Trends in chronic disease prevalence in the S.A. medical aid schemes: 2006 – 2011

Research and Monitoring Unit

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Contents

List of Figures

Executive summary

Research and Monitoring conducted a trend analysis study on chronic diseases in the private healthcare sector for the period 2006 – 2011. The study design was a retrospective review of the Scheme Risk Measurement prevalence database.

The top 10 conditions that showed the fastest increase in the period 2006 – 2011, in order of their prevalence from highest to lowest in 2011 were hypertension, hyperlipidaemia, diabetes mellitus type 2, hypothyroidism, glaucoma, rheumatoid arthritis, bipolar mood disorder, Parkinson's disease, chronic renal disease, and systemic lupus Erythematosus.

The prevalence of hypertension grew by 36.8% between 2006 and 2011, from 57.6 to 78.8 per 1 000 beneficiaries, making it the fastest increasing cardiovascular disease among medical scheme beneficiaries and the most prevalent chronic disease on the PMB Chronic Disease List (CDL).

Hyperlipidaemia's prevalence among beneficiaries grew by 37.7% from 23.9 in 1 000 beneficiaries in 2006 to 23.9 in 1 000 beneficiaries in 2011. This is most likely due to lifestyle changes.

The 84.2% increase in the prevalence of diabetes mellitus type 2 between 2006 and 2011 again points to the importance of leading a healthy lifestyle.

Over six time more females than male beneficiaries were treated for hypothyroidism between 2006 and 2011. The overall prevalence of the disease increased from 9.7 to 13.7 per 1 000 beneficiaries in that period. The prevalence in female beneficiaries increased by 37.5%, from 16.5 per 1 000 in 2006 to 22.6 per 1 000 in 2011. The prevalence of hypothyroidism among male beneficiaries increased at a faster rate, from 2.3 per 1 000 in 2006 to 3.8 per 1 000 in 2011, an increase of 63.2%.

The prevalence of glaucoma increased from 1.8 per 1 000 beneficiaries in 2006 to 2.7 per 1 000 in 2011. No significant gender-related difference in prevalence was observed.

Rheumatoid arthritis prevalence increased from 2.0 per 1 000 beneficiaries in 2006 to 2.6 per 1 000 beneficiaries in 2011, an increase of 31.7%. More female than male beneficiaries were treated for the disease during that period. The prevalence of rheumatoid arthritis among female beneficiaries increased from 2.8 to 3.8 per 1 000 in 200 – 2011, compared to a change from 1.1 to 1.4 per 1 000 in male beneficiaries during the same period.

The prevalence of bipolar mood disorder (BMD) among medical schemes beneficiaries more than doubled between 2006 and 2011. The psychiatric condition showed an increase of a staggering 250.0% during the period covered by the study. Very few beneficiaries under the age of 14 years were treated for BMD, but the prevalence of BMD among female beneficiaries 15 – 39 years increased from 1.0 per 1 000 in 2006 to 2.9 per 1 000 in 2011. Similar trends were observed in the older age groups (above 40 years).

Parkinson's disease prevalence increased by 47.2% between 2006 and 2011, from 0.5 to 0.8 per 1 000 beneficiaries. Prevalence of the disease among beneficiaries between the ages of 60 and 79 years increased from 3.9 to 4.4 per 1 000 in the same period; the prevalence was higher in beneficiaries older than 80 years, increasing from 11.0 per 1 000 in 2006 to 12.2 per 1000 in 2011.

The prevalence of chronic renal disease increased from 0.2 per 1 000 in 2006 to 0.3 per 1 000 beneficiaries in 2011, an increase of 47.6%. More male than female beneficiaries were treated for the disease, in 2011, its prevalence was 0.4 per 1 000 male and 0.3 per 1 000 female beneficiaries.

The prevalence of systemic lupus erythematosus (SLE) increased from 0.16 per 1 000 beneficiaries in 2006 to 0.22 per 1 000 beneficiaries in 2011. The prevalence of SLE is high in women than in men. There were seven times more women than men treated for SLE in 2011.

Without aggressive intervention into the root causes of these chronic diseases and their costs, these trends are expected to continue to worsen.

1 Introduction

It is well established that non-communicable diseases (NCDs) or chronic diseases are the leading cause of death in the world; with 36 million or 63% of the 57 million deaths that occurred in the world during 2008 attributable to such diseases. Cardiovascular diseases, diabetes, cancer and chronic respiratory diseases caused the majority of these deaths.

Most of these NCD deaths occur in low- and middle-income countries, including the Sub-Saharan Africa (SSA). The burden of chronic diseases is increasing in low- and middle-income countries [1].

NCDs are not only responsible for the enormous human suffering; they also threaten the economies of many countries as they mostly affect the older and experienced members of the workforce. The WHO estimates that deaths from chronic diseases will increase by 77% between 1990 and 2020, and that most of these deaths will occur in the developing regions of the world [2].

South Africa has the highest chronic disease death rate in people aged 15 to 69 years in the African continent [1]. It is estimated that of the nearly 500 000 deaths that occurred during 2000 in South Africa, 37% were due to NCDs [3]. Most patients with chronic diseases are managed at the primary healthcare level in the public health sector. Patients on a medical scheme receive their care in the private sector, mostly from general practitioners. Medical schemes are legally obliged to pay for the treatment of 25 chronic conditions included in the Chronic Disease List (CDL) as part of the Prescribed Minimum Benefits (PMBs). The CDL's are shown in Table 1. PMBs were introduced into the Medical Schemes Act to ensure that beneficiaries of medical schemes would not run out of benefits for certain conditions and find themselves forced to turn to state facilities for treatment. These conditions are defined by diagnosis codes. Schemes must provide for the diagnosis, medical management and prescribed medication for these conditions, to the extent provided for by way of therapeutic algorithms. This part of the PMBs came into operation on 1 January 2004. PMBs are defined in Regulation 7 of the Medical Schemes Act.

There are no routine South African national data on the prevalence of chronic diseases. The Scheme Risk Measurement (SRM, previously Risk Equalisation Fund) database on chronic diseases is one of the best data sources on the prevalence of chronic diseases in South Africa.

This research brief reviews trends of chronic diseases in the private health care sector. Medical schemes are the main means of financing private health care, covering about 18% (8.7 million) of the South African population in 2011. Membership of medical schemes is strongly linked to employment. In 2010, the membership racial breakdown was 64.3% and 35.7% for blacks and whites respectively [4].

Table 1: Chronic diseases in the Chronic Disease List

Chronic Disease Code	Full Description
ADS	Addison's Disease
AST	Asthma
BCE	Bronchiectasis
BMD	Bipolar Mood Disorder
CHF	Cardiac failure[1]
CMY	Cardiomyopathy
COPD	Chronic Obs. Pulmonary Disease
CRF	Chronic Renal Disease
CSD	Crohn's Disease
DBI	Diabetes Insipidus
DM1	Diabetes Mellitus 1
DM2	Diabetes Mellitus 2
DYS	Dysrhythmias
EPL	Epilepsy
GLC	Glaucoma
HAE	Haemophilia
HYL	Hyperlipidaemia
HYP	Hypertension
IBD	Ulcerative Colitis
IHD	Coronary Artery Disease
MSS	Multiple Sclerosis
PAR	Parkinson's Disease
RHA	Rheumatoid Arthritis
SCZ	Schizophrenia
SLE	Systemic LE
TDH	Hypothyroidism

[1] CHF was combined with CMY in the prevalence tables.

2 Literature Review

2.1 Chronic Respiratory Conditions

The prevalence of respiratory diseases is expected to rise in low- and middle-income countries because of ageing of the population and the increase in tobacco smoking. However, tobacco smoking is reported to have decreased in South Africa due to tobacco control measures [5]. The most common chronic respiratory diseases in South Africa are asthma (AST) and chronic obstructive pulmonary disease (COPD).

AST was the 13th most important cause of death in South Africa in 2000, accounting for 1.5% of all deaths. South Africa's AST mortality rates (1.5 per 100 000) in the 5 to 34 years age group are disproportionally higher than in other parts of the world. South Africa's AST case fatality rate of 18.5 per 100 000 asthmatics is the fifth highest in the world. The CHAMP (Chestiness in Childhood Asthma in Mitchells Plain) study reported AST diagnosis prevalence of 13.1% in pre-school and 11.2% in the school-going children. Many studies report the prevalence of self-reported AST in adults to be between 10% and 13% in South Africa [5].

COPD was the fifth most common cause of death in the world in 2001, responsible for 4.7% of deaths. In South Africa, COPD was responsible for 2.3% of all deaths, mostly in older ages, in 2000. The South African Demographic and Health Survey 1998 (SADHS) reported the overall national prevalence of chronic bronchitis was 2.3% in men and 2.8% in women. The female excess was unexpected given the national figures for smoking in the SADHS were 42% and 11% among men and women respectively [5].

The prevalence of bronchiectasis (BCE) is unknown and varies considerably among different countries. It is relatively common in South Africa because of the large number of infections occurring in this country. Based on a review of an insurance claims database in the United States, it was estimated that about 25 per 100,000 people have BCE. This number increases to 272 per 100,000 for those over 74 years old. BCE is known to occur in patients across the spectrum of age and gender, but older females tend to have higher than average prevalence [6].

2.2 Cardiovascular conditions

Cardiovascular disease accounts for about 30% of deaths worldwide, and 80% of these deaths are in the developing world [7]. The high morbidity caused by cardiovascular diseases leaves up to 50% of all survivors chronically disabled [8]. Premature cessation of economic activity, along with worsening quality of life due to cardiovascular disease in the economically active population is a huge medical, economic and social problem. Cardiovascular diseases that are covered in the CDL include cardiomyopathy (CMY), coronary artery disease (IHD), dysrhythmias (DYS) and hypertension (HYP).

CMY is a relatively common condition in South Africa, and one of the major contributors to heart failure in Africa. The prevalence of heart failure across the world is unknown, but hospital-based studies indicate that CMY accounts for 20% of all heart failure admissions in African hospitals. The crude estimate of the prevalence of heart failure in developed countries is estimated at 3-20 per 1 000 [9]. A cohort study of patients with confirmed cases of cardiovascular disease who were being treated at the cardiology unit of the Chris Hani Baragwanath Hospital in Johannesburg found that 35% of heart failure cases were attributable to CMY [10].

IHD is very rare in SSA and is diagnosed more frequently among men than women. IHD was diagnosed in 10% of patients with confirmed cases of cardiovascular disease who attended the cardiology unit at the Chris Hani Baragwanath Hospital. Between 1992 and 1994, 36 people from Soweto where diagnosed with IHD at the Chris Hani Baragwanath Hospital in 1994. IHD was responsible for about 0.2% of 20,000 deaths occurring annually in Soweto [10].

HYP is a highly prevalent condition in South Africa and is a risk factor for heart disease and the single most important risk factor for stroke. HYP is called a silent killer because people who have the condition are usually unaware. The 1998 SAHDS reported a hypertension (blood pressure > 160/95 mmHg) prevalence of 12.7% in South Africans over the age of 15 years. The prevalence was 13.9% in women and 10.9% in men [11]. The 2010 South African General Household Survey (GHS), with a slightly different adult age definition, found self-reported diagnosis of HYP prevalence of 10.5% in South African adults 18 years and older. Prevalence in the GHS was 12.9% and 7.5% for females and males respectively [12].

2.3 Chronic Renal Disease

Chronic renal disease (CRF) affects mainly young people in the 20 to 50 years age group in SSA and is primarily due to hypertension and glomerular diseases. CRF is approximately 3 to 4 times more common in Africa than in developed countries [13]. The number of patients enrolled in the end-stage renal disease Medicare-funded (US) program increased from approximately 86,354 beneficiaries in 1983 to 547,892 beneficiaries in 2008 [14]. The prevalence of CRF is unknown in South Africa.

2.4 Gastrointestinal Disorders

Gastrointestinal disorders, including inflammatory bowel diseases such as Crohn's Disease (CSD) and Ulcerative Colitis (IBD), affect more than 200 per 100 000 persons in the West. The peak age for CSD is 20 to 30 years; for IBD, it is 30 to 40 years. IBD occurs more frequently in men, whereas IBD is more common in women [15]. A study conducted in Cape Town estimated the incidences of CSD in the coloured, white and black population groups to be 1.8, 2.6 and 0.3/100 000 per year respectively and those for IBD 1.9, 5.0 and 0.6/100 000 respectively [16]. Data on the prevalence of gastrointestinal disorders in South Africa is scarce.

2.5 Diabetes Mellitus

There are three main types of diabetes mellitus (DM), namely, Diabetes Mellitus Type 1 (DM1), Diabetes Mellitus Type 2 (DM2) and gestational diabetes (which may precede development of DM2). DM1 occurs most commonly in children and accounts for approximately 10% of all diabetes mellitus cases. DM2 diabetes accounts for about 90% of all diabetes cases, and many people who have this condition are undiagnosed [17]. DM2 occurs most commonly in people over age 40. The greatest increase in the prevalence of DM, especially DM2, is expected to occur in Asia and Africa [18]. Diabetes mellitus affects 9.4 million people in Africa [13]. In its website, the Diabetes Society says "that approximately 4-6 million people in SA have diabetes." The SADHS found prevalence of self-reported diabetes in South African males and females 15 years and older to be 2.4% and 3.7%, respectively. The proportion of deaths attributable to diabetes are more pronounced among women compared to men [5].

2.6 Psychiatric Conditions

Epidemiological data on psychiatric conditions in South Africa and the rest of Africa is lacking. The prevalence of psychiatric disorders is expected to be high in South Africa as a result of stressors such as past history of racial discrimination and political violence. The prevailing levels of poverty, criminal violence, and high rates of gender inequality are likely to contribute to vulnerability to common psychiatric disorders [19]. The two psychiatric disorders, Bipolar Mood Disorder (BMD) and Schizophrenia (SCZ) form part of the 26 chronic diseases covered as PMBs.

2.7 Neurological Disorders

Epilepsy (EPL) is the most common neurological condition [20]. Epilepsy South Africa estimates that about one in every 100 people has epilepsy.

There are no well-documented epidemiological studies on multiple sclerosis (MSS) in South Africa. MSS is not a common condition in South Africa. Some studies have extrapolated the prevalence of MSS to be 1 in 700 (63,500 sufferers) while Multiple Sclerosis South Africa (MSSA) have estimated that there are just about over 5000 cases of MSS in this country [21, 22].

2.8 Auto-immune Conditions

Arthritis is the number one disabling disease in South Africa affecting an estimated one in every seven people. Rheumatoid arthritis (RHA) accounts for about six percent of all reported arthritis cases. RHA arthritis afflicts three times more women than men. Systemic Lupus Erythematosus (SLE) is a disease of primarily young women aged between 15 and 40 years.

2.9 Addison's Disease

Addison's disease (ADS) is a very rare condition with a reported prevalence of 93 to140 cases per million population in the west. The prevalence of Addison's Disease is unknown in South Africa.

2.10 Diabetes Insipidus

Diabetes Insipidus (DBI) is an uncommon condition with a reported prevalence of three cases per 100,000 population in the United States [23]. The prevalence of DBI is unknown in South Africa.

2.11 Glaucoma

The worldwide prevalence of glaucoma (GLC) is increasing as a result of the rapidly aging population [24]. The prevalence of GLC in the 40 years and older age group is 1.86% in the United States [25]. A conservative estimate of the prevalence of glaucoma in Africa is that it occurs in 4% of people older than 40. In South Africa, glaucoma affects up to 5.3% of people in this age group. The proportion of blindness that can be attributed to glaucoma in South Africa is 23% [26, 27].

2.12 Haemophilia

The worldwide prevalence of haemophilia (HAE) is between 1.8 and 11.4 cases per 100,000 male individuals [28]. About one per 5 000 males are born with haemophilia [29]. The prevalence of HAE is unknown in South Africa.

2.13 Hyperlipidaemia

According to the Heart and Stroke Foundation South Africa, it is estimated that 80% of South Africans who live in cities have raised bad cholesterol, and 20% of them have levels that place them at high risk of developing heart disease.

2.14 Parkinson's disease

Parkinson's disease (PAR) is the most common neurodegenerative disease after Alzheimer's disease. The worldwide prevalence of PAR is 1% among persons over 60 years of age and rises to 4% of the population over 80 [30, 31]. Few PAR -related studies have been published in Africa and consequently, little is known about the epidemiology of PAR in South Africa [32, 33].

2.15 Hypothyroidism

Hypothyroidism (TDH) is more common in older women and ten times more common in women than in men, and

increases with age. Prevalence of previously diagnosed and treated TDH ranges from 14 to 19 per 1000 women. Other studies in Europe, Japan and USA have reported prevalence that ranges between 0.6 and 12 per 1000 in women and between 1.3 and 12 per 1000 in men [34]. There is not enough epidemiological data on hypothyroidism in South Africa. It is believed that the incidence of TDH in whites is comparable to incidences in Europe and North America and the incidence for blacks is higher [35].

3 Study objective

The objective of the study presented in this Research Brief was to report on the trends in the prevalence of chronic diseases in the South African medical schemes industry from 2006 to 2011.

4 Methodology

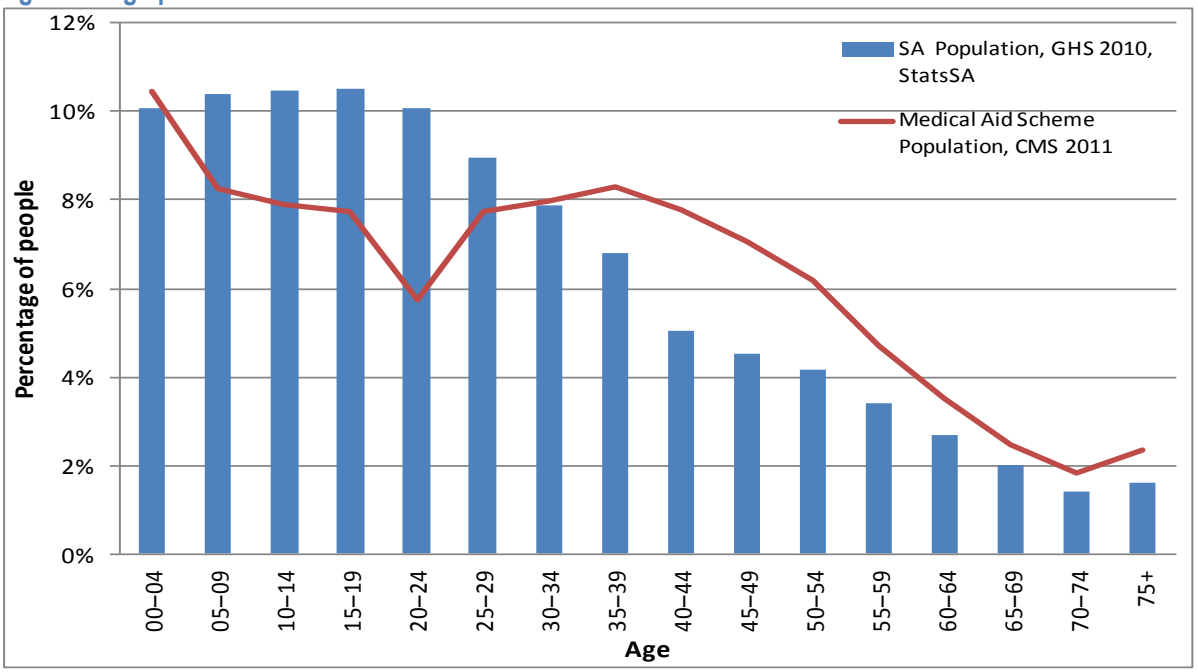
4.1 Study Population

The study was conducted on the South African medical schemes industry. The study population consisted of all registered open and restricted schemes between 2006 and 2011. Medical schemes exempted from the rules governing the provision of PMBs were not included in the analysis.

4.2 Data

As part of the SRM project, all registered medical schemes submit monthly treated chronic disease prevalence data to the Council for Medical Schemes on a quarterly basis. Medical schemes used the rules set out by the Entry and Verification criteria to identify each chronic disease case [36]. The number of beneficiaries included in the analysis by age, gender and year are shown in Appendix A. The medical schemes have an overrepresentation of young children and beneficiaries over the age of 35 years compared to the South African general population as shown in Figure 1.

Figure 1: Age profile of the medical aid schemes beneficiaries.



The month of June was selected for each of the years, as well as only the data from those schemes that reported good quality data. In previous data quality analysis, the data submitted for the month of June in any year was found to be reliable and a better reflection of the schemes' risk profile. Data quality classification is discussed in the Annual Scheme Risk Measurement report [37]. The month-to-month variation in the reported prevalence of chronic diseases reduced substantially between 2006 and 2009, indicating consistency in reporting and improved data quality. This variation has remained low between 2009 and 2011.

The SRM Contribution Table [38] was used to calculate estimated cost of diagnosing and treating chronic diseases. The SRM Contribution Table is a table of average costs for each CDL condition by age.

4.3 Data management and analysis

The data was extracted into a Windows Excel spreadsheet format and imported to a STATA statistical software package for management and analysis. The output was then transcribed to Excel for tabulating summary statistics and constructing graphical representations of the results. Descriptive statistics were calculated to produce summary statistics of key variables.

5 Results: Trends of chronic conditions

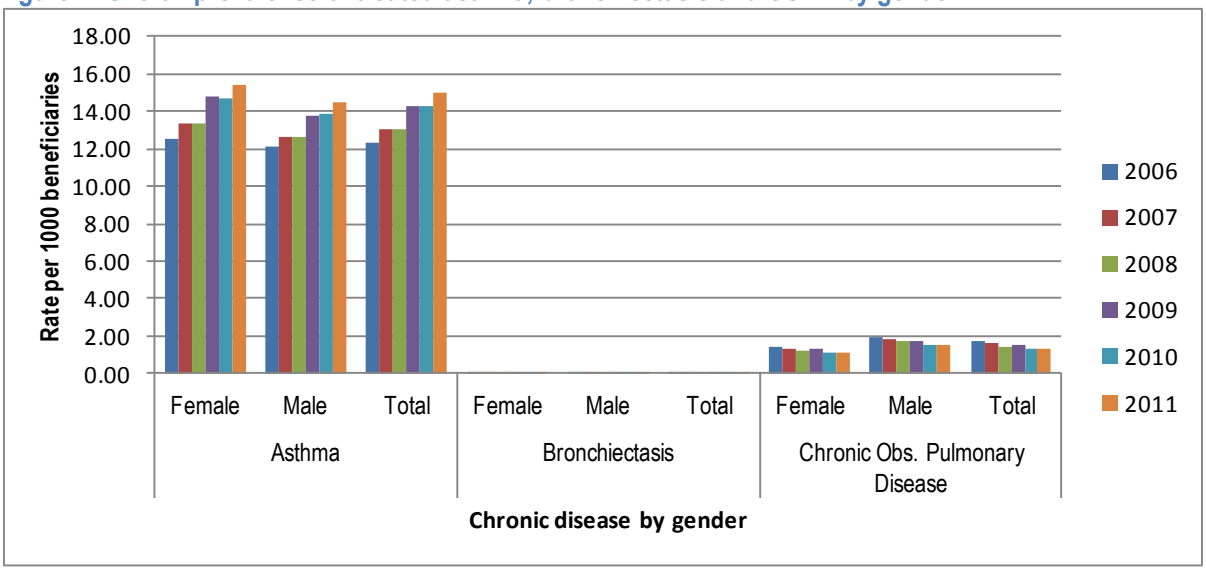
5.1 Chronic respiratory conditions

Figure 2 shows the prevalence of treated chronic respiratory diseases of medical scheme members by gender. The overall prevalence of asthma in the medical aid population increased from 12.3 per 1000 in 2006 to 15.0 per 1000 in 2011. This represents an increase of 22%. AST rates were slightly higher in the female compared to the male medical scheme beneficiaries.

The treated COPD rates decreased between 2006 and 2011. The overall treated prevalence for COPD was 1.7 per 1000 in 2006 and decreased by 24% to 1.3 per 1000 in 2011. More males (1.5 per 1000) than females (1.1 per 1000) received treatment for COPD in 2011.

The overall prevalence of treated BCE has remained unchanged at about 0.1 per 1000 between 2006 and 2011. There was no difference by gender.

Figure 2: Overall prevalence of treated asthma, bronchiectasis and COPD by gender.

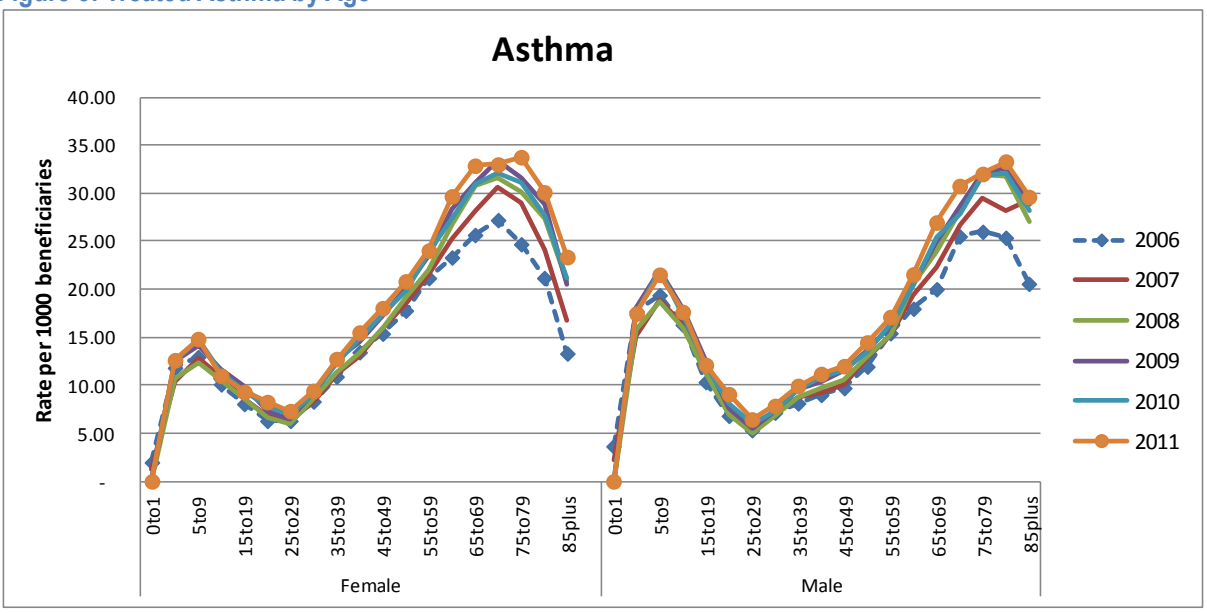


In 2011, on the basis of SRM data submitted by all medical schemes to the Council for Medical Schemes, it was estimated that the annual cost for diagnosis and treatment of medical schemes beneficiaries with AST was R888 494 351, which is more than the combined annual estimated cost for COPD (R335 533 078) and BCE (R4 216 086).

The treated AST prevalence curves by age in Figure 3 suggest that the biggest increase between 2006 and 2011 was in the older age groups. The prevalence among children under 5 years increased from 4.9 per 1000 in 2006 to 11.3 per 1000 beneficiaries in 2011. This represents a 131% increase. The prevalence in children under the

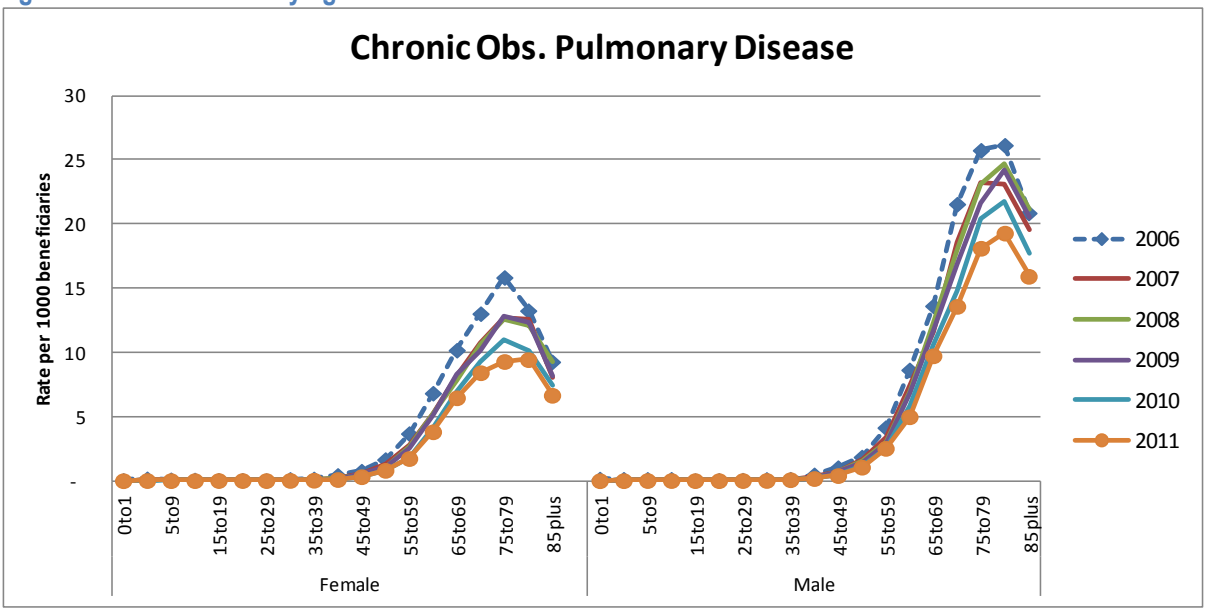
age of 5 years in 2011 was 9.4 per 1000 and 13.1 per 1000 for female and male respectively. The diagnosis and treatment of children in the 5 to 14 years age group increased by 142% from 6.8 per 1000 in 2006 to 16.3 per 1000 in 2011. The prevalence was 13.0 per 1000 in females and 19.6 per 1000 in males in the 5 to 14 years age group in 2011. The prevalence in the 20 to 39 years age group increased by 168% from 3.5 per 1000 to 9.4 per 1000. Prevalence in the age group 40 years and older increased by 200% from 6.9 per 1000 to 20.6.

Figure 3: Treated Asthma by Age



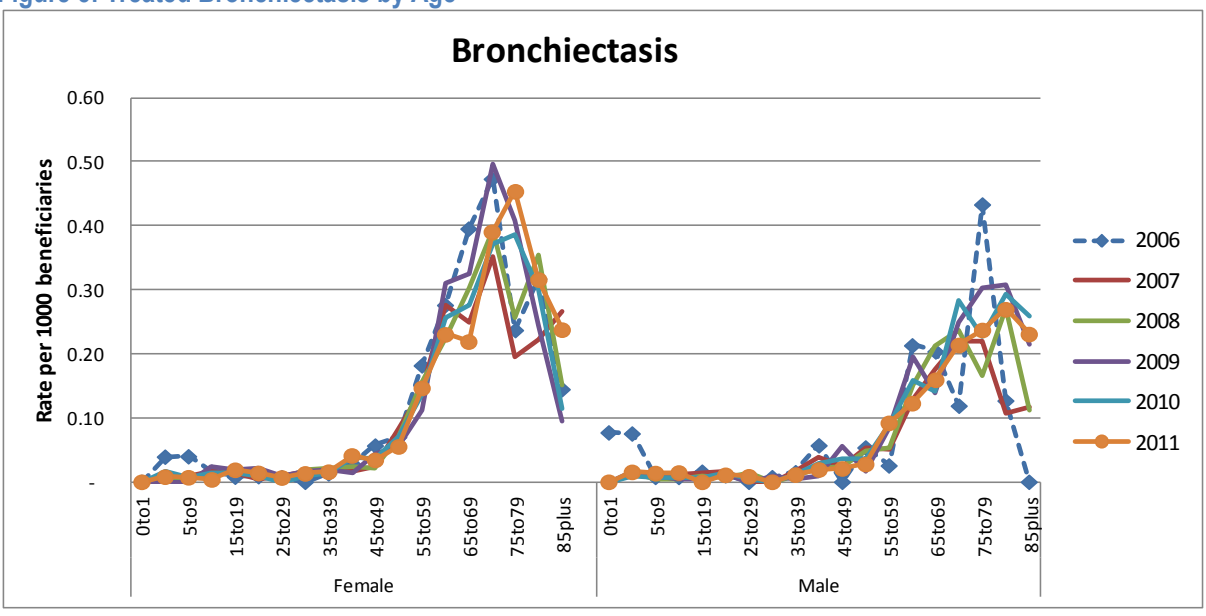
The prevalence of COPD has decreased across all age bands between 2006 and 2011. Fewer cases of COPD were reported in younger age groups (<40 years). The overall prevalence for beneficiaries over the age of 40 years decreased from 4.6 per 1000 to 3.3 per 1000.

Figure 4: Treated COPD by age



The prevalence of bronchiectasis has remained unchanged during the SRM data collection period (Figure 5). Bronchiectasis was treated in 0.14 per 1000 and 0.08 per 1000 female and male beneficiaries over the age of 40 respectively. The overall prevalence was 0.11 per 1000 for beneficiaries over the age of 40 years.

Figure 5: Treated Bronchiectasis by Age



5.2 Cardiovascular conditions

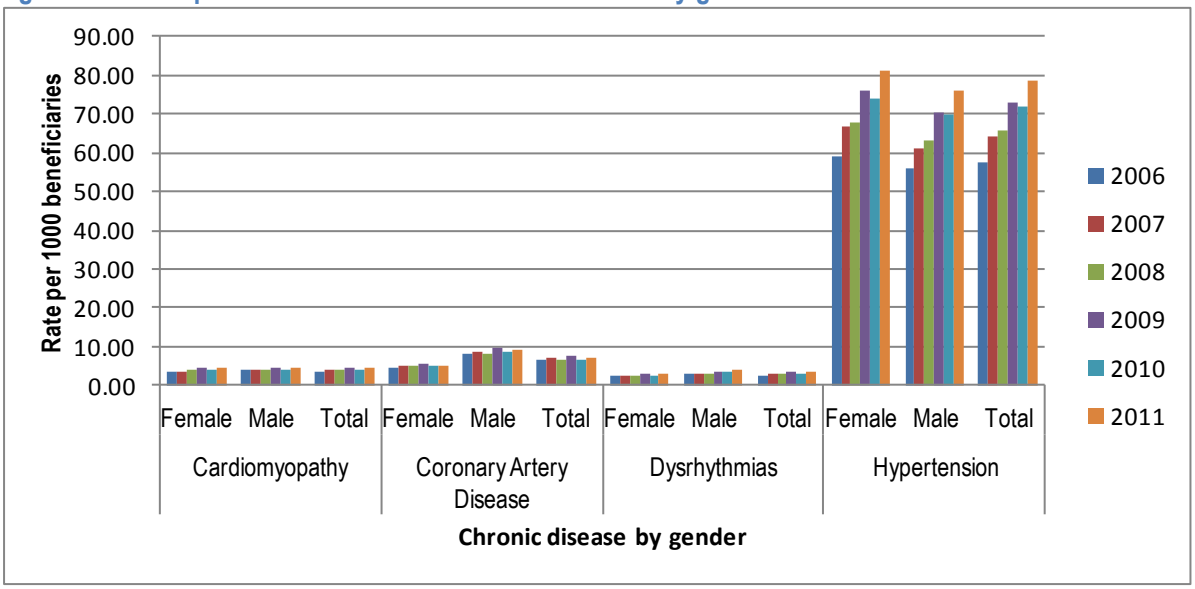
As shown in Figure 6, the overall prevalence of diagnosis and treatment of CMY paid for by medical aid schemes increased slightly from 3.6 per 1000 in 2006, to 4.3 per 1000 in 2011. The differences by gender were not significant. The 2011 annual estimated cost for diagnosis and treatment of medical schemes beneficiaries with CMY was R990, 857, 958.

Nearly double the proportion of male medical schemes beneficiaries were diagnosed with coronary artery disease, compared to female beneficiaries. In 2006, coronary artery disease prevalence in males was 8.3 per 1000 compared to 4.5 per 1000 in females. The treated prevalence rates increased to 9.1 per 1000 and 5.0 per 1000 in 2011 in males and females respectively. The 2011 annual estimated cost for diagnosis and treatment of medical schemes beneficiaries with coronary artery disease was R1, 076, 661, 782.

Very few cases of DYS were reported in medical schemes beneficiaries. The overall prevalence increased from 2.6 in 2006 to 3.3 per 1000 in 2011. Small differences were observed in the prevalence rates between female and male beneficiaries. The 2011 annual estimated cost for diagnosis and treatment of medical schemes beneficiaries with DYS was R312, 020, 590.

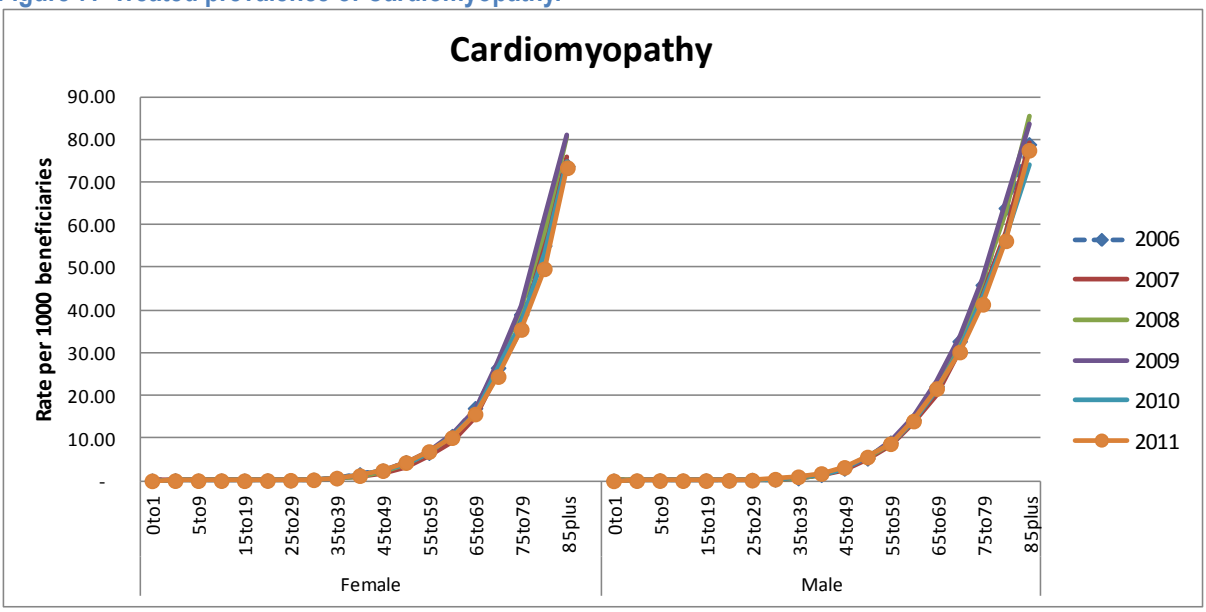
HYP was the fastest increasing cardiovascular condition, increasing by 37% between 2006 and 2011 (57.6 to 78.8 per 1000). In 2011, more female than male beneficiaries received treatment for hypertension (81.2 vs. 73.1 per 1000). The 2011 annual estimated cost for diagnosis and treatment of medical schemes beneficiaries with hypertension was R2, 992, 887, 249.

Figure 6: Overall prevalence of cardiovascular conditions by gender.



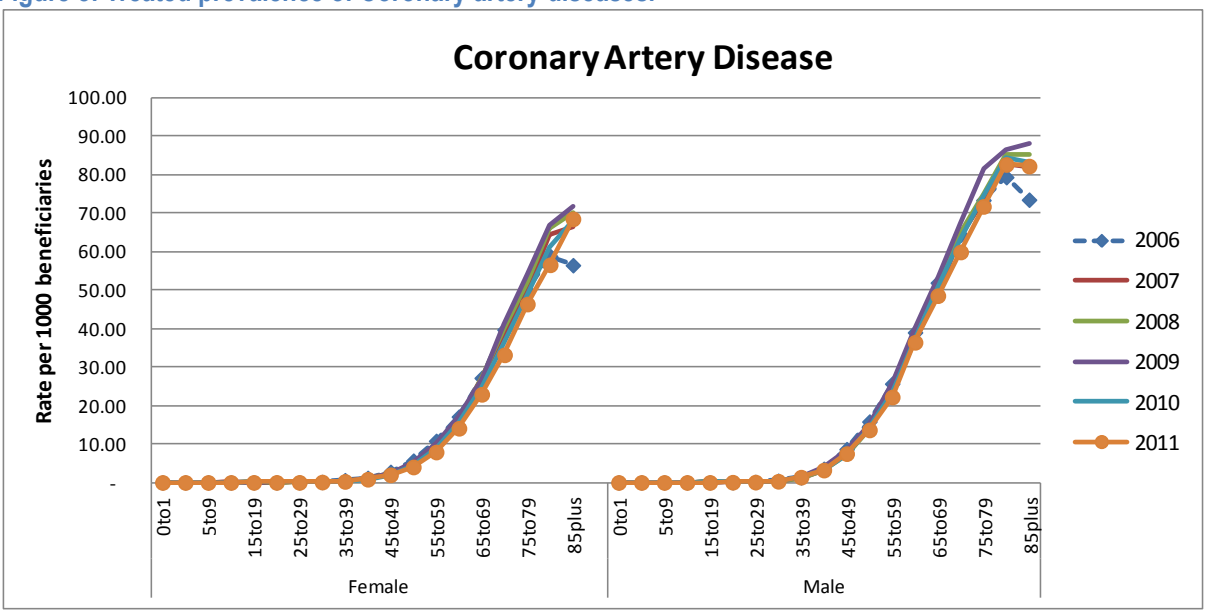
The prevalence of treated CMY has shown a slight increased across all age bands between 2006 and 2011. Very few cases of CMY were reported in younger age groups (<40 years). The overall prevalence of treated CMY for beneficiaries over the age of 40 years increased from 9.7 per 1000 in 2006, to 10.6 per 1000 in 2011. Similar increases were observed in male and female beneficiaries (Figure 7).

Figure 7: Treated prevalence of Cardiomyopathy.



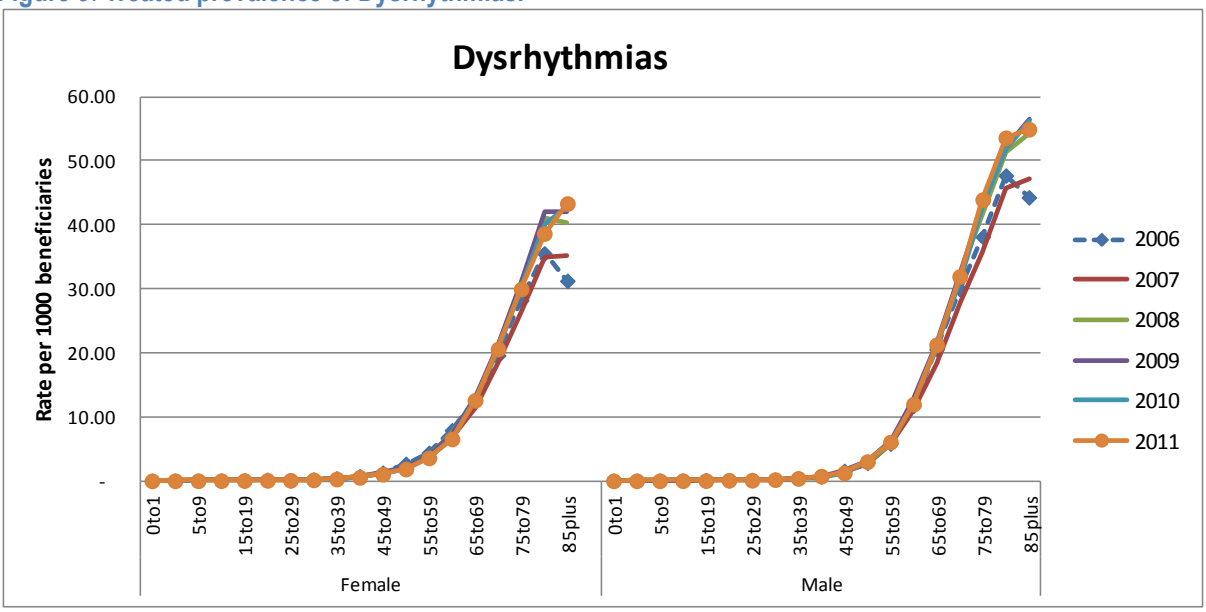
The overall prevalence of treated IHD for beneficiaries over the age of 40 years showed an insignificant increase from 17.3 per 1000 in 2006, to 17.7 per 1000 in 2011 (Figure 8).

Figure 8: Treated prevalence of Coronary artery diseases.



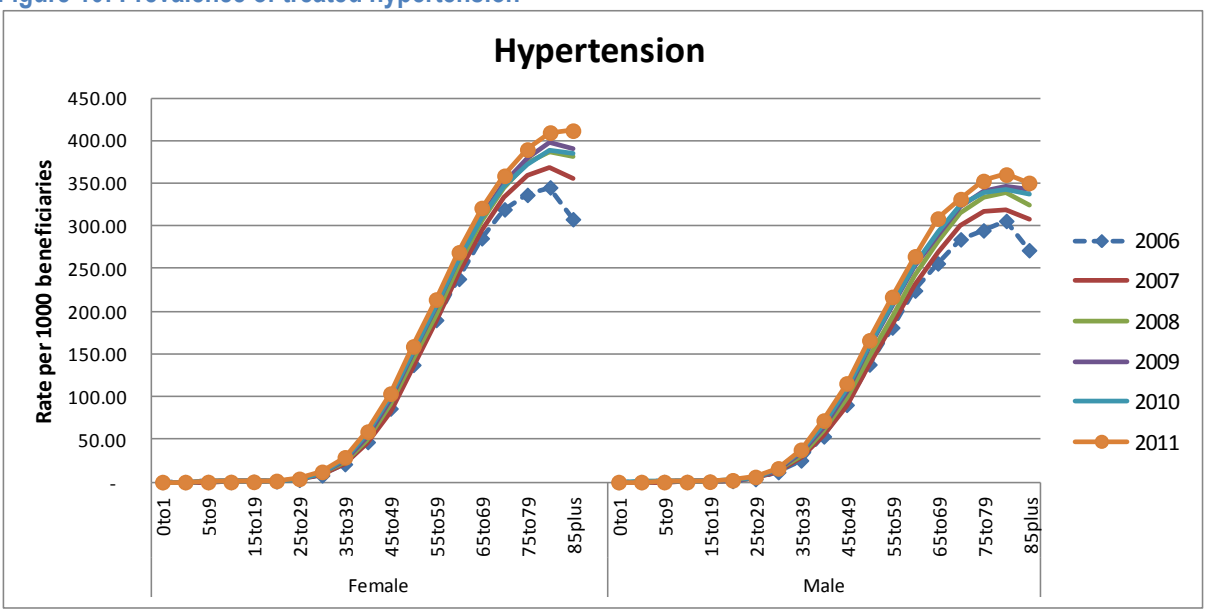
The overall prevalence of DYS for beneficiaries over the age of 40 years increased from 6.9 per 1000 in 2006, to 8.46 per 1000 in 2011. The prevalence of DYS was lower in the younger age groups (Figure 8).

Figure 9: Treated prevalence of Dysrhythmias.



The prevalence of treated HYP has shown a consistent increase across all age groups (Figure 10). The prevalence increased at a faster rate (44%) in the 15 to 39 age group, from 8.1 per 1000 in 2006 to 11.7 per 1000 in 2011 for all beneficiaries. Prevalence for beneficiaries over the age of 40 years increased from 151.2 per 1000 in 2006, to 192.8 per 1000 in 2011. This represents an increase of 28% in this age group.

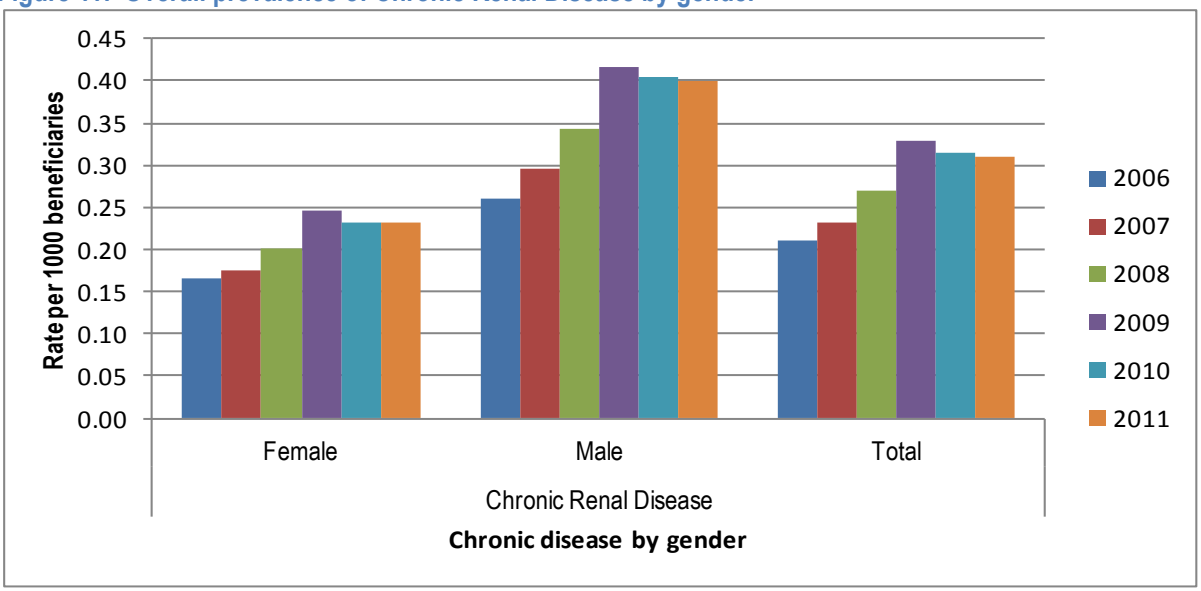
Figure 10: Prevalence of treated hypertension



5.3 Chronic renal disease

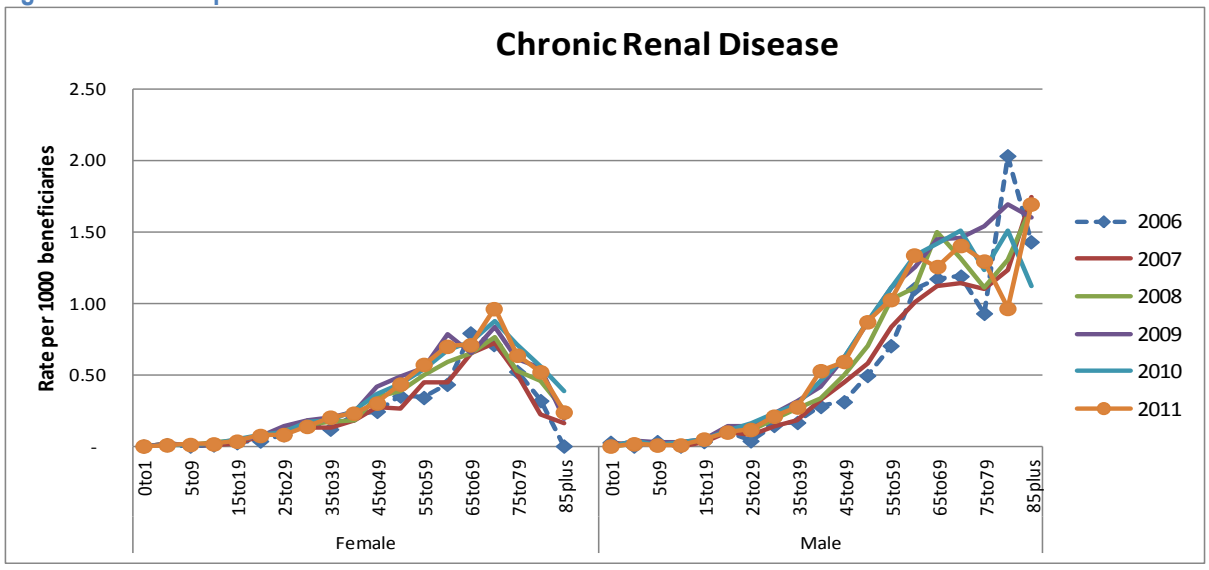
The overall prevalence of treated CRF increased from 0.2 per 1000 in 2006, to 0.3 per 1000 in 2011. More male than female beneficiaries were treated for CRF. In 2011, the prevalence of CRF was 0.4 per 1000 in males and 0.3 per 1000 in females. The 2011 annual estimated cost for diagnosis and treatment of medical schemes beneficiaries with CRF was R744, 778, 310.

Figure 11: Overall prevalence of Chronic Renal Disease by gender



Very few cases of CRF were observed in beneficiaries younger than the age of 20 years. The prevalence of treated CRF in the 20 to 39 years age group was about 0.1 per 1000 in both 2006 and 2011. A notable increase was observed in the 40 years and older age group, from 0.5 per 1000 in 2006, to 0.7 per 1000 in 2011.

Figure 12: Treated prevalence of Chronic Renal Disease.

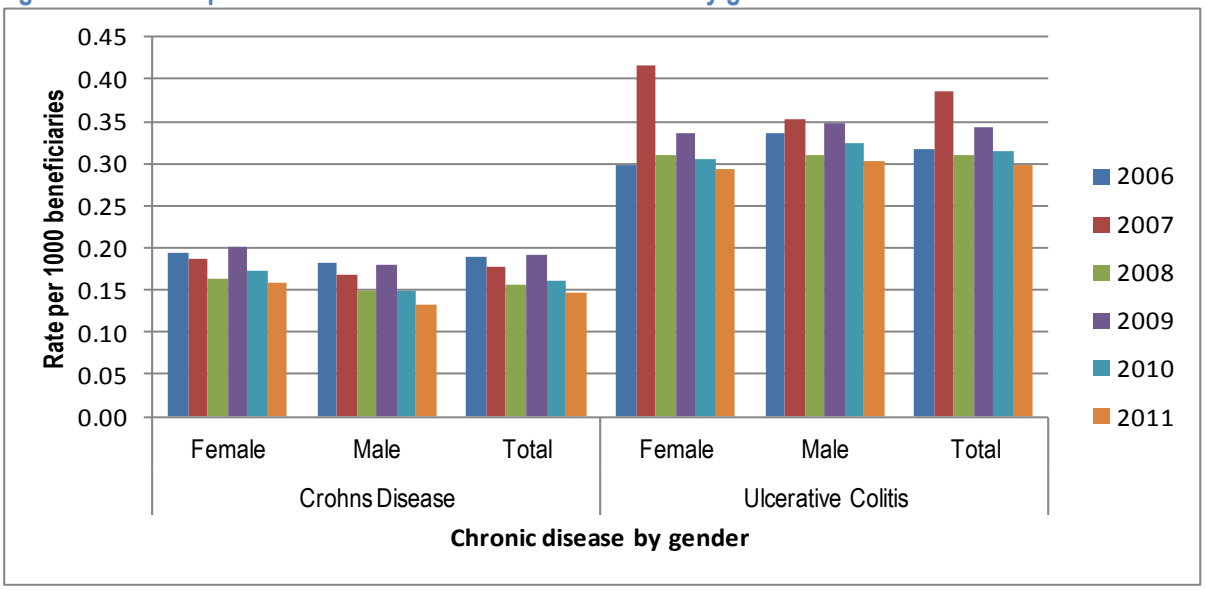


5.4 Gastrointestinal disorders

Very few beneficiaries were treated for Crohn's Disease (CSD) in the private healthcare sector. There were 617 and 1,051 medical scheme beneficiaries treated for CSD per month in 2006 and 2011 respectively. This represented a marginal decrease from 0.19 per 1000 in 2006, to 0.15 per 1000 in 2011. Ulcerative Colitis (IBD) is also a relatively rare condition in medical schemes. The prevalence was 0.3 per 1000 in 2011 (Figure 13).

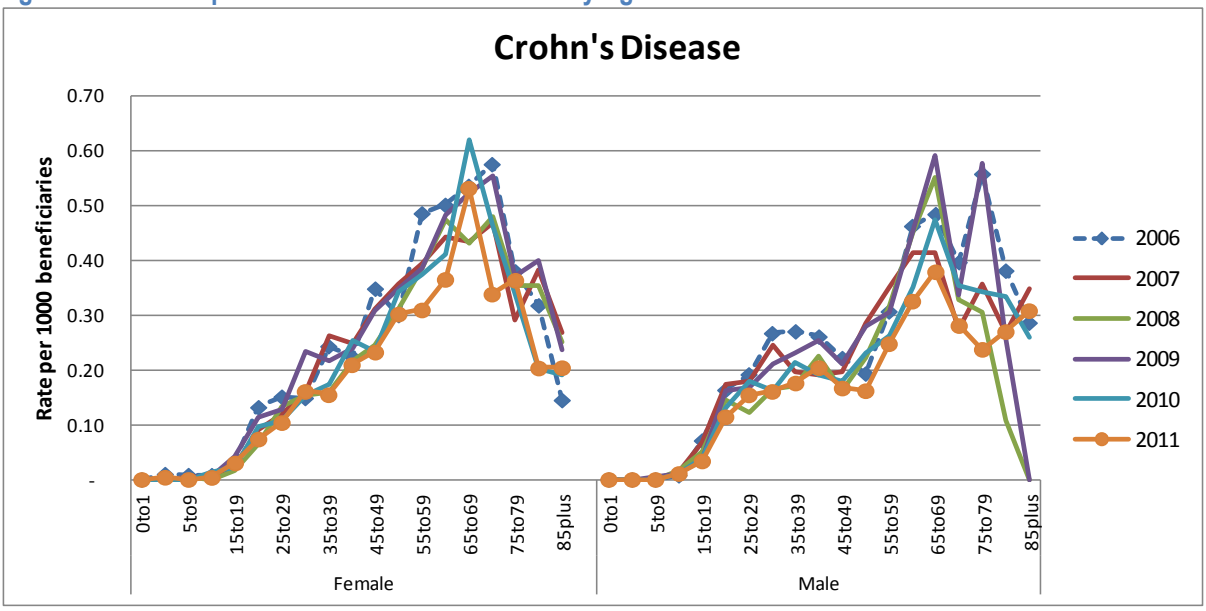
The 2011 annual estimated cost for diagnosis and treatment of medical schemes beneficiaries with gastrointestinal disorders was R54, 915, 071.

Figure 13: Overall prevalence of Gastrointestinal Conditions by gender.



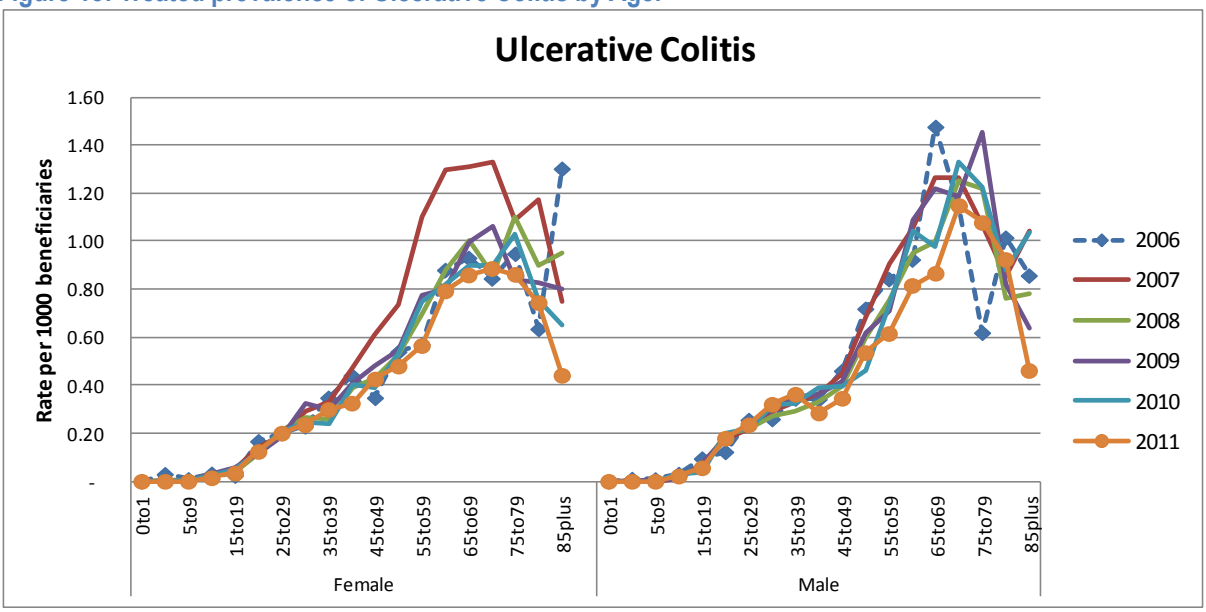
The prevalence of CSD for beneficiaries over the age of 20 years remained unchanged at about 0.2 per 1000 between 2006 and 2011. Very few cases of CSD were observed in child beneficiaries (Figure 14).

Figure 14: Treated prevalence of Crohn's Disease by Age.



The prevalence of IBD for beneficiaries over the age of 20 years remained unchanged at about 0.4 per 1000 between 2006 and 2011. Very few cases of IBD were observed in child beneficiaries (Figure 15).

Figure 15: Treated prevalence of Ulcerative Colitis by Age.

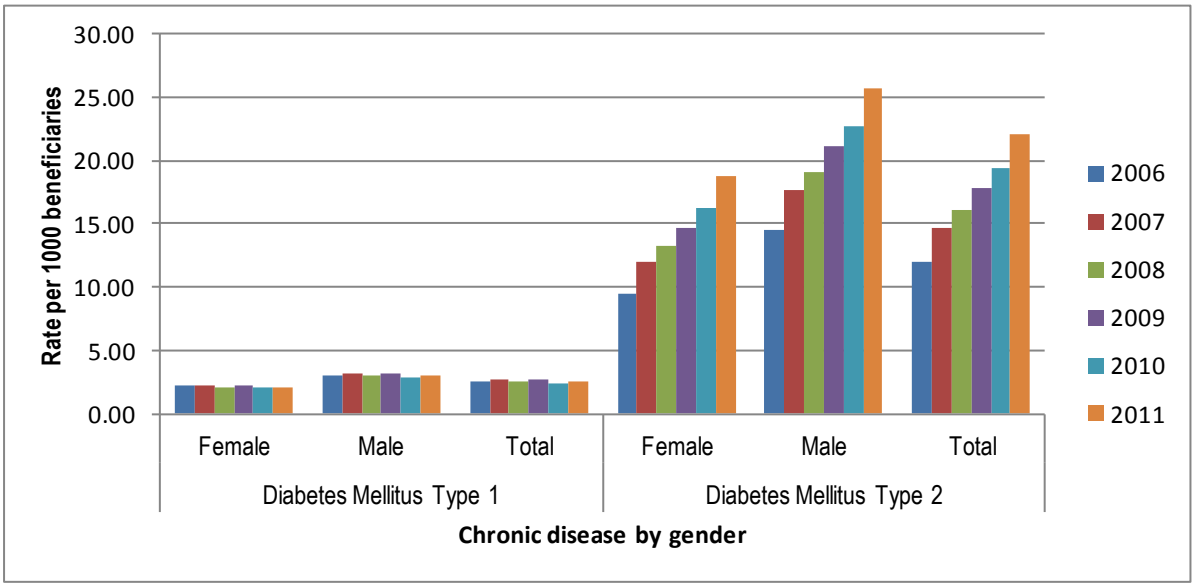


5.5 Diabetes mellitus

The overall prevalence of DM1 in the medical schemes population remained unchanged at about 2.6 per 1000 between 2006 and 2011, as shown in Figure 16. More male than female beneficiaries were diagnosed and treated for DM1 (3.0 per 1000 vs. 2.2 per 1000).

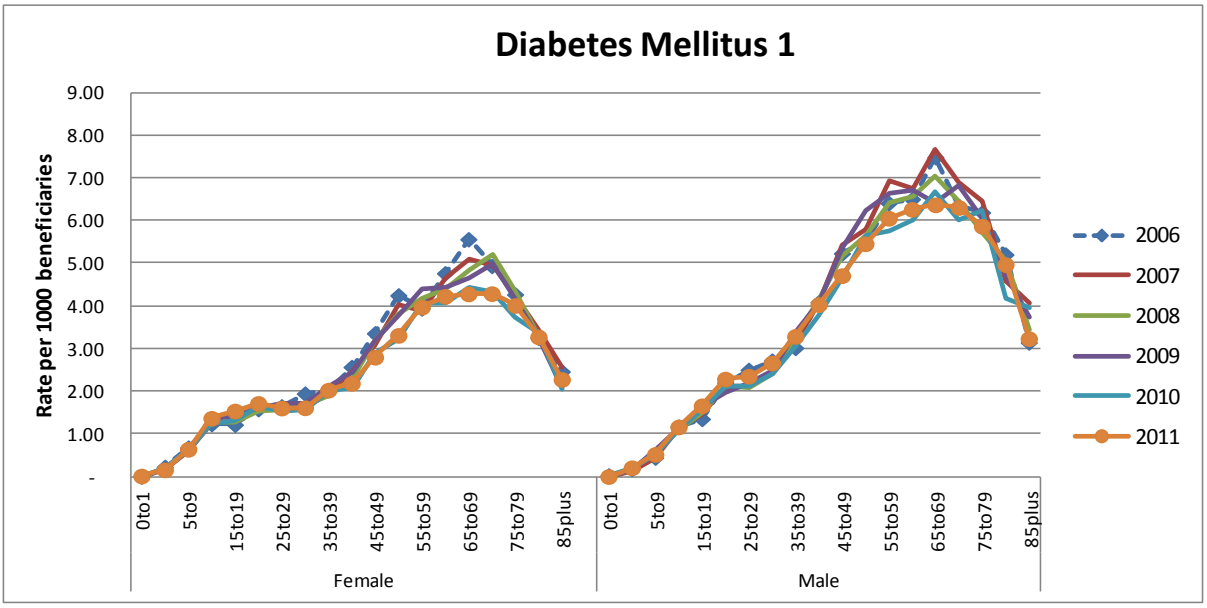
The overall prevalence of DM2 has increased from 12.0 per 1000 in 2006, to 22.1 per 1000 in 2011. This represents an increase of 84%. An increase close to 100% was observed in the female beneficiaries (9.5 to 18.9 per 1000) and male prevalence increased by 76% (14.6 to 25.7 per 1000)

Figure 16: Overall prevalence of Diabetes Mellitus by gender



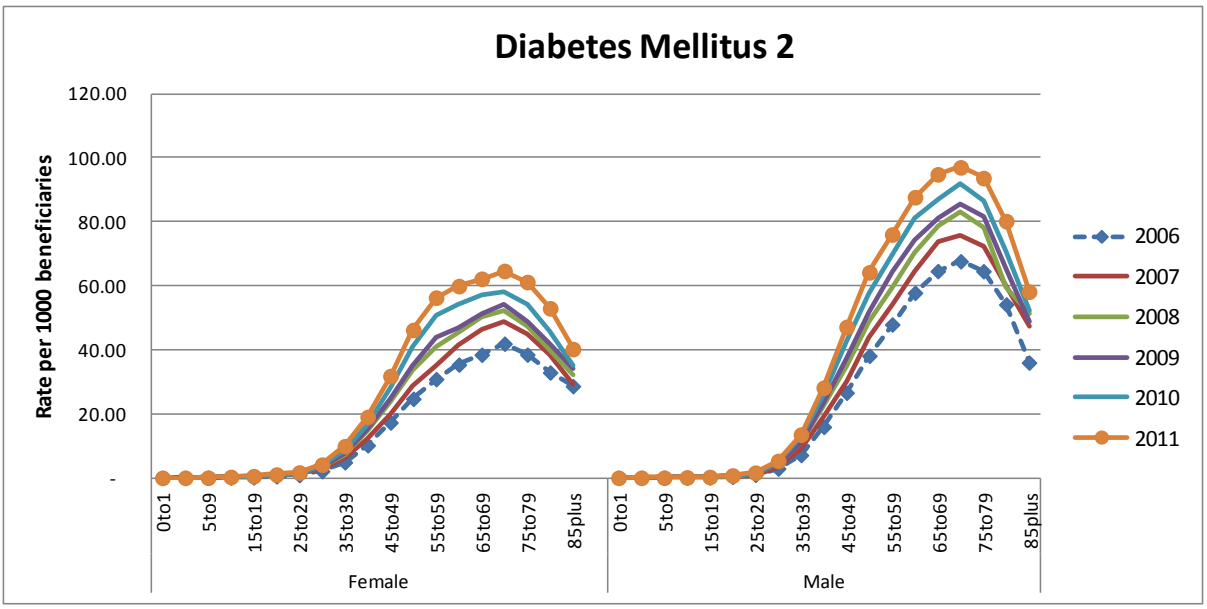
The prevalence of DM1 in children between the ages of 5 and 14 years was 1.0 per 1000 throughout the period under review. There was no difference in prevalence by gender in this age group. Prevalence remained unchanged between 2006 and 2011 at about 2.1 per 1000 and 4.2 per 1000 in the 15 to 39 years and 40 years and older age groups, respectively (Figure 17). The 2011 annual estimated cost for diagnosis and treatment of medical schemes beneficiaries with DM1 was R567, 228, 963.

Figure 17: Treated prevalence of Diabetes Mellitus 1 by Age



As expected, very few cases of DM2 were observed in child beneficiaries as shown in Figure 18. DM2 prevalence in the 15 to 39 years age group increased from 2.1 per 1000 in 2006, to 4.1 per 1000 in 2011. The age group 40 years and older experienced a 72% prevalence increase, 31.0 per 1000 in 2006 to 53.2 per 1000 in 2011. A higher proportion of male (63.5 per 1000) than female (44.3 per 1000) beneficiaries were treated for DM2 in the age group 40 years and older. The 2011 annual estimated cost for diagnosis and treatment of medical schemes beneficiaries with DM2 was R2, 120, 924, 382.

Figure 18: Treated prevalence of Diabetes Mellitus 2 by Age

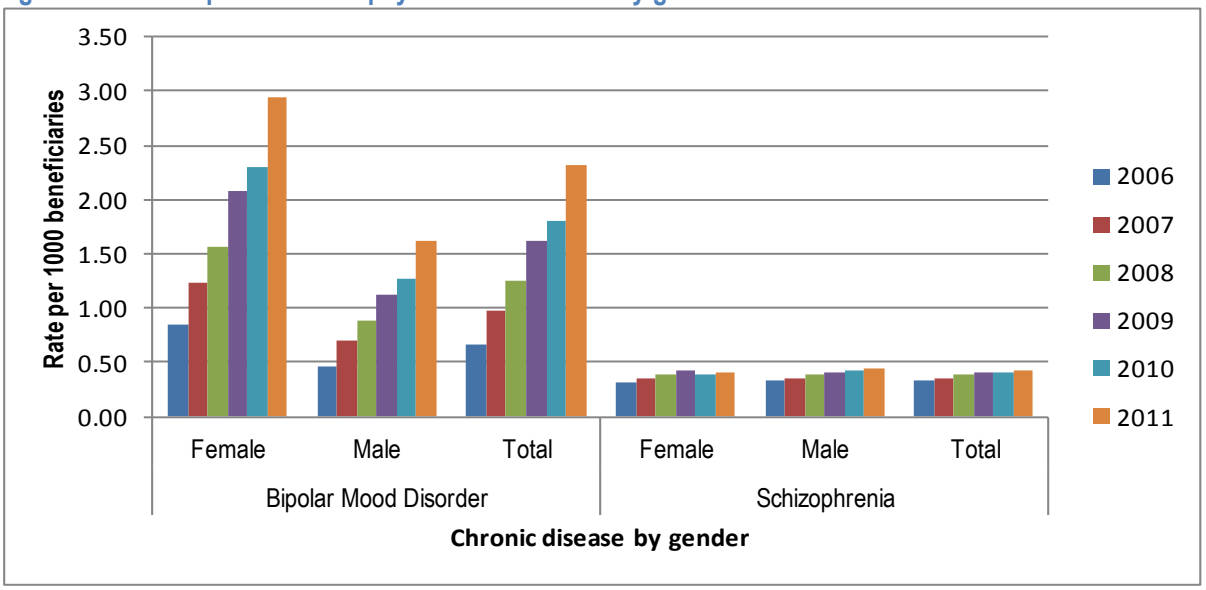


5.6 Psychiatric conditions

The overall prevalence of treated BMD increased by 250% between 2006 and 2011, from 0.7 to 2.3 per 1000 ben eficiaries. A similar rate of increase was observed in females and males. BMD was diagnosed and treated in 2.9 and 1.6 per 1000 in female and male beneficiaries in 2011.

The prevalence of SCZ has remained under 0.5 per 1000 between 2006 and 2011. Similar rates were observed in both males and females (Figure 19). The 2011 annual estimated cost for diagnosis and treatment of medical schemes beneficiaries with BMD and SCZ was R464, 351, 768.

Figure 19: Overall prevalence of psychiatric disorders by gender



Very few beneficiaries under the age of 14 years were treated for BMD (Figure 20). The prevalence of BMD in female beneficiaries in the 15 to 39 years age group increased from 1.0 per 1000 in 2006, to 3.6 per 1000 in 2011. For males, prevalence was 0.5 per 1000 in 2006 and 2.9 per 1000 in 2011. Similar trends were observed in the 40 years and older age group (1.2 to 4.0 per 1000 in females, and 0.7 to 2.3 per 1000 in males).

Figure 20: Treated prevalence of Bipolar Mood Disorder by Age

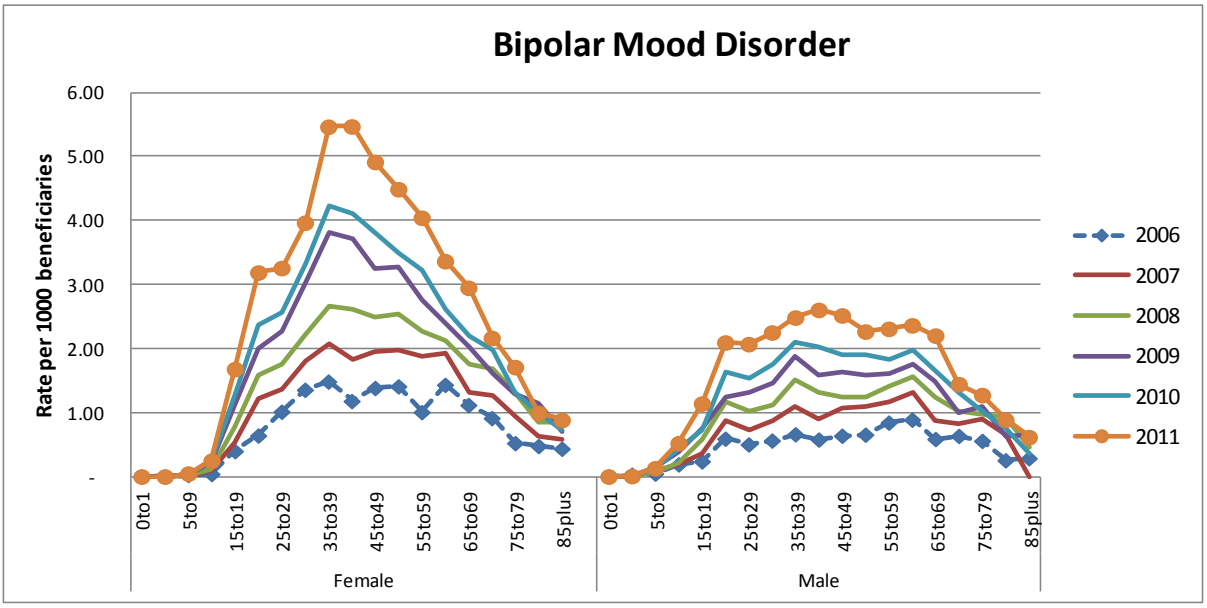
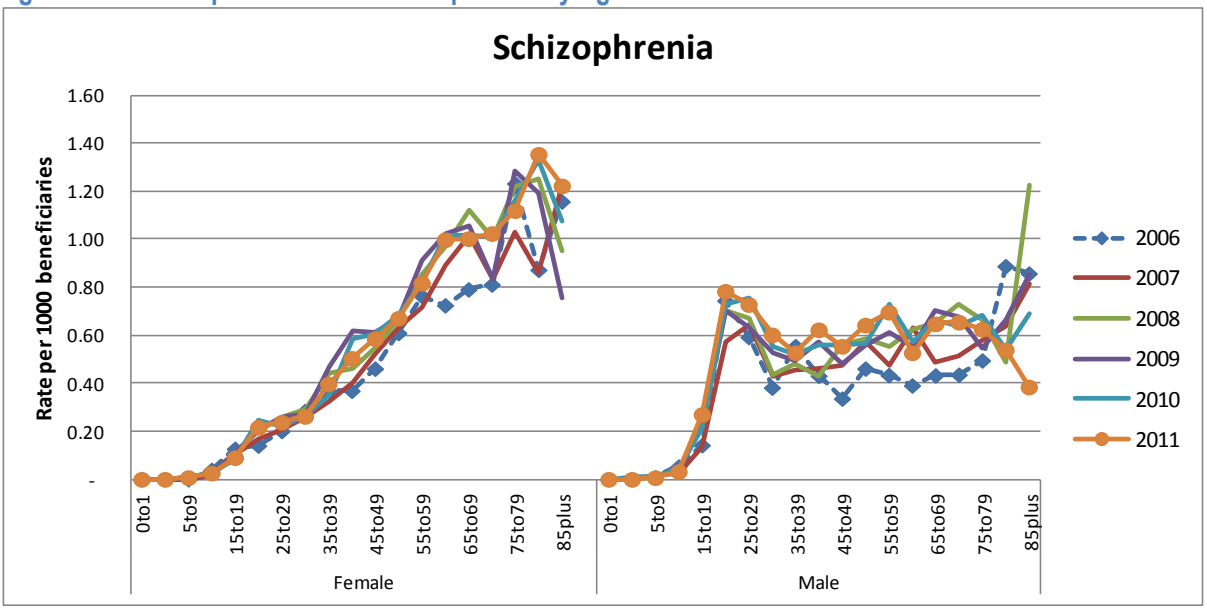


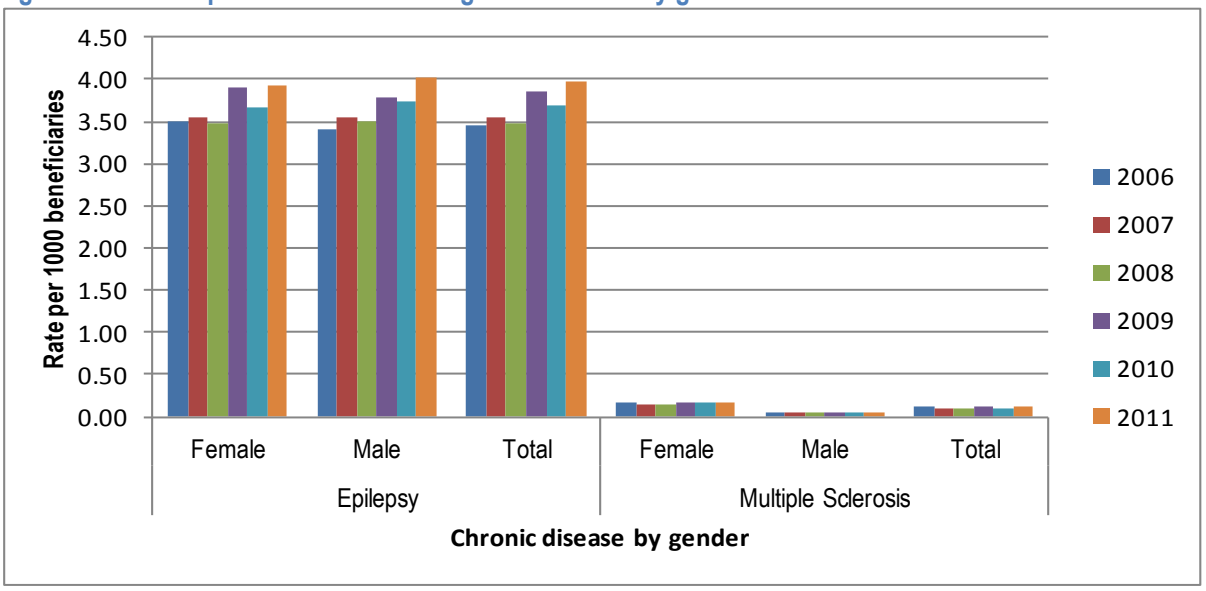
Figure 21: Treated prevalence of Schizophrenia by Age



5.7 Neurological disorders

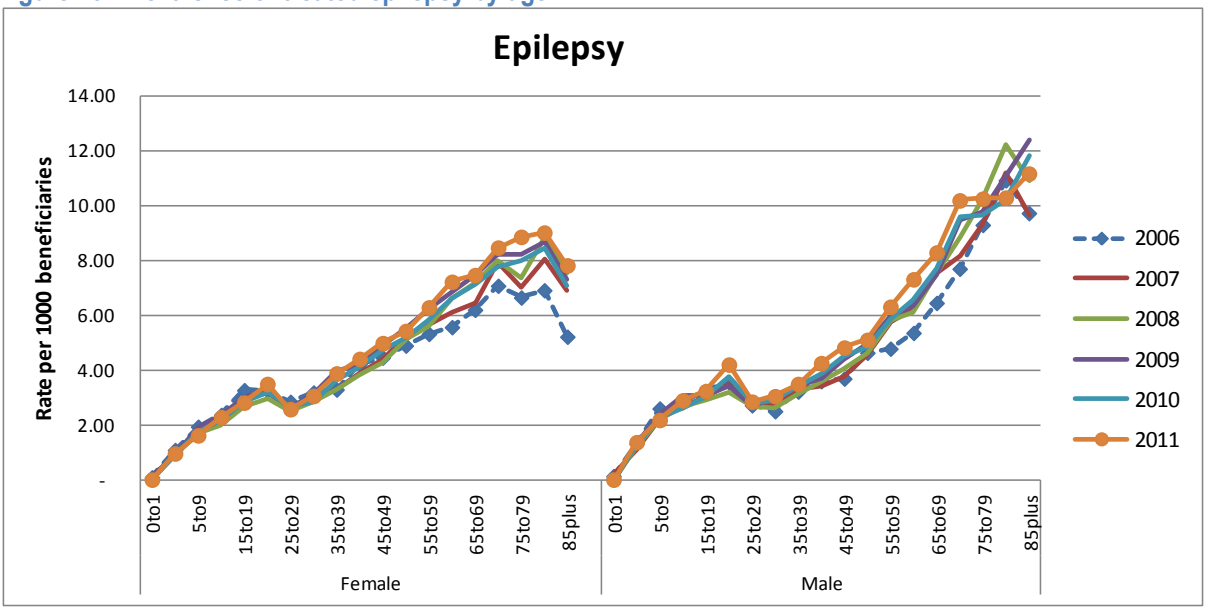
The overall prevalence of treated EPL increased by 15% from 3.5 per 1000 in 2006, to 4.0 per 1000 beneficiaries in 2011. Very few beneficiaries were treated for MSS (0.1 per 1000). The 2011 annual estimated cost for diagnosis and treatment of medical schemes beneficiaries with epilepsy and MSS was R603, 847, 257.

Figure 22: Overall prevalence of Neurological Disorders by gender



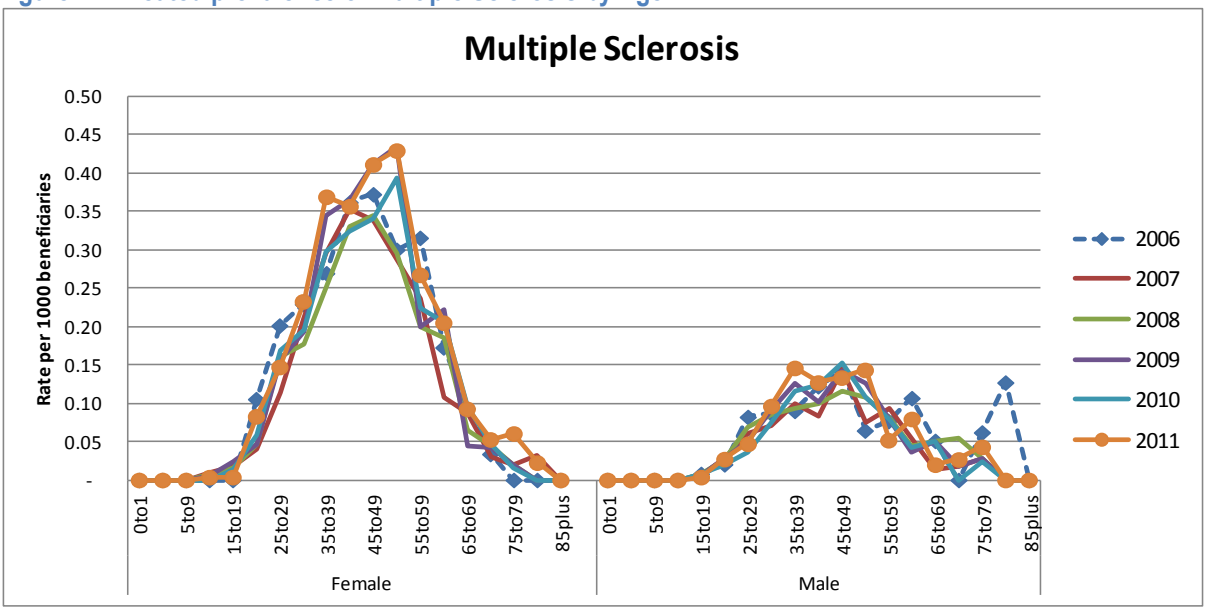
The prevalence of treated epilepsy was strongly correlated with age, increasing from 0.9 per 1000 in the 0 to 5 years age group, 2.3 per 1000 in the 5 to 14 years age group, 3.3 per 1000 in the 15 to 39 years age group, and to 6.1 per 1000 in the 40 years and older age group. The gender differences were not significant (Figure 23).

Figure 23: Prevalence of treated epilepsy by age



MSS was rarely seen in both the very young and older age groups, and mostly affected women, as shown Figure 24.

Figure 24: Treated prevalence of Multiple Sclerosis by Age



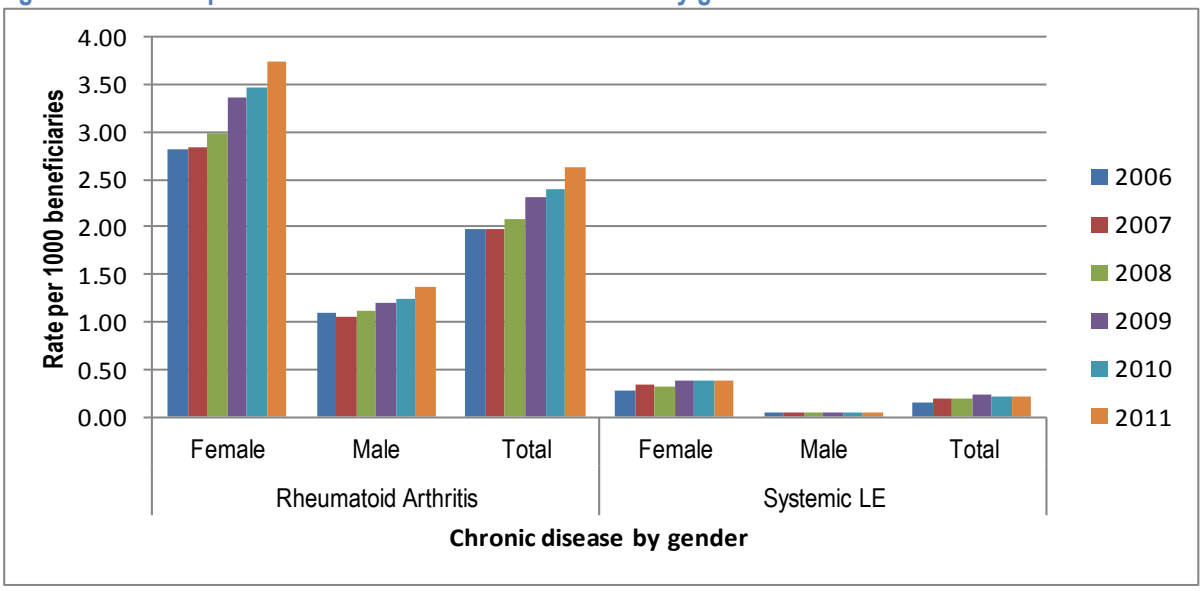
5.8 Auto-immune Conditions

The overall prevalence of treated RHA increased from 2.0 per 1000 in 2006, to 2.6 per 1000 in 2011. More female than male beneficiaries were treated for rheumatoid arthritis. Prevalence in females increased from 2.8 to 3.8 per 1000 compared to a change of 1.1 to 1.4 per 1000 in males between 2006 and 2011.

The overall prevalence of treated SLE increased from 0.16 to 0.22 per 1000 for all the years between 2006 and 2011. In 2011, seven times more women than men were diagnosed and treated for SLE.

The 2011 annual estimated cost for diagnosis and treatment of medical schemes beneficiaries with RHA and SLE was R264, 777, 872.

Figure 25: Overall prevalence of Auto-immune Conditions by gender



The prevalence of RHA females in the 40 years and older age group increased from 6.9 to 8.6 per 1000 between 2006 and 2011. The increase was slower in males, 2.8 to 3.3 per 1000 (Figure 26).

As shown in Figure 27, SLE prevalence in females was higher in the 40 years and older age group (0.7 per 1000) compared to the 15 to 39 years age group (0.3 per 1000).

Figure 26: Treated prevalence of Rheumatoid Arthritis by Age

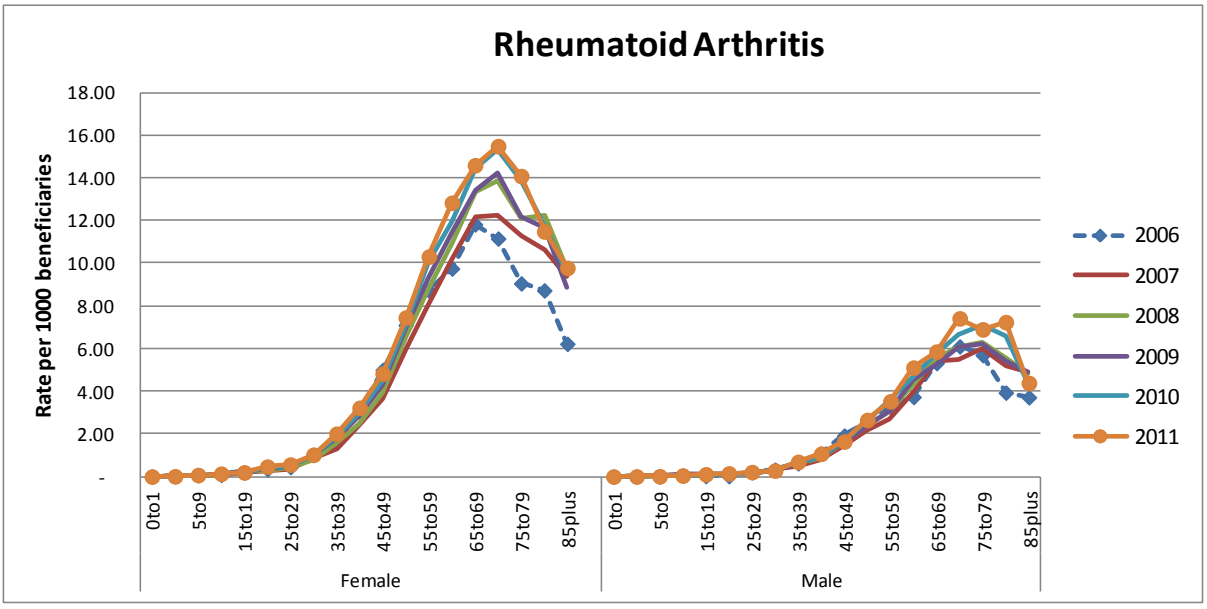
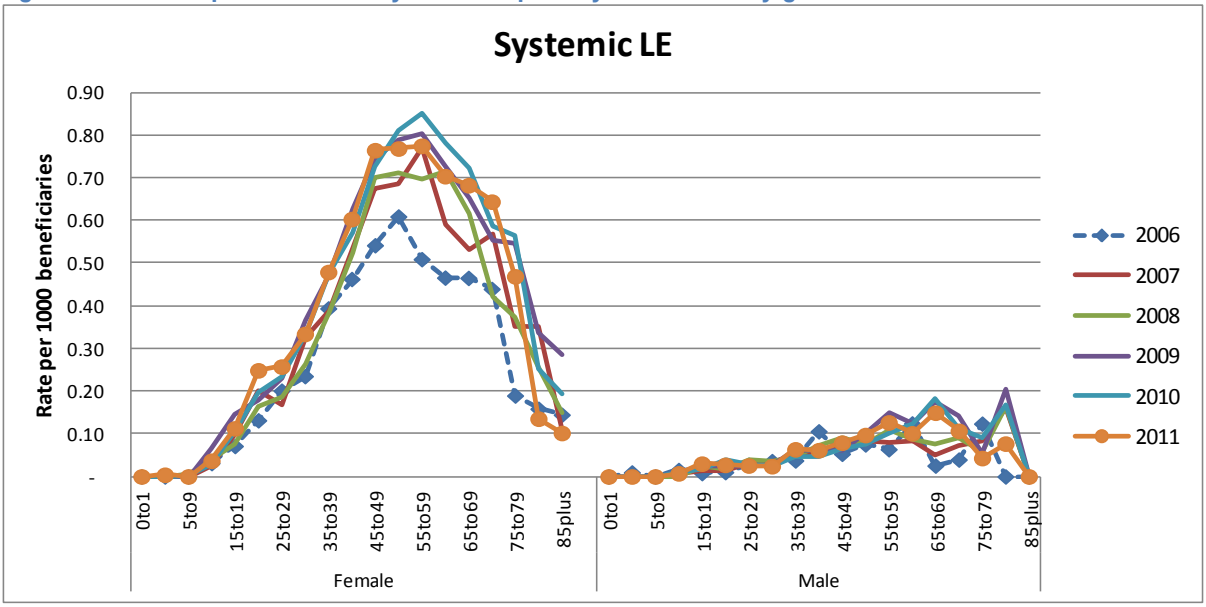


Figure 27: Treated prevalence of Systemic Lupus Erythematosus by gender



5.9 Addison's disease

The overall prevalence of ADS in medical aid schemes beneficiaries averaged 0.06 per 1000 between 2006 and 2011. The male-to-female prevalence ratio was 1:1.2 – 1.5 [39].The 2011 annual estimated cost for diagnosis and treatment of medical schemes beneficiaries with ADS was R1, 358, 808. ADS was atypically more common in the 40 years and older age groups in both male and female beneficiaries (Figure 29).

Figure 28: Overall prevalence of Addison's disease by gender

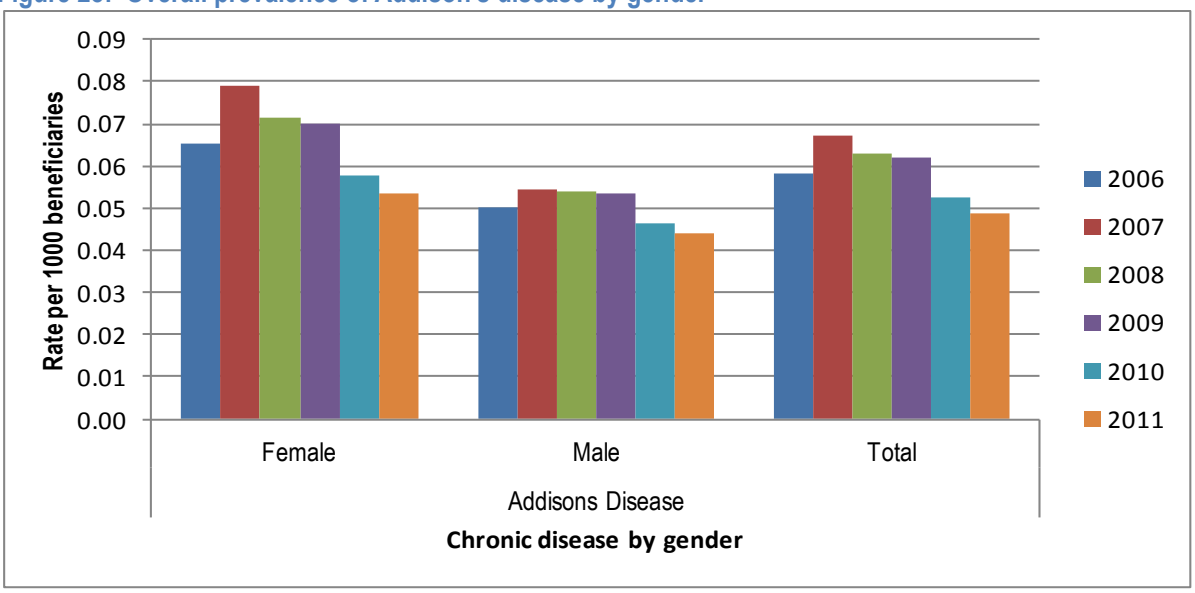
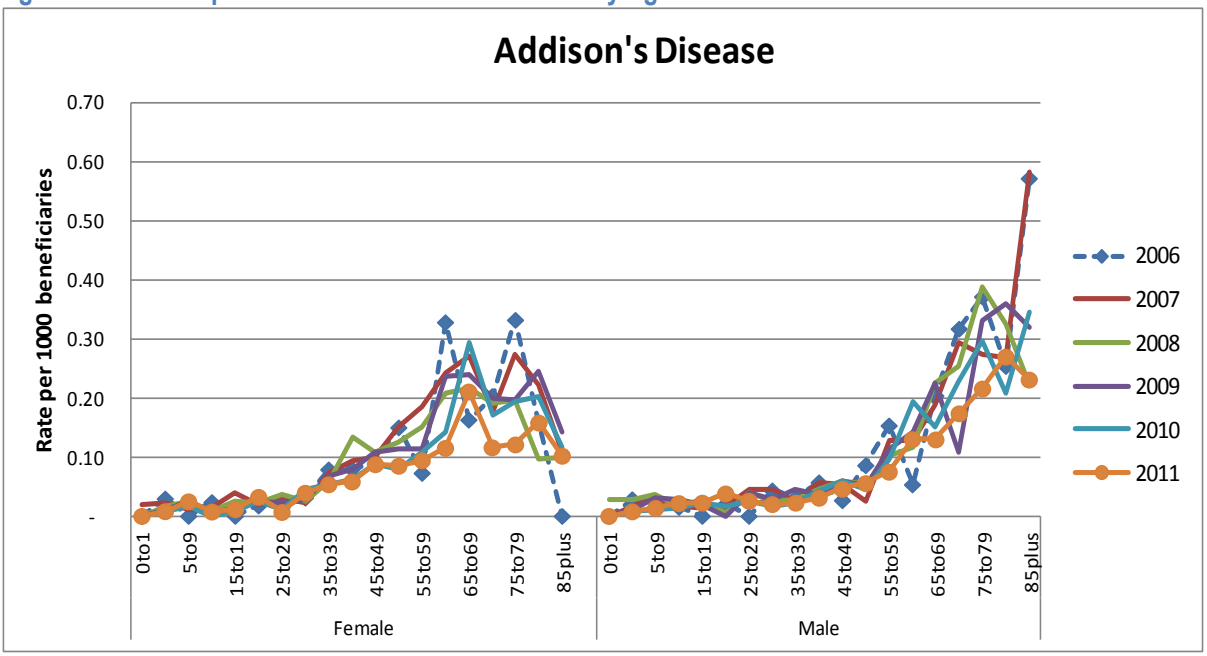


Figure 29: Treated prevalence of Addison's Disease by Age



5.10 Diabetes Insipidus

The overall prevalence of DBI in the medical aid schemes beneficiaries was 0.2 per 1000 in 2011 (Figure 30). There was no significant age or gender-related differences (Figure 31) in the prevalence of DBI. The 2011 annual estimated cost for diagnosis and treatment of medical schemes beneficiaries with DBI was R2, 077, 432.

Figure 30: Overall prevalence of Diabetes Insipidus by gender

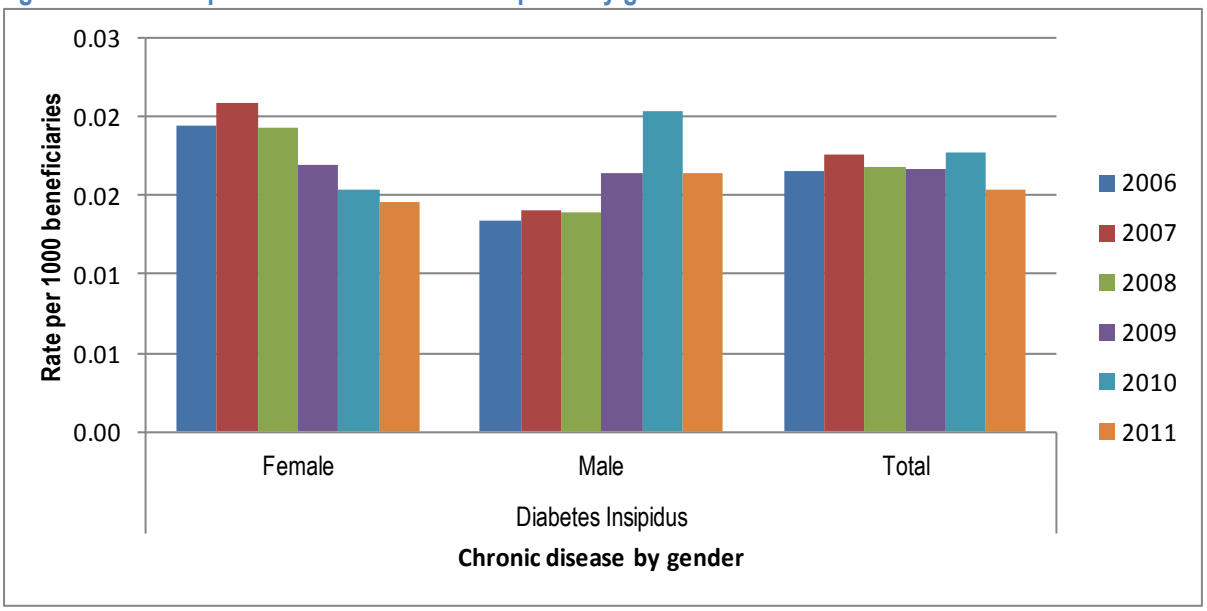
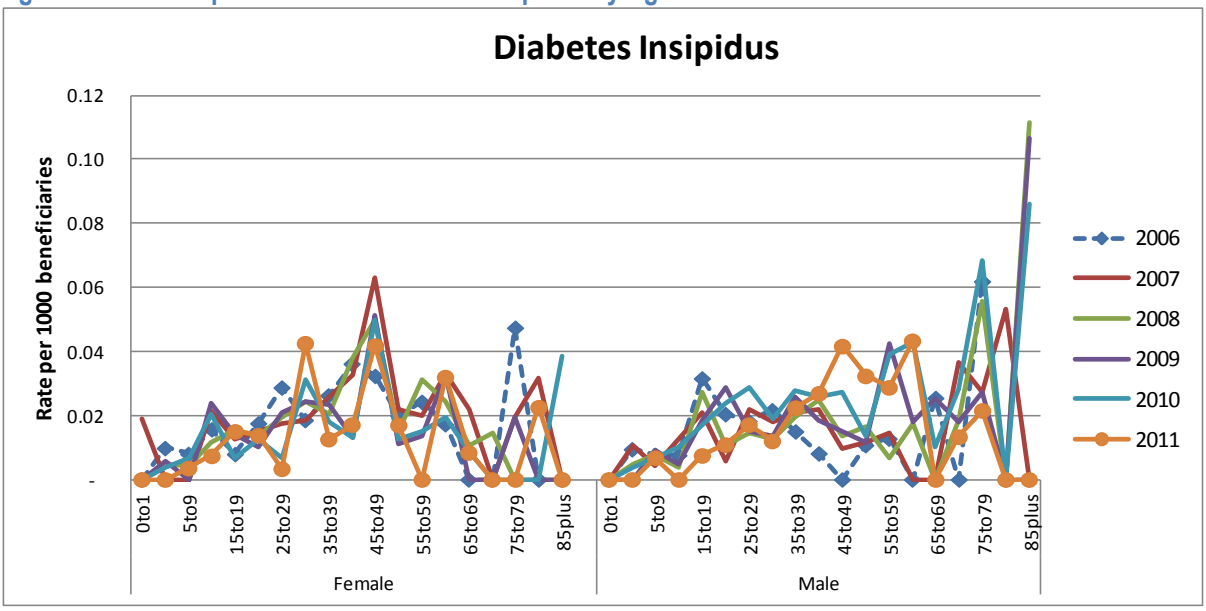


Figure 31: Treated prevalence of Diabetes Insipidus by Age



5.11 Glaucoma

The overall prevalence of GLC increased from 1.8 per 1000 in 2006, to 2.7 per 1000 in 2011. There was no significant gender related difference (Figure 32). The 2011 annual estimated cost for diagnosis and treatment of medical schemes beneficiaries with GLC was R143, 028, 968. GLC in medical schemes beneficiaries was more common in the 40 years and older age group. Prevalence in beneficiaries over the age of 40 years increased from 5.0 to 7.0 treated cases per 1000.

Figure 32: Overall prevalence of Glaucoma by gender

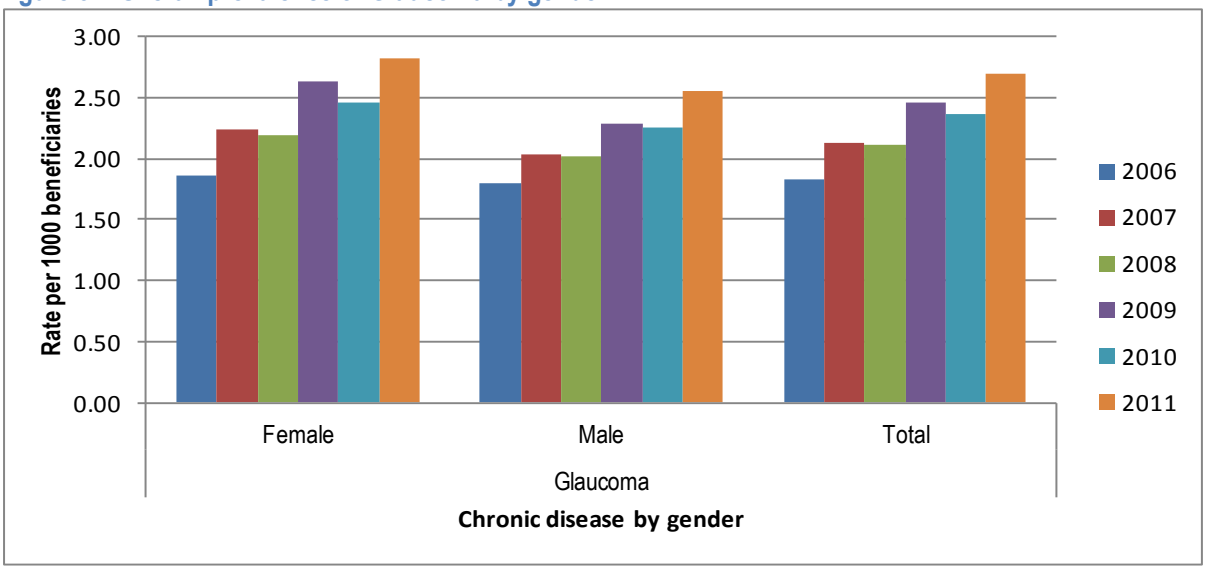
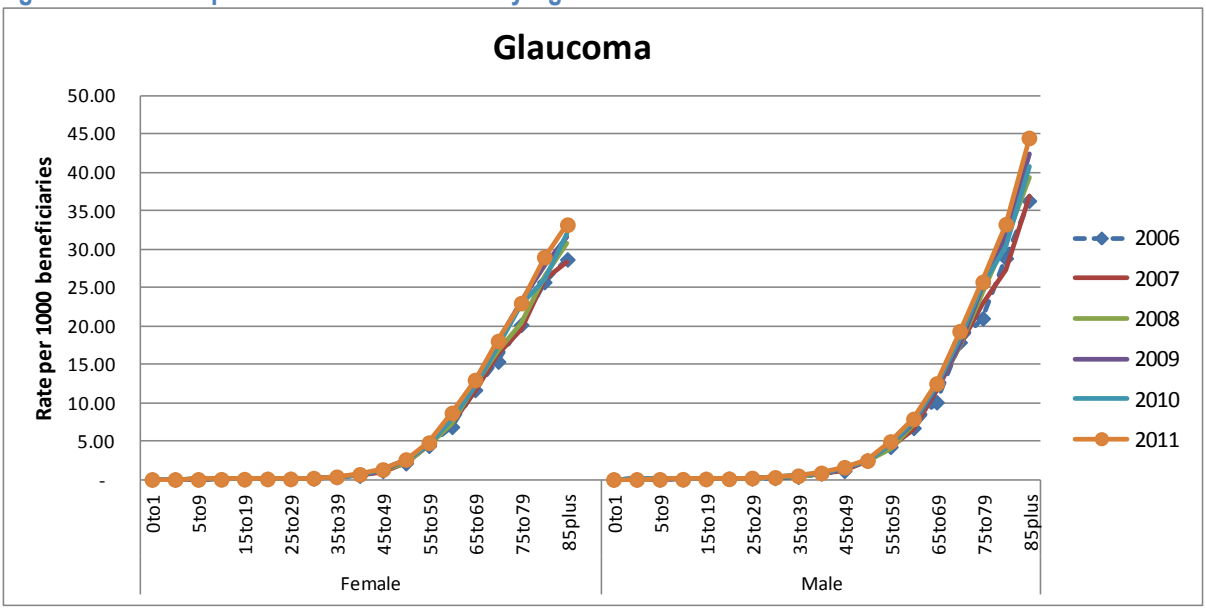


Figure 33: Treated prevalence of Glaucoma by Age



5.12 Haemophilia

The number of South African medical aid schemes beneficiaries treated for HAE increased from 39 in June 2006 to 98 cases in June 2011. The overall prevalence in male beneficiaries was 2.8 per 100, 000 in 2011 (Figure 34 & Figure 35). Virtually all these cases were male. The 2011 annual estimated cost for diagnosis and treatment of medical schemes beneficiaries with HAE was R25, 072, 040.

Figure 34: Overall prevalence of Haemophilia by gender

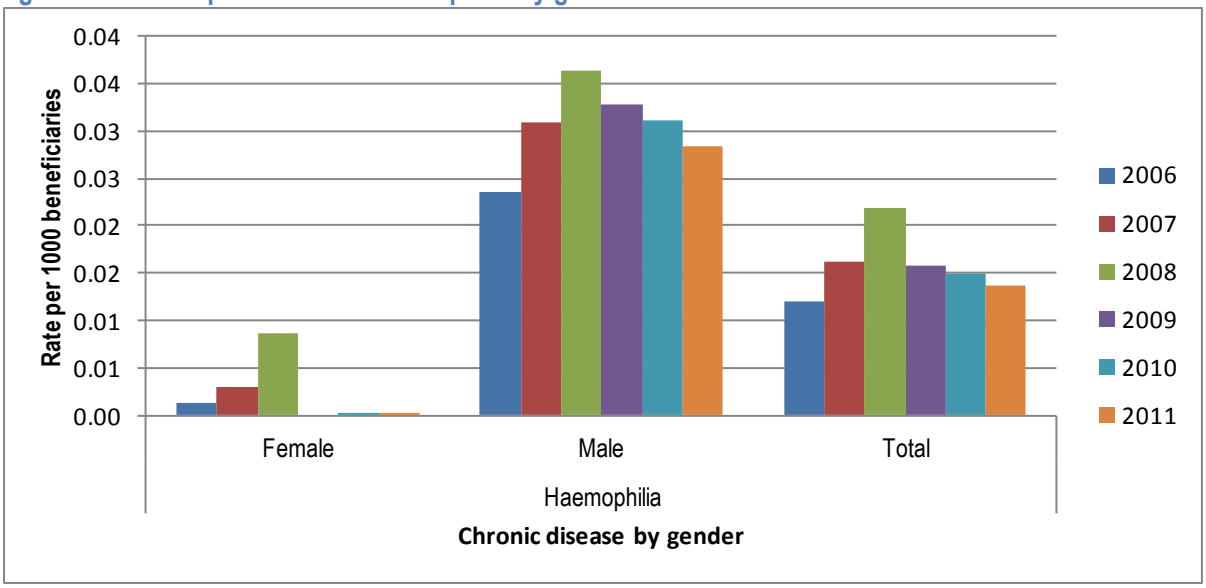
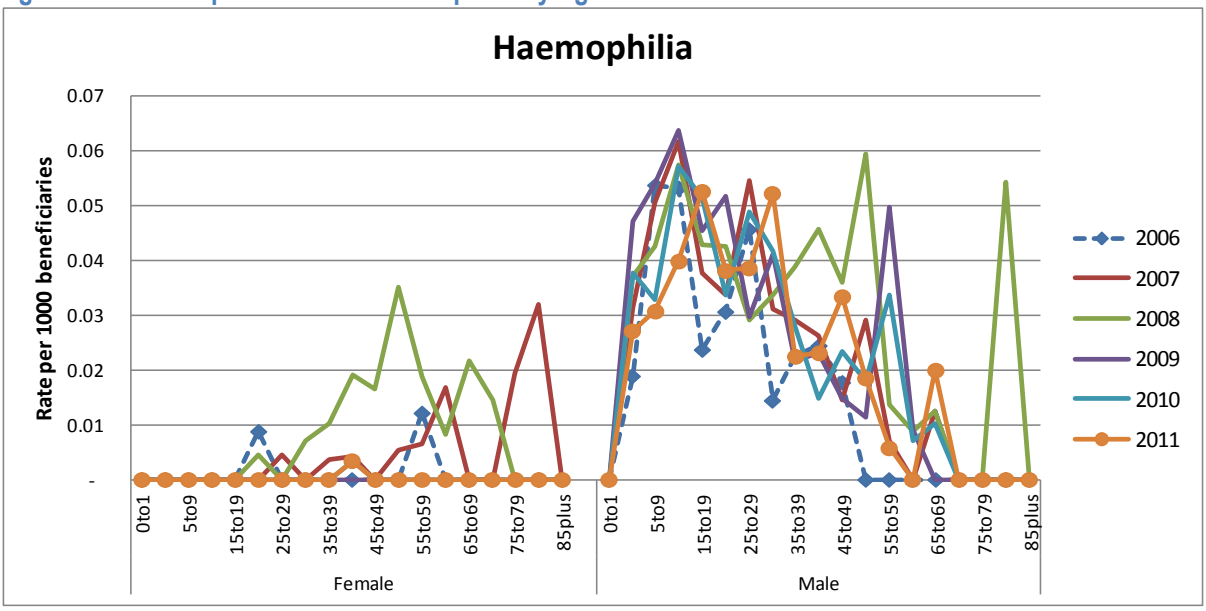


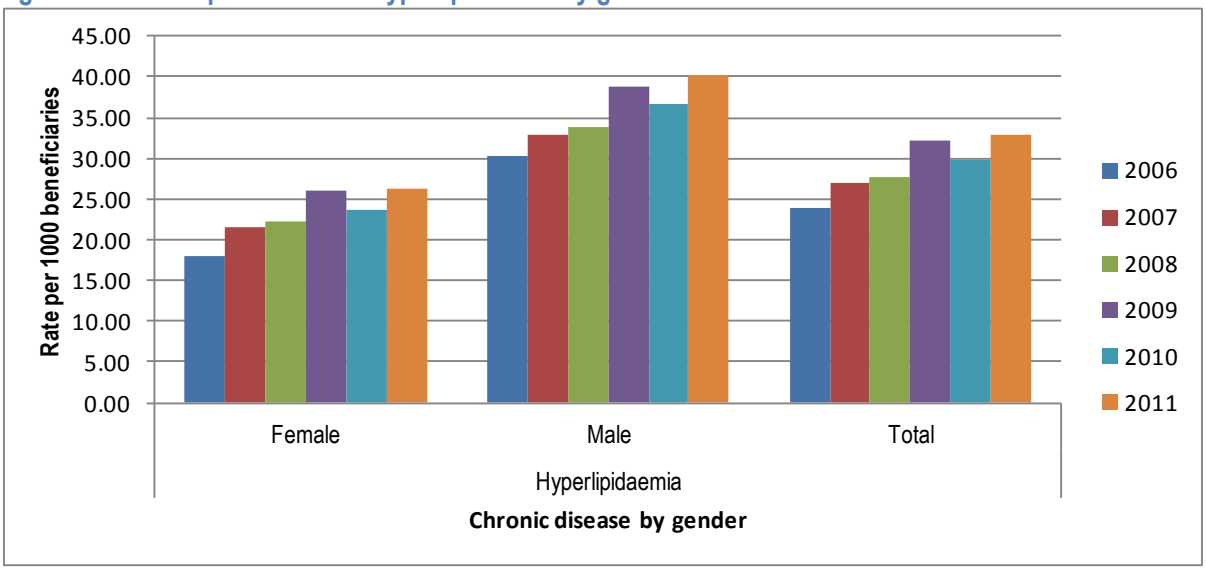
Figure 35: Treated prevalence of Haemophilia by Age



5.13 Hyperlipidaemia

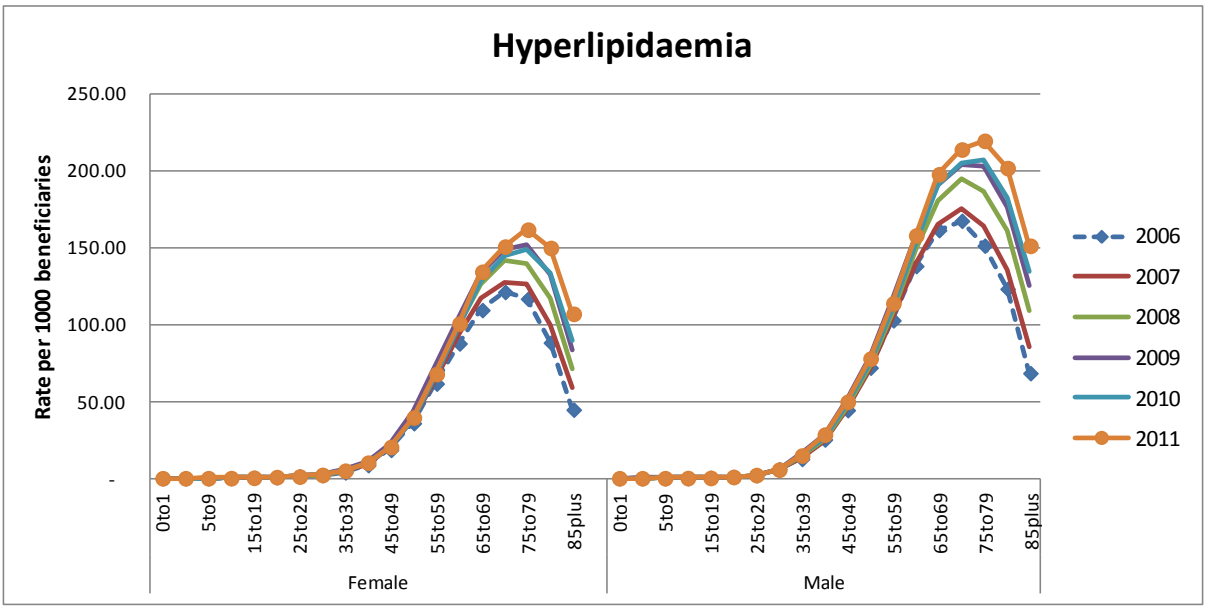
A steady increase in the overall prevalence of treated HYL was noted between 2006 and 2011; it increased from 23.9 per 1 000 in 2006 to 32.9 per 1 000 in 2011. More male than female beneficiaries were diagnosed and treated for the condition. In male beneficiaries, prevalence increased from 30.4 to 40.2 per 1 000 between 2006 and 2011; an increase from 18.0 to 26.6 per 1 000 was seen in female beneficiaries during the same period (Figure 36). The 2011 annual estimated cost for the diagnosis and treatment of medical scheme beneficiaries with HYL was R1 605 854 403.

Figure 36: Overall prevalence of Hyperlipidaemia by gender



Prevalence for male and female beneficiaries in the 15 to 39 years age group increased from 4.7 and 1.7 cases per 1000 in 2006, to 5.0 and 2.0 cases per 1000 in 2011, respectively. The fastest increase was observed in the 40 years and older age group, increasing from 80.6 and 47.7 per 1000 in 2006, to 101.6 and 65.0 per 1000 in 2011 for males and females respectively (Figure 37).

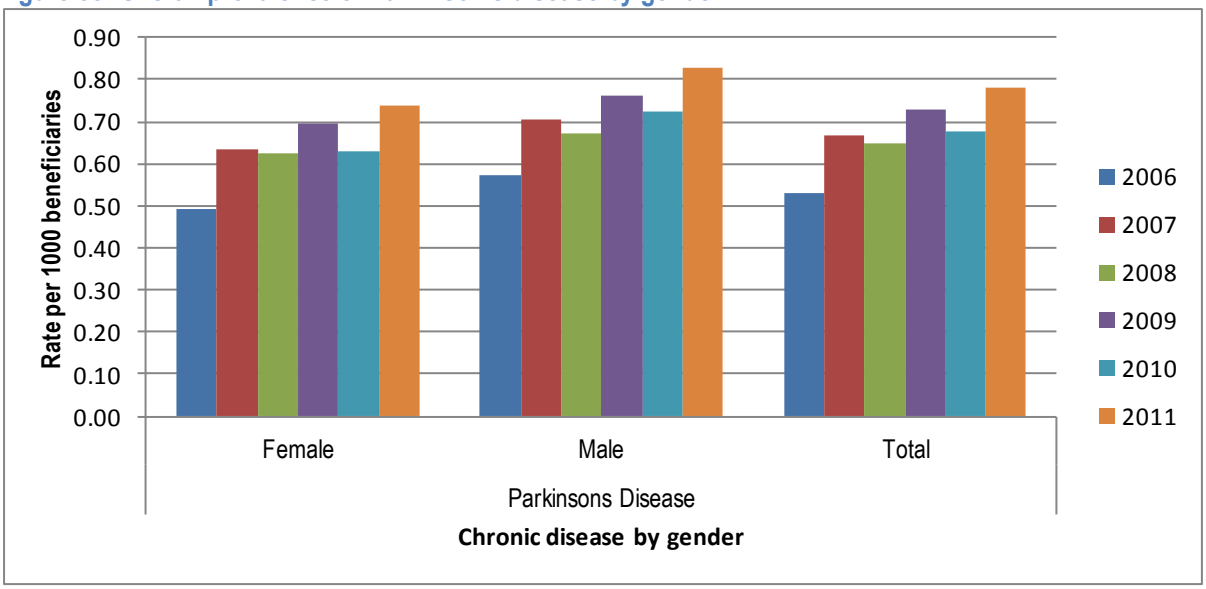
Figure 37: Treated prevalence of Hyperlipidaemia by Age



5.14 Parkinson's disease

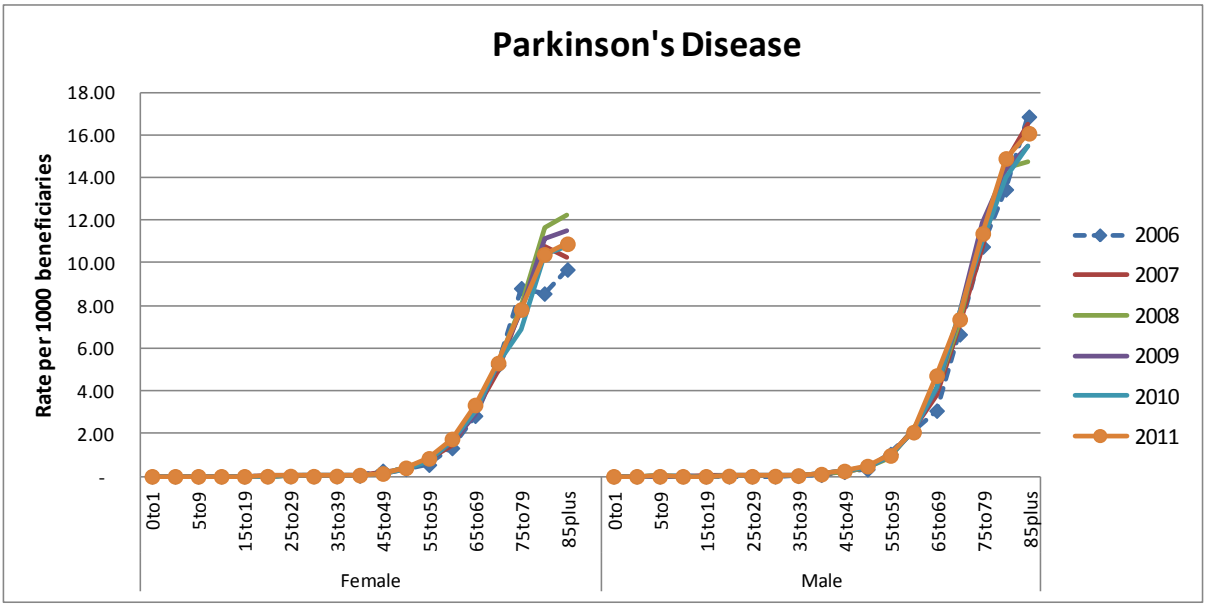
The overall prevalence of PAR increased from 0.5 to 0.8 per 1000 between 2006 and 2011 (Figure 38).

Figure 38: Overall prevalence of Parkinson's disease by gender



Prevalence of PAR among beneficiaries in the 60 to 79 years age group increased from 3.9 to 4.4 per 1000 between 2006 and 2011. Prevalence was higher among beneficiaries in the 80 years and older age group, increasing from 11.0 per 1000 in 2006, to 12.2 per 1000 in 2011. Very small gender-related changes in prevalence were observed (Figure 39).

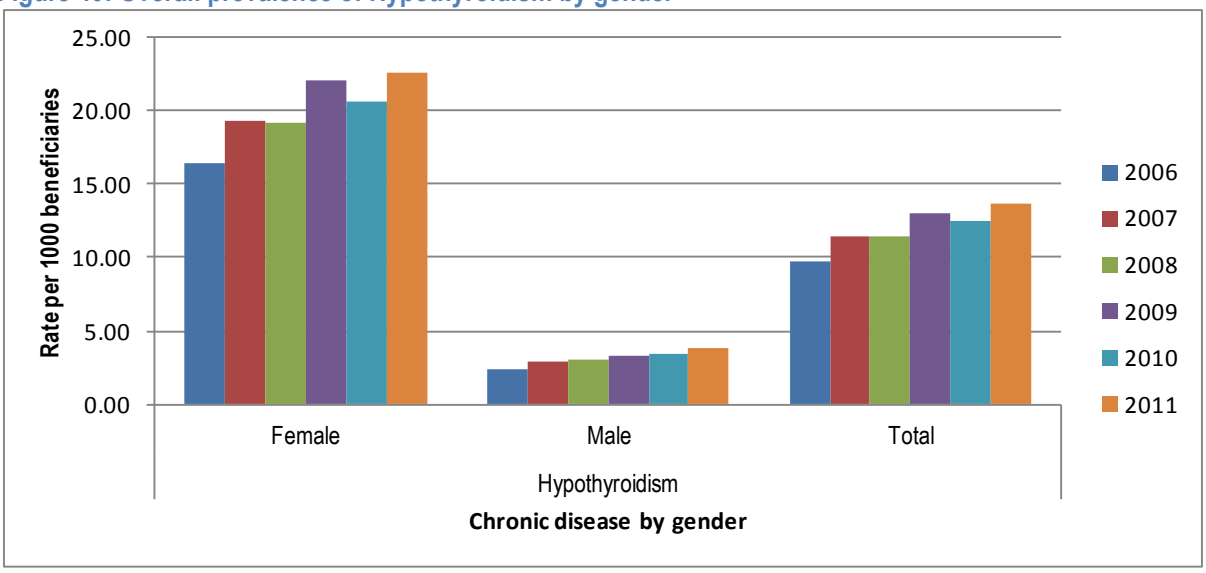
Figure 39: Treated prevalence of Parkinson's disease by Age



5.15 Hypothyroidism

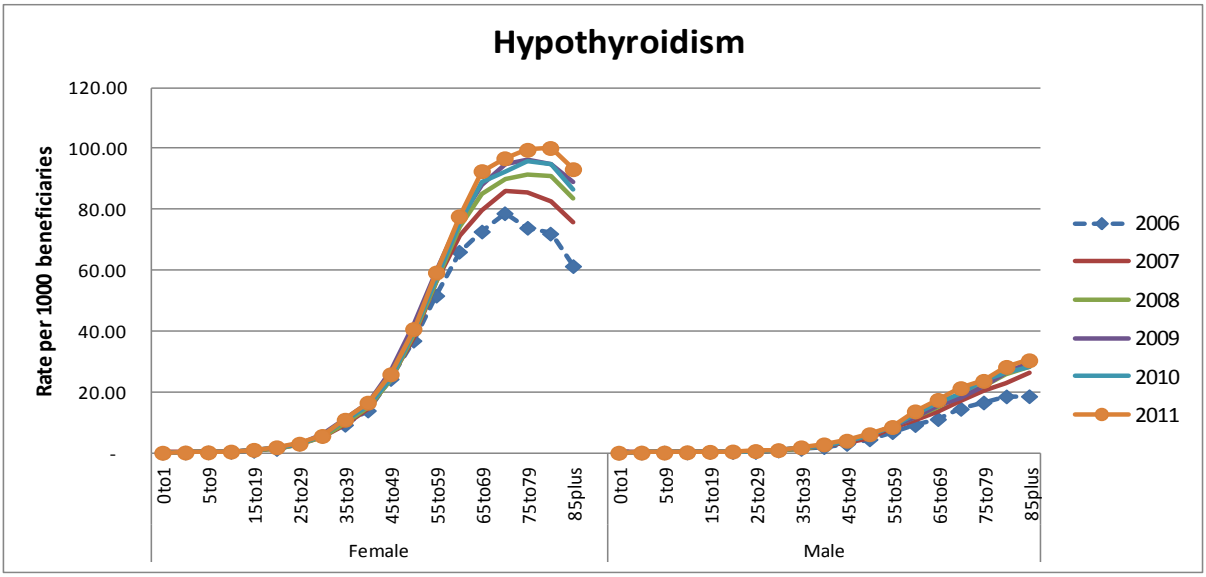
Over six times more female than male beneficiaries were treated and diagnosed for TDH between 2006 and 2011. The overall prevalence increased from 9.7 to 13.7 per 1000 beneficiaries. Prevalence increased by 20% in female beneficiaries, from 16.5 per 1000 in 2006, to 22.6 per 1000 in 2011. Prevalence for males averaged 3.1 per 1000 between 2006 and 2011 (Figure 40).

Figure 40: Overall prevalence of Hypothyroidism by gender



Prevalence of the condition increased from 40.1 per 1000 in 2006 to 52.7 per 1000 in 2011 among female beneficiaries in the 40 years and older age group. Prevalence for males in the same age group increased from 3.0 to 9.2 per 1000 (Figure 41).

Figure 41: Treated prevalence of Hypothyroidism by Age



6 Discussion and conclusion

There has been a sustained upward trend in diagnosis and treatment of many chronic conditions on the Chronic Disease List. These increases may be due to improved data management systems of medical schemes and administrators, the worsening age and disease profile of beneficiaries, and the increased beneficiary awareness of entitlements. Unfortunately, it is not possible to isolate the different components that contribute to the observed trend. Behavioural change of members and/providers can also explain the observed trends.

The increase observed in the prevalence of treated chronic respiratory conditions was mostly attributable to asthma (AST). AST increased by 22% between 2006 and 2011. The biggest increase in the prevalence of AST between 2006 and 2011 was in the older age groups. The observed increases may be attributed to the worsening disease profile, the improved ability of medical schemes to correctly identify beneficiaries with chronic diseases or Chronic Obstructive Pulmonary Disease (COPD) in the older age bands is misclassified as AST. The prevalence of treated AST observed in medical scheme child and adult beneficiaries is extremely lower than the AST prevalence reported in other studies. The gender variation in the prevalence of COPD in medical schemes was consistent with the national figures for current smoking reported in the SADHS, where 42% of men and 11% of women were smokers [5]. The unexpected drop of COPD in 2010 may be attributable to data quality issues. COPD in the younger age groups is likely to be a misclassification or a data quality issue. Difficulty in diagnosing bronchiectasis (BCE) may be responsible for the low reported rates. Higher prevalence of BCE in older females is consistent with observations in other studies [6].

Medical scheme beneficiaries were diagnosed and treated for hypertension (HYP) increased by 37% between 2006 and 2011, making it one of the fastest increasing cardiovascular conditions and most prevalent chronic disease. The odd marked drop in the prevalence of HYP in 2010 is likely to be as a result poor application of the Entry and Verification criteria for the identification of chronic diseases. Just about R 3 billion was paid by medical schemes to diagnose and treat HYP. The increase observed in the prevalence of coronary artery disease (IHD) is consistent with results observed in other studies. Over R 1 billion was paid out by medical schemes to manage IHD. Cardiomyopathy (CMY) was diagnosed in fewer than five per 1000 beneficiaries but the cost to the industry was about R 1 billion. Collectively, medical schemes paid about R 5 billion rand to manage cardiovascular diseases.

Chronic renal disease (CRF) increased by about 40% in beneficiaries over the age of 40 years. Overall, CRF was the fourth fastest increasing chronic disease on the CDL, increasing by 48%. The estimated cost of treating chronic renal disease was about R0.7 billion in 2011. CRF is one of the most expensive chronic conditions to treat.

Very few medical scheme beneficiaries were treated for gastrointestinal conditions. The rarity of Crohn's disease (CSD) and ulcerative colitis (IBD), data quality and the difficulty in accurately identifying cases is the possible reason for lack of a clear trend between 2006 and 2011.

The gender differences in the prevalence of Diabetes Mellitus Type 1 (DM1) are consistent with the 1998 SADHS survey, which reported higher rates of diabetes in females. The prevalence of DM1 has remained unchanged at 2.4 per 1000 beneficiaries between 2006 and 2011. The reasons for this observation are unclear. It has been suggested that some DM1 cases might be misclassified as Diabetes Mellitus Type 2 (DM2). The 85% increase in the prevalence of treated DM2 indicates the importance of chronic diseases of lifestyle as a one of the factors that is driving costs in the medical schemes industry.

The prevalence of treated Bipolar Mood Disorder (BMD) increased by more than 200% between 2006 and 2011, from 0.7 to 2.3 per 1000. BMD was more common in female than male beneficiaries. There are concerns in the private healthcare industry that some mental health conditions that are not PMBs are classified as bipolar mood disorder in order to ensure reimbursement by medical schemes. Schizophrenia (SCZ) was very rare and mostly affected older and female beneficiaries.

Epilepsy (EPL) was the most common condition in the neurological group of conditions accounting 97% of the prevalence in the group. About 24% of all neurological conditions treatment and diagnosis costs were attributable to MSS.

The autoimmune group of conditions was made up of 91% of rheumatoid arthritis (RHA) and 9% of Systemic Lupus Erythematosus (SLE) cases. Both RHA and SLE affected more female than male beneficiaries.

Hyperlipidaemia (HYL) was one o the fastest increasing chronic condition in the medical scheme beneficiaries. The increase is likely to be partly due to lifestyle changes in the population. More than 1.6 billion was paid out to healthcare providers by medical schemes to treat HYL.

The top ten chronic conditions that showed the fasted increase were Bipolar Mood Disorder, Diabetes Mellitus Type 2, Chronic Renal Disease, Parkinson's Disease, Glaucoma, Hypothyroidism, Systemic LE, Hyperlipidaemia, and Hypertension.

The implications of more medical schemes beneficiaries with chronic diseases is an increase in GP and specialists visits, an increase in the use of medicines, and a possible increase in hospital events. Without aggressive intervention into the root causes of these chronic diseases and their costs, these trends are expected to continue to worsen.

7 References

1. Alwan, A., et al., *Monitoring and surveillance of chronic non-communicable diseases: progress and capacity in high-burden countries.* Lancet, 2010. **376**(9755): p. 1861-8.
2. *Global status report on noncommunicable diseases 2010. Geneva : World Health Organization*. 2011.
3. Bradshaw, D., et al., *Initial burden of disease estimates for South Africa, 2000.* S Afr Med J, 2003. **93**(9): p. 682-8.
4. *General Household Survey, 2010*, S.S. Africa, Editor. 2010, Statistics South Africa: Pretoria, South Africa.
5. Steyn, K., J. Fourie, and N. Temple, *Chronic Diseases of Lifestyle in South Africa: 1995 - 2005. Technical Report.* 2006, Cape Town: Cape Town: South African Medical Research Council.
6. O'Donnell, A.E., *Bronchiectasis.* Chest, 2008. **134**(4): p. 815-23.
7. Ntusi, N.B. and B.M. Mayosi, *Epidemiology of heart failure in sub-Saharan Africa.* Expert Rev Cardiovasc Ther, 2009. **7**(2): p. 169-80.
8. Wilkinson, P.R., et al., *A long-term follow-up of stroke patients.* Stroke, 1997. **28**(3): p. 507-12.
9. Mayosi, B.M., *Contemporary trends in the epidemiology and management of cardiomyopathy and pericarditis in sub-Saharan Africa.* Heart, 2007. **93**(10): p. 1176-83.
10. Sliwa, K., et al., *Spectrum of heart disease and risk factors in a black urban population in South Africa (the Heart of Soweto Study): a cohort study.* Lancet, 2008. **371**(9616): p. 915-22.
11. Steyn, K., et al., *Hypertension in South African adults: results from the Demographic and Health Survey, 1998.* J Hypertens, 2001. **19**(10): p. 1717-25.
12. Hasumi, T. and K.H. Jacobsen, *Hypertension in South African adults: results of a nationwide survey.* J Hypertens, 2012. **30**(11): p. 2098-104.
13. Naicker, S., *Burden of end-stage renal disease in sub-Saharan Africa.* Clin Nephrol. **74 Suppl 1**: p. S13-6.
14. *United States Renal Data System, USRDS 2010 Annual Data Report: Atlas of Chronic Kidney Disease and End-Stage Renal Disease in the United States,National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD*. 2010 [cited 2013 13 April]; Available from: http://www.uptodate.com/contents/epidemiology-of-chronic-kidney-disease.
15. Cosnes, J., et al., *Epidemiology and natural history of inflammatory bowel diseases.* Gastroenterology. **140**(6): p. 1785-94.
16. Wright, J.P., et al., *The epidemiology of inflammatory bowel disease in Cape Town 1980-1984.* S Afr Med J, 1986. **70**(1): p. 10-5.
17. Butler, N., *National guidelines at a glance: type 2 diabetes mellitus.* Prof Nurs Today, 2011. **15**(6): p. 41 - 45.
18. Wild, S., et al., *Global prevalence of diabetes: estimates for the year 2000 and projections for 2030.* Diabetes Care, 2004. **27**(5): p. 1047-53.
19. Stein, D.J., et al., *Lifetime prevalence of psychiatric disorders in South Africa.* Br J Psychiatry, 2008. **192**(2): p. 112-7.
20. Hirtz, D., et al., *How common are the "common" neurologic disorders?* Neurology, 2007. **68**(5): p. 326-37.
21. Modi, G., et al., *Multiple sclerosis in South Africa.* S Afr Med J, 2006. **98**(5): p. 391 - 393.

22. Rosati, G., *The prevalence of multiple sclerosis in the world: an update.* Neurol Sci, 2001. **22**(2): p. 117-39.

23. Seckl, J. and D. Dunger, *Postoperative diabetes insipidus.* Bmj, 1989. **298**(6665): p. 2-3.

24. Quigley, H.A. and A.T. Broman, *The number of people with glaucoma worldwide in 2010 and 2020.* Br J Ophthalmol, 2006. **90**(3): p. 262-7.

25. Grehn, F. and R. Stamper, *Glaucoma (Essentials in Ophthalmology)*. 2008: Springer.

26. Cook, C., *Glaucoma in Africa: size of the problem and possible solutions.* J Glaucoma, 2009. **18**(2): p. 124-8.

27. Labuschagne, M., *Glaucoma: what should the general practitioner know?* SA Family Medicine Practice, 2010. **52**(6): p. 493-497.

28. Stonebraker, J.S., et al., *A study of variations in the reported haemophilia A prevalence around the world.* Haemophilia, 2010. **16**(1): p. 20-32.

29. Reid, E. and A. Segaloff, *Distribution of growth hormone among cell fractions isolated from pituitary gland.* Proc Soc Exp Biol Med, 1958. **97**(1): p. 187-8.

30. de Lau, L.M. and M.M. Breteler, *Epidemiology of Parkinson's disease.* Lancet Neurol, 2006. **5**(6): p. 525-35.

31. Nussbaum, R.L. and C.E. Ellis, *Alzheimer's disease and Parkinson's disease.* N Engl J Med, 2003. **348**(14): p. 1356-64.

32. Carr, J., B. Kies, and J. Fine, *Guideline for the treatment of Parkinson's disease.* S Afr Med J, 2009. **99**(10): p. 755-6, 758.

33. Okubadejo, N.U., et al., *Parkinson's disease in Africa: A systematic review of epidemiologic and genetic studies.* Mov Disord, 2006. **21**(12): p. 2150-6.

34. Vanderpump, M.P.J., *The epidemiology of thyroid diseases. In: Braverman LE, Utiger RD, eds. Werner and Ingbar's The Thyroid: A Fundamental and Clinical Text.* 9 ed. 2005, Philadelphia: JB Lippincott-Raven. 398-406.

35. *Screening for congenital hypothyroidism in South Africa. Report on a national workshop (1992).* S Afr Med J, 1994. **84**(2): p. 106-8.

36. *Gudelines for the Idenitification of Beneficiaries with Risk Factors in Accordance with the Entry and Verification Criteria: Version 6.1*. 2013 [cited 2013 25 February]; 6.1:[Available from: www.medicalschemes.com/Publications.aspx.

37. *Analysis Of REF Shadow Returns 2011*. 2011 [cited 2011 13 March 2013]; Available from: www.medicalschemes.com/Publications.aspx.

38. *Scheme Risk Measurement Weighting and Count Tables For 2012*. 2012 [cited 2013 13 March 2013]; Available from: www.medicalschemes.com/Publications.aspx.

39. Bergthorsdottir, R., et al., *Premature mortality in patients with Addison's disease: a population-based study.* J Clin Endocrinol Metab, 2006. **91**(12): p. 4849-53.

8 Acknowledgements

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9 Annexure A – Number of lives used in the analysis

		Fair CDL Data: Lives included in the Analysis		Poor CDL Data: Lives excluded in the Analysis		Total	
Year	Age	Female	Males	Female	Males	Female	Males
2006	LessThan1	35,865	38,764	24,791	26,074	60,656	64,838
	1to4	101,888	105,966	108,833	113,380	210,721	219,346
	5to9	125,422	130,359	158,925	165,141	284,347	295,500
	10to14	127,620	131,635	175,836	181,093	303,456	312,728
	15to19	125,848	126,619	174,716	176,770	300,564	303,389
	20to24	113,309	97,958	118,994	108,319	232,303	206,277
	25to29	137,732	109,489	110,508	90,628	248,240	200,117
	30to34	159,748	138,113	153,487	123,771	313,235	261,884
	35to39	150,516	131,901	172,166	154,079	322,682	285,980
	40to44	135,639	119,864	161,687	157,356	297,326	277,220
	45to49	119,102	107,833	142,901	139,447	262,003	247,280
	50to54	93,865	86,079	112,483	108,979	206,348	195,058
	55to59	74,473	69,697	90,046	85,567	164,519	155,264
	60to64	50,117	47,824	67,488	61,075	117,605	108,899
	65to69	35,567	31,973	53,348	44,682	88,915	76,655
	70to74	23,604	19,864	41,768	31,848	65,372	51,712
	75to79	16,609	12,576	33,052	22,241	49,661	34,817
	80to84	10,033	6,189	21,947	12,623	31,980	18,812
	85plus	5,760	2,890	13,689	6,015	19,449	8,905
	Total	**1,642,717**	**1,515,593**	**1,936,665**	**1,809,088**	**3,579,382**	**3,324,681**
2007	LessThan1	53,460	55,906	11,286	11,969	64,746	67,875
	1to4	183,984	191,190	42,226	44,084	226,210	235,274
	5to9	229,470	237,688	62,589	65,712	292,059	303,400
	10to14	235,581	243,964	71,653	74,808	307,234	318,772
	15to19	235,469	239,685	74,875	77,586	310,344	317,271
	20to24	201,683	177,797	47,174	43,591	248,857	221,388
	25to29	226,912	183,537	41,471	34,863	268,383	218,400
	30to34	266,467	224,128	56,278	46,668	322,745	270,796
	35to39	270,641	237,399	66,751	58,881	337,392	296,280
	40to44	242,217	223,898	67,724	62,670	309,941	286,568
	45to49	213,088	198,764	63,538	60,413	276,626	259,177
	50to54	172,720	158,776	50,581	51,727	223,301	210,503
	55to59	137,501	124,389	36,509	38,571	174,010	162,960
	60to64	103,248	92,639	25,050	24,758	128,298	117,397
	65to69	75,981	64,749	18,957	16,526	94,938	81,275
	70to74	54,458	43,072	14,887	11,844	69,345	54,916
	75to79	40,451	28,464	11,982	8,299	52,433	36,763
	80to84	25,102	14,853	8,656	4,977	33,758	19,830
	85plus	15,690	7,131	5,503	2,456	21,193	9,587
	Total	**2,984,123**	**2,748,029**	**777,690**	**740,403**	**3,761,813**	**3,488,432**
2008	LessThan1	73,255	75,699	9,604	10,051	82,859	85,750
	1to4	207,364	215,886	38,854	40,986	246,218	256,872
	5to9	251,560	259,729	53,799	56,501	305,359	316,230
	10to14	255,485	262,259	60,700	63,706	316,185	325,965
	15to19	255,001	257,531	65,815	69,390	320,816	326,921
	20to24	217,091	188,642	49,377	48,297	266,468	236,939
	25to29	253,425	206,366	44,384	41,858	297,809	248,224
	30to34	283,635	237,467	51,777	48,197	335,412	285,664
	35to39	292,116	254,617	61,444	58,129	353,560	312,746
	40to44	257,234	234,226	60,934	60,933	318,168	295,159
	45to49	231,496	211,974	59,775	59,758	291,271	271,732
	50to54	185,742	170,068	50,324	52,300	236,066	222,368
	55to59	143,966	131,151	40,677	41,495	184,643	172,646
	60to64	106,268	95,255	31,687	30,195	137,955	125,450
	65to69	75,376	64,181	24,758	21,373	100,134	85,554
	70to74	54,007	42,594	19,535	15,523	73,542	58,117
	75to79	39,470	27,588	15,075	10,692	54,545	38,280
	80to84	24,372	14,387	9,918	5,748	34,290	20,135
	85plus	16,409	7,338	6,678	3,164	23,087	10,502
	Total	**3,223,272**	**2,956,958**	**755,115**	**738,296**	**3,978,387**	**3,695,254**

		Fair CDL Data: Lives included in the Analysis		Poor CDL Data: Lives excluded in the Analysis		Total	
Year	Age	Female	Males	Female	Males	Female	Males
2009	LessThan1	65,786	68,658	25,811	26,540	91,597	95,198
	1to4	183,319	191,333	77,666	81,044	260,985	272,377
	5to9	214,412	222,320	98,538	101,149	312,950	323,469
	10to14	212,207	219,585	105,004	105,630	317,211	325,215
	15to19	215,246	220,171	107,392	107,050	322,638	327,221
	20to24	194,377	174,593	71,177	59,622	265,554	234,215
	25to29	234,619	203,254	82,330	59,634	316,949	262,888
	30to34	246,093	218,495	93,954	71,120	340,047	289,615
	35to39	251,752	227,490	104,037	84,159	355,789	311,649
	40to44	225,302	209,647	99,209	86,606	324,511	296,253
	45to49	204,591	191,788	91,706	82,383	296,297	274,171
	50to54	170,491	159,671	76,194	70,447	246,685	230,118
	55to59	133,913	123,218	57,487	53,716	191,400	176,934
	60to64	103,394	93,345	41,636	36,884	145,030	130,229
	65to69	74,228	63,201	30,333	24,715	104,561	87,916
	70to74	54,746	43,265	23,417	17,877	78,163	61,142
	75to79	39,197	27,370	16,659	11,702	55,856	39,072
	80to84	25,094	14,949	10,635	6,104	35,729	21,053
	85plus	17,159	7,526	7,083	3,278	24,242	10,804
	Total	**2,865,926**	**2,679,879**	**1,220,268**	**1,089,660**	**4,086,194**	**3,769,539**
2010	LessThan1	88,366	90,851	7,731	7,992	96,097	98,843
	1to4	256,263	266,728	25,447	26,970	281,710	293,698
	5to9	297,106	306,743	31,509	32,624	328,615	339,367
	10to14	291,745	298,429	32,925	34,167	324,670	332,596
	15to19	290,494	292,902	36,354	36,502	326,848	329,404
	20to24	241,808	208,182	28,332	27,609	270,140	235,791
	25to29	306,586	245,539	31,054	31,682	337,640	277,221
	30to34	317,612	263,228	31,535	34,497	349,147	297,725
	35to39	333,913	283,616	33,471	35,921	367,384	319,537
	40to44	298,880	265,032	34,559	36,804	333,439	301,836
	45to49	269,675	242,799	35,518	39,464	305,193	282,263
	50to54	225,283	202,430	32,612	35,856	257,895	238,286
	55to59	174,877	155,609	25,898	28,217	200,775	183,826
	60to64	131,670	115,681	20,811	19,143	152,481	134,824
	65to69	93,242	77,889	16,984	13,645	110,226	91,534
	70to74	68,918	53,561	14,467	11,379	83,385	64,940
	75to79	47,218	32,746	10,762	7,583	57,980	40,329
	80to84	30,461	18,163	7,246	4,130	37,707	22,293
	85plus	20,921	9,235	5,045	2,308	25,966	11,543
	Total	**3,785,038**	**3,429,363**	**462,260**	**466,493**	**4,247,298**	**3,895,856**
2011	LessThan1	83,936	87,105	13,269	13,852	97,205	100,957
	1to4	249,573	258,280	43,013	45,104	292,586	303,384
	5to9	283,280	293,194	52,246	54,699	335,526	347,893
	10to14	270,984	276,173	53,734	56,166	324,718	332,339
	15to19	265,608	266,381	57,633	59,240	323,241	325,621
	20to24	215,469	183,602	43,186	41,940	258,655	225,542
	25to29	295,200	232,911	47,228	46,179	342,428	279,090
	30to34	300,964	247,687	50,486	51,106	351,450	298,793
	35to39	311,651	262,832	54,101	54,901	365,752	317,733
	40to44	283,742	250,746	55,440	53,733	339,182	304,479
	45to49	249,980	224,816	53,812	54,041	303,792	278,857
	50to54	216,327	195,257	47,918	48,148	264,245	243,405
	55to59	167,669	150,238	36,045	34,871	203,714	185,109
	60to64	130,760	113,430	25,814	23,399	156,574	136,829
	65to69	94,251	77,784	17,283	14,103	111,534	91,887
	70to74	72,542	56,081	13,502	10,194	86,044	66,275
	75to79	49,354	34,063	8,962	6,372	58,316	40,435
	80to84	33,208	19,285	6,243	4,222	39,451	23,507
	85plus	23,092	10,112	4,361	2,469	27,453	12,581
	Total	**3,597,590**	**3,239,977**	**684,276**	**674,739**	**4,281,866**	**3,914,716**