations 7
[9] MSA Regulations Annexure A

### 2.1.2 Income cross-subsidies

#### 2.1.2.1 Income rating

Medical schemes can differentiate contributions based on incomes[10]. Lower contributions for low-income members compared to high-income members create cross-subsidies based on incomes. In practice medical schemes differentiate contributions using income bands, with lower contribution rates for members in lower income bands.

#### 2.1.2.2 Tax subsidies

The Income Tax Act (Act 58 of 1962) ('the ITA') provides medical scheme members a tax subsidy in respect of contributions, termed the Medical Scheme Fees Tax Credit (MTC). The MTC is in the form of a deduction from a member's normal tax payable[11] and is a flat amount based on the member's number of dependents[12]. The flat amount is greater relative to lower contributions and incomes. The MTC is available only to medical scheme members who pay income tax as the MTC is deducted from a member's tax payable.

Members also receive a tax subsidy in respect of additional medical expenditure, termed the Additional Medical Scheme Fees Tax Credit (AMTC)[13]. The AMTC is also in the form of a deduction from a member's normal tax payable. For a taxpayer younger than 65 years and where the taxpayer, a spouse or child of the taxpayer does not have a disability, the AMTC is calculated as the amount by which additional medical expenditure exceeds 7.5% of taxable income. Additional medical expenditure is calculated as 25% of the aggregate of the amount by which medical scheme contributions exceed four times the tax credit of a taxpayer and out of pocket healthcare expenditure. For a taxpayer older than 65 years, the AMTC is calculated as all

[10] MSA 29(1)(n)
[11] ITA 6A(1)
[12] ITA 6A(2)
[13] ITA 6B(2)

additional medical expenditure. Additional medical expenditure is calculated as 33% of the amount by which medical scheme contributions exceed three times the tax credit of a taxpayer and out of pocket healthcare expenditure[14]. The AMTC for taxpayers below the age of 65 is greater for low-income earners than for high-income earners as the AMTC is calculated based on the amount by which additional medical expenditure exceeds a percentage of taxable income.

### 2.1.3 Limitations to cross-subsidies

#### 2.1.3.1 Adverse selection

Open enrolment allows individuals to anti-selectively purchase medical scheme coverage when they are high risk. McLeod and Ramjee (2007) stated that there is evidence that individuals with chronic diseases are more likely to be members of medical schemes compared to individuals without chronic diseases. McLeod and Grobler (2008) demonstrated that since the introduction of PMBs, which cover pregnancy and childbirth costs, large numbers of women joined medical schemes before giving birth and left schemes thereafter. Conversely, there are lower proportions of children covered by medical schemes compared to adults and there is low coverage among students and young working age adults (McLeod and Ramjee, 2007).

The MSA allows underwriting of members using waiting periods[15], during which members are not entitled to claim for benefits, and penalties in contributions for individuals who join schemes after breaks in coverage[16]. These measures aim to protect against adverse selection by encouraging individuals to join schemes when they are young and to remain members. However, the effectiveness of late joiner penalties depends on public awareness of the penalties and individuals may join schemes after breaks in coverage due to unaffordability rather than adverse selection (McLeod and Ramjee, 2007).

[14] ITA 6B(3)
[15] MSA 29A
[16] MSA Regulations 4(13)

#### 2.1.3.2 Risk selection

Options contirbutions are related to their risk profiles. McLeod (2005) showed that different age profiles result in a wide range of average costs across options for the PMB package. Medical schemes can compete on offering low contributions by designing benefits that attract low-risk members rather than by obtaining cost-efficient and quality care for members (McLeod, 2005; McLeod and Ramjee, 2007). Medical schemes have reduced coverage for conditions that are not PMBs and have used benefit management tools, such as DSPs and medicine formularies, to deter high-risk members from joining options (McLeod and Ramjee, 2007).

#### 2.1.3.3 Limited use of income bands

The use of income bands is not common among medical schemes and has decreased over time (McLeod and Ramjee, 2007), with only about 20% of open schemes offering options with income bands in 2013 (Ramjee and Vieyra, 2014). Restricted schemes make greater use of income bands compared to open schemes but the use of income bands among restricted schemes has also reduced over time (McLeod and Ramjee, 2007). The decrease may be because medical schemes that use income bands are prone to adverse selection whereby pensioners, who are high-risk members, typically have lower incomes and are more likely to select options with income bands (McLeod and Ramjee, 2007).

#### 2.1.3.4 Subsidies below the tax threshold

The MTC and AMTC are available to medical scheme members who are taxpayers and not to members whose incomes fall below the income tax threshold. Free public healthcare serves as an in-kind subsidy to households with taxable incomes below the tax threshold. However, public healthcare charges user fees which are based on means tests for partial and full payment. Households that have incomes above the means tests but fall below the tax threshold or do not purchase coverage due to unaffordable contributions do not receive the in-kind subsidy (McLeod, 2005).

### 2.1.4 Social solidarity reforms

Discussion documents published by DoSD (2002) and DoH (2002) outlined additional social solidarity reforms that were proposed to follow the existing social solidarity reforms (McLeod, 2005). The reforms consisted of introducing a subsidy to all members including members below the tax threshold, risk equalisation between medical schemes, mandatory income-related contributions and mandatory medical scheme membership. The reforms are reviewed below, based on their descriptions in the discussion documents.

#### 2.1.4.1 Contribution subsidies

A fixed subsidy per beneficiary would replace the MTC and AMTC. The subsidy would not be a deduction from tax payable and would be given to all members including members who are below the tax threshold. The subsidy would be equal to the amount spent per life in the public sector to create an equal subsidy for individuals in the private and public sectors.

#### 2.1.4.2 Risk equalisation

Risk equalisation would transfer funds from options with low-risk profiles to options with high-risk profiles through a Risk Equalisation Fund (REF). The REF would receive contributions from options at an industry community rate and would pay amounts to options based on their risk profiles. Risk equalisation would create an incentive for medical schemes to compete based on cost-efficient and quality delivery of healthcare rather than risk selection (McLeod, 2005). Members would have a better understanding of the trade-offs between the price of contributions and DSP availability and the cost and quality of coverage (McLeod, 2005).

Grobler et al. (2003) proposed a formula to determine the REF's allocation of funds to options. The formula was developed further in research that was conducted by a Risk Equalisation Formula Consultative Task Team, which is detailed in McLeod et al.

(2004). An international panel of experts reviewed and supported the findings of the task team (Armstrong et al., 2004). The formula was presented in the form of a table of the cost per beneficiary for the PMB package, with risk factors of age, diagnosis of the CDL conditions, the number of simultaneous CDL conditions, treatment of HIV/AIDS and maternity. The table indicates the amount which the REF would pay to medical schemes based on the risk factors of each beneficiary.

#### 2.1.4.3 Mandatory contributions

Mandatory membership would reduce adverse selection by requiring coverage for low-risk members who select not to be covered. Mandatory contributions would be implemented through a social security tax that, together with the per-capita subsidy, would fund the PMB package. The social security tax and per capita subsidy would be paid directly to the REF, which would pool funds and make risk-adjusted payments to schemes in respect of the PMB package. Contributions in respect of benefits above the PMB package would be paid directly to medical schemes and would be reduced by the amount of the social security contribution. Mandatory contributions would relate to incomes to increase income cross-subsidies among members.

### 2.1.5 Relation to social security

World Bank (1994) set out a framework in which social security consists of three pillars: a public pillar which provides a basic level of savings to reduce poverty and is funded by taxes; a mandatory pillar which provides savings above the minimum and which would be privately funded; and a voluntary pillar provides additional savings for those who want to save more than the mandatory pillar.

McLeod (2005) described healthcare financing using this framework. Healthcare financing can consist of:

- Universal benefits that are available as a fixed financial allocation or entitlement to a free service. There is no contribution and benefits are funded by government. This pillar provides universal access, especially for poor and informal workers.
- Benefits that are available above pillar 1. Contributions are determined with income and risk cross-subsidies and there are mandates for coverage for those who can afford them. This pillar makes benefits accessible to income earners through social solidarity.
- Benefits that are discretionary and are above the minimum level of benefits that are covered by mandatory contributions. This pillar allows individuals to make decisions on coverage and government would be required to ensure consumer protection.

Figure 2.1, taken from McLeod (2005), shows graphically how medical scheme social solidarity reforms would fit into this framework. Pillar 1 consists of the removal of the tax subsidy and replacing it with a per-capita subsidy and budget allocations for the public healthcare system. Pillar 2 consists of the mandatory social security tax that would be paid to the REF and allocated to medical schemes on a risk-adjusted basis to fund common benefits. Pillar 3 consists of contributions in respect of supplementary benefits, which would be paid directly to medical schemes.

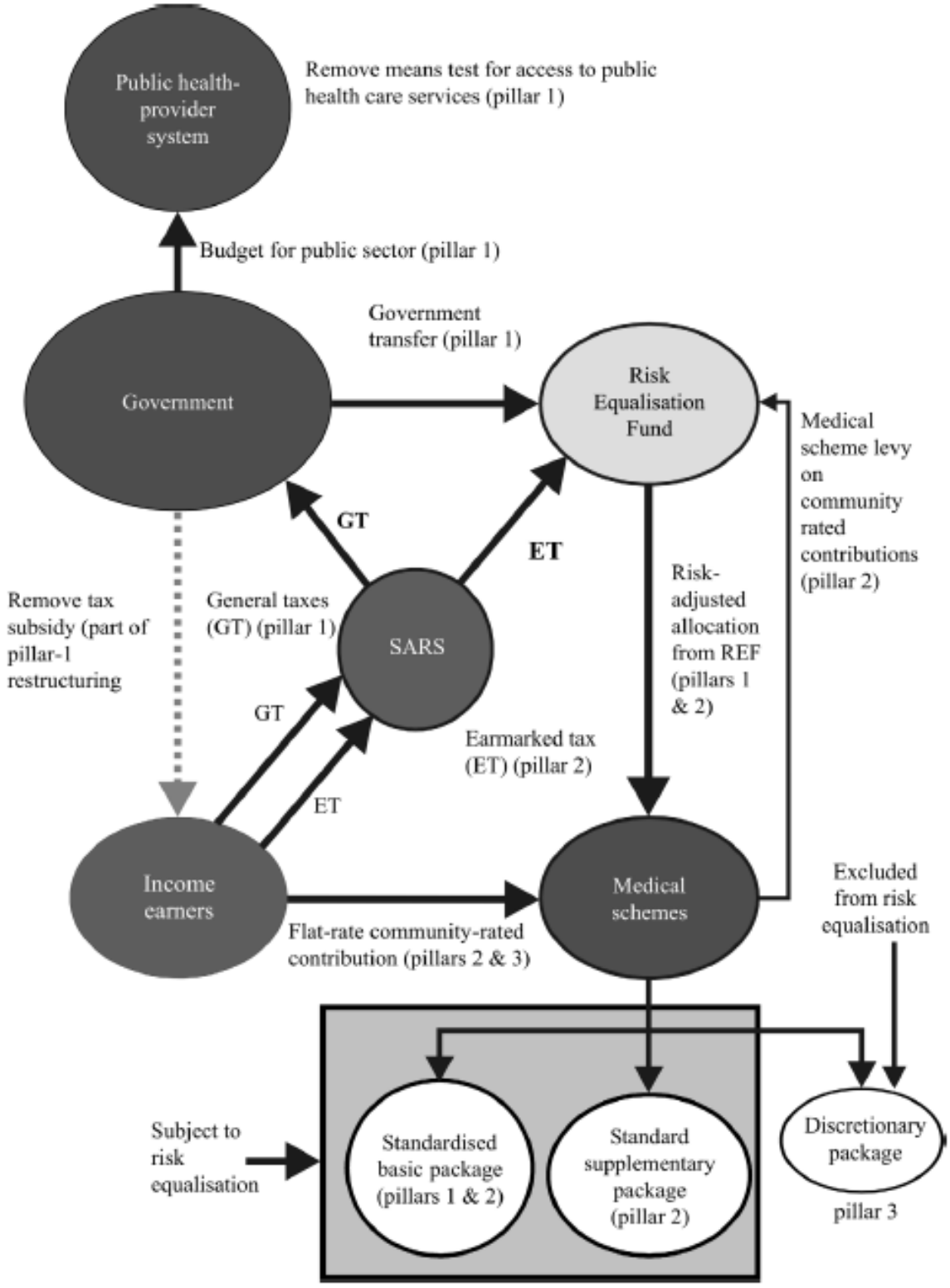



**Figure 2-1** Social security structure of medical scheme social solidarity reforms (McLeod, 2005)

## 2.2 Affordability of contributions

Several studies have analysed the affordability of medical scheme contributions for South African households. The section describes the studies, namely Söderlund & Peprah (1998), McLeod et al, (2003), Fish and Ramjee, 2007, McLeod and Grobler (2009) and Ataguba and McIntyre (2012, 2018).

### 2.2.1 Söderlund & Peprah (1998)

Söderlund & Peprah (1998) investigated the affordability of a package of essential care which was defined in terms of a list of DTPs. The estimated cost of the package was R685 per person per annum in 1998. Affordability of the package was assessed by comparing the cost to levels of income for which coverage could be mandatory. The study considered three scenarios: a community rate contribution across all insured individuals, a contribution that was a percentage of income with caps to the percentage and a community rate contribution with subsidies for low-income earners.

The community rate contribution was unaffordable for low-income earners when they were included in mandatory coverage. Contributions were most unaffordable for low-income earners with large family sizes. The study suggested that for the package to be affordable coverage should not be mandatory for dependents, unless there are subsidies from small to large family sizes.

Contributions as a proportion of income created a substantial cross-subsidy between low- and high-income earners. The cross-subsidy was greater the lower the income level for mandatory coverage. However, contributions remained unaffordable for low-income earners, even where there were no caps on the level of contributions for high-income earners. Although contributions were affordable for high-income earners, contributions would increase substantially which may result in high-income earners being less willing to continue as medical scheme members. The contribution was significantly lower for high-income earners when low-income earners were not included in mandatory membership.

Community rate contributions with subsidies for low-income earners would be affordable for relatively low incomes. However, very low-income earners would continue to find the package unaffordable, even with significant subsidies.

### 2.2.2 McLeod et al. (2003)

McLeod et al. (2003) analysed the affordability of the PMB package, including in-patient and out-patient benefits, the CDL benefits and non-healthcare costs. The prices of the components of the package were developed for different clusters of beneficiaries. There was a low cluster costing R1 551 per beneficiary per annum, a high cluster costing R3 797 per beneficiary per annum and a weighted industry price costing R2 156 per beneficiary per annum, in 2001. The cost of the PMB package in the public sector was also considered. This was R1 015 per beneficiary per annum, although there was uncertainty in this estimate.

Affordability of the PMB package was first assessed by comparing the cost of the package to the expenditure on benefits of existing options. The cost of the package for the low cluster, high cluster and the weighted average cost were on average below the expenditures of options. There were few options where expenditures were below the cost of the PMB package, especially for the low cluster and industry weighted cost. The low expenditures of some options may have been due to these options' extremely young age profiles. The analysis suggested that the PMB package was affordable as existing expenditure comfortably covered the cost of the PMB package.

Affordability was then assessed by comparing the cost of the PMB package, including non-healthcare costs that were necessary to deliver PMBs, to the average gross contribution per beneficiary. Contributions exceeded the cost of the PMB package for the low cluster, high cluster and industry-weighted cost. Contributions exceeded the PMB cost by large amounts, which would allow contributions to fund additional benefits. Almost all options had average contributions that covered the cost of PMBs.

Options that did not cover the cost may have had exceptionally young age profiles, leading to low contribution rates. The PMB package was thus affordable for existing medical scheme members based on the contributions paid by members.

Affordability was then assessed by comparing the cost of the PMB package to illustrative incomes based on the actual incomes of medical scheme members. Affordability was assessed based on the PMB package cost as a percentage of income. The package was unaffordable for a large proportion of the medical scheme population. The package was especially unaffordable for pensioners, low-income earners and large family sizes. Contributions became more affordable with the low cluster and the public sector cost. The analysis suggested that many members paid contributions that were not affordable and significant subsidies were needed to make contributions affordable for members.

### 2.2.3 Fish and Ramjee (2007)

Fish and Ramjee (2007) assessed the affordability of contributions of open medical scheme options in the market. Affordability was assessed based on the proportion of options that households could purchase below a threshold percentage of income.

Few options were affordable for low-income households and hardly any options were affordable for households with very low incomes. Most options were unaffordable for households with average incomes, unless the threshold percentage was increased. Households with high-incomes could afford most options, although the number of options was smaller if the threshold percentage was decreased.

The paper also analysed trends in affordability over a five-year period. It found that that there had been little change in affordability for most income groups, with improvements in affordability only occurring for high-income medical scheme members. The paper commented that the lack of improvement was despite the introduction MSA's social solidarity regulations which should have improved

affordability. The paper ascribed the lack of improvement in affordability to the absence of additional social solidarity reforms following the MSA's introduction.

### 2.2.4 McLeod and Grobler (2009)

McLeod and Grobler (2009) analysed the impact of social solidarity reforms on the affordability of contributions for medical scheme members. The analysis considered households with a range of illustrative incomes, a household composition consisting of two adults and two children and a single income earner. Households were assumed to purchase options from a medical scheme in the market. The option with the most comprehensive benefit package was found to be affordable for only the highest income earners. The study assumed that lower income earners purchased lower cost options that were affordable to them.

The study found that the replacement of the existing tax subsidy with a per-capita subsidy would substantially reduce the proportion of income spent on contributions by low-income households but contributions would still be unaffordable. REF transfers, implemented after the per capita subsidy, would increase the proportion of income spent on contributions by low-income households to a level that was similar to the proportion before the change in subsidy. This was due to outflows under the REF from options purchased by low-income earners because of the young age profiles of these options. If REF transfers were implemented simultaneously with a flat social security contribution funding PMB benefits for income earners, the proportion of income spent would not increase with the REF transfers. The proportion would decline slightly from the level before risk equalisation but would still be unaffordable for low-income earners.

If the REF were introduced before the per-capita subsidy or a social security contribution, cover would be significantly less affordable for low-income earners. Based on this McLeod and Grobler (2009) warned that social solidarity could decrease for some sequences of introducing social solidarity reforms. They suggested that

reforms should be implemented in a sequence of the per-capita subsidy followed by simultaneous implementation of the REF and the social security contribution.

The study also investigated the impact of pooling common benefits of options within schemes. Pooling common benefits before the per-capita subsidy, risk equalisation and social security contribution would result in substantially higher contributions for low-income earners. Pooling common benefits after these reforms would result in lower contributions compared to the status quo but higher contributions compared to the implantation of social solidarity reforms without the pooling of common benefits. The introduction of common benefits would thus decrease affordability for low-income members.

### 2.2.5 Ataguba and McIntyre (2012, 2018)

Ataguba and McIntyre (2012) and Ataguba and McIntyre (2018) investigated equity in the financing and delivery of healthcare services for South African households. Expenditure on medical scheme contributions and incomes were taken from Statistics South Africa's Income and Expenditure Surveys.

Medical scheme contributions were found to be a progressive source of healthcare financing when viewed across the population as medical scheme members had high incomes relative to the full population. However, contributions were found to be regressive among medical scheme members, with contributions comprising a greater share of consumption for low-income members compared to high-income members. Although the studies investigated equity rather than affordability, the results suggest that medical scheme coverage is less affordable for low-income medical scheme members.

The study found that Out of Pocket (OOP) payments were regressive and that OOP payments were made by both medical scheme members and uncovered households. This suggests that expansion of medical scheme coverage could address regressive

OOP payments by currently uncovered households. However, the study pointed out that regressive contributions among medical scheme members means that healthcare financing may become more regressive across the population if coverage expands. This suggests that the expansion of medical scheme coverage would need to be accompanied by a more progressive structure for contributions.

# 3 Data

This dissertation used several data sources, which are described in Sections 3.1 to 3.5. All data sources were from 2015 so that data from the same year would be used throughout the analysis.

## 3.1 Household survey data

Household data of relationships, demographics, incomes and expenditures were used for investigating household profiles and for projecting mandatory income-related contributions. Statistics South Africa (StatsSA) monitors the incomes and expenditures of South African households using the Income and Expenditure Survey and the Living Conditions Survey. This dissertation used the 2014/2015 Living Conditions Survey (the "LCS") as it was the most recent survey for which data were available.

### 3.1.1 Design of the LCS

StatsSA (2017a) describes the design of the LCS. The LCS was a cross-sectional household survey conducted from October 2014 to October 2015. Data were collected from households by means of questionnaires and diaries. Questionnaires contained modules on household compositions, particulars of household members, education, employment, welfare, information regarding dwellings and services, housing, crime, items of expenditure, assets, incomes and information on health and disabilities. Diaries recorded daily acquisitions over two week-long periods. Diary amounts were annualised and expenditures and incomes were benchmarked to April 2015 by inflating or deflating expenditures with the Consumer Price Index (CPI).

The survey sampled 27 527 households. Sample weights were applied to the household observations so that the responses represented the national population. Weights were set initially based on the probabilities of households being selected in the design of the survey. The weights were adjusted to account for remote areas excluded from the sample, survey non-response and trimming of household with extremely high weights.

The weights were benchmarked to population estimates for age, sex and race groups in StatsSA's 2015 mid-April population estimates.

### 3.1.2 Data files

The LCS data were received from StatsSA as CSV files. The data were comprised of five files:

- The Person file which contained information of persons in the households;
- The Household file which contained information of the households;
- The Person Income file which contained information of each person's income;
- The Household assets file which contained information of households' assets; and
- The Total file which contained information of households' incomes and expenditures.

The data files were imported into Microsoft SQL Server Express using Microsoft SQL Server Management Studio. The files contained unique identification numbers for households which allowed the tables to be joined on households.

The data were accompanied by documents that provided descriptions of the coding in the data. These were:

- The Metadata report which contained the coding of person and household information; and
- The table of Classification of Individual Consumption by Purpose (COICOP) codes which provided the coding of incomes and expenditures.

The documents were set up as tables and imported into Microsoft SQL Server Express using Microsoft SQL Server Management Studio.

The data processing that was required for the analysis was performed in Microsoft SQL Management Studio.

### 3.1.3 Imputation

The survey allowed responses of "don't know", "unspecified" and "other" for three of the variables used in the analysis: medical scheme membership, education level and work status. These were regarded as missing responses. There were 1 132, 495 and 4 479 missing responses for medical scheme membership, education level and work status respectively. The missing observations were not necessarily for the same units in the survey as responses were missing for items rather than for units.

Discarding missing observations could decrease the quality of the analysis if missing values differ systematically from known values in the sample (Groves et al., 2009). Therefore, rather than discarding the observations, values of missing observations were imputed into the data. Multiple imputation, described in Section 4.2, was used to impute the missing items.

Table 3-1 summarises the results of the imputations in terms of the numbers and percentages of imputed values for the missing observations. The percentages of observations with known values are shown for comparison. There were small differences in the percentages of imputed values compared to known values for each variable. There were fewer medical scheme beneficiaries; more individuals with no or incomplete schooling and fewer with higher education; and more formal sector workers and fewer unemployed.

**Table 3-1** Imputation results

| | | Number missing | Percentage Missing | Percentage Known |
|---|---|---|---|---|
| Medical scheme membership | No | 979 | 86.48% | 84.50% |
| | Yes | 153 | 13.52% | 15.50% |
| Education level | No schooling | 89 | 17.98% | 15.60% |
| | Incomplete schooling | 302 | 61.01% | 59.30% |
| | Complete schooling | 95 | 19.19% | 19.80% |
| | Technical certificate | 1 | 0.20% | 1.30% |
| | Higher education | 8 | 1.62% | 4.00% |
| Employment status | Formal sector | 972 | 21.70% | 17.40% |
| | Informal sector | 210 | 4.69% | 5.90% |
| | Private household | 103 | 2.30% | 2.60% |
| | Unemployed | 3 194 | 71.31% | 74.10% |

## 3.2 Cost curves

Cost curves of the PMB package were used to project risk equalisation transfers and to project mandatory contributions. Scheme Risk Measurement (SRM) returns and REF contribution tables and grid counts were used to derive PMB cost curves for males and females in 2015.

The CMS ran a shadow process for the REF from 2005 to 2011 to prepare for a system of risk equalisation. The REF shadow process produced contribution tables and grid counts in respect of the PMB package for 2004 to 2010. The methodology for determining the contribution tables and grid counts are detailed in Risk Equalisation Technical Advisory Panel (RETAP) (2007). SRM returns replaced REF shadow returns in 2012. Medical schemes submit SRM returns to the CMS annually on the same basis as the REF shadow returns as part of Healthcare Utilisation Annual Statutory Returns. The purpose of the SRM returns is to measure and report on the risk profiles of medical schemes rather than for a system of risk equalisation (CMS, 2016b).

SRM contribution tables and grid counts were used to derive a cost curve for the PMB package by age. The SRM contribution tables and grid counts are published by the CMS on the CMS website[17]. The contribution tables used the REF base year of 2009 and inflated costs to 2015 using inflation factors that were not published. The grid counts identified CDL conditions using the Entry and Verification Criteria detailed in CMS (2015).

The contribution tables were weighted by the grid counts to derive a curve of the expected cost per beneficiary by age for 2015. The cost curve, weighted by the 2015 medical scheme demographic profile contained in CMS (2016a), gave an expected cost of R615.79 per beneficiary per month (PBPM). This is slightly higher than the average cost of R608.90 reported by CMS (2016b) due to differences in the submission of membership data in CMS (2016a) compared to the SRM returns. It should be noted that the actual average cost of PMBs reported by schemes in 2015 was R646.81. The difference between the actual cost and the expected cost based on the SRM contribution tables and grid counts are discussed further in Section 8.3.2.

The SRM contribution tables and grid counts were not split by sex. Sex was significant for the analysis as the sex profile would differ between existing medical scheme beneficiaries and beneficiaries under mandatory coverage, as shown in Section 6.4. Professor Heather McLeod produced male and female REF contribution tables for 2010 using the 2007 base male and female REF contribution tables inflated to 2010. Professor McLeod termed these "preferred REF contribution tables" as the tables used a methodology that was consistent with previous REF tables. The preferred tables were published on the website of Professor McLeod[18].

[17] https://www.medicalschemes.com/Publications.aspx
[18] http://www.heathermcleodnz.com/#/ref-tables/4580364658

The preferred 2010 REF contribution tables were weighted by the 2010 grid counts to derive male and female PMB cost curves for 2010. A combined cost curve for 2010 was derived by weighting the male and female costs curves by the number of beneficiaries in 2010 by age, contained in CMS (2011). The ratios of male and female costs to the combined costs for each age were used to scale the 2015 combined curve and derive male and female cost curves for 2015.

Figure 3-1 shows the combined, female and male cost curves for 2015. The curves spike for beneficiaries under 1 year due to high-cost neonatal cases. Costs are lowest for children and young adults. There is a hump in the female curve between ages 20 and 40 due to maternity costs. The curve increases for middle-aged and older adults, reaching a peak at about age 80. The cost curve for males is significantly higher than the cost curve for females at older ages. The combined curve is closer to the female curve between ages 20 and 29 and at old ages due to the higher proportions of females in the medical scheme population at these ages.

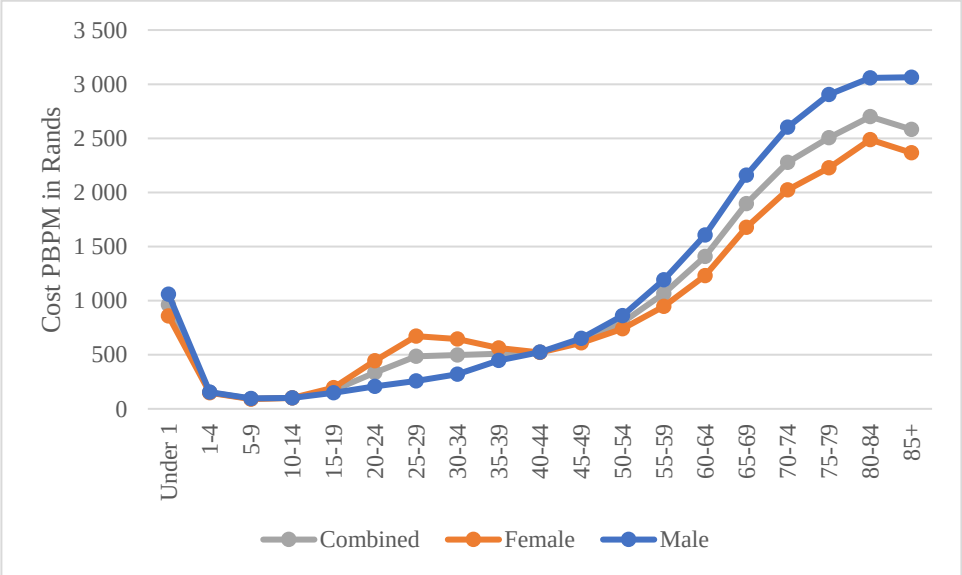



**Figure 3-1** PMB cost curves

## 3.3 CMS option data

Statistics of options' gross contributions and the number of beneficiaries belonging to options were needed to calculate the average contributions of options. The CMS publishes Annual Reports which include annexures with statistical tables for medical schemes and options. Statistics of the gross contributions of options and the number of beneficiaries belonging to options in 2015 were in Annexure S of the 2015/2016 CMS Annual Report (CMS, 2016). Statistics of the number of beneficiaries belonging Efficiency Discount Options were also needed and were in Annexure T of the 2015/2016 CMS Annual Report (CMS, 2016).

Statistics of the numbers of medical scheme beneficiaries belonging to options by age and sex were needed for projecting risk equalisation transfers. The CMS Annual Report did not contain the numbers of beneficiaries belonging to options by age and sex. Medical schemes submit Annual Statutory Returns (ASRs) to the CMS that contain data in greater detail than the CMS Annual Report and include the numbers of beneficiaries belonging to options by age and sex. Data were extracted from Part 2.3 of schemes' 2015 ASRs[19].

Data for Community Medical Aid Scheme were blanked out in the 2015/2016 CMS Annual Report due to a dispute regarding the scheme's financial statements. Statistics of the scheme's gross contributions and number of beneficiaries were taken from the scheme's ASR rather than the CMS Annual Report.

## 3.4 Population incomes

The projection of mandatory income-related contributions required the total income of the population that would be covered under mandatory membership. Two scenarios were considered for mandatory contributions: a mandatory surcharge on taxable income and a mandatory contribution based on payroll. Total taxable income was taken

[19] The ASRs are made available by the CMS and were provided for this research by Healthman (Pty) Ltd.

from the 2015 Tax Statistics published by the South African Revenue Service (SARS) (SARS, 2016). Total compensation of employees was taken from the Statistical Tables accompanying 2015 National Accounts published by the South African Reserve Bank (SARB) (SARB, 2016).

## 3.5 Contribution tables

Medical schemes' benefits brochures were used for data of contributions. Benefit brochures contained contribution tables, with contributions by type of beneficiary and income bands if applicable. Benefit brochures were also used for information on benefits to group options by benefit design.

Benefit brochures were not available for some medical schemes, especially restricted schemes with few beneficiaries. Contribution tables were obtained for 166 options from 25 medical schemes and for 14 Efficiency Discount Options from 5 medical schemes. The options covered 7 995 062 beneficiaries.

# 4 Statistical methods

## 4.1 Descriptive statistics

Descriptive statistics were used to describe household profiles and medical scheme contributions. The distributions of household demographics, household incomes, expenditure on medical scheme contributions and gross contributions of medical scheme options were illustrated using histograms. The distributions of household incomes and household expenditure on medical scheme contributions were also described using percentiles.

## 4.2 Imputation

Multiple imputation was used to replace missing items in the 2014/2015 LCS sample. Imputation is a statistical technique for replacing missing data with derived values (Groves et al., 2009). Multiple imputation imputes values multiple times with random errors to account for uncertainty and combines the results into one set of estimates (Rubin, 2004).

Multiple imputation was performed in R (R Core Team, 2017) using the "mice" package (van Buuren and Groothuis-Oudshoorn, 2011). Models were fitted using known values and were used as predictive models to fit values for missing observations. Logistic regression models were fitted to impute medical scheme membership and multinomial logistic regression models were fitted to impute education level and work status. Age group, sex, province, settlement type, relation to household head, household composition and household income were used as independent variables in the models.

## 4.3 Linear regression

Linear regression was used to investigate the relationship between expenditure on medical scheme contributions and household characteristics. Linear regression assumes that the expected value of a continuous dependent variable is a linear function

of independent variables given values of the independent variables (Montgomery and Peck, 1992).

Regression has underlying assumptions of normally distributed residuals and constant and uncorrelated variance of residuals (Montgomery & Peck, 1982). Q-Q plots and residual plots were examined to test for normality of residuals and constant variance of residuals respectively. The plots were used to suggest transformations of the response variable that allowed the model to meet the regression assumptions.

Outliers in the data were identified using Dffit statistics, which measure the change in the fitted value by omitting single observations (Montgomery and Peck, 1982). The "olsrr" package in R was used to calculate and assess the Dffit statistics. Observations were deemed influential if the absolute value of the Dffit value was greater than $2\sqrt{(p+1)/(n-p-1)}$, where $n$ is the number of observations and $p$ is the number of independent variables. The Dffit statistic was calculated to be 0.12 for this dissertation's regression.

The regression model was fitted in R (R Core Team, 2017) using Weighted Least Squares to account for the survey weights. Variables were selected for inclusion in the model by backwards stepwise selection using the "step" function in R. The "step" backwards stepwise selection function starts with all variables considered for the model and calculates the Akaike Information Criterion (AIC) with the loss of each variable in the model. The variable whose loss results in the lowest AIC is deleted from the model. The process is repeated until no further variables can be deleted from the model without an increase in the AIC.

# 5 Household profiles

This chapter investigates the household profiles of medical scheme members. The household profiles in Chapter 7 were based on the results of this chapter. This chapter describes the number of medical scheme beneficiaries in the population, followed by the household compositions, demographics, incomes and expenditure on contributions of medical scheme beneficiaries.

The investigation used data from the LCS, described in Section 3.1. All analyses in this chapter accounted for sample weights so that the results reflected the characteristics of the population.

Household profiles of the non-medical scheme population were not analysed in this chapter. However, demographics and incomes of the non-medical scheme population were considered in Section 6.4 for projecting mandatory medical scheme coverage.

## 5.1 Medical scheme membership

The LCS, after imputation, contained 8 542 945 medical scheme beneficiaries and 46 224 482 individuals who were not beneficiaries. There were 3 365 168 households with medical scheme beneficiaries and 12 064 734 households with individuals who were not beneficiaries. 1 255 251 households were partially covered, in which some but not all household members were medical scheme beneficiaries.

CMS (2016a) reported 8 775 618 medical scheme beneficiaries and 3 932 700 Principal Members on average in 2015. The number of medical scheme beneficiaries in the LCS was slightly lower than the number reported by the CMS. This is likely due to the LCS understating medical scheme beneficiaries in its sample. The number of households in the LCS was significantly lower than the number of Principal Members reported by the CMS. The lower number of households compared to Principal Members is likely to be as a result of households that have more than one Principal Member.

## 5.2 Household compositions

Household compositions were described according to the numbers of adult and child medical scheme beneficiaries in households. The household head and the spouse or partner of the household head were assumed to be adults; the children, stepchildren or adopted children of the household head and grandchildren of the household head were assumed to be children; and other household members were assumed to be adults if they were older than 18 years and were otherwise assumed to be children. A household did not necessarily correspond to a single Principal Member.

Figure 5-1 shows the most common household compositions. Single adults were the most common, followed by two adults, two adults and two children, two adults and one child, one adult and one child, one adult and two children and two adults and three children. Other household compositions were less frequent. The order of the most common household compositions according to the number of individuals was different, given the different household sizes. The order was two adults and two children, two adults and one child, two adults, one adult, two adults and three children, one adult and two children and one adult and one child. Other household compositions had relatively large numbers of individuals, given their large household sizes.

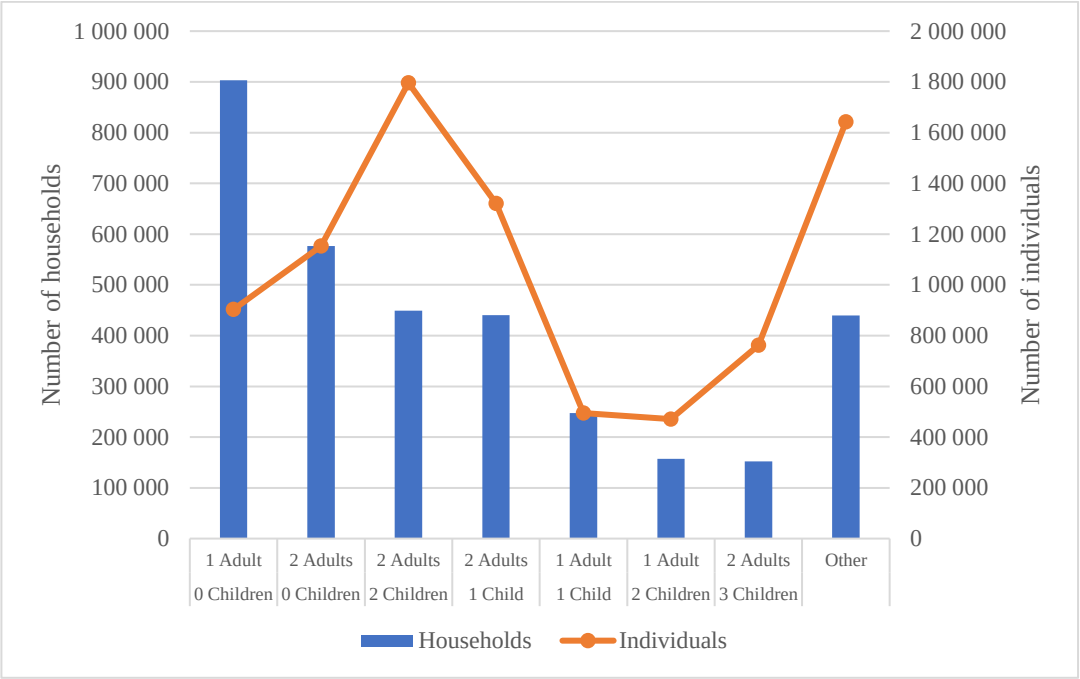



**Figure 5-1** Household compositions of households with coverage

Figure 5-2 shows the proportion of households with partial coverage for the household compositions. There were few partially covered households with two adults and two or more children. Partial coverage was more common among smaller household compositions. Households with two adults and either no child or one child often had a child that was not covered. Households with one adult and two children often had an adult that was not covered. Households with one adult and one child or no child often had an adult, a child or both that was not covered.

Partially covered households may due household being unable to afford contributions or may indicate adverse selection, especially where children or young adults are not covered. Reasons for partial coverage can be investigated further.

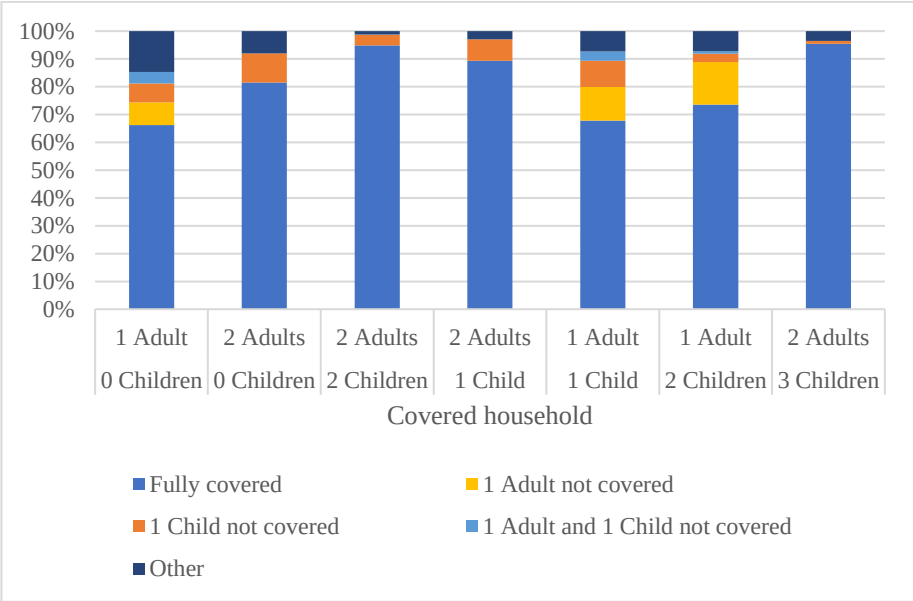



**Figure 5-2** Description of partially covered households

## 5.3 Demographics

The proportions of medical scheme beneficiaries by age and sex in the LCS are shown in Figure 5-3. The age profile of medical scheme beneficiaries showed a peak at young ages, a drop at between ages 20 and 29, a peak at middle ages and a gradual drop at older ages. The drop between ages 20 and 29 is due to adverse selection by students and young adults who select not to be covered. The proportion of female beneficiaries was significantly higher than male beneficiaries between ages 25 and 39. The higher proportion of female beneficiaries at these ages is due to adverse selection by members who purchase coverage when they are expecting maternity costs.

The LCS proportions were compared to statistics reported in CMS (2016a) to demonstrate their reasonability. The CMS statistics had a similar profile to the LCS but with significantly more beneficiaries under one year. This may have been due to schemes tending to report the number of beneficiaries under one year unreliably (CMS, 2016b).

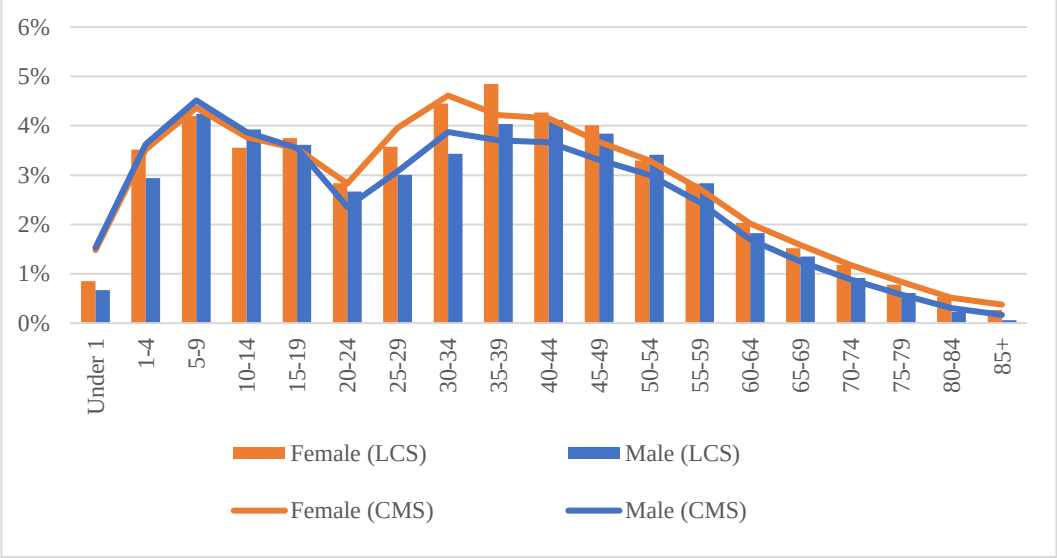



**Figure 5-3** Age distribution of beneficiaries

Demographic profiles of the different household compositions differed significantly. The following observations were made from Figure 5-4 for the household compositions' demographic profiles:

- Single person households had a wide distribution of ages. There were more males at younger ages and females at older ages. This may have been due to higher incomes among males at younger ages and greater longevity among females at older ages.
- Households with two adults had a wide distribution of ages, with a peak around ages 25 to 24, a dip between ages 35 and 49, a higher peak after age 50 and a tail into older ages. The first peak may indicate young families that do not have children; the dip may indicate families with children; and the second peak may indicate families with children who have left the household. The percentage of females was greater than males at young ages and less than males at old ages. The difference may reflect the age gap between male and female spouses.

— Households with two adults and two children had high percentages at child ages and adult ages and few students, young adults and pensioners. There were more female than male children, amore females than males at young adult ages and fewer females than males at old ages.
— Households with two adults and one child had children at young ages. Adults had a large range of ages but few pensioners. There were more female than male children, more females than males at young adult ages and fewer at old adult ages.
— Households with one adult and one child had a wide distribution of ages. The proportion of female adults was substantially greater than male adults. The household composition was thus predominantly single mothers.
— Households with one adult and two children mostly had children at older ages. There were substantially more female adults than male adults, as with households with one adult and one child. The household composition was thus predominantly single mothers.
— Households with two adults and three children had a similar demographic profile to households with two adults and two children. The pattern appears jagged as there were few households with this household composition in the data.

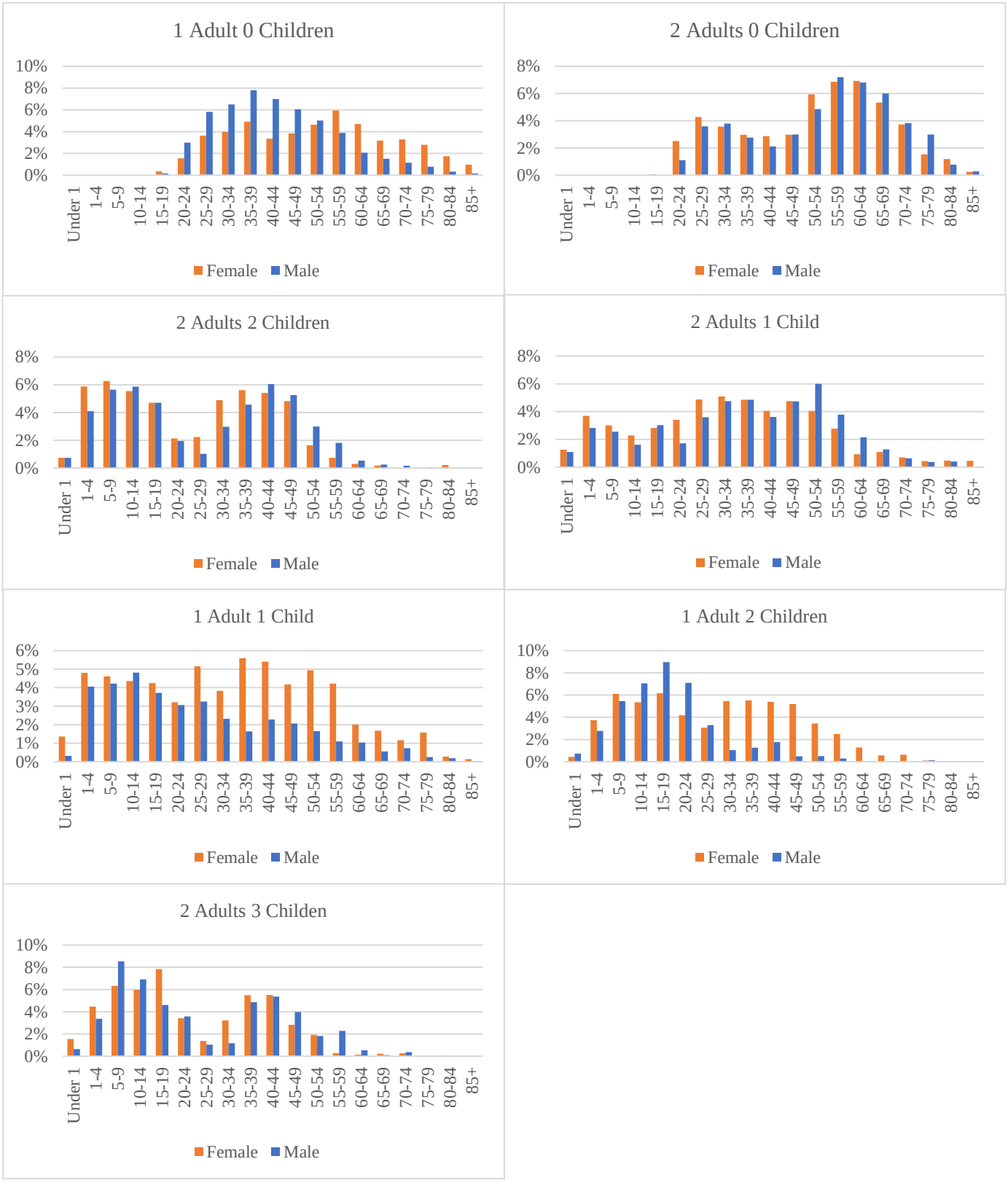



**Figure 5-4** Age distribution of beneficiaries by household composition

## 5.4 Incomes

Incomes were described using household incomes from all sources, including income from work, income from capital, income from pensions and annuities and other sources of income, such as transfers from family members. The survey recorded income from work as gross income before deductions and tax and included income from overtime, allowances and bonuses (StatsSA, 2017b). The LCS regarded medical scheme contributions paid by an employer as in-kind income. This dissertation included medical scheme contributions paid by employers as income since contributions paid by employers typically form part of their employees' cost to company (McLeod and Ramjee, 2007).

The national population had an income distribution heavily skewed towards low incomes. The percentage of the population who were medical scheme beneficiaries was very low for low incomes, increased to about 80% at an income of about R650 000 and remained at this level for higher incomes. The medical scheme population had a wide distribution of incomes as the national population was heavily skewed towards low incomes but the percentage of the population who were medical scheme beneficiaries was skewed towards high incomes.

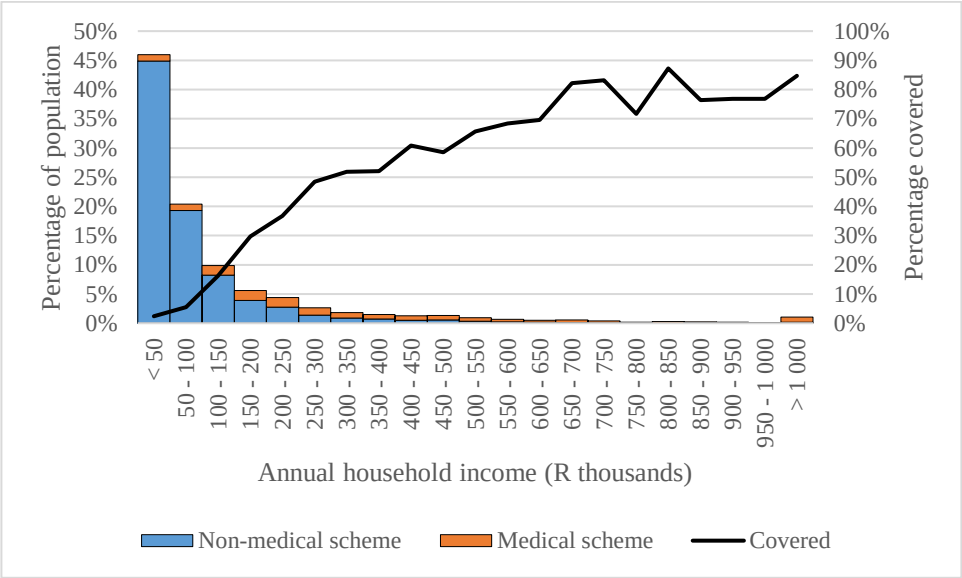



**Figure 5-5** Medical scheme coverage by household income

Incomes were described for different household compositions and ages using the 10th, 25th, 50th, 75th and 90th percentiles of household incomes.

Figure 5-6 shows the percentiles for household compositions. Single adult households had the lowest incomes, followed by households with a single adult and children. Households with two adults had higher incomes, although there were large ranges of incomes and some households had low incomes. Households with two adults and children had the highest incomes and the largest ranges of incomes.

The range between the 10th and 90th percentiles of income was large and income was positively skewed for all household compositions. Thus, there was significant variability in incomes within different household compositions, with most households having low incomes and few having high incomes.

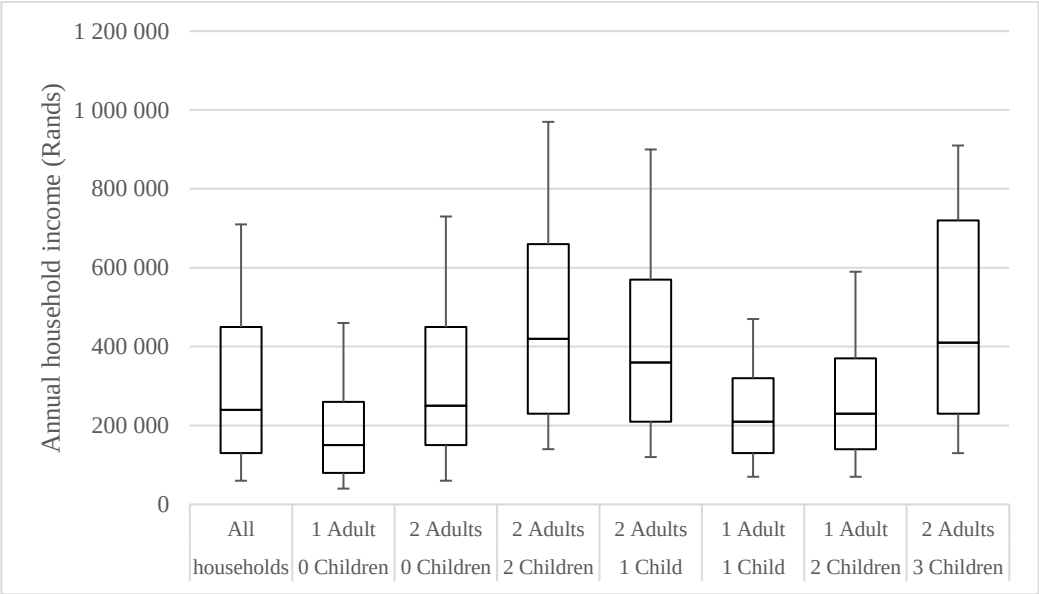



**Figure 5-6** Household income by household composition

Figure 5-4 showed that households with one or two adults and no children had wide ranges of ages. Therefore, the effect of the age of the head of the household on incomes was investigated for these household compositions.

Incomes for single adult households increased from age 20 to age 59, which is likely to be due to promotional salary increases for older workers. Incomes for single adult households and for two adult households fell from age 60 due to decreases in incomes after retirement.

There was variability in incomes and skew distributions of incomes for all ages. However, there was less variability in incomes in retirement compared to incomes before retirement.

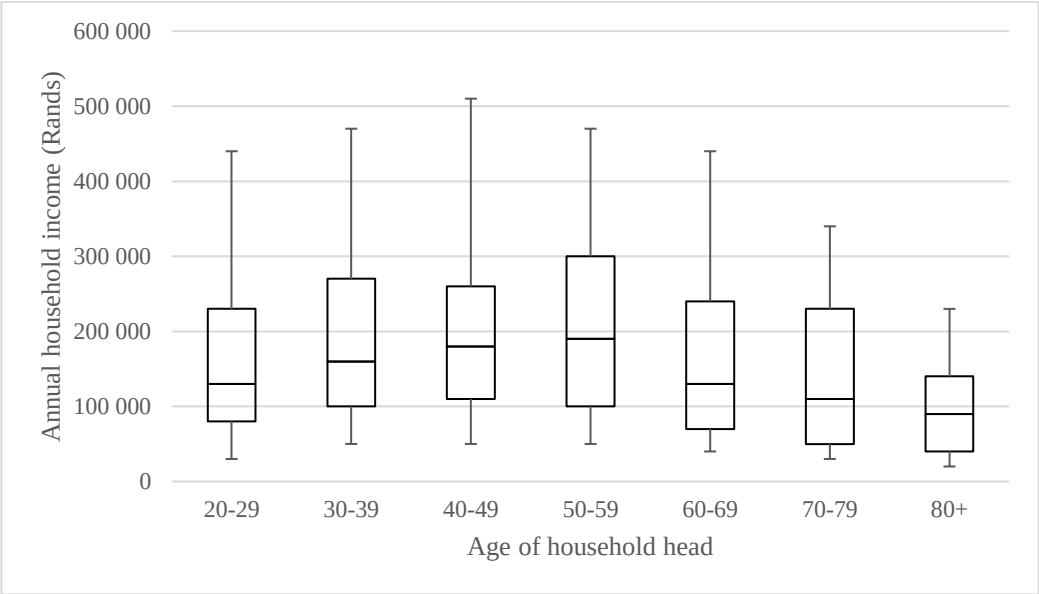



**Figure 5-7** Household income by age for single adult households

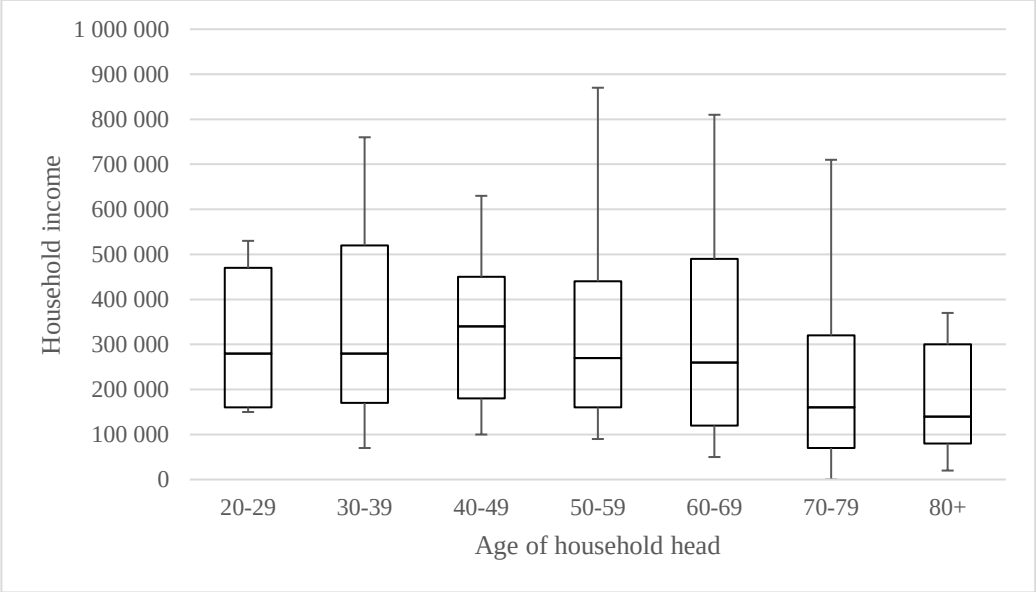



**Figure 5-8** Household income by age for two adult households

## 5.5 Expenditure on contributions

The LCS recorded expenditure at a household level. Therefore, expenditure on contributions was analysed for households rather than for individuals. Households with medical scheme beneficiaries but without expenditure on contributions were excluded from the analysis. It is likely that contributions for these households were paid by other households.

Expenditure on contributions was taken to be the sum of contributions paid by members and employers. Contributions paid by employers were included as employers usually remunerate employees based their cost to company and employees effectively bear the cost of employer contributions (McLeod and Ramjee, 2007).

Figure 5-9 shows the distribution of expenditure on medical scheme contributions recorded in the LCS. Expenditure on contributions had a wide range and was positively skewed. The percentage of households with expenditure of less than R1 000 per month was greater than expected. This may have been due to under-reporting of expenditure in the LCS or due to expenditure data not accounting for employer subsidies.

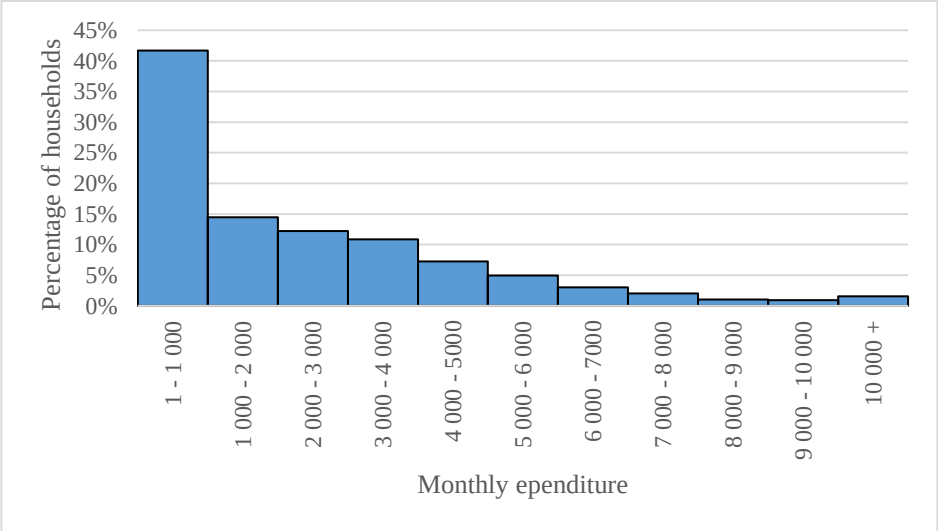



**Figure 5-9** Household expenditure on medical scheme contributions

Figures 5-10 to 5-12 show the distribution of expenditure on contributions by household composition, income and age of the household head. The distribution of expenditure on contributions was described using the $10^{th}$, $25^{th}$, $50^{th}$, $75^{th}$ and $90^{th}$ percentiles.

The median and higher percentiles increased with larger household sizes and higher incomes. Expenditure was expected to increase with these characteristics as larger household sizes pay contributions for more beneficiaries and higher income households can spend more on contributions. The effects of household size and income may compound each other as larger household sizes have higher incomes, as shown in Section 5.4. The $10^{th}$ and $25^{th}$ percentiles were similar for different household compositions and incomes. Thus, some households choose to spend little on contributions, despite having large household sizes and high incomes.

Expenditure on contributions was stable across ages of the household head. However, pensioners had small household sizes and low incomes, as shown in Sections 5.3 and 5.4. On this basis pensioners were expected to spend less on contributions. Constant expenditure across ages indicated that pensioner ages had the effect of increasing expenditure on contributions.

Expenditure on contributions was positively skewed for all household compositions, incomes and ages. Thus, within household compositions, income groups and age groups most households had low expenditure on contributions and few had high expenditure.

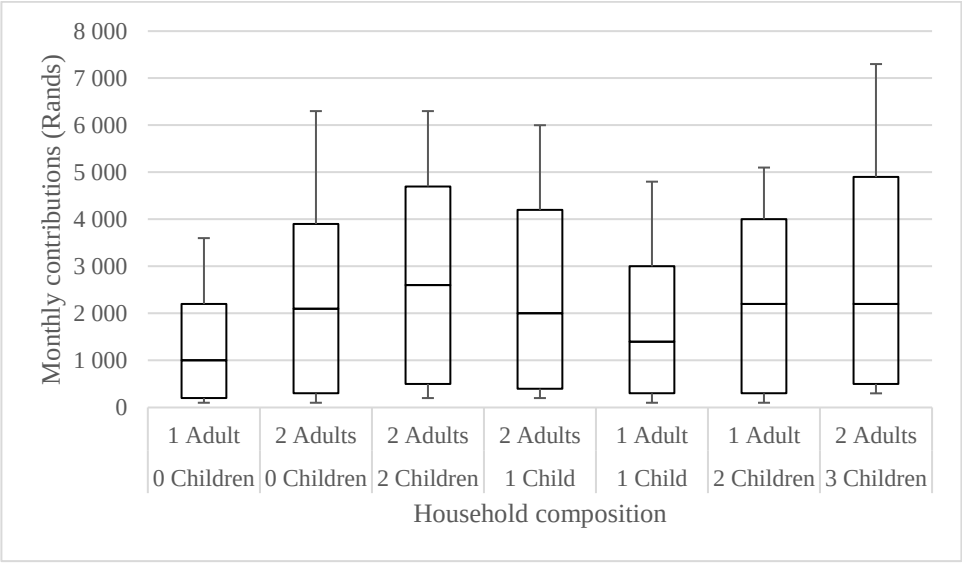



**Figure 5-10** Household contributions by household composition

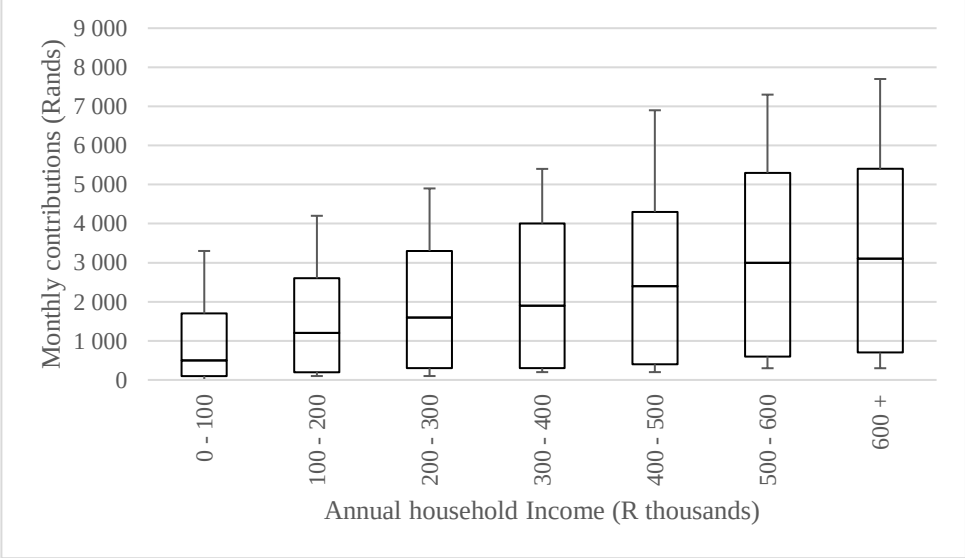



**Figure 5-11** Household Contributions by income

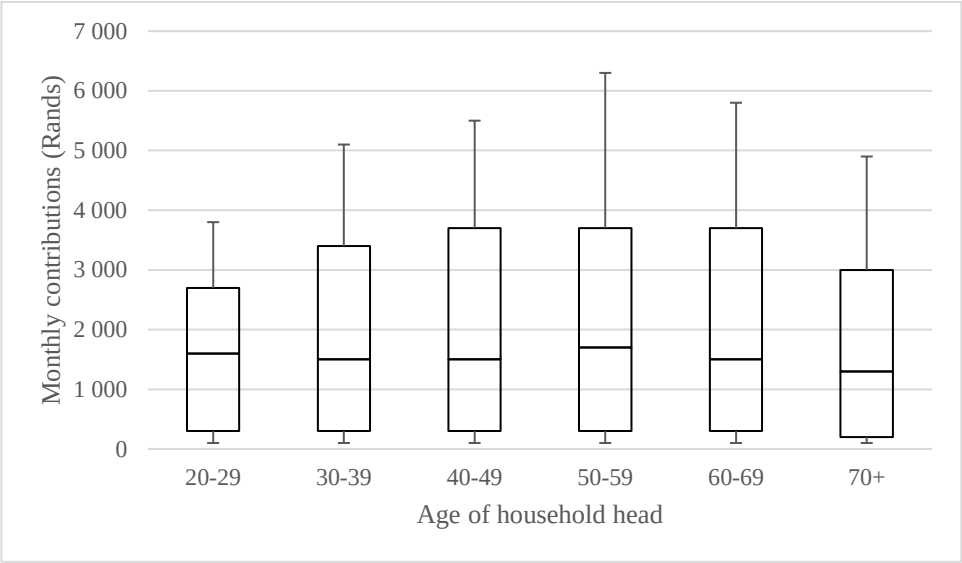



**Figure 5-12** Household contributions by age of household head

The relationship between expenditure on contributions and household characteristics was analysed further using linear regression, described in Section 4.3. Linear regression allowed expenditure on contributions to be explained by several household characterises simultaneously, which was not possible using percentiles.

The dependent and independent variables that were used in the regression are summarised in Table 5-1. The dependent variable was household expenditure on medical scheme contributions. The independent variables were the number of adults in the household, the number of children in the household, age and sex of the head of the household, household income, the type of settlement, the sector of work of the head of the household, the highest level of education completed by the head of the household, the value of owner-occupied dwellings and the value of household assets. The value of owner-occupied dwellings was not in the LCS data but could be derived from imputed rental income, which was calculated as 7.135% of a dwelling's value. The LCS contained self-reported information on diagnosis and medicine usage for several chronic diseases. The information was not used in the regression as the data were recorded for individuals and the regression was at a household level.

**Table 5-1** Description of variables in the regression analysis

| Name | Type | Description |
|---|---|---|
| Expenditure on contributions | Continuous | Sum of member and employer contributions |
| Number of adults | Count | Number of medical scheme beneficiaries who are the head of household and spouse or partner |
| Number of children | Count | Number of medical scheme beneficiaries who are children, stepchildren or adopted children |
| Number of other household members | Count | Number of medical scheme beneficiaries in a household but not part of a family |
| Age | Continuous | Age last birthday of the household head |
| Sex | Binary | Sex of the household head |
| Income | Continuous | Household income including in-kind medical scheme employer contributions |
| Settlement type | Categorical | Derived variable from the LCS with four levels: urban formal, urban informal, rural formal and traditional areas |
| Work status | Categorical | Work status of the household head with four levels: unemployed, formal sector employed, informal sector employed and private household |
| Education | Categorical | Highest education level of the household head, categorised into five levels: no schooling, incomplete schooling, complete schooling, technical certificate and higher education |
| Value of owner-occupied dwelling | Continuous | Value of dwelling derived from the value for imputed rents |
| Value of assets | Continuous | Aggregated value of household assets |

Q-Q plots and residual plots were used to check that the regression's assumptions were met and Dffit statistics were used to remove outliers from the data, as described in Section 4.3.

The Q-Q plots and residual plots showed that a log-transformation of the dependent variable resulted in residuals that were close to normally distributed, independent and with constant variance. A log-transformation is commonly used to model healthcare expenditures and can provide a model with better estimates when expenditure is skewed, has heavy tails and variance that is not constant (Manning and Mullahy, 2001).

Transformations of independent variables improved the fit of the regression. Log-transformations were applied to income, the value of owner-occupied dwellings and the values of assets and the square of age was included in the regression to allow for a nonlinear relationship between expenditure on contributions and age. An interaction term between the number of adult and child household members was included to account for how expenditure on contributions may increase with children, given the number of adults.

The regression was fitted with backwards stepwise selection, described in Section 4.3. An ANOVA for the selected regression model produced an F-statistic of 62.89 on 12 and 3 313 degrees of freedom. The result was highly significant, indicating that the overall model explained expenditure on contributions. The adjusted R-squared of the model was 0.2088. The low R-squared indicates that there was significant variability in expenditure on contributions not explained by the independent variables in the regression.

The parameter estimates for the model, after stepwise selection, are shown in Table 5-2. Sex, work status, dwelling value and value of assets were dropped from the regression in the model selection process.

**Table 5-2** Regression parameters

| | Estimate | Standard error | t-value | |
|---|---|---|---|---|
| Intercept | 5.863 | 0.290 | 20.192 | *** |
| Adults | 0.414 | 0.047 | 8.746 | *** |
| Children | 0.343 | 0.066 | 5.222 | *** |
| Adults/Children interaction | -0.158 | 0.039 | -4.088 | *** |
| Log (Income) | 0.217 | 0.022 | 9.945 | *** |
| Age | -0.026 | 0.008 | -3.264 | ** |
| Age squared | 0.0004 | 0.0001 | 4.208 | *** |
| Urban | 0.291 | 0.064 | 4.569 | *** |
| No schooling | -0.655 | 0.262 | -2.499 | * |
| Incomplete schooling | -0.259 | 0.053 | -4.876 | *** |
| Technical certificate | 0.293 | 0.096 | 3.064 | ** |
| Higher education | 0.263 | 0.049 | 5.326 | *** |

* Significant at the 5% level
** Significant at the 1% level
*** Significant at the 0.1% level

Coefficients of the significant variables can be used to describe their effects on household expenditure on contributions.

The coefficients for adults, children and their interaction can be interpreted in terms of approximate percentage changes in expected expenditure, since expenditure on contributions was log transformed. An additional adult resulted in about a 41.4% increase in expected expenditure. The increase is less than 100%, indicating that an additional adult in the household results in households spending less per person. This is in part due to lower contributions for Adult Dependents compared to Principal Members. It may also indicate that members with Adult Dependents belong to cheaper options.

The increase in expected expenditure for an additional child depended on the number of adults in the household as the interaction between the numbers of adults and children was significant. An additional child in the household resulted in a 34.3% increase in expected expenditure minus 15.8% for every adult in the household. In a household

with one adult there is about an 18.5% increase in expected expenditure for an additional child. In a household with two adults, there is little increase in the total expenditure on contributions with an additional child. This may indicate that members with Child Dependents belong to cheaper options

The coefficient for income can be interpreted as an approximate percentage increase in contributions for a 100% in income, since both expenditure on contributions and income were transformed with logs. For a 100% increase in income, contributions are expected to increase by about 21.7%. The use of income bands in contribution tables contributes to the relationship between expenditure on contributions and incomes. However, the effect of income bands on contributions is not great, as shown in Section 6.1, and does not account fully for the relationship. Households with higher incomes thus prefer more costly options which may be due to their ability to afford contributions.

The finding of a positive relationship between contributions and incomes agrees with McLeod and Grobler (2009), who assumed that medical scheme members with higher incomes purchase more costly options. It can be noted that income elasticities for expenditure on healthcare and on healthcare insurance by individuals and households are close to zero in most international studies (Getzen, 2006). Reasons for the difference in the relationship compared to international studies can be investigated in future research.

The coefficients for age and age-squared were both significant, indicating a quadratic relationship between expenditure on contributions and age. The positive sign of the quadratic term indicates that expenditure on contributions increases at old ages and that effect becomes stronger as age increases. The increase in contributions for old ages, despite community rating, suggests that households purchase options with more comprehensive benefits as they reach and progress through old age.

Households in urban settings are expected to spend about 31.5% more on contributions compared to households in rural settings. Members in urban settings may choose to purchase options with more comprehensive benefits due to greater access to facilities in urban areas and hence greater ability to utilise benefits.

Household heads with higher levels of education are expected to spend more on medical scheme contributions. The relationship suggests that more educated households prefer more comprehensive medical scheme options.

# 6 Projection of reforms

This chapter projects the effects of reforms discussed in Section 2.1.4 on contributions. The results were used in Chapter 7 to project contributions for household under the reforms. Section 6.1 describes existing contributions for medical scheme options. Sections 6.2 to 6.4 project tax subsidies, risk equalisation transfers and mandatory contributions, respectively.

## 6.1 Existing contributions

There were 276 options from 83 medical schemes in 2015 (CMS, 2016). Figure 6-1 shows the percentages of medical scheme options and medical scheme beneficiaries by the level of contribution. The figure shows the average gross contribution per beneficiary per month (PBPM) calculated from CMS data described in Section 3.3. Options were centred at contributions of R1 000 to R1 500 but had a wide range. Options had tails below R1 000 and above R2 000 and the distribution was skewed towards high contributions. The percentage of beneficiaries was larger than the percentage of options between R1 000 and R2 000 and smaller in the tails. Thus, options with low and high contributions had relatively few beneficiaries.

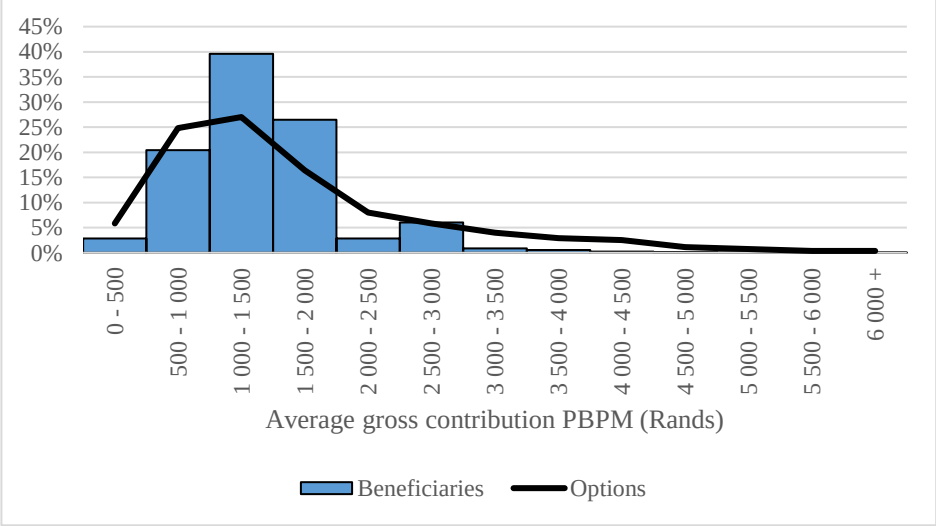



**Figure 6-1** Options by average gross medical scheme contributions

Figure 6-2 shows the benefit design of options by the level of contributions. Options were grouped into five benefit design categories: Network options that deliver benefits primarily through DSPs; Hospital options that cover only PMBs; Savings options that cover day to day benefits through medical savings accounts; Traditional options that cover day to day benefits through risk benefits; and Hybrid options that cover day to day benefits through a combination of medical savings accounts and risk benefits. Contributions can vary within these categories as there are differences in the extent and form of day to day benefits that options offer. This may be due to differences in the number of chronic conditions covered, benefit limits, copayments, reimbursement rates, coverage of preventative care, managed care protocols, medicine formularies and types and compositions of networks (Kaplan and Ranchod, 2015).

Options had different benefit design characteristics by the level of contribution. Options with low average contributions consisted of Network options, Hospital options and low-cost Traditional options; options with higher average contributions consisted of Traditional options and Savings options; and options with the highest average contributions consisted of high-cost Traditional options and Hybrid options.

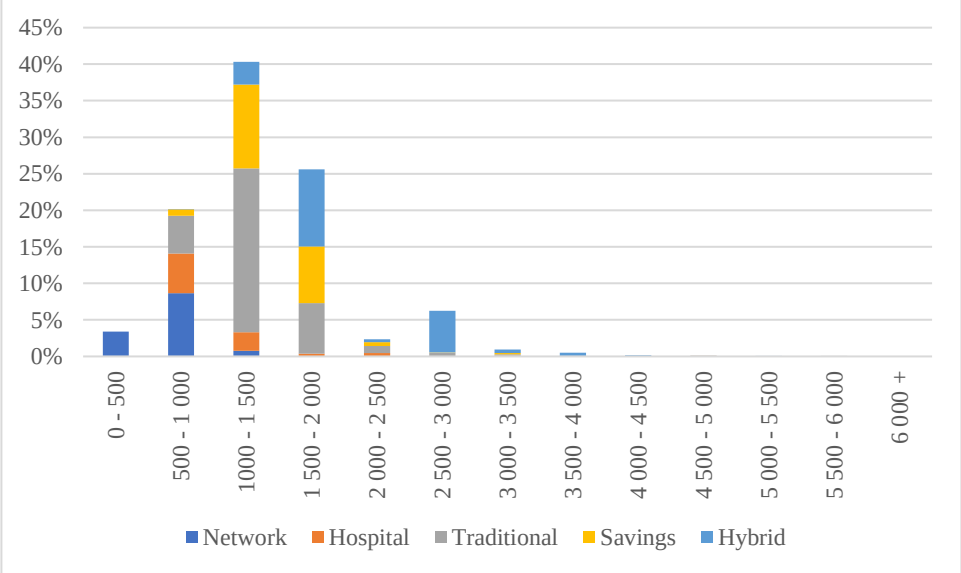



**Figure 6-2** Benefit design by contribution level

Medical schemes can differentiate contributions based on the numbers and types of dependents and by income, as described in Section 2.1.1.1.

Schemes also differentiate contributions for Efficient Discount Options (EDOs). EDOs have the same benefit design as existing options but charge discounted contributions in return for restricting members to the use of cost-efficient providers. The MSA allows the CMS to grant medical schemes exemption from complying with its regulations[20], which allows medical schemes to differentiate contributions of EDOs if an exemption is granted. Although EDOs are not registered as distinct options, they were considered distinct options in this section given their different contribution tables. There were 42 options from 8 medical schemes that had EDOs in 2015 (CMS, 2016).

Figures 6-3 to 6-5 summarise the average contributions by types of dependents and incomes using the contribution tables described in Section 3.5. The figures show average contributions for three groups of options: options with average gross contributions below R1 000, between R1 000 and R2 000 and above R2 000. The groups correspond to the lower tail, centre and upper tail of the distribution in Figure 6-1. The averages were weighted by the numbers of beneficiaries in each option. It was assumed that all options had the same income distributions as the numbers of beneficiaries in incomes bands were not known.

Adult Dependent (AD) and Child Dependent (CD) contributions were on average 82% and 35% of Principal Member (PM) contributions respectively. AD contributions were a lower percentage for the medium-cost group and CD contributions were a lower percentage for the high-cost group. The lower CD contributions may intend to encourage CDs to join high-cost options.

[20] MSA 8(h)

Contributions increased for the low-cost group up to a monthly income of R12 000 and for the medium-cost group up to a monthly income of R20 000. Contributions increased more steeply for the low-cost group of options compared to the medium-cost group of options. Contributions of the high-cost group hardly increased with incomes.

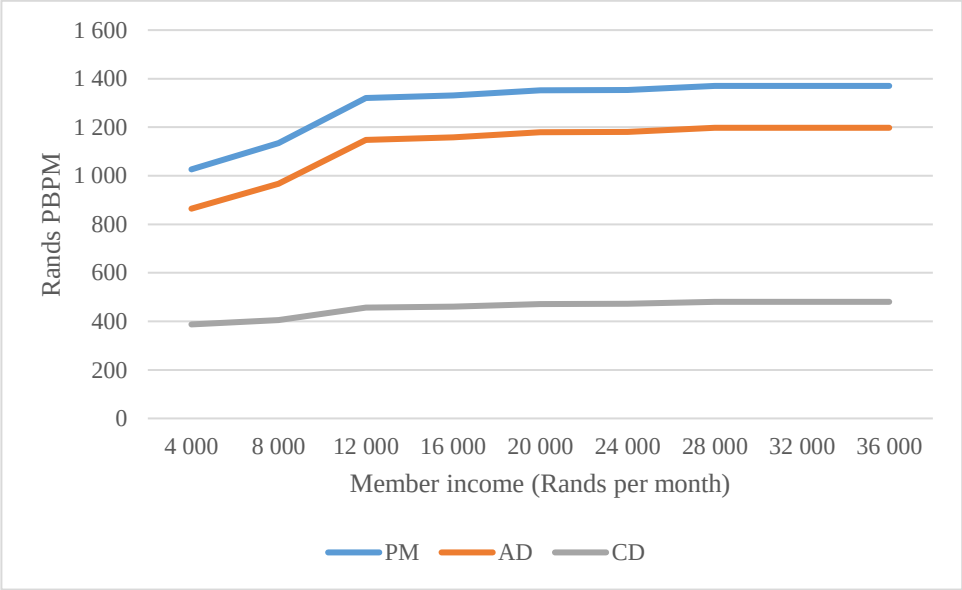



**Figure 6-3** Average contribution for the low-cost group

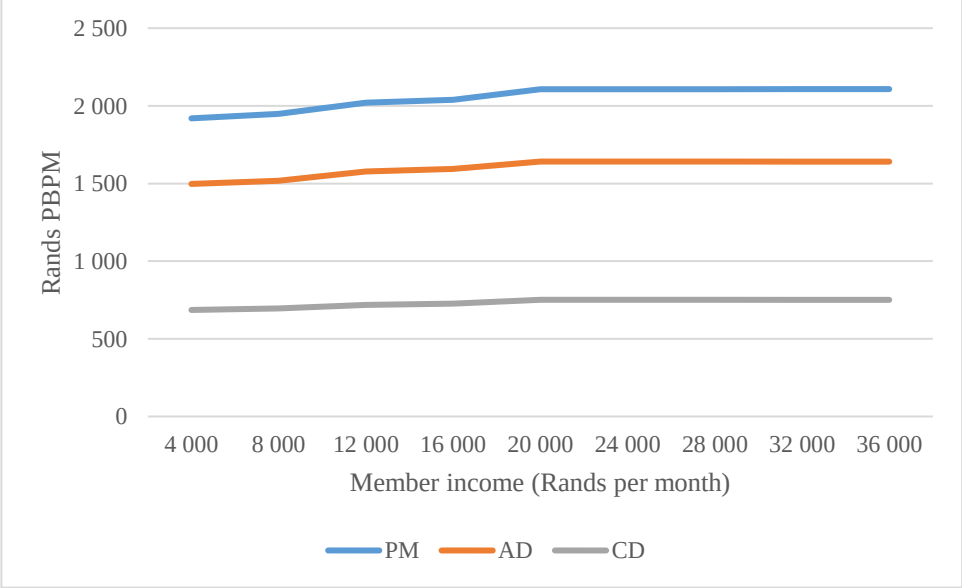



**Figure 6-4** Average contribution for the medium-cost group

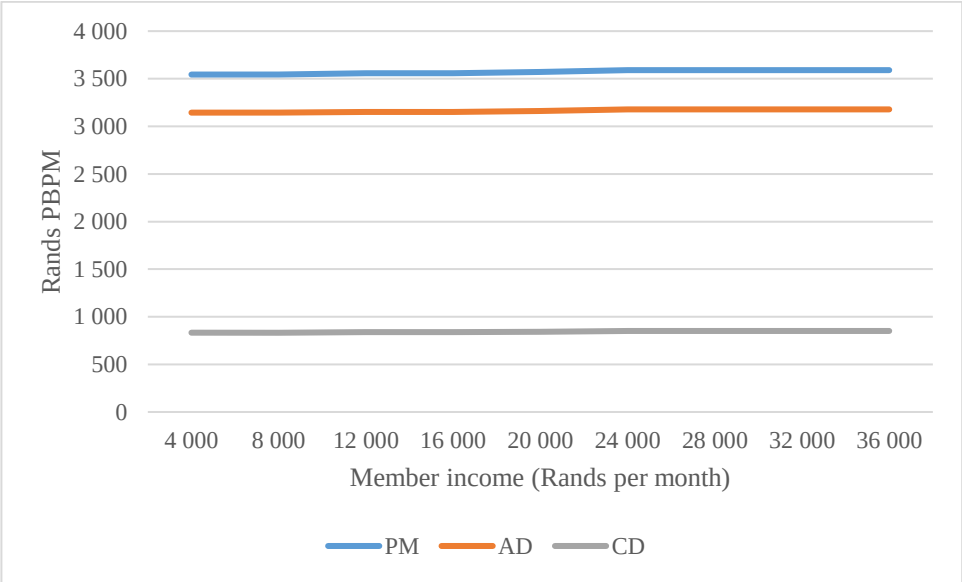



**Figure 6-5** Average contribution for the high-cost group

## 6.2 Tax subsides

The MTC in the 2015 tax year was R257 for the taxpayer, R257 for the taxpayer's first dependent and R172 for each additional dependent[21]. The MTC is greater as a percentage of income for lower-income medical scheme members and is a greater as a percentage of contributions for larger household sizes, especially households with Child Dependents.

The per-capita subsidy was estimated as a flat amount equal to the public sector healthcare cost per person in 2015. Public expenditure on healthcare in the 2015/2016 government budget year was R157.7 billion (National Treasury, 2015). There were 46.2 million individuals who were not medical scheme beneficiaries in the LCS and it was assumed that only these individuals used public healthcare services. Thus, the estimated per-capita subsidy was R284.30 per person.

The estimated per-capita subsidy was slightly greater than the MTC for the Principal Member and first dependent. The difference would be small relative to income, except

[21] Rates and Monetary Amounts and Amendment of Revenue Laws Act (Act 13 of 2015) 5(1)

for very low-income households. The estimated per-capita subsidy was significantly greater than the MTC for subsequent dependents. Thus, the replacement of the MTC with a flat per-capita subsidy would benefit members with Child Dependents.

## 6.3 Risk equalisation

Risk equalisation transfers were calculated as the difference in the expected PMB cost per beneficiary between options and the industry. The expected PMB cost was estimated using age and sex as risk factors. McLeod and Grobler (2009) showed that additional risk factors of maternity and chronic conditions would result in larger transfers. However, data were not available to estimate transfers using these factors.

The expected PMB cost was calculated using the cost curves and demographic information described in Sections 3.2 and 3.3. Figure 6-6 shows the expected PMB cost by option, ordered from highest to lowest. The horizontal line indicates the expected PMB cost for the industry. There were 141 options with an expected cost higher than the industry and 131 options with an expected cost below the industry. The differences between options and the industry average were greater for high-cost options and there were several options whose expected PMB costs were significantly greater.

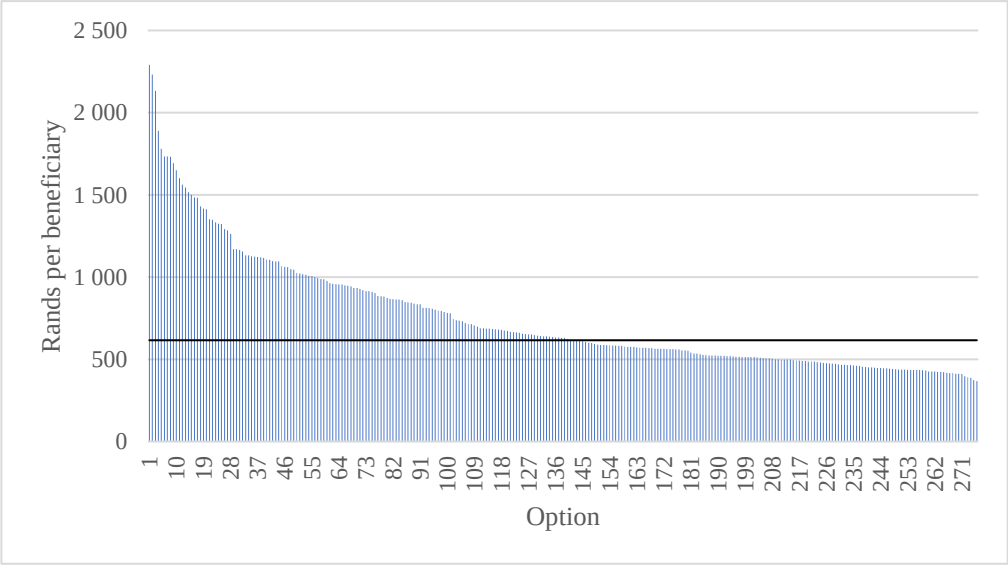



**Figure 6-6** Expected average PMB cost

Figure 6-7 shows projected risk equalisation transfers by option, ordered from largest to smallest. The projected transfers are the differences between the expected PMB cost per beneficiary of options and the industry. Positive transfers indicate an inflow to an option and negative transfers indicate an outflow from an option.

It can be noted that the REF was originally intended to operate among medical schemes rather than options. However, this would not ensure risk equalisation between options within schemes, given that options are required to be self-sustaining in terms of their financial performances[22]. Therefore, this dissertation considered risk equalisation between options rather than between schemes.

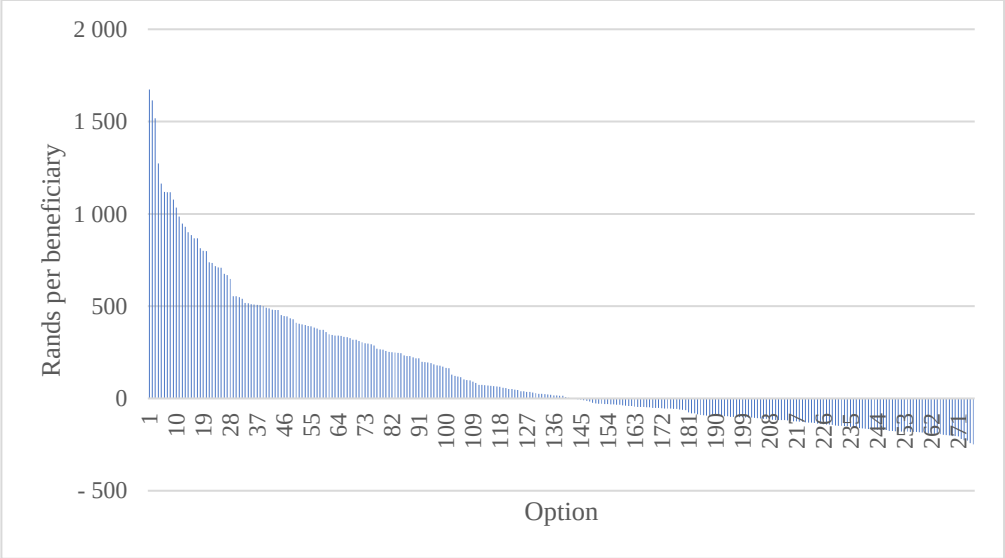



**Figure 6-7** Projected risk equalisation transfers

Risk equalisation transfers were expressed as a percentage of average contributions and not the amount per beneficiary. The amount per beneficiary would not be equitable as it would be larger for members with low contributions, such as members with CD contributions and members on low income bands. The percentage could be applied equitably to contributions of all beneficiaries.

[22] MSA 33(2)b

Figure 6-8 shows the projected transfers of options as a percentage of contributions compared to gross contributions. The sizes of the points indicate the numbers of beneficiaries in the options. Projected risk equalisation transfers were negative for low contributions and increased with contributions. However, there was variability in the percentages at all levels of contributions. Despite large positive projected transfers, the percentages at high contributions were not large due to the high contributions. There were several options with extremely low and high transfers. However, outlying options had few beneficiaries and extreme transfers would affect few beneficiaries.

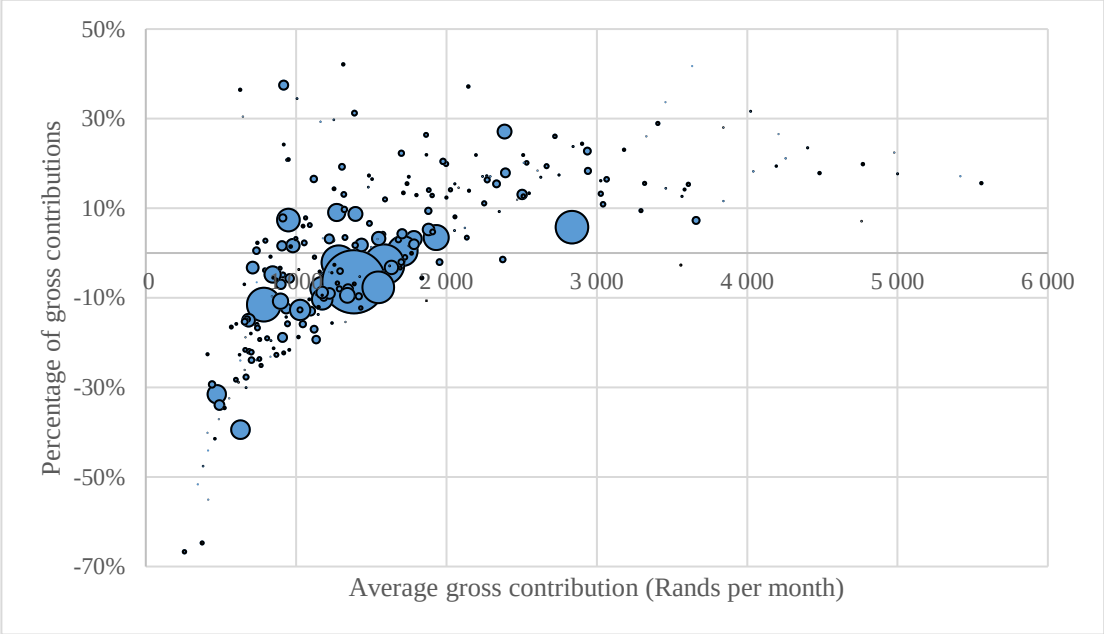



**Figure 6-8** Projected transfers as a percentage of average gross contributions

## 6.4 Mandatory contributions

Mandatory contributions were calculated as the contribution that, together with the per-capita subsidy, would fund the PMB package for all medical scheme members. Medical scheme coverage would include existing medical scheme members and income earners paying mandatory contributions. McLeod and Grobler (2009) calculated the social security contribution as a flat percentage across all incomes. The projections in this

dissertation were also done as a flat percentage although it is possible for the percentage to change with income.

Mandatory contributions were calculated for three scenarios based on different income thresholds for mandatory membership. The three scenarios were:

- a surcharge on taxable income for income earners earning above the tax threshold with coverage for existing medical scheme members and income earners earning above the tax threshold;
- a payroll tax for all income earners with coverage for existing medical scheme members and all income earners; and
- a payroll tax for all income earners with coverage extended to the full South African population.

The tax threshold for the 2015 tax year was R70 700 per annum for income earners below age 65, R110 200 per annum for income earners between ages 65 and 75 and R123 350 per annum for income earners above age 75[23].

The LCS data described in Section 3.1 were used to estimate the numbers and demographic profiles of the populations covered in the scenarios.

Taxpayers and income earners were determined using individual incomes in the LCS. Incomes included income from wages and business, income from capital and other sources of income, excluding social pensions. Income additionally included in-kind medical scheme fringe benefits.

It was assumed that all dependents would be covered in a family with a taxpayer or income earner. Dependents were defined using the definition for medical scheme dependents. The MSA defines medical scheme dependents as "the spouse or partner, dependent children or other members of the member's immediate family in respect of

[23] Government Notice 510 (2015) 2(d)(viii)

whom the member is liable for family care and support; or any other person who, under the rules of a medical scheme, is recognised as a dependent of a member"[24] and defines a Child Dependent as "a dependent who is under the age of 21 or older if he or she is permitted under the rules of a medical scheme to be a dependent"[25].

The LCS's definition of a household did not correspond to the MSA's definition of dependents. The LCS questionnaire defined a household as people who live in the same dwelling for a minimum period and provide themselves jointly with food or other essentials (StatsSA, 2017b). To be consistent with the MSA's definition, only spouses and partners of the household head and children, stepchildren and adopted children of the household head below the age of 21 or between the ages of 21 and 27 and without an income were assumed to be dependents under mandatory coverage. It was only possible to identify dependents who were related to the head of the household in which they lived.

Table 6-1 shows a breakdown of medical scheme coverage for the three scenarios. 15.6% of individuals in the LCS were medical scheme beneficiaries. 9.9% of individuals were not medical scheme beneficiaries but would be covered by an income earner above the tax threshold. A further 34.2% of individuals were not medical scheme beneficiaries and would be covered by an income earner below the tax threshold. The remaining 40.4% of individuals were not medical scheme beneficiaries and would not be covered by an income earner.

**Table 6-1** Number of beneficiaries under mandatory coverage

| | | **Number** | **Percentage** |
|---|---|---|---|
| Medical scheme | | 8 542 945 | 15.6% |
| Non-medical scheme | Income earner above tax threshold | 5 408 677 | 9.9% |
| | Income earner below tax threshold | 18 711 054 | 34.2% |
| | No income earner | 22 104 741 | 40.4% |

[24] MSA 1(1)
[25] MSA Regulations 1(1)

The demographics of the medical scheme population would be different under the scenarios. The demographic profiles of existing medical scheme beneficiaries showed a dip between ages 20 and 30 and a high proportion of females between ages 25 and 40 due to adverse selection. The addition of taxpayers who are not medical scheme members and their dependents would significantly reduce the dip between ages 20 and 30 and would reduce the proportion of females between ages 25 and 40. The addition of income earners below the tax threshold would increase in the proportion of beneficiaries between the ages of 20 and 30 due to the young age profile of low-income earners and their dependents. Coverage of the full population would increase the proportion of children and decrease the proportion of old working-age adults.

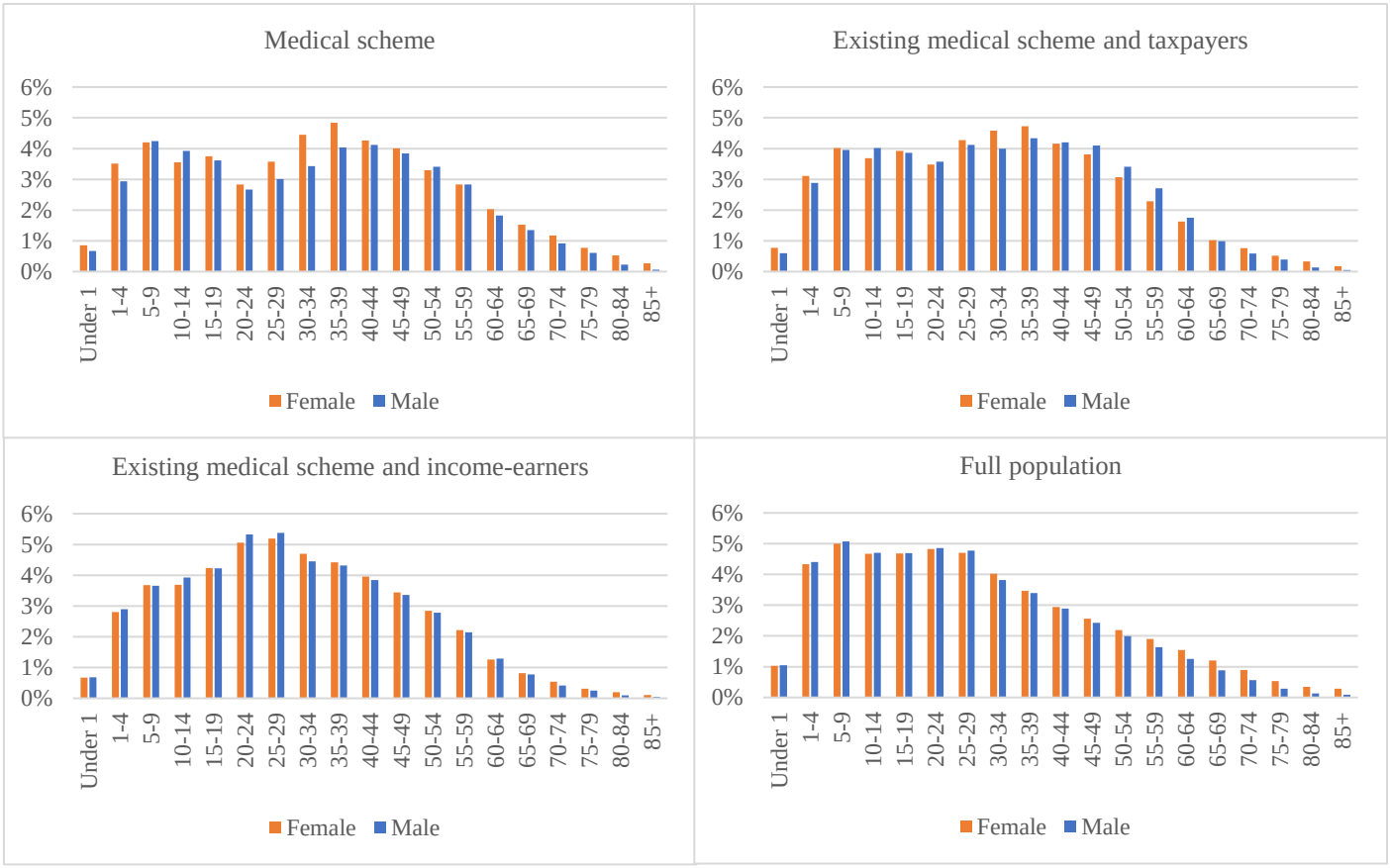



**Figure 6-9** Demographic profile under mandatory coverage scenarios

The cost of the PMB package under mandatory coverage was estimated using age and sex as risk factors. The PMB cost curves derived in Section 3.2 were used for the cost per beneficiary by age and sex. The projections assumed the same cost curves for each of the scenarios. Utilisation may differ between existing and newly covered medical scheme beneficiaries due to differences in burden of disease, preferences for different types of benefits and differences in the cost of delivery. For example, the burden of both non-communicable diseases and HIV/AIDS varies significantly by province, which indicates variation by socio-economic groups (Pillay-van Wyk, et al., 2013) and income earners who are not covered by medical schemes have greater preference for primary care benefits compared to existing medical scheme members (Broomberg, 2006). Differences in utilisation for uncovered individuals and the cost of delivery under mandatory coverage can be investigated in further research.

Table 6-2 shows the projected cost of the PMB package under the scenarios. The cost increased substantially under mandatory coverage due to the additional beneficiaries covered. The cost PBPM decreased under mandatory coverage due to the improved risk profile of the covered population.

**Table 6-2** Projected costs of PMBs under mandatory coverage

| | **Annual cost (R millions)** | **Cost PBPM** | **Cost PBPM as % of existing beneficiaries** |
|---|---|---|---|
| Existing beneficiaries | 63 027 | 614.80 | |
| Existing beneficiaries plus taxpayers | 93 606 | 559.11 | 90.9% |
| Existing beneficiaries plus income earners | 200 364 | 511.19 | 83.1% |
| Full population | 330 325 | 502.62 | 81.8% |

Table 6-3 shows the projected cost of the PMB package, the income of the covered population and the income-related contribution that would be required to fund mandatory coverage. The projected cost is shown after the deduction of the per-capita subsidy for covered individuals. Statistics for taxable income and compensation of employees were described in Section 3.4. The contribution was projected to be 3.41%

of taxable income for existing beneficiaries and taxpayers, 4.76% of compensation of employees for existing beneficiaries and income earners and 7.68% of compensation of employees for the full population. Mandatory contributions would replace existing medical scheme members' contributions in respect of PMBs rather than being additional contributions.

**Table 6-3** Projected social security contribution to fund mandatory coverage

| | **Cost (R million)** | **Income (R million)** | **Contribution (% of income)** |
|---|---|---|---|
| Existing beneficiaries and taxpayers | 46 009 | 1 347 278 | 3.41% |
| Existing beneficiaries and income earners | 88 932 | 1 867 851 | 4.76% |
| Full population | 143 480 | 1 867 851 | 7.68% |

The projection of contributions under mandatory coverage also required projecting costs that were not in respect of PMBs, which were termed supplementary costs. The costs would not be covered by the mandatory contribution and would be paid directly to medical schemes. Supplementary costs were calculated as the difference between average gross contributions and the expected cost of PMBs shown in Figure 6-6. Supplementary costs reflect the cost of benefits that are not PMBs but may also reflect other factors that are considered in pricing contributions. Actuarial Society of South Africa (ASSA) (2011) advises that actuaries consider a scheme's non-healthcare expenses, projected utilisation, investment income, solvency level, reserving strategy and contribution rate structure in pricing contributions.

Figure 6-10 shows the split of PMB and supplementary costs by option. Supplementary costs were a high share of costs for options with high contributions and were substantial for options with the highest contributions. PMB costs comprised most of the contribution for options with low contributions. There were a few options where PMB costs were greater than average contributions and there were no supplementary costs. These options had mostly pensioner members and were priced to produce large underwriting deficits.

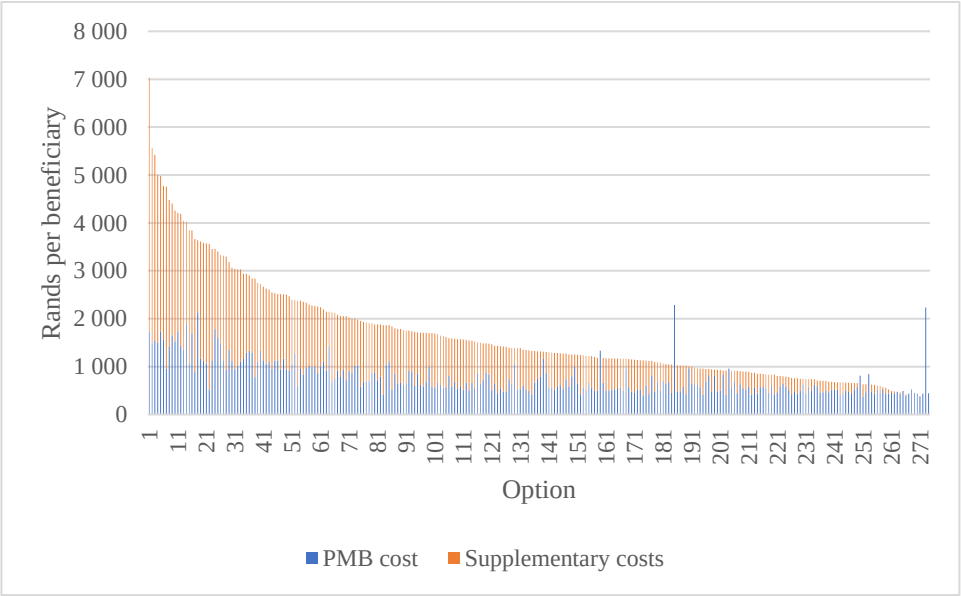



**Figure 6-10** PMB and supplementary costs of options

Supplementary costs were expressed as a percentage of average contributions percentages so that supplementary costs would be projected equitably for different types of beneficiaries.

Figure 6-11 shows the percentage of supplementary costs compared to the gross contributions of options. The sizes of the points indicate that numbers of beneficiaries in the options. Supplementary costs were low for options with low contributions and in some cases were zero. As explained, options with extremely low supplementary costs had mostly pensioner members and were priced to produce large underwriting deficits. The percentages increased steeply with contributions. Despite large supplementary costs for options with high contributions, the percentages were not large due to the high contributions. There was variability in percentages at all levels of contributions.

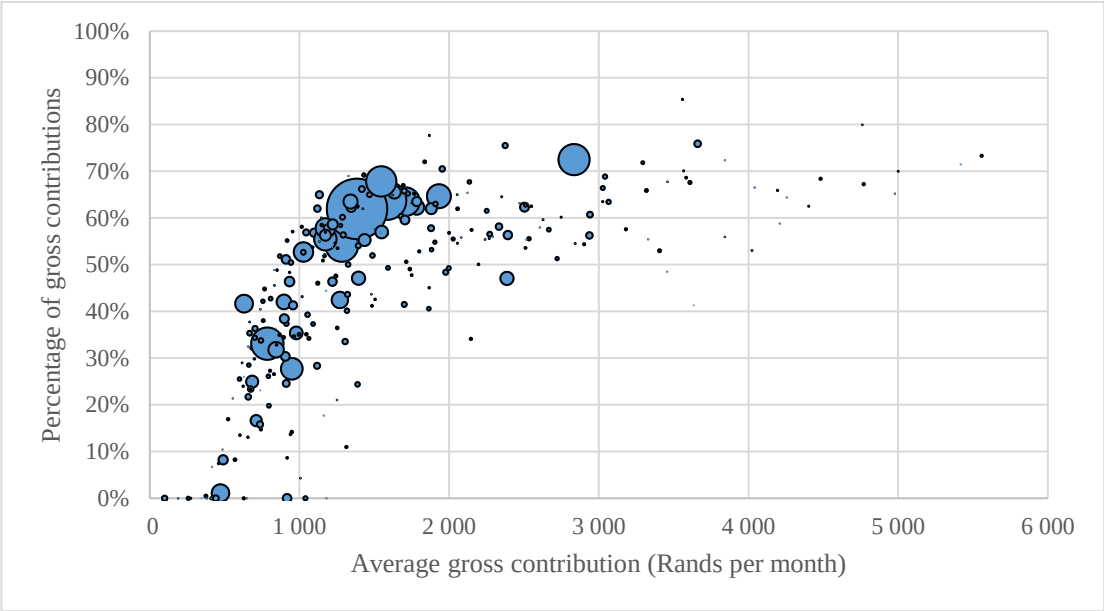



**Figure 6-11** Supplementary costs as a percentage of average gross contributions

# 7 Affordability

This chapter projects the affordability of contributions under the reforms. The chapter aims to update McLeod and Grobler (2009) who assessed the impact of the reforms in 2007 and aims to extend the study by assessing affordability for a broader range of household profiles.

Section 7.1 describes the methodology that was used for the projections. Section 7.2 sets out results for the sequence of reforms recommended by McLeod and Grobler (2009) and Section 7.3 sets out results for alternative sequences of the reforms.

## 7.1 Methodology

Affordability was projected for a set of illustrative household profiles and medical scheme options. This section describes the household profiles, the medical scheme options, how contributions were projected and how affordability was assessed.

### 7.1.1 Household profiles

This dissertation assessed affordability for two household compositions: two adults and two children and a single adult. Two adults and two children was the third most frequent household composition in terms of the number of households and most frequent in terms of the number of beneficiaries. McLeod and Grobler (2009) used this household composition in their study. A single adult was the most common household composition in terms of the number of households and the third most common in terms of the number of beneficiaries.

Additionally, the single adult household composition was split into non-pensioner and pensioner households as a significant number of single adults were pensioners. Non-pensioner and pensioner households had different income distributions, different expected expenditure on contributions and a different tax threshold for projecting the effect of the MTC.

Affordability was assessed for a range of incomes for each household composition. The 10th, 25th 50th, 75th and 90th percentiles of incomes of household compositions in Section 5.4 were used as illustrative incomes for the household profiles.

### 7.1.2 Medical scheme options

This effect of reforms was projected for illustrative medical scheme options. McLeod and Grobler (2009) projected the effect of reforms for options of a medical scheme in the market. This dissertation did not use actual options as results could differ based on the choice of options due to variability in projected risk equalisation transfers and supplementary benefits. Rather this dissertation grouped options in the market into the three groups described in Section 6.1 and used the averages of the groups to represent typical options in the market.

The average contributions of the groups by beneficiary types and incomes were shown in Figures 6-3 to 6-5. Table 7-1 summarises the groups' average projected risk equalisation transfers and supplementary costs. The averages were calculated from the projected transfers and supplementary costs in Sections 6.3 and 6.4 with options weighted by the numbers of beneficiaries. The benefit design of options in the groups was shown in Figure 6-2.

**Table 7-1** Average projected risk equalisation transfers and supplementary costs (as a percentage of gross contributions)

| **Option group** | **Projected risk equalisation transfer** | **Supplementary costs** |
|---|---|---|
| Low | -13.4% | 28.7% |
| Medium | -2.6% | 59.2% |
| High | 12.7% | 64.8% |

McLeod and Grobler (2009) allocated medical scheme options to households based on the assumption that higher income households purchase costlier options. This dissertation found that expenditure on contributions increased with incomes but other factors also affected expenditure on contributions. This dissertation did not allocate options to households based on incomes and assessed each group of options for all incomes.

### 7.1.3 Projecting contributions

Contributions were projected for the sequence of reforms recommended by McLeod and Grobler (2009). This consisted of replacing the existing tax credit with a per-capita subsidy; the introduction of risk equalisation between options; and the introduction of mandatory income-related contributions and mandatory coverage.

Contributions were projected as follows:

- Existing contributions were determined by types of beneficiaries and incomes in households and the average contributions shown in Figures 6-3 to 6-5.
- The effects of the MTC and the per-capita subsidy were projected using household sizes and the subsidy amounts stated in Section 6.2. The subsidies were deducted from existing contributions.
- The effect of risk equalisation was projected using the percentage changes in contributions for the groups shown in Table 7-1. The percentages were applied to contributions before tax subsidies after which the tax subsidies were deducted.
- Contributions under mandatory membership were calculated as the sum of the mandatory contribution and supplementary costs. The mandatory contribution was projected using households' incomes and the mandatory contribution rates shown in Section 6.4. Tax subsidies were not deducted from contributions as tax subsidies would fund the costs of PMBs, as described in Section 6.4. Supplementary costs were projected using the percentages of contributions in respect of supplementary costs shown in Table 7-1.

### 7.1.4 Assessing affordability

Previous studies of affordability of medical schemes used the proportion of income spent on contributions to assess affordability. This dissertation used this method and assessed affordability using the proportion of income spent on projected contributions under reforms.

Previous studies compared the proportion to a threshold above which contributions were deemed to be unaffordable. Söderlund and Peprah (1998) and Fish and Ramjee (2006) used a threshold of 10% of income. DoSD (2002), cited by McLeod et al., (2003), used a threshold of 16% of income. Additionally, Broomberg et al. (2006) used a guideline of 8% of income for assessing the affordability of Low Income Medical Schemes which were proposed for low-income households.

This dissertation did not pick a specific threshold to assess affordability as there was no consensus on a threshold among the studies. This dissertation regarded proportions below 8% as affordable and proportions above 16% as unaffordable. Proportions between 8% and 16% were regarded as possibly being affordable depending on the choice of a threshold.

Section 8.3.1 discusses the definition of affordability and suggests work to improve the measurement of affordability.

## 7.2 Results

Results are set out for the two household compositions in Sections 7.2.1 and 7.2.2, with section 7.2.2 split into results for non-pensioner and pensioner households. The sections describe the proportion of income spent on contributions for different medical scheme options, incomes and stages of reforms. The sections also give a summary table of options that are affordable for households.

The results are set in 2015 as contributions were projected using information from 2015 and the LCS data were benchmarked and inflated to April 2015.

### 7.2.1 Two adults and two children

Figures 7-1 to 7-3 show the proportion of income spent on contributions for the low-, medium- and high-cost groups of options.

The following was observed for the low-cost group:

- The low-cost group, before the MTC, was unaffordable for low incomes. The proportion was 29% for decile 1 and 18% for quartile 1. The low-cost group became affordable as incomes increased. The proportion was 10% for the median and was below 8% for quartile 3 and decile 9.
- The MTC decreased the proportion for households. The effect was larger for lower income households as the subsidy was a fixed amount. The MTC decreased the proportion to 22% for decile 1, 14% for quartile 1 and below 8% for the median. The proportions for quartile 3 and decile 9 decreased further below 8%.
- The per-capita subsidy decreased the proportions further as the subsidy was greater than the MTC for dependents, especially Child Dependents. The percentage decreases were small and, like the MTC, were greater for lower incomes. Decile 1 decreased to 19% and quartile 1 decreased to 12%. Higher incomes decreased by insignificant amounts.
- Risk equalisation increased the proportions and offset some of the decrease from the subsides. The percentage increases were greater for lower income households as with the subsidies. Risk equalisation increased the proportion to 23% for decile 1, to 15% for quartile 1 and to slightly above 8% for the median. The proportions for higher incomes remained well below 8%.
- Mandatory contributions for taxpayers decreased the proportions for low-income households as the income-related contribution was lower than the industry PMB community rate for low-income households. The decreases for

low incomes were large given the high existing proportions. Conversely mandatory contributions increased the proportions for high incomes. Mandatory contributions decreased the proportion to 12% for decile 1, 9% for quartile 1 and 6% for the median. The proportion changed little for quartile 3 and increased for decile 9 but was still low.

— Mandatory coverage for all income earners increased the proportion by 1.3 percentage points for all incomes. Proportions remained below 16% for all incomes and below 8% for the median, quartile 3 and decile 9.

— Mandatory coverage for the full population increased the proportion by 2.9 percentage points for all incomes. Proportions remained below 16% for all incomes but were now above 8% for the median, quartile 3 and decile 9.

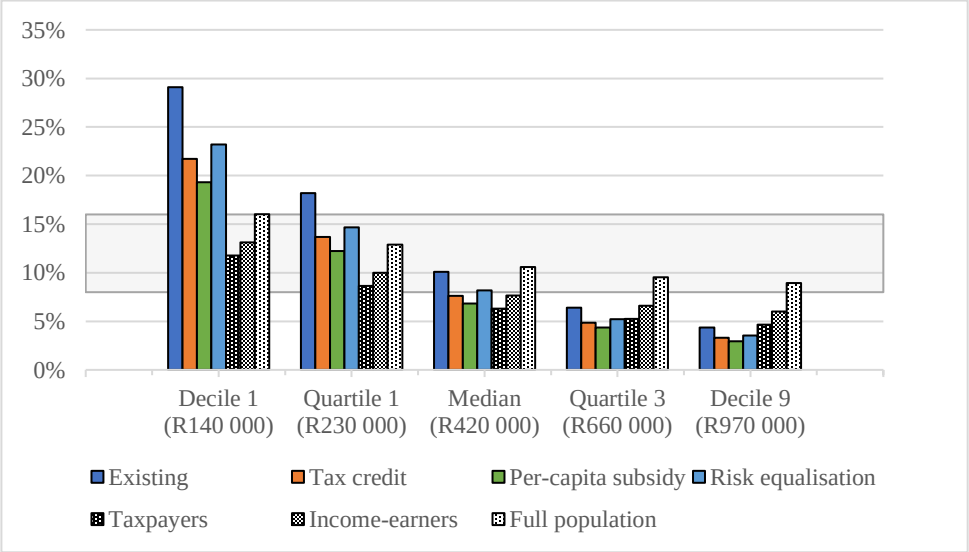



**Figure 7-1** Projected proportions – two adults and two children, low-cost group

The following was observed for the medium-cost group:

- The medium-cost group, before the MTC, was not affordable for low incomes. The proportion was 43% for quartile 1 and 28% for quartile 1. Contributions became affordable as incomes increased. The proportion was 15% for the median, 10% for quartile 3 and below 8% for decile 9.
- The MTC decreased the proportion for all households, as with the low-income group. The MTC decreased the proportion to 36% for decile 1 and 23% for quartile 1. These proportions remained greater than the 16% threshold. The proportion decreased to 13% for the median, below 8% for quartile 3 and further below 8% for decile 9.
- The per-capita subsidy decreased the proportions as with the low-income group. Decile 1 and quartile 1 remained significantly greater than the 16% threshold, despite the decreases. Decreases for higher incomes were not significant as the increase in the subsidy was small relative to incomes.
- Risk equalisation for the medium-cost group did not have a significant effect on the proportions.
- Mandatory contributions decreased the proportions for low incomes and increased the proportions for high incomes, as with the low-cost group. Mandatory contributions for taxpayers decreased the proportion to 29% for decile 1 and 20% for decile 2. These remained above the 16% threshold. The proportion changed little for the median. The proportions increased above 8% for quartile 3 and increased for decile 9 but remained slightly below 8%.
- Mandatory coverage for all income earners increased the proportion by 1.3 percentage points for all incomes. The proportions increased further above 16% for low incomes. Proportions increased to 14% for the median, 10% for quartile 1 and above 8% for decile 9.
- Mandatory coverage for the full population increased the proportion by 2.9 percentage points for all incomes. Proportions increased further above 16% for low incomes. The proportion increased above 16% for the median, to 13% for quartile 3 and to 11% for decile 9.

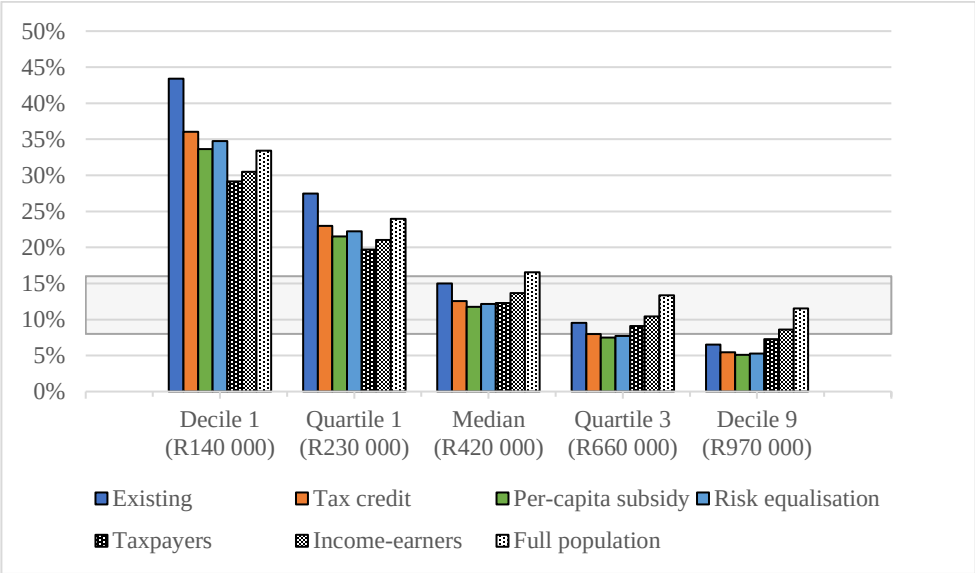



**Figure 7-2** Projected proportions – two adults and two children, medium-cost group

The following was observed for the high-cost group:

- The high-cost group, before the MTC, was only below 16% for quartile 3 and decile 9, with proportions of 15% and 11%. The proportions were very high for low incomes. The proportions were 72% for decile 1, 44% for quartile 1 and 24% for the median.
- The MTC decreased the proportion for all households. The decreases were large for low-income households but the proportions remained high for decile 1 and quartile 1. The MTC had a smaller effect on the proportions for higher income households. The MTC decreased the proportions to 22% for the median, to 14% for quartile 3 and to 9% for decile 9.
- The per-capita subsidy decreased the proportions. However, the proportions for decile 1 and quartile 1 remained very large. The decreases for higher incomes were not significant as the increase in the subsidy was small relative to incomes.
- Risk equalisation decreased the proportions and added to decreases from the subsides. The percentage decreases were greater for lower income households but proportions for decile 1 and quartile 1 remained very high. Risk equalisation decreased the proportion for the median to 18%, which was slightly greater than

the 16% threshold. The proportions decreased to 11% for quartile 3 and to slightly less than 8% for decile 9.

— Mandatory contributions for taxpayers did not have a significant effect for decile 1 and quartile 1. The proportion increased to 19% for the median as the income-related contribution was greater than the industry community rate. The proportion increased to 11% for quartile 3 and to 10% for decile, which was now above the 8% threshold.

— Mandatory coverage for all income earners increased the proportion by 1.3 percentage points for all incomes. The proportion increased further above 16% for the median, to 15% for quartile 3 and to 12% for decile 9.

— Mandatory coverage for the full population increased the proportion by 2.9 percentage points for all incomes. The proportion increased above 16% for quartile 3 and to 15% for decile 9.

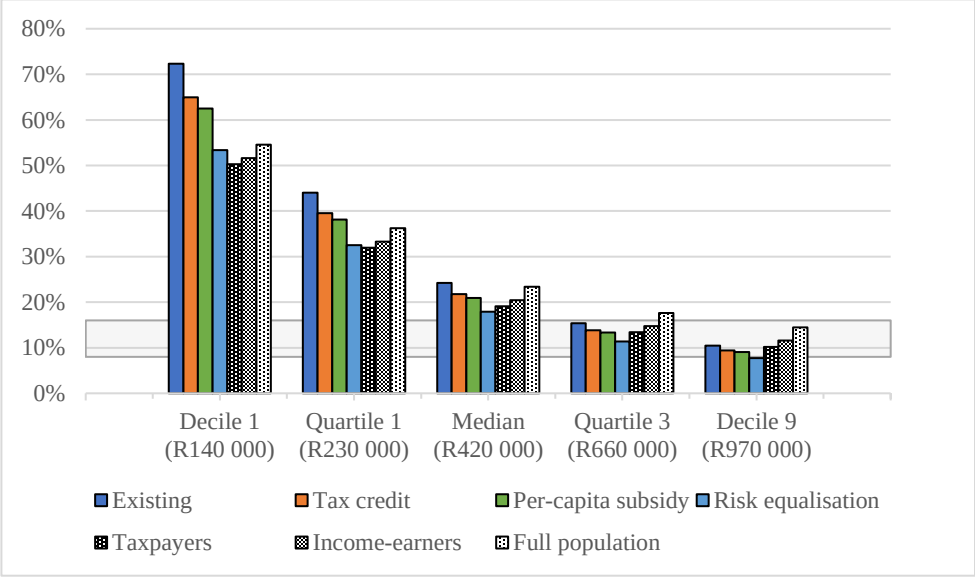



**Figure 7-3** Projected proportions – two adults and two children, high-cost group

Table 7-2 summarises the options that would be affordable for two adult and two children households. The table includes only options below the 16% threshold and shows the proportions in brackets.

**Table 7-2** Summary of affordability per option type for households comprising two adults and two children (contribution as % of income shown when < 16%)

| | | Decile 1<br>(R140 000) | Quartile 1<br>(R230 000) | Median of risk<br>(R420 000) | Quartile 3<br>(R660 000) | Decile 9<br>(R970 000) |
|---|---|---|---|---|---|---|
| Existing contribution | | | (Low-cost slightly >16%) | Low-cost (10%)<br>Medium-cost (15%) | Low-cost (<8%)<br>Medium-cost (10%)<br>High-cost (16%) | Low-cost (<8%)<br>Medium-cost (<8%)<br>High-cost (11%) |
| MTC | | | Low-cost (14%) | Low-cost (<8%)<br>Medium-cost (13%) | Low-cost (<8%)<br>Medium-cost (8%)<br>High-cost (14%) | Low-cost (<8%)<br>Medium-cost (<8%)<br>High-cost (9%) |
| Per-capita subsidy | | | Low-cost (12%) | Low-cost (<8%)<br>Medium-cost (12%) | Low-cost (<8%)<br>Medium-cost (8%)<br>High-cost (13%) | Low-cost (<8%)<br>Medium-cost (<8%)<br>High-cost (9%) |
| Risk equalisation | | | Low-cost (15%) | Low-cost (8%)<br>Medium-cost (12%) | Low-cost (<8%)<br>Medium-cost (8%)<br>High-cost (11%) | Low-cost (<8%)<br>Medium-cost (<8%)<br>High-cost (8%) |
| Mandatory coverage | Taxpayers | Low-cost (12%) | Low-cost (9%) | Low-cost (<8%)<br>Medium-cost (12%) | Low-cost (<8%)<br>Medium-cost (9%)<br>High-cost (13%) | Low-cost (<8%)<br>Medium-cost (<8%)<br>High-cost (10%) |
| | Income earners | Low-cost (13%) | Low-cost (10%) | Low-cost (<8%)<br>Medium-cost (14%) | Low-cost (<8%)<br>Medium-cost (10%)<br>High-cost (15%) | Low-cost (<8%)<br>Medium-cost (9%)<br>High-cost (12%) |
| | Full population | Low-cost (16%) | Low-cost (13%) | Low-cost (11%)<br>Medium-cost slightly >16% | Low-cost (10%)<br>Medium-cost (13%)<br>High-cost slightly >16% | Low-cost (9%)<br>Medium-cost (12%)<br>High-cost (15%) |

### 7.2.2 Single adults

The assessment of single adult households was split into assessments of non-pensioner and pensioner households, as explained in Section 7.1.1.

#### 7.2.2.1 Non-pensioners

Figures 7-4 to 7-6 show the proportion of income spent on contributions for the low-, medium- and high-cost groups of options.

Contributions for single adults were lower than contributions for two adults and two children, given only a single member and no dependents. However, incomes were also lower which resulted in similar proportions compared to two adults and two children.

The following was observed for the low-cost group:

- The low-cost group, before the MTC, was unaffordable for decile 1, with a proportion of 25%. Contributions became affordable as incomes increased. The proportion was 15% for quartile 1, 9% for the median and below 8% for quartile 3 and decile 9.
- The MTC decreased the proportions for all incomes except for decile 1. Decile 1 was below the tax threshold and would not receive the tax deduction. The effect for other incomes was larger for lower income households. The MTC decreased the proportion to 11% for quartile 1 and below 8% for the median. The proportions for quartile 3 and decile 9 decreased further below 8%.
- The per-capita subsidy decreased the proportion for decile 1 as decile 1 did not receive the MTC. The proportion decreased to 18% which was still above the 16% threshold. The effect of the per-capita was not significant for other households as the per-capita subsidy was similar to the MTC for a Principal Member.
- Risk equalisation increased the proportions and offset some of the decrease from the subsides. The percentage increases were greater for lower income households. Risk equalisation increased the proportion to 22% for decile 1, 13%

for quartile 1 and slightly above 8% for the median. The proportions for higher incomes remained well below 8%.

— Mandatory contributions decreased the proportions for low incomes and increased the proportions for high incomes. The decreases for low incomes were large given the high existing proportions. Mandatory contributions for taxpayers decreased the proportion to 11% for decile 1, 8% for decile 2 and 6% for the median. The proportion changed little for quartile 3 and increased for decile 9 but was still well below 8%.

— Mandatory coverage for all income earners increased the proportion by 1.3 percentage points for all incomes. Proportions remained below 16% for all incomes and below 8% for the median, quartile 3 and decile 9.

— Mandatory coverage for the full population increased the proportion by 2.9 percentage points for all incomes. Proportions remained below 16% for all incomes but were now above 8% for the median, quartile 3 and decile 9.

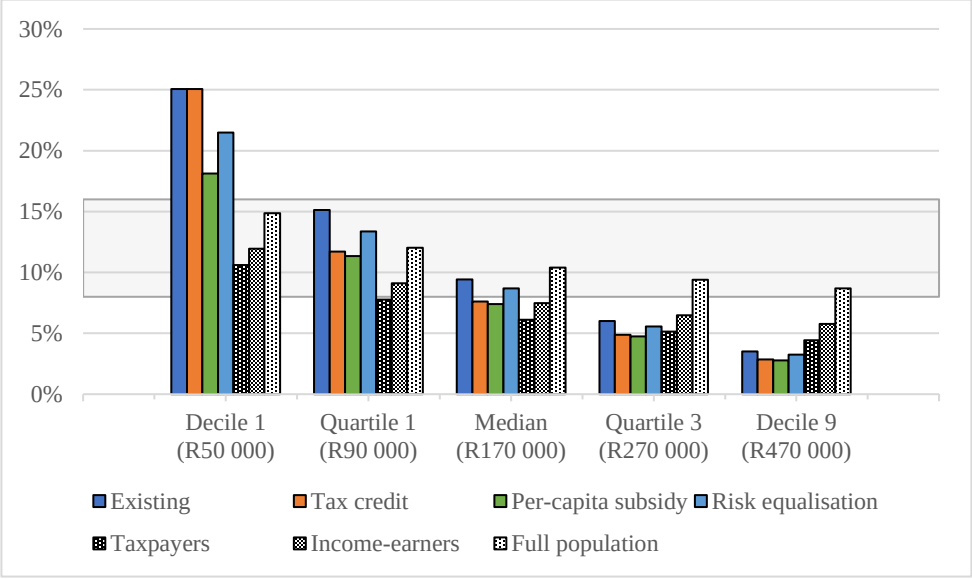



**Figure 7-4** Projected proportions – non-pensioner single adult, low-cost group

The following was observed for the medium-cost group:

- The medium-cost group, before the MTC, was not affordable for low incomes. The proportions were 47% for quartile 1 and 26% for quartile 1. Contributions became affordable as incomes increased. The proportion was 14% for the median, 9% for quartile 3 and was below 8% for decile 9.
- The MTC decreased the proportions for all incomes, except for decile 1, which was below the tax threshold. The MTC decreased the proportion to 23% for quartile 1 which was still greater than the 16% threshold. The proportion decreased to 13% for the median and below 8% for quartile 3 and decile 9.
- The per-capita subsidy decreased the proportion for decile 1 to 40%, which was still significantly above the 16% threshold. The effect of the per-capita was not significant for other households as the per-capita subsidy was similar to the MTC for a Principal Member.
- Risk equalisation did not have a significant effect on the proportions for the medium-cost group.
- Mandatory contributions for taxpayers decreased the proportions for low incomes and increased the proportions for high incomes. Mandatory contributions decreased the proportion to 31% for decile 1 and to 19% for decile 2. The proportion for the median decreased slightly, to 12%. The proportion increased above 8% for quartile 3 and increased for decile 9 but remained below 8%.
- Mandatory coverage for all income earners increased the proportion by 1.3 percentage points for all incomes. The proportions increased further above 16% for low incomes. Proportions increased to 14% for the median, 10% for quartile 1 and above 8% for decile 9.
- Mandatory coverage for the full population increased the proportion by 2.9 percentage points for all incomes. Proportions increased further above 16% for low incomes. The proportion increased above 16% for the median, to 13% for quartile 3 and to 11% for decile 9.

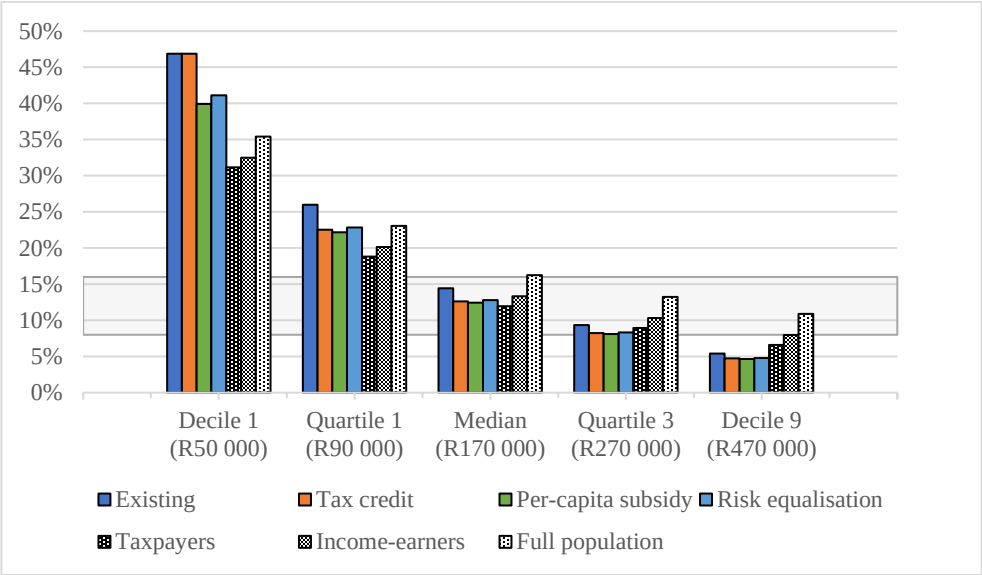



**Figure 7-5** Projected proportions – non-pensioner single adult, medium-cost group

The following was observed for the high-cost group:

- The high-cost group, before the MTC, was only below 16% for quartile 3 and decile 9, with proportions of 16% and 9%. The proportions for decile 1 and quartile 1 were very high, at 86% and 47%, and the proportion for the median was 25%.
- The MTC decreased the proportions for all incomes, except for decile 1 which was below the tax threshold. The proportion after the MTC was still high for quartile 1 and decreased to 23% for the median. The proportion decreased slightly to 15% for quartile 3 and changed little for decile 9.
- The per-capita subsidy decreased the proportion for decile 1. However, the proportion for decile 1 was still very high. The effect of the per-capita was not significant for other households as the per-capita subsidy was similar to the MTC for a Principal Member.
- Risk equalisation decreased the proportions and added to the decreases from the subsides. The percentage decreases were greater for lower income households. However, the proportions for decile 1 and quartile 1 remained high.

Risk equalisation decreased the proportion to 20% for the median, to 13% for quartile 3 and to slightly less than 9% for decile 9.

— Mandatory contributions for taxpayers decreased the proportions for decile 1 and quartile 1. However, the proportions for these incomes remained high. Mandatory contributions for taxpayers did not have a significant effect for the median. The proportion increased to 14% for quartile 3 and to 9% for decile 9, which was now above the 8% threshold.

— Mandatory coverage for all income earners increased the proportion by 1.3 percentage points for all incomes. The proportion increased further above 16% for the median, to 15% for quartile 3 and to 11% for decile 9.

— Mandatory coverage for the full population increased the proportion by 2.9 percentage points for all incomes. The proportion increased above 16% for quartile 3 and to 14% for decile 9.

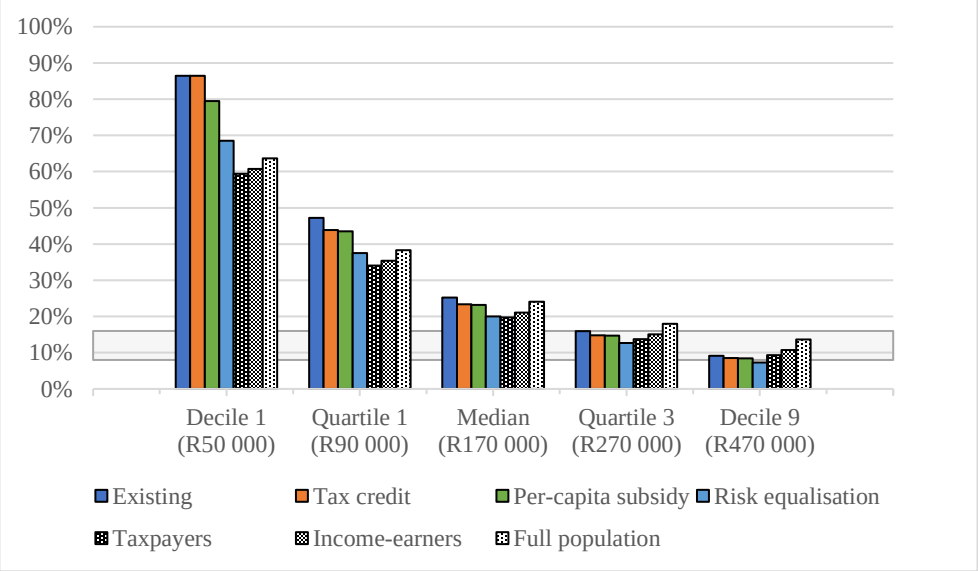



**Figure 7-6** Projected proportions – non-pensioner single adult, high-cost group

Table 7-3 summarises the options that would be affordable for non-pensioner single adult households. The table includes only options below the 16% threshold and shows the proportions in brackets.

**Table 7-3** Summary of affordability per option type for households comprising non-pensioner single adults (contribution as % of income shown when < 16%)

| | | Decile 1 (R50 000) | Quartile 1 (R90 000) | Median (R170 000) | Quartile 3 (R270 000) | Decile 9 (R470 000) |
|---|---|---|---|---|---|---|
| Existing contribution | | | Low-cost (15%) | Low-cost (9%)<br>Medium-cost (14%) | Low-cost (<8%)<br>Medium-cost (9%)<br>High-cost (16%) | Low-cost (<8%)<br>Medium-cost (<8%)<br>High-cost (9%) |
| MTC | | | Low-cost (12%) | Low-cost (<8%)<br>Medium-cost (13%) | Low-cost (<8%)<br>Medium-cost (8%)<br>High-cost (15%) | Low-cost (<8%)<br>Medium-cost (<8%)<br>High-cost (9%) |
| Per-capita subsidy | | | Low-cost (11%) | Low-cost (<8%)<br>Medium-cost (13%) | Low-cost (<8%)<br>Medium-cost (8%)<br>High-cost (13%) | Low-cost (<8%)<br>Medium-cost (<8%)<br>High-cost (9%) |
| Risk equalisation | | | Low-cost (13%) | Low-cost (9%)<br>Medium-cost (13%) | Low-cost (<8%)<br>Medium-cost (8%)<br>High-cost (13%) | Low-cost (<8%)<br>Medium-cost (<8%)<br>High-cost (8%) |
| Mandatory contributions | Taxpayers | Low-cost (11%) | Low-cost (8%) | Low-cost (<8%)<br>Medium-cost (12%) | Low-cost (<8%)<br>Medium-cost (9%)<br>High-cost (14%) | Low-cost (<8%)<br>Medium-cost (<8%)<br>High-cost (9%) |
| | Income earners | Low-cost (12%) | Low-cost (9%) | Low-cost (<8%)<br>Medium-cost (13%) | Low-cost (<8%)<br>Medium-cost (10%)<br>High-cost (15%) | Low-cost (<8%)<br>Medium-cost (8%)<br>High-cost (14%) |
| | Full population | Low-cost (15%) | Low-cost (12%) | Low-cost (10%)<br>Medium-cost slightly >16% | Low-cost (9%)<br>Medium-cost (13%)<br>High-cost slightly >16% | Low-cost (9%)<br>Medium-cost (11%)<br>High-cost (14%) |

#### 7.2.2.2 Pensioners

Figures 7-7 to 7-9 show the proportion of income spent on contributions for the low-, medium- and high-cost groups of options.

Contributions for single adults were lower than contributions for two adults and two children, given only a single member and no dependents. However, incomes for pensioners were very low, which resulted in proportions that were higher than the other household profiles.

The following was observed for the low-cost group:

- The low-cost group was unaffordable for decile 1 and quartile 1 with proportions of 41% and 25%. Contributions became affordable as incomes increased. The proportion was 12% for the median and was below 8% for quartile 3 and decile 9.
- Decile 1 and quartile 1 were below the tax threshold for age 65 and would not receive the MTC. The MTC decreased the proportions for the median, quartile 3 and decile 9. However, the effect of the MTC was not large for higher income households. The MTC decreased the proportion to 9% for the median and the proportions for quartile 3 and decile 9 decreased further below 8%.
- The per-capita subsidy decreased the proportions for decile 1 and quartile 1 as these incomes did not receive the MTC. The proportion decreased to 30% for decile 1 and to 18% for quartile 1. The effect of the per-capita was not significant for other households as the per-capita subsidy was similar to the MTC for a Principal Member.
- Risk equalisation increased the proportions and offset some of the decrease from the subsides. The percentage increases were greater for lower income households. Risk equalisation increased the proportion to 35% for decile 1 and to 22% for quartile 1. The proportion decreased to 11% for the median and remained well below 8% for higher incomes.

— Mandatory contributions for taxpayers decreased the proportions for low-income households. The reductions were large for low incomes given their high existing proportions. Mandatory contributions decreased the proportion to 15% for decile 1, 11% for decile 2, 7% for the median and 5% for quartile 3. The proportion increased slightly for decile 9 but was still well below 8%.

— Mandatory coverage for all income earners increased the proportion by 1.3 percentage points for all incomes. Decile 1 increased above 16%. Other proportions remained below 16% and quartile 3 and decile 9 remained below 8%.

— Mandatory coverage for the full population increased the proportion by 2.9 percentage points for all incomes. Proportions for incomes above decile 1 remained below 16% but were now above 8% for quartile 3 and decile 9.

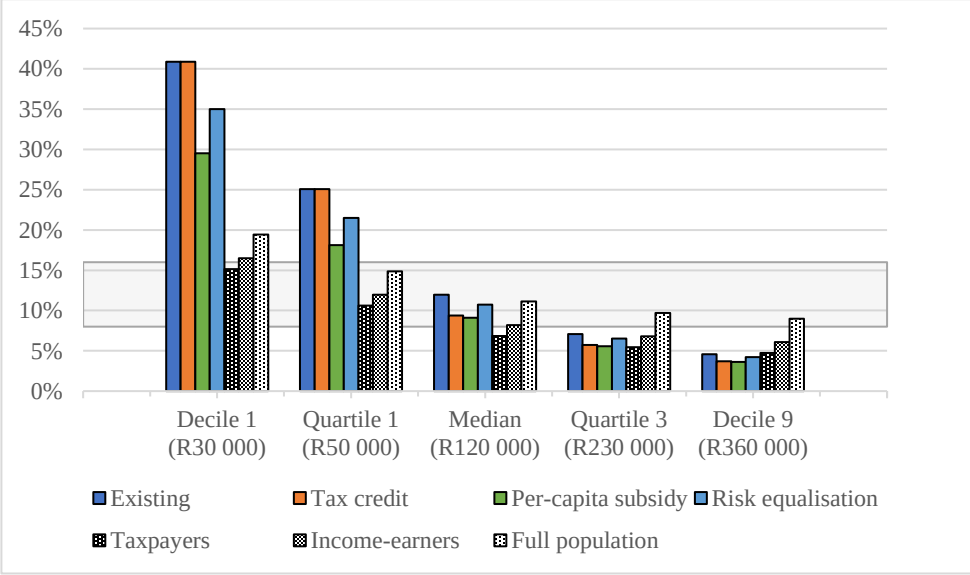



**Figure 7-7** Projected proportions – pensioner single adult, low-cost group

The following was observed for the medium-cost group:

- The medium-cost group, before the MTC, was unaffordable for low incomes. The proportions were very high, with proportions of 77% for decile 1 and 47% for quartile 1. The medium-cost group became affordable as incomes increased. The proportions were 20% for the median, 11% for quartile 3 and below 8% for decile 9.
- The MTC decreased the proportions for the median, quartile 3 and decile 9 but not for decile 1 and quartile 1 as these incomes were below the tax threshold. The MTC decreased the proportion to 17% for the median, to 11% for the quartile 3 and to 7% for decile 9.
- The per-capita subsidy decreased the proportion to 65% for decile 1 and to 40% for quartile 1. These proportions remained significantly above the 16% threshold. The effect of the per-capita was not significant for other households as the per-capita subsidy was similar to the MTC for a Principal Member.
- Risk equalisation did not have a significant effect on the proportions for the medium-cost group.
- Mandatory contributions decreased the proportions for low incomes. However, the proportions for decile 1 and quartile 1 remained significantly above the 16% threshold, at 49% for decile 1 and 31% for quartile 1. The proportion for the median decreased below the 16% threshold, to 15%. The proportion changed little for quartile 3 and increased to almost 8% for decile 9.
- Mandatory coverage for all income earners increased the proportion by 1.3 percentage points for all incomes. The proportions increased further above 16% for low incomes. Proportions increased above 16% for the median, to 11% for quartile 1 and above 8% for decile 9.
- Mandatory coverage for the full population increased the proportion by 2.9 percentage points for all incomes. Proportions increased further above 16% for low incomes. The proportion increased to 14% for quartile 3 and to 12% for decile 9.

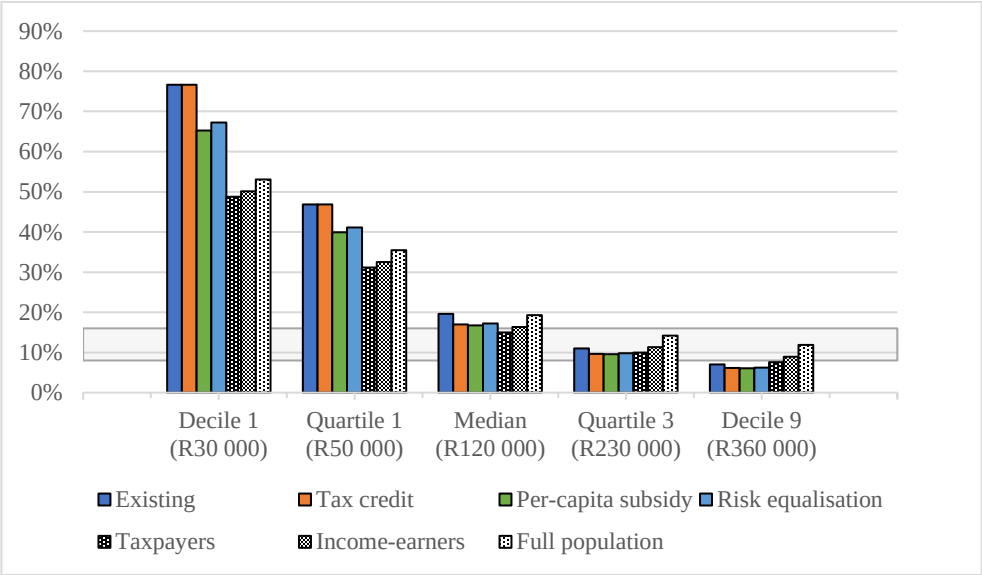



**Figure 7-8** Projected proportions – pensioner single adult, medium-cost group

The following was observed for the high-cost group:

- The high-cost group, before the MTC, was unaffordable, except for the highest incomes. The proportions were extremely high for low incomes, with proportions of 142% for quartile 1, 86% for quartile 1 and 36% for the median. The proportion was 19% for quartile 3 and 12% for decile 9.
- The MTC decreased the proportions for the median, quartile 3 and decile 9 but not for decile 1 and quartile 1 as these incomes were below the tax threshold. The MTC decreased the proportions slightly, to 33% for the median, 17% for quartile 3 and 11% for decile 9.
- The per-capita subsidy decreased the proportions for decile 1 and quartile 1 but the proportions remained extremely high. The effect of the per-capita was not significant for other households as the per-capita subsidy was similar to the MTC for a Principal Member.
- Risk equalisation decreased the proportions and added to decreases from the subsides. The proportions for decile 1, quartile 1 and the median remained high. The proportion decreased below 16% for quartile 3 to 10% and for decile 9.

— Mandatory contributions decreased the proportions for low incomes and increased the proportions for high incomes. The proportions for decile 1 and quartile 1 remained extremely high at 95% for decile 1 and 61% for quartile 1. The proportion for the median decreased to 26%. The proportion changed little for quartile 3 and increased slightly to 11% for decile 9.

— Mandatory coverage for all income earners increased the proportion by 1.3 percentage points for all incomes. The proportion increased above 16% quartile 3 and to 13% for decile 9.

— Mandatory coverage for the full population increased the proportion by 2.9 percentage points for all incomes. The proportion increased further above 16% for quartile 3 and close to 16% for decile 9.

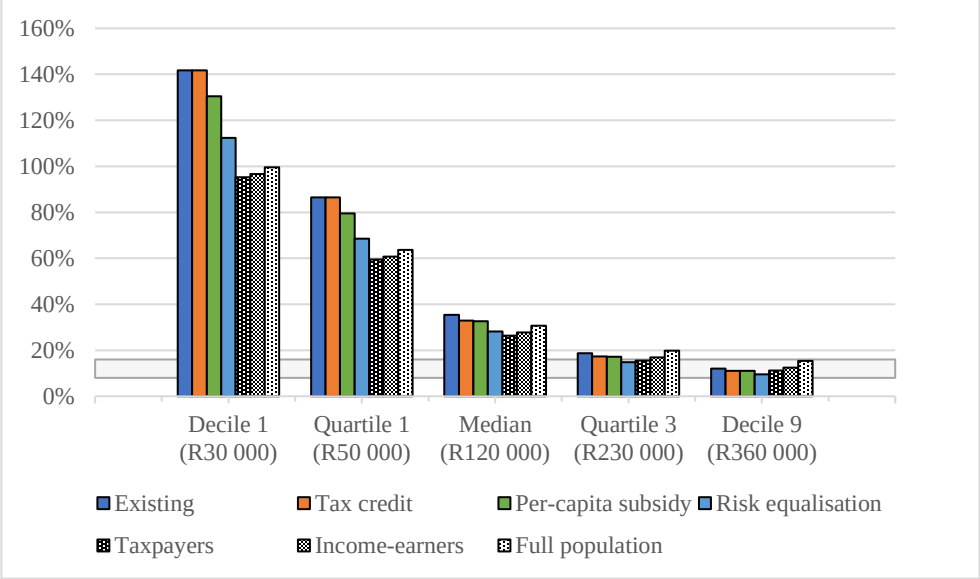



**Figure 7-9** Projected proportions – pensioner single adult, high-cost group

Table 7-4 summarises the options that would be affordable for pensioner single adult households. The table includes only options below the 16% threshold and shows the proportions in brackets.

**Table 7-4** Summary of affordability per option type for households comprising pensioner single adults (contribution as % of income shown when < 16%)

| | | Decile 1<br>(R30 000) | Quartile 1<br>(R50 000) | Median<br>(R120 000) | Quartile 3<br>(R230 000) | Decile 9<br>(R360 000) |
|---|---|---|---|---|---|---|
| Existing contribution | | | | Low-cost (12%) | Low-cost (<8%)<br>Medium-cost (11%) | Low-cost (<8%)<br>Medium-cost (<8%)<br>High-cost (12%) |
| MTC | | | | Low-cost (9%) | Low-cost (<8%)<br>Medium-cost (10%) | Low-cost (<8%)<br>Medium-cost (<8%)<br>High-cost (11%) |
| Per-capita subsidy | | | | Low-cost (9%) | Low-cost (<8%)<br>Medium-cost (10%) | Low-cost (<8%)<br>Medium-cost (<8%)<br>High-cost (11%) |
| Risk equalisation | | | | Low-cost (11%) | Low-cost (<8%)<br>Medium-cost (10%)<br>High-cost (15%) | Low-cost (<8%)<br>Medium-cost (<8%)<br>High-cost (10%) |
| Mandatory contributions | Taxpayers | Low-cost (15%) | Low-cost (11%) | Low-cost (<8%)<br>Medium-cost (15%) | Low-cost (<8%)<br>Medium-cost (10%)<br>High-cost (16%) | Low-cost (<8%)<br>Medium-cost (<8%)<br>High-cost (11%) |
| | Income earners | Low-cost slightly >16% | Low-cost (12%) | Low-cost (8%)<br>Medium-cost slightly >16% | Low-cost (<8%)<br>Medium-cost (11%)<br>High-cost slightly >16% | Low-cost (<8%)<br>Medium-cost (9%)<br>High-cost (13%) |
| | Full population | | Low-cost (15%) | Low-cost (11%) | Low-cost (10%)<br>Medium-cost (14%) | Low-cost (9%)<br>Medium-cost (12%)<br>High-cost (15%) |

## 7.3 Other sequences of reforms

McLeod and Grobler (2009) showed that the position of risk equalisation in the sequence of reforms was important for affordability. Low-income households have low expected expenditure on contributions and are likely to purchase low-cost options. These options have outflows due to risk equalisation. Risk equalisation could increase the proportion of income spent on contributions by low-income households if it is introduced before income cross-subsidies.

This section considers the effect of the position of risk equalisation in the sequence of reforms for low-income households. The position is considered relative to mandatory income-related contributions and the per-capita subsidy.

### 7.3.1 Risk equalisation and income-related contributions

Figures 7-1, 7-4 and 7-7 showed the proportion of income spent on contributions for the low-cost group. Risk equalisation increased contributions before the introduction of mandatory income-related contributions. However, risk equalisation would not increase contributions if it were introduced alongside the income-related contribution rather than before it.

For the low-income households in the figures:

- The proportions for two adult and two children households before risk equalisation were slightly above the 16% threshold for decile 1 and 12% for quartile 1. The proportions increased to 23% and 15% with risk equalisation. If risk equalisation were introduced alongside mandatory income-related contributions the proportions would decrease to 12% for decile 1 and 9% for quartile 1 without the preceding increase.
- The proportions for non-pensioner one adult households before risk equalisation were slightly above the 16% threshold for decile 1 and 11% for quartile 1. The proportions increased to 21% and 13% with risk equalisation. If risk equalisation were introduced alongside mandatory income-related

contributions the proportions would decrease to 11% for decile 1 and 8% for quartile 1 without the preceding increase.

— The proportions for pensioner one adult households before risk equalisation were 30% for decile 1 and 18% for quartile 1. The proportions increased to 35% and 22% with risk equalisation. If risk equalisation were introduced alongside income-related contributions the proportions would decrease to 15% for decile 1 and 11% for quartile 1 without the preceding increase.

Therefore, a sequence of reforms in which risk equalisation is introduced alongside income-related contributions rather than before would remove an interim decrease in affordability for low-income members.

### 7.3.2 Risk equalisation and the per-capita subsidy

The sequence of reforms in Section 7.2 introduced risk equalisation after the per-capita subsidy. The per-capita subsidy decreased contributions for households below the tax threshold and for low-income households with dependents. The decreases offset increases due to risk equalisation for the low-cost group of options.

Figure 7-10 demonstrates the effect of introducing risk equalisation before the per-capita subsidy for the low-cost group and the households mentioned above. The figure shows that:

— The proportion for decile 1 of non-pensioner single adults would increase from 25% to 28% with risk equalisation before decreasing to 22%.

— The proportion for decile 1 of pensioner single adults would increase from 41% to 46% with risk equalisation before decreasing to 35%.

— The proportion for quartile 1 of pensioner single adults would increase from 25% to 28% with risk equalisation before decreasing to 22%.

— The proportion for decile 1 of two adults and two children would increase from 22% to 26% with risk equalisation before decreasing to 23%.

— The proportion for quartile 1 of two adults and two children would increase from 14% to 16% with risk equalisation before decreasing to 15%.

Therefore, a sequence of reforms in which risk equalisation is introduced before the per-capita subsidy rather than after would result in an interim decrease in affordability for the low-income households above.

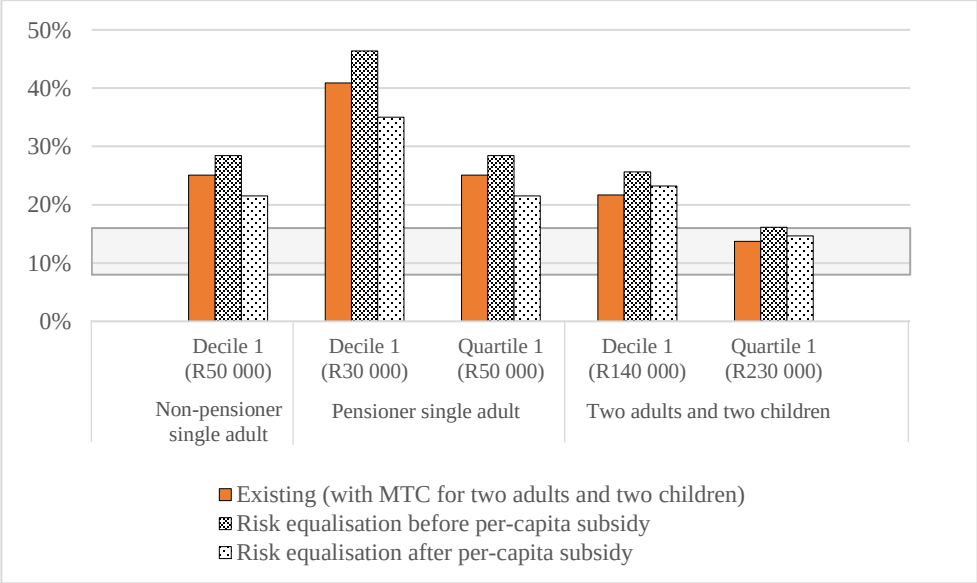



**Figure 7-10** Projected proportions with risk equalisation before the per-capita subsidy

# 8 Discussion

This chapter discusses the results of the dissertation. The chapter sets out the main findings in Section 8.1. Section 8.2 discusses the relevance of the findings for current healthcare reforms. Section 8.3 describes this study's limitations and suggests areas for further research.

## 8.1 Findings

The main findings for the affordability of medical scheme coverage under the reforms can be summarised as follows.

Coverage is not affordable for low-income members, even for low-cost options. Contributions are affordable for members with higher incomes, although affordability depends on the choice of option and the threshold for affordability. Few members can afford the costliest options and affordability for these members depended on the threshold for affordability.

Affordability is similar for different household compositions as larger household sizes have higher incomes. The effects of reforms would also be similar for different household compositions. Coverage is less affordable for pensioners as a result of their low incomes. Furthermore, pensioners are expected to choose higher-cost options compared to non-pensioners. Pensioners are required to fund coverage from their post-retirement incomes as post-retirement medical assistance has declined as an employee benefit in South Africa (Mcleod and Ramjee, 2007). Thus, unaffordability of contributions is significant for pensioners.

The MTC decreases the cost of contributions and improves affordability. The MTC is large relative to incomes for low-income households but is not large enough to make coverage affordable for households with very low incomes. Households below the tax threshold do not receive the MTC, despite coverage being most unaffordable for low-

income households. These households include many pensioner households as pensioners have both low incomes and a higher tax threshold.

A per-capita subsidy would make coverage more affordable for households that do not receive the MTC. A flat per-capita subsidy would also benefit households with dependents, especially Child Dependents. As with the MTC, the effect would be larger for low-income households but was not large enough to make contributions affordable for households with very low incomes.

Risk equalisation would increase contributions for low-cost options. The increase would reverse some, but not all, of the increase in affordability from the subsidies. Affordability would decrease for low-income households who are expected to purchase these options. Risk equalisation would need to be accompanied by income cross-subsidies for these members. Risk equalisation would decrease contributions for higher cost options, of which there are relatively few. The decreases would make contributions more affordable for high-income households who purchase these options, although the effect would be small relative to incomes.

The sequence of reforms was found to be important for affordability. Risk equalisation before mandatory contributions would decrease affordability for low-income members. Additionally, risk equalisation before the per-capita subsidy would decrease affordability for low-income members in the period before the per-capita subsidy. Mandatory income-related contributions would be needed alongside risk equalisation to avoid the decrease in affordability for low-income members.

Mandatory income-related contributions as a flat percentage of income would increase affordability significantly for low-income members. Low-cost options would become affordable for low-income members, depending on the threshold for affordability. The largest increases in affordability would be for pensioner households. Mandatory income-related contributions resulted in higher contributions for high-income

households. However, most options remained affordable when contributions were mandatory for taxpayers only.

Mandatory contributions for all income earners would increase contributions as newly covered members have relatively low incomes. Contributions would remain affordable for most members, depending on the threshold for affordability. However, the increase in contributions would be large for high-income members and members may not be willing to accept the large increases.

Mandatory contributions for the full population would expand coverage but increase contributions for members further. Coverage would become unaffordable for most members. The increase in contribution would be very large for high-income members and members may not be willing to accept the large increases.

## 8.2 Relevance for healthcare reforms

The findings have relevance for current developments in healthcare financing reforms, namely National Health Insurance and the Competition Commission's Health Market Inquiry.

### 8.2.1 National Health Insurance

South Africa is introducing National Health Insurance (NHI) which will change the structure of public and private financing in South Africa (Government Notice 627, 2017). Thus, policymakers will need to determine the role of medical schemes as part of NHI.

Government Notice 627 (2017) defines NHI as being "implemented through the creation of a single fund that is publicly financed and publicly administered." The single fund would fund healthcare services for the full population. McLeod (2012) proposed a single fund multipayer model in which a risk equalisation fund serves as a single financing pool for minimum benefits across the population. The model extends

the social solidarity model investigated in this dissertation with the inclusion of accredited NHI funds and public sector funds. In this way, medical schemes could be part of a system which funds the full population rather than being separate private funding.

McLeod (2012)'s proposed model, shown in Figure 8-1, consists of the following components:

- Taxes would be paid through SARS to a National Health Fund. The National Health Fund would allocate funds as an equitable subsidy per person to various subsystems.
- The subsystems could include allocations to provinces to provide healthcare services; 'accredited NHI funds' which could be similar to existing medical schemes and would fund employed households; a public sector employee fund similar to the current Government Employees Medical Scheme; and public NHI funds that operate alongside the accredited NHI funds. Funds may be required to provide benefits using reimbursement mechanisms such as capitation for primary care and payments based on Diagnosis Related Groups for hospital payments.
- The allocation to systems may be based on a per capita allocation or on a risk-adjusted allocation, with age, sex and HIV/AIDS as potential risk factors. Public funding could be implemented by province as there are reliable data on differences in demographics and projected prevalence of HIV/AIDS by province.
- Within each system, risk adjustment could be used to establish equitable financing. The systems could adopt different approaches for the risk adjustment formula. For example, provincial budgets could use the current equitable share formula for allocations to provinces and accredited health funds could use the risk equalisation mechanism reviewed in this dissertation.
- In addition to allocating funds based on risk, income cross-subsidies could be introduced through income-related contributions. Income cross-subsidies

would increase social solidarity for different incomes for healthcare above minimum benefits.

The introduction of risk equalisation and income cross-subsidies for medical schemes could be a step towards the National Health Fund described above. Further work can be done to project the household costs of mandatory income-related contributions to a National Health Fund.

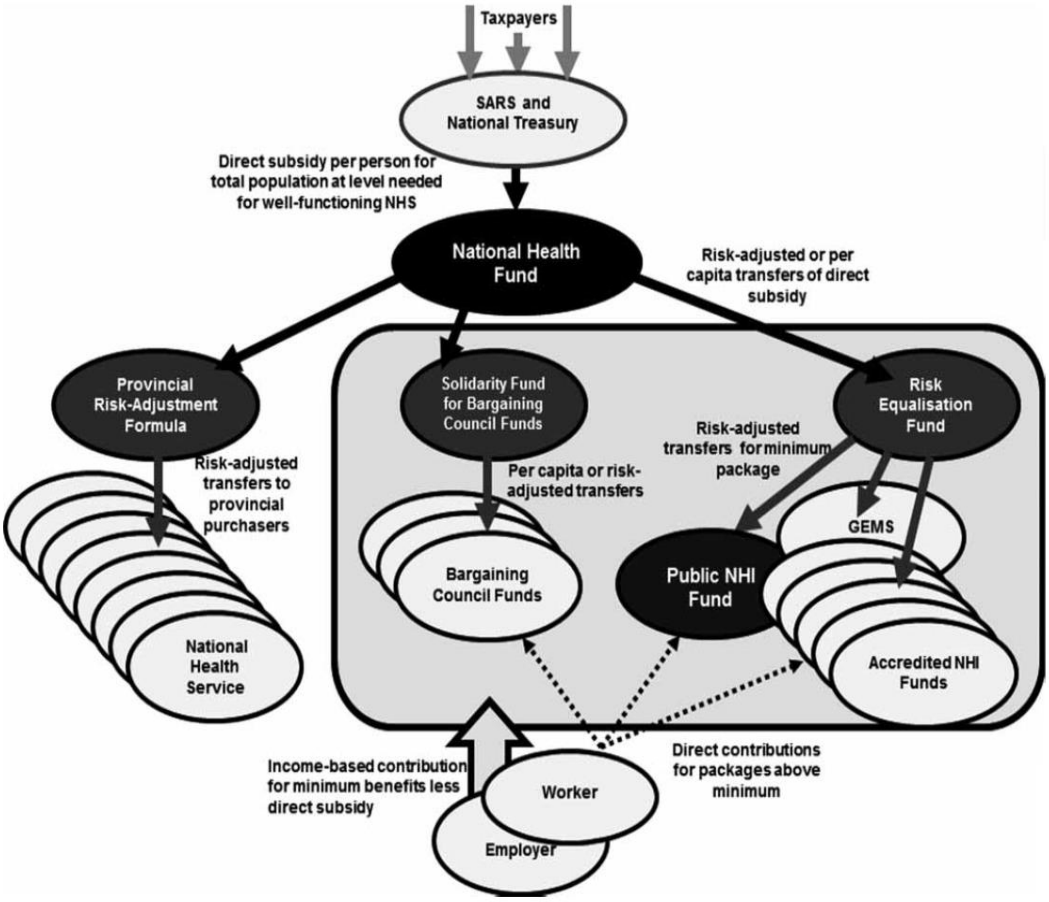



**Figure 8-1** McLeod (2012)'s proposed single fund multiplayer model for NHI

Additionally, there is uncertainty about the continuation of the MTC before the introduction of NHI. The NHI White Paper states that the MTC will be reviewed and will be consolidated into NHI (Government Notice 627, 2017). This dissertation showed that the MTC increases affordability for low-income members. Affordability would thus decrease for low-income members if the MTC is removed before the introduction of NHI.

### 8.2.2 Health Market Inquiry

The Competition Commission is carrying out an inquiry into healthcare costs in the private sector, called the Health Market Inquiry (HMI). The Competition Commission released preliminary findings of the HMI in 2018 (Competition Commission South Africa, 2018). The preliminary findings contained recommendations about the social solidarity reforms that were investigated in this dissertation.

The HMI found that the medical scheme policy framework was incomplete due to the partial implementation of social solidarity reforms. The inquiry recommended the implementation of a risk equalisation fund based on a standard set of benefits in order to remove the incentive for medical schemes to risk select. The inquiry suggested that risk equalisation between medical schemes could be a step towards a single risk pool envisaged by NHI.

The HMI did not call for the implementation of mandatory medical scheme membership. The inquiry cited two reasons for this: mandatory contributions may prevent lower income medical scheme members from spending on more immediate non-healthcare needs; and mandatory membership would result in a one-off reduction in costs that would be insignificant if medical schemes cost continue to increase rapidly.

Regarding the first reason, this dissertation found that mandatory coverage could be affordable, even for low-income earners. Affordability would require cross-subsidies from high- to low-income households, which could be achieved through mandatory contributions that are related to incomes. Thus, the HMI may have underestimated the potential for low-income households to be included in mandatory coverage and still have resources for non-healthcare consumption.

Regarding the second reason, this dissertation found that mandatory coverage could be affordable based on current costs. However, if contributions increase more rapidly than incomes, as has happened in the past, it is likely that mandatory contributions become unaffordable for households. Therefore, risk equalisation and cost containment measures need to accompany mandatory coverage for mandatory coverage to be affordable for households over the longer term.

## 8.3 Limitations and further work

### 8.3.1 Defining affordability

This dissertation used thresholds for the percentage of income spent on contributions to assess affordability. The method was based on past studies of affordability of medical schemes. However, past studies did not justify using this method or the levels that they used for the threshold. Furthermore, there was no consensus on the threshold proportions of incomes among the studies on the level of the threshold, with studies using standards ranging from 8% to 16%.

Affordability for many of the households, options and stages of reforms in this dissertation depended on the choice of the threshold. Therefore, this research needs a more reliable definition of affordability. A reliable definition for affordability is also important for assessing the effects of other reforms, such as the current review of the definition of the PMB package.

In general affordability of healthcare insurance has not been clearly defined despite its importance in policymaking (Bundorf and Pauly, 2006). Bundorf and Pauly (2006) developed a definition for affordability using a micro-economic framework in which households allocate consumption to satisfy spending on healthcare insurance and non-healthcare consumption, if possible. Affordability was defined as the ability for households to pay health insurance contributions and have resources left for an acceptable level of non-healthcare consumption. This definition could be used to provide a more rigorous method of assessing the effect of reforms on affordability for households.

This definition requires standards for acceptable non-healthcare consumption. The percentage thresholds that were used in this dissertation do not necessarily relate to an acceptable level of non-healthcare consumption. For example, income-related contributions were found to be affordable for low-income households at the 16% threshold. However, these households' absolute incomes would not be adequate for an acceptable level of non-healthcare consumption. Further research is required to determine what is an acceptable level of non-healthcare consumption for South African households.

### 8.3.2 Data limitations

This dissertation used illustrative typical household profiles to demonstrate the effects of reforms. Ideally affordability would have been assessed for actual households as this would give results for all medical scheme members. However, this required household data containing the medical scheme options purchased by members which were not available.

Medical schemes store membership data that include the options purchased by members. However, the data do not generally include incomes, except for members belonging to options with income bands. These options, as per Section 6.1, are mostly low-cost options and are mostly from restricted schemes. Thus, medical data would

represent only some options that only represent a subset of members.. Furthermore, medical scheme data are private and this dissertation used only publicly available data sources.

SARS captures the medical scheme options of taxpayers for calculation of the MTC and AMTC as part of taxpayers' annual tax returns. Tax return data would contain information of the numbers of dependents and the taxable incomes of members. Thus, tax return data could be used for this research. However, the data are not accessible as taxpayers' information may not be disclosed to any person who is not a SARS official, except for a list of specific purposes[26].

The following were additional limitations to the data sources used in this dissertation:

- Risk equalisation and the cost of mandatory coverage should be projected using a more comprehensive set of risk factors. The REF risk factors included maternity and CDL conditions that were not used in this research because of a lack of data. These data may be contained in Healthcare Utilisation Statutory Returns but are not made publicly available by the CMS.
- The PMB cost curve in this dissertation underreports the actual cost of PMBs. The difference may be due to fast-changing demographics, changes in utilisation patterns and improved identification of beneficiaries with the SRM risk factors (CMS, 2016b). This trend is expected to continue due to deteriorating risk profiles (CMS, 2016b). The 2015 SRM return contribution tables used a base year of 2009 and were inflated by the CMS to 2015. There may be a need to adjust the contribution tables using actual costs or for the CMS to rebase the contribution tables.
- It is likely that there are inaccuracies in the incomes and expenditure reported in the LCS. The total weighted income from salaries and wages reported in the LCS was R1.39 trillion which was substantially lower than compensation of

[26] Taxation Administration Act (Act 28 of 2011) 68-71

employees reported in the 2015 National Accounts of R1.87 trillion (SARB, 2016). The difference may be in part due to different definitions of earnings. Total weighted medical scheme contributions paid by households and employers in the LCS were R81.20 billion, which was significantly lower than total gross contributions reported by the CMS in 2015 of R151.63 billion. The difference may be in part due to non-reporting of employer subsidies in the LCS. The accuracy of incomes and expenditure on contributions in the LCS need to be investigated in more detail in total, as well as for different groups in the population.

### 8.3.3 Additional scenarios

The scenarios investigated in this dissertation were limited and can be extended in the following ways:

- Additional household profiles can be analysed. For example, households with two pensioners, single mothers and households with two adults and three children can be assessed.
- Different structures for the income-related contribution can be investigated. The structure may be more progressive than a flat rate as with the scale for personal income tax. This would have different implications for household compositions given their different incomes.
- The projections did not consider employer subsidies for contributions while working or in retirement as the information was not available. Employer subsidies vary and may be large for some employers. For example, the Government Employees Medical Scheme, which had 1.77 million beneficiaries in 2015 (CMS, 2016), provides a subsidy for employees that is up to 75% of the total contribution[27].

[27] Department of Public Service and Administration (2016). Determination and Directive on Medical Assistance for Employees in the Public Service

— This dissertation used the current definition of the PMB package for the set of common benefits. The PMB package is being reviewed by the CMS and the Medical Schemes Amendment Bill proposed mandatory "Comprehensive Service Benefits" which may replace PMBs. A different set of common benefits would affect solidarity through the scope of the package and the effect of risk factors on the cost of the package.

— The results of this dissertation could be tested for sensitivity to costs. Risk equalisation and cost containment by schemes may improve schemes' cost-efficiency, especially for low-cost options that have low supplementary costs. Alternatively, schemes' costs may increase at above the increase in CPI as has occurred historically.

— This dissertation assumed that newly covered beneficiaries have the same costs as existing beneficiaries. Utilisation and the cost of delivery may differ between existing and newly covered beneficiaries as pointed out in Section 6.4. Further research can be done on the utilisation of different member profiles under mandatory coverage and on the cost of delivery of healthcare services under mandatory coverage.

— Section 5.2 showed that significant numbers of households have partial coverage. Partial coverage may be due to adverse selection or unaffordability of contributions. Reasons for partial coverage and the effects of mandatory membership for partially covered households can be investigated in further research.

— This dissertation assumed that both income earners in dual-income households pay the mandatory contribution. This would not be the case where one income earner earns below the tax threshold. Income earners in dual-income households would also pay different rates if the income-related contribution is not a flat rate. The distribution of individual incomes in dual-income households and the effects of income-related contributions for these households can be investigated.

— Further research can consider the effects of reforms for closed and open medical schemes. Closed schemes may be less prone to adverse selection, are likely to have lower risk profiles, make greater use of income bands in their contribution tables, have lower non-healthcare costs, may have employer subsidies offered by employers and may have mandates for coverage that are imposed by employers. Thus, the effects of reforms may not be large for closed medical schemes compared to open medical schemes.
— A full analysis of affordability could include out of pocket (OOP) payments. Medical scheme members, especially members of low-cost options, may pay OOP payments due to co-payments, limited benefits and benefit exhaustion. South Africa's National Health Accounts, summarised in DoH (2017), gives estimates of OOP payments incurred by medical scheme members that could be used in an analysis that includes OOP payments.

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