Chapter 2

Literature Study: Background and discussion of elements pertaining to chronic medication

Chapter 1	Introduction	The background, motivation and reasoning for the study as well as the goals and outline of the study are given.
Chapter 2	Literature Study	Literature review of health care systems, chronic medication, cost, compliance, prevalence and patient profiles provide the background for the quantitative analyses
Chapter 3	Research Methodology	The research methodology followed in the study is discussed.
Chapter 4	Results and Discussion	A number of analyses are performed on the available data to establish prescribing trends, including demographic profiles, geographic distribution, utilisation, costs, providers of medication and medication compliance. The results of the empirical investigation are also reported in this chapter.
Chapter 5	Conclusions and recommendations	This chapter contains final conclusions and recommendations on chronic medication management in the private sector in South Africa.

2.1. Overview of the chapter

In Chapter 2, health care in general is discussed, which includes different types of health care as well as the way in which health care services are rendered and facilitated in various settings and countries, including South Africa. Reimbursement strategies will be investigated, and the distinction between private and public health care will be discussed.

The focus will then shift to the pharmaceutical component of health care, specifically chronic medication. The distribution, cost and utilisation of chronic medication and the population demographics of chronic medication users will be discussed. This discussion provides the background against which the quantitative analysis of retrospective data in Chapter 4 is done.

Figure 2.1 depicts the flow of the chapter and Figure 2.2 gives a more detailed layout of Chapter 2.

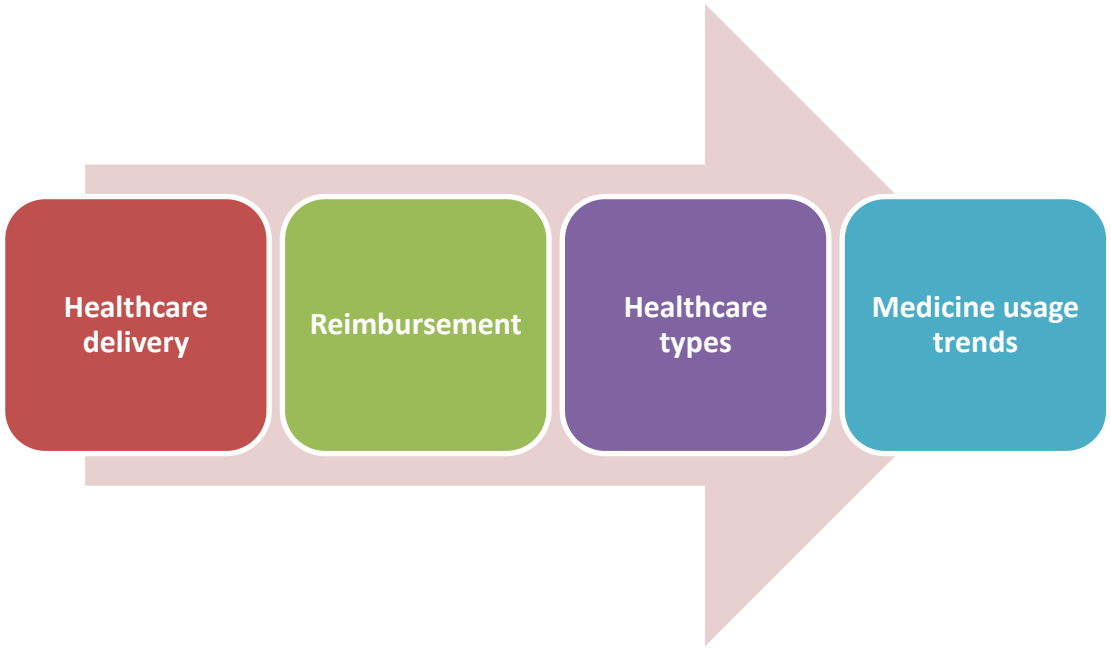

Figure 2.1: Graphic illustration of systematic flow of Chapter 2

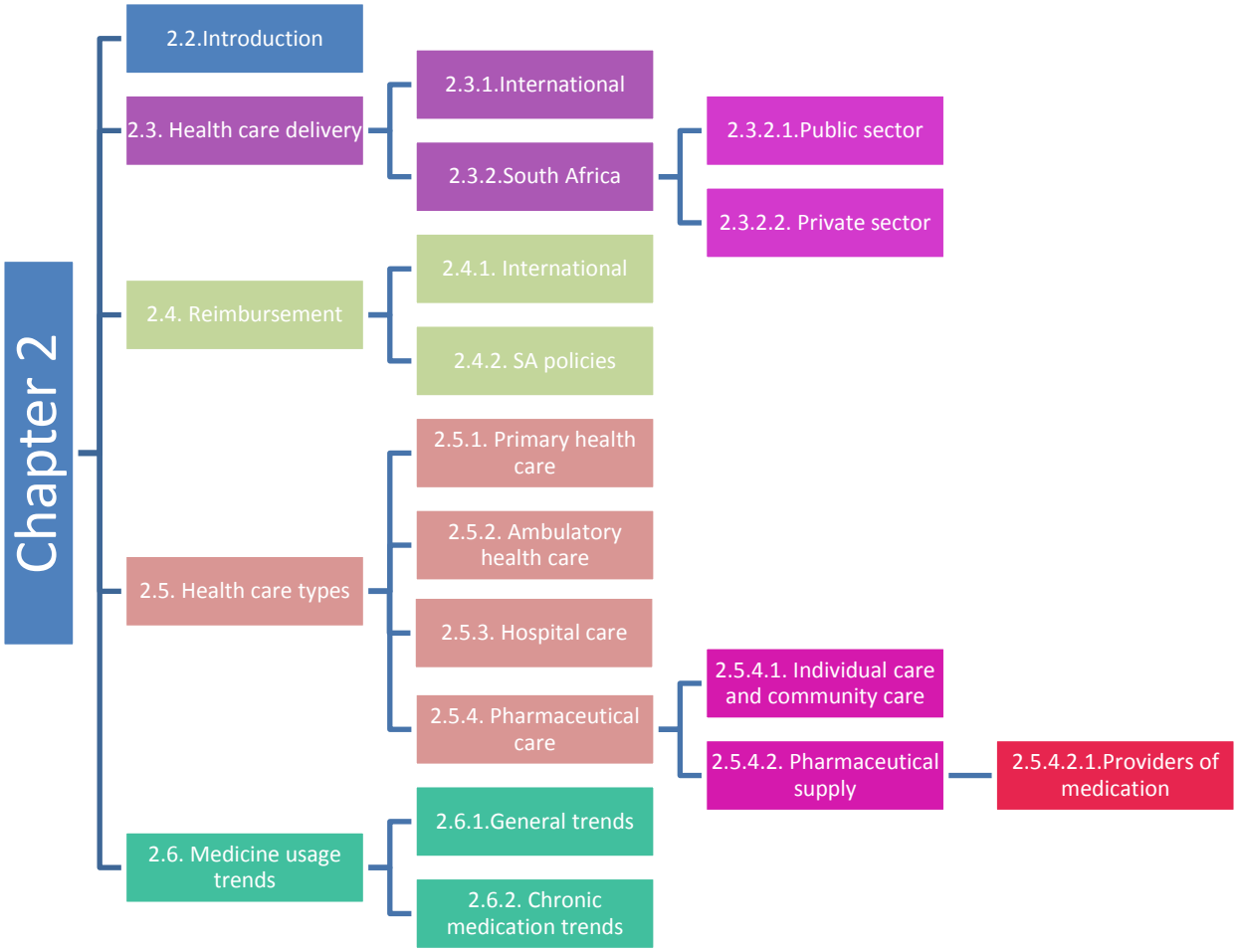

Figure 2.2: Layout of Chapter 2

2.2. Introduction

In South Africa, the increasing cost of health care (including products and services) has become problematic for all health care stakeholders, including patients. This has led to increased use of economic evaluations to investigate alternative health care outcomes. This escalation in health care spending is due to increased life expectancy technology, increased expectations, higher standards of living and more demand for health care quality and services (Lutchman, 2011:92).

The South African government also realises the importance of health care and health care therefore remains one of the South African Government's main concerns, particularly since the current system has been described as "failing to produce a successful health care outcome pre- and post-1994" (Department of Health, 2011a).

The Department of Health has therefore set out a ten-point plan to address current health care shortcomings and establish a workable health care system in South Africa (DoH, 2010b). The ten points of the plan are:

- Provision of strategic leadership and creation of a social compact for better health outcomes
- Implementation of National Health Insurance (NHI)
- Improving the quality of health services
- Overhauling the health care system and improving its management
- Improving human resource management, planning and development
- Revitalisation of infrastructure
- Accelerated implementation of HIV/AIDS and Sexually Transmitted Infections and increased focus on TB and other communicable diseases
- Mass mobilisation for better health for the population
- Review of the National drug policy
- Strengthening research and development

Although health care includes many facets and elements as illustrated in the ten-point plan, the key area of health care to be investigated in this study is that of medication provision to patients. The focus will specifically be on the dispensing and distribution of chronic medication in the private sector. The results of this study may aid in a better understanding of the profile of the

chronic medication user and the best way of providing this chronic medication. The data and findings may be useful to the private health care sector (medical schemes, private sector pharmacies and pharmaceutical companies), but also to South African health care policy makers as the private and public sector are bound to become partners in the National Health Insurance (NHI) scheme that has been proposed and gazetted by Government.

The goals set out by government in the NHI Green Paper (Department of Health, 2011a) are to:

- provide improved access to quality health services for all South Africans irrespective of whether they are employed or not
- pool risks and funds so that equity and social solidarity will be achieved through the creation of a single fund
- procure services on behalf of the entire population and efficiently mobilise and control key financial resources to help contain costs
- strengthen the under-resourced and strained public sector to improve health systems performance

The NHI Green Paper also includes a detailed timetable for the first years of NHI implementation, while full implementation might take 14 years (Department of Health, 2011a).

Implementing a successful health care system that addresses all the health care needs of the patient as set out in the ten-point plan is seen as a South African priority, and this study aims to further explore the various elements of health care and specifically the provision of medication in a health care system.

2.3. Health care delivery

The World Health Organisation (WHO, 2000:2), in its 2000 World Health report, defines a health care system as follows:

> Health systems consist of all the people and actions whose primary purpose is to improve health. They may be integrated and centrally directed, but often they are not. After centuries as small-scale, largely private or charitable, mostly ineffectual entities, they have grown explosively in this century as knowledge has been gained and applied. They have contributed enormously to better health, but their contribution could be greater still, especially for the poor. Failure to achieve that potential is due more to systemic failings than to technical limitations. It is therefore urgent to assess current performance and to judge how health systems can reach their potential

The relationship between the functions and objectives of a health care system according to the WHO World Health Report (WHO, 2000) is depicted in Figure 2.3:

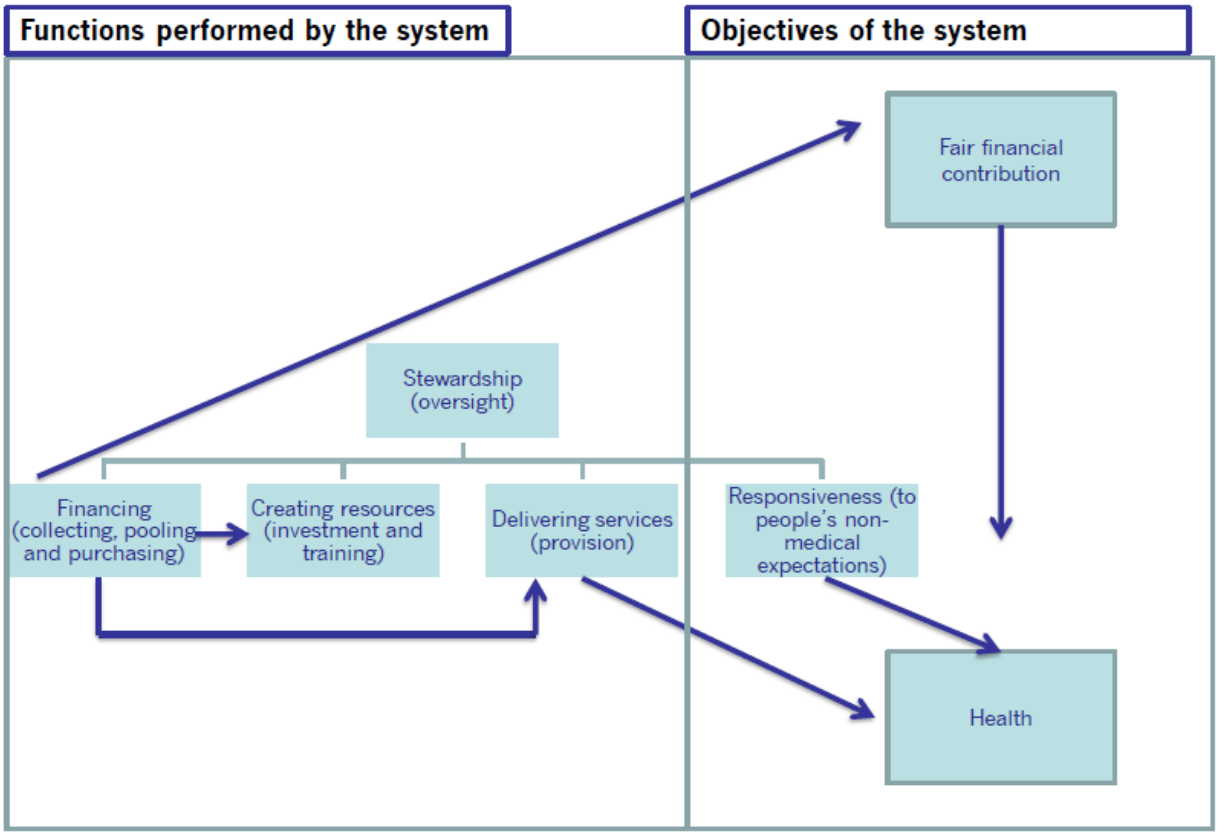

Figure 2.3: Relations between functions and objectives of a health care system (adapted from WHO, 2000:25)

Figure 2.3 points out that the three main objectives of a country's health care system should be overall good health, achieved by sufficient responsiveness, which is not financially out of reach for the majority of the population.

The World Health report (WHO, 2000) describes a good health system, most importantly, as contributing to good health. But it is not always sufficient to maintain or improve the average health of the population if inequality still increases or remains high. The health system therefore also has the responsibility of reducing inequalities by preferentially improving the health of the poorest wherever these inequalities are caused by conditions that can be amended. The objective of good health can be defined as inclusive of two main components, according to the WHO (2008d:26):

- *Goodness (* the best attainable average level) and
- *Fairness* (the smallest feasible differences among individuals and groups)

For patients, a good health care system delivers efficient service at an affordable price, as Motheral and Heinle (2004:1007) found in a 2004-survey among US patients. The patient needs

efficient health care service, and it was found that factors such as out-of-pocket cost for a prescription, the list of drugs covered by the health care plan and receiving help with questions or problems play a significant role in members' satisfaction with their medical health care systems and plans (Motheral & Heinle, 2004:1007).

Now that the main attributes of a successful health care system have been discussed, the ways in which health care systems are implemented in various countries and settings will be investigated in paragraph 2.3.1 to follow.

2.3.1. International health care systems

In this section it will be demonstrated that the governments of countries have different perspectives on how to achieve good health care service to all patients. Governments rely on varying types of health care insurance systems to take care of the medical needs of its population.

Wagner *et al.* (2011:23) define a health care insurance system as follows:

> The term health care insurance system refers to all types of health insurance programs, including private, public, for profit and not-for-profit programs and organizations, particularly those which include the poor. Health insurance programs pool risks across populations and pay part of or all health-care expenses for their defined population of members (and possibly dependents) from premiums contributed by individuals, employers, nongovernmental organizations and/or government.

According to Hohman (2006:1), all health care systems can be classified as a national health service model, an entrepreneurial model or a mandated insurance model.

Tanner (2008:1-6) agrees that there are different health care models followed and used across the world. Each country's health care system is a result of "its unique conditions, history, politics, and national character", and many are currently undergoing reform.

Types of systems, according to Tanner (2008:6-7), are:

- **Single-payer systems**

In a single-payer health care system, the government pays for the health care of all citizens. It collects taxes, is responsible for the administration of the supply of health care and pays providers directly. This system basically replaces private insurance with a single government entity. The government establishes a global budget, decides how much of the country's resources should be designated to health care and sets prices or reimbursement rates for providers. Providers are employees earning government salaries, or they are independent and reimbursed according to the services and procedures they provide. In the most regulated single-

payer systems, private health insurance is prohibited (Tanner, 2008:6-7). An example of a single-payer system is Canada (Birn & Nixon, 2010:516-520).

- **Employment-based systems**

Countries with employment-based systems require that employers provide workers with health insurance, often through semi-private “sickness funds.” These insurance funds operate within industry sectors, with benefits and premiums set by the government. Premiums are often a form of payroll tax paid directly to the fund. Providers remain independent and reimbursement rates are negotiated with the funds individually or nationally. An example of such an employment based system is Germany (Tanner, 2008:6-7).

- **Managed Competition**

Managed competition leaves the provision of health care in the hands of the private sector while still regulating the market with strict government controls and regulations. In most cases, the government insists that individuals buy insurance. This may be paired with a requirement for employers to provide insurance to their workers. Individuals have a choice of insurers within the regulated marketplace and a choice of providers. Although the government sets a standard benefits package, insurers may compete on price, cost sharing and additional benefits. Switzerland is the clearest example of a managed-competition approach to universal coverage, although the Netherlands has also recently adopted a similar system (Tanner, 2008:6-7).

Birn and Nixon (2010:518) only distinguish between single-payer and multiple-payer systems. Table 2.1 gives a list the differences between the two systems as they set out by them.

Within these broad categories are significant differences. Tanner (2008:7) has studied these differences and state that some countries, such as France and Japan, impose significant cost sharing on consumers in an effort to discourage overutilisation and to control costs. Other countries strictly limit the amount that consumers must pay out-of-pocket. Some countries permit free choice of providers, while others limit it. In some countries there is unlimited purchase of alternative or supplemental private insurance, whereas in others, private insurance is prohibited or used very little. Resource allocation and prioritisation differ vastly in all of these scenarios.

Table 2.1: Differences between single and multi-payer health care insurance systems (adapted from Birn & Nixon, 2010:518)

Single-payer health care system (e.g. Canada)	**Multiple Payer private health care system (e.g. USA)**
Raises funds, administers claims and shares costs across the population more efficiently and equitably	Overhead costs can be upward of 10 times higher among private insurers compared with a public single payer
One authority with an incentive and the capacity to contain costs	The larger the share of private health care financing, the more difficult it is to control expenditures (e.g. for-profit hospitals are 3-11% more expensive than non-profit hospitals)
No marketing expenses	Employer-provided health insurance is a disincentive for labour mobility and hence negatively affects the allocation of labour
No need to estimate risks to establish differentiated premiums	
No profit paid to shareholders	As the cost of health insurance increases, so do costs to employers who provide health insurance, resulting in fewer salary increases, and other cuts to the employer's bottom line.

2.3.2. South African health care system

Based on the classification given, South Africa seems to have a combination between a single-payer system, where the government pays for all medical needs (i.e. SA public health sector), and a managed competition system, where the private sector can charge within a regulated environment and patients are free to choose which medical scheme to belong to. According to the Klynveld, Peat, Marwick and Goerdeler (KPMG) global executive director for health care, research has shown that single-payer systems cut administration costs, making more money available to cater for the health care needs of a population (Smith, 2010). For example, single-payer countries such as Canada had managed to cut administration costs to 2% of health care expenfditure, compared to 17% in the US with 'multi multi-payers' (Smith, 2010).

For single payer systems like Canada, however, a broad taxpayer base is needed (Birn & Nixon, 2010:517). Birn and Nixon explain that two-thirds of Canada's medicare expenditure is funded by the provinces themselves, based on a variety of mechanisms:

- General revenues (from income and corporate taxes) are an important source of revenue.
- Three provinces (Alberta, Ontario and British Columbia) use premiums based on the income of its residents (sliding income scale).

- Other provinces raise revenues through lotteries and special taxes on alcohol and cigarettes.

In this single-payer system, no-one is denied services even if the tax contribution is not made (Birn and Nixon, 2010:517)

According to Schaay *et al.* (2011:4), there are three areas of serious concern in the SA health care system:

- A significant increased burden of disease related to HIV/AIDS
- Notable weakness in certain areas of health system management
- A low level of health outcomes when compared to the country's expenditure on health care

Peltzer (2009:11) found that, of all South African patients who received in-patient care, 72.2% attended a public and 24.3% a private facility. Of patients who received outpatient care at a facility, 58.7% attended a public and 35.7% a private facility.

The following sections investigate the two parts of the SA health care sector: public and private.

2.3.2.1. Public health care in South Africa

It can generally be stated that the public health care system in South Africa is not a successful one, based on various measurements. According to Engelbrecht and Crisp (2010:195): "There is sufficient evidence that, for the resources to its avail, the South African Health care system is performing poorly."

Kleinert and Horton (2009:759-760) found that South Africa spends more on health than any other African country at 8.7% of its GDP. This is similar to the health care spending in Sweden (8.9% of GDP). Yet South Africa is one of only 12 countries worldwide in which maternal mortality and mortality for children younger than 5 years have actually increased since 1990 (Kleinert & Horton, 2009:758,759). This emphasizes the fact the South African health system performs poorly when comparing its impact on the health status of the nation to countries with a similar or poorer per capita GDP (Kleinert & Horton, 2009:759-760).

This viewpoint is further supported by Econex research which found that the poorest households, who are eligible for free public health care, pay considerable sums for private health care. They found that user dissatisfaction in the public sector were mostly due to long waiting times, unobtainable medication and rude medical staff. In the private sector, dissatisfaction was mainly due to the perceived high price of the services (Econex, 2010a).

According to a comparative study of the quality of health systems in 48 developed and developing countries in 2008, it was found that South Africa's public sector ranked eighth from the bottom, while the private sector ranked sixth from the top (Econex, 2010a).

Poor health care services relating to unavailability of medication in the public sector may result from several factors, according to Cameron *et al*. (2009: 247). Inadequate funding and purchasing systems, lack of incentives for maintaining sufficient stock levels, inefficient forecasting and even illegal distribution of medicines for private resale play a role.

Concerning the role of the pharmacist as dispenser of medication in the public health care system, Deputy Minister of Higher Education and Training, Mduduzi Manana, states that South Africa needs 1200 new pharmacists a year, according to the South African Pharmacy Council (SAPC).The current number of pharmacist graduates are 450 per year, and a lack of academic staff, infrastructure, and a shortage of mid-level healthcare workers contribute to this problem (SAPC, 2013). This shortage of pharmacists limits the pharmacist's potential role as part of the health care team (SAPC,2013). In 2010 there were 12,813 pharmacists registered with the Pharmacy Council of whom 96 % were actively practicing (Schellak & Gous, 2011). This resulted in a pharmacist/population ratio of one pharmacist per 3,849 people, whereas the World Health Organization's (WHO) average for industrialized countries is one pharmacist per 2 300 people (Schellak & Gous, 2011). In the public sector, the pharmacist to patient ratio has reached a state of crisis, according to Misra and Cele (2007:44), with emigration of pharmacists and higher salaries in the private sector being cited as some of the reasons for this shortage.

Based on the mentioned shortcomings, government has been forced to re-assess the current health care system and structures. This has led to the inception of the social health insurance model called NHI. (Cameron *et al*., 2009:247).

- **Envisaged National Health Insurance**

The African region has an almost 40% lower average than other regions in the availability of medication for acute and chronic conditions in the public sector (Cameron *et al.,* 2011:7).

Medicines do not seem to be the only component of health care that is lacking in African countries. According to the WHO (2006b), the number of nurses and doctors available per 100 000 of the population are very low when compared to countries such as the US and France. Mozambique, for instance, has 3 doctors per 100 000 population whilst France has 337. Table 2.2 gives this data for African and European countries as well as the US.

Table 2.2: Cross-country comparison of physician and nurse density per 100 000 population (WHO, 2006b)

Country	Medical practitioner density per 100 000	Nurse density per 100 000
Mozambique	3	21
Lesotho	5	62
Zambia	12	174
Zimbabwe	16	72
Namibia	30	306
Botswana	40	265
South Africa	77	408
United States of America	256	937
France	337	724
United Kingdom	230	1212

Table 2.2 also illustrates that South Africa, although performing poorly when compared to first world countries, has the best doctor and nurse-ration per 100 000 population when compared to the other African countries.

South Africa is known for its inequitable distribution of wealth, which seems to have spilled over to inequalities in health care as well. Whitehead (1992:430) proposes that criteria for assessing which health inequalities are unfair should be based on whether they are due to inherent biological factors, due to informed choices of the individual or are potentially avoidable.

The World Health Report (WHO, 2000) as well as Murray *et al*. (2000:245) present an individually-based rather than a group-based approach to measuring health inequalities. This approach can measure health inequalities only, because individually-based measures only capture the health status of individuals.

Table 2.3 gives a summary of the principal accomplishments and shortcomings of the South African health care system according to Harrison (2010:2).

Table 2.3: Accomplishments and shortcomings of SA healthcare system 1994-2009 (Harrison, 2010:2)

Accomplishments		**Shortcomings**	
1	Legislation and gazetted policy	1	Insufficient prevention and control of epidemics
2	Free primary health care	2	Limited effort to curtail HIV/AIDS
3	Essential drugs programme	3	Emergence of MDR TB and XDR TB
4	Choice on termination of pregnancy	4	Lack of attention to the epidemic of alcohol abuse
5	Anti-tobacco legislation	5	Skewed allocation of resources between public and private sectors
6	Community service for graduating health professionals	6	Inequitable spending patterns compared to health needs
7	Better health systems management	7	Insufficient health professionals in public sector

8	Greater parity in district expenditure	8	Weaknesses in health systems management
9	Clinic expansion and improvement	9	Poor quality of care in key programmes
10	Hospital revitalisation programme	10	Operational inefficiencies
11	Improved immunisation programme	11	Insufficient delegation of authority
12	Improved malaria control	12	Persistently low health worker morale
		13	Insufficient leadership and innovation

Harrison (2010:6) also mentions that the number of deaths in South Africa has almost doubled between 1998 and 2009. He continues to paint a dismal picture when referring to infant mortality rates, which have increased from 50 per 1000 live births in 1994 to 60 in 2003.

The Health Department indicates in its strategic plan for 2010-13 that it intends to establish a National Health Insurance (NHI) system as part of its health reform process. The aim of this NHI is to improve the financing and delivery of "an efficient, equitable, and sustainable health care system in pursuit of universal health care for all" (Department of Health, 2010b).

The proposed NHI system focuses on developing an essential health care package, the creation of an NHI fund to provide financial resources and defining the role of private funders and providers in the system (Department of Health, 2010b).

According to the chairperson of the Council for Medical Schemes in the 2010-2011 Council for Medical Schemes Report (CMS, 2011:17), the "emergence of a National Health Insurance (NHI) system and its successful implementation depend on South Africa's ability to regulate health service provision such that the interests of South Africans are both served and protected."

According to an article by the *Mail and Guardian* on 21 September 2010, NHI was a resolution from a meeting of the ANC in Polokwane in 2007. The programme is expected to cost R128 billion in its first year, increasing to R376 billion by 2025. Dr Olive Shisana, the CEO of the Human Science Research Council who chairs the ministerial advisory committee on the NHI, explained that the ministry was exploring the following options to fund NHI:

- A surcharge on taxable income
- Payroll taxes for employees and/or employers
- An increase in value-added tax (VAT), dedicated to the NHI
- Removal of the current tax credits with regards to medical aids

However, the main source of revenue would be from the country's general taxation (Pillay, 2010).

In the Green Paper on NHI released in August 2011, it is stated that the NHI will offer all South Africans and legal residents access to a defined package of comprehensive health services. It will offer care at all levels, from primary health care to specialized secondary care, and highly specialized tertiary and quaternary levels of care (Department of Health, 2011a).

According to the NHI Policy Document (2011: 4, 5), quality of service will be ensured by:

- A radical improvement in the quality of services in the public health facilities. This means massive investment in improvement of health infrastructure, both buildings and equipment.
- Compliance to certain basic standards, and the creation of an overseeing body called the Office of Health Standards Compliance.
- A great improvement to public health care management. This is to be achieved as part of the 10-point program and speaks of a complete overhaul of the health care system.

According to a KPMG report investigating the impact of NHI in South Africa, economic benefit estimates illustrate that a one year increase in a nation's average life expectancy can increase GDP per capita by 4% in the long run. Having a healthier labour force can also result in increased productivity. Based on international studies, labour force productivity can increase between 20% and 47.5% (KPMG, 2011:2).

The Pharmaceutical Industry Association of SA (PIASA) is a trade association of companies involved in the manufacture and/or marketing of medicines in South Africa. The membership includes local companies as well as foreign multinational pharmaceutical companies. Their comments on the proposed NHI system include (PIASA, 2011:4-5):

- Medication is lacking in the proposed documents and exploration of the role of medicines in the NHI system is needed. This includes supply chain management, procurement, pricing and reimbursement, as well as the availability of pharmacies and human resources.
- The budget allocated to medicine in NHI needs to be revised and increased.
- Originator medication should remain available in the public sector.
- In terms of the medicines supply chain, the availability issues have not been yet been considered.
- A decentralised system of medicine procurement is advised.

- PIASA recommends that the reimbursement models for medication be explored in detail.
- Systems for the setting of formularies and national treatment guidelines should be fair and transparent.
- Health technology assessment (HTA) should be implemented incrementally after a cost-benefit analysis and an analysis of available skills and resources have been completed
- Regulatory issues concerning medicines and investment in health research needs more attention.
- The pharmaceutical industry can contribute to health sector reforms such as disease management programmes, medicines information services and patient compliance initiatives and this should be utilised.
- A number of institutional and legislative reforms have to be planned out in detail in order to ensure transparent and independent service delivery structures.

It seems that there are still various gaps to be closed before implementing the NHI, but the need for an improved health care system is clear.

Table 2.4 illustrates public health expenditure of various countries expressed as various ratios (to GDP, to total government expenditure and public health expenditure per capita).

Table 2.4: Public health expenditure of various countries expressed as various ratios (KPMG, 2011:10)

Country	Public Expenditure on health as % of GDP			Public Health Expenditure as a % of total Government Expenditure			Public Health Expenditure per capita PPP (constant 2005 prices, US$)		
	2007	2008	2009	2007	2008	2009	2007	2008	2009
Australia	5.56	5.56	5.56	17.10	17.10	17.10	2 190.38	2 200.64	2 211.92
Brazil	3.51	3.72	4.13	5.37	5.96	6.08	342.13	385.33	430.82
Canada	6.70	6.84	7.50	17.11	17.19	17.01	2 573.52	2 688.39	2 882.95
China	1.92	2.05	2.29	10.27	10.27	10.27	106.13	125.62	155.04
India	1.21	1.35	1.37	4.06	4.41	4.06	33.48	39.51	43.14
Russia	3.45	3.10	3.51	10.21	9.17	8.53	580.96	633.26	668.74
South Africa	3.45	3.27	3.41	11.06	10.39	9.27	336.72	334.44	345.72
United Kingdom	6.91	7.16	7.81	15.65	15.12	15.12	2 465.16	2 662.19	2 842.59
United States	6.97	7.26	7.88	19.00	18.73	18.68	3 239.53	3 425.90	3 602.45

From Table 2.4 it can be seen that in terms of public health expenditure as a percentage of GDP and public health expenditure as a percentage of total government expenditure, South

Africa is comparable with countries such as Russia and Brazil. However, in terms of the public health expenditure per capita, South Africa compares poorly with countries such as Australia and the United Kingdom, where there are national health systems.

In section 2.3.2.1, the current state of the South African public health care system as well as the plans to change the South African medical services landscape (in the form of National Health Insurance) were discussed. Section 2.3.2.2 will elaborate on the current Private Health care System in South Africa – an environment where the public can choose to belong to any open medical aid scheme, contribute out of their own pocket and receive a set of medical services in return.

2.3.2.2. Private health care in South Africa

The number of medical practitioners and specialists in SA per province according to Medpages (2011), a data provider specialising in listings of (mostly private) medical professionals, are presented in Table 2.5.

Table 2.5: Medical practitioners and specialists in South Africa (Medpages, 2011)

Medical Specialists	Total	Gauteng	WC*	KZN*	MP *	NW*	FS*	Lim*	EC*	NC*
Anaesthetist	1,217	533	310	198	22	33	51	9	52	9
Cardiac & Thoracic Surgeon	108	45	25	18	1	3	9	1	5	1
Cardiologist	173	79	43	31	2	2	6	1	9	0
Dermatologist	187	71	55	31	3	4	8	3	10	2
ENT	254	104	55	51	6	6	10	6	13	2
Family Physician	399	121	84	82	23	21	25	11	23	9
Gastroenterologist	80	44	20	12	0	0	2	0	2	0
General Practitioner	13724	4723	2421	2316	752	751	753	697	1119	235
Gyn & Obs	872	364	204	143	22	31	36	18	49	5
Neurologist	125	55	29	25	0	1	10	1	4	0
Neurosurgeon	143	67	33	20	4	3	6	1	7	2
Oncology	178	60	55	25	3	4	17	4	8	2
Ophthalmologist	376	152	87	60	9	18	15	8	22	5
Orthopaedic Surgeon	613	257	151	101	13	15	32	7	32	5
Paediatricians	811	316	208	137	15	32	38	18	42	5
Pathologist	454	210	105	57	5	12	38	5	20	2
Physician	728	306	176	118	12	23	42	7	39	5
Plastic Surgeon	154	69	49	21	1	0	4	0	10	0
Psychiatrist	577	229	183	74	4	14	26	17	25	5
Pulmonologist	82	37	26	11	0	0	2	0	6	0

Radiologist	498	230	105	81	8	11	21	13	27	2
Surgeon	587	208	133	131	11	22	27	9	38	8
Urologists	212	81	48	42	6	9	10	2	11	3
Vascular Surgeons	40	17	12	8	0	0	1	1	1	0

*full names of provinces

WC= Western Cape

NC= Northern Cape

EC= Eastern Cape

MP= Mpumalanga

FS= Free State

KZN= KwaZulu-Natal

Lim= Limpopo

Table 2.5 illustrates that there are a number of specialists in the country, although the distribution of skills per province already gives an indication of disparities in health care provision. For example, 124 of the gastroenterologists in SA reside in Gauteng or the Western Cape, while the rest of the country is served by the remaining 36, of which the provinces KZN, Mpumalanga, Northern Cape and Limpopo have none.

Table 2.6 continues to illustrate the unequal distribution of medical practitioners between rural and urban provinces. All of the nine provinces have medical practitioner density ratios higher than the WHO minimum level of 20:100 000 population. Limpopo, Eastern Cape, Mpumalanga, and Northern Cape (considered rural provinces) have the least number of medical practitioners per 100 000 people. The more urbanised provinces (Gauteng, Western Cape and KwaZulu-Natal) have a higher ratio of medical practitioners serving the population. There has, however, been a national decline in the proportion of medical practitioners to the population between 2001 and 2004.

Table 2.6: Ratio of medical practitioners per 100 000 population (Department of Health, 2006a:18)

Ratio of medical practitioners per 100 000 population across provinces, 2001 and 2004	**2001**	**2004**
Eastern Cape	34	27
Free State	69	54
Gauteng	173	126
KwaZulu-Natal	70	52
Limpopo	21	18
Mpumalanga	42	30
North West	30	23

Northern Cape	54	42
Western Cape	182	147

The number of health care professionals to be produced in South Africa according to the national HRH plan (Department of Health, 2006a), is given in Table 2.7.

Table 2.7: Production of health care professionals (Department of Health, 2006a)

Professional/ mid-level category	Duration of training	Location of training	Current annual national production	Proposed annual production	% increase in production
Emergency medical services practitioners	3 years	Technikon	-	1 000 by 2009	-
Medical practitioners	5 to 6 years	University	1 200	2 400 by 2014	100%
Medical assistants	3 years	Proposed at University	-	Initial group of 100 by 2009	-
Medical specialists	Average 5 years	University	**	**	-
Professional nurses	4 years	University, Technikon, and Colleges	1 896	3 000 by 2011	58.2%
Enrolled nurses	2 years	College of Nursing and private nursing schools	7 368	10 000 by 2008	35.7%
Nutritionists/ dieticians	4 years	University	150	250 by 2010	66.7%
Pharmacists	4 years	University	400	600 by 2010	50%
Pharmacy assistants	1 year	University	-	900 by 2008	-

Inequalities in the availability of health care services are further explained by the IMS Market Prognosis South Africa 2010-2014 which states that private health care in SA accounts for only a third of hospital beds, while about two-thirds of doctors and 75% of specialists work in the private sector. Many of the major corporate health care providers are involved in supplying both primary and secondary health care (IMS, 2011:34). McIntyre and Thiede (2007:19-20) supports this finding by reporting, using 2005 data that 60% of total health care funds in South Africa flow through private intermediaries. Medical schemes account for 76% of private expenditure, with household out-of-pocket expenditure contributing 23%.

According to the Human Resources in Health Care (HEARD) Gap analysis (George *et al.*, 2009), there is a shortage of 80 000 health care professionals in the public health sector of South Africa. Approximately 30% of medical practitioners, 60% of nurses and 15.5% of pharmacists

work in the public health sector, yet they serve approximately 85% of South Africa's population (George *et al*., 2009:6).

Private health care in South Africa can be obtained by either paying privately for any medical cost or by belonging to a medical scheme which will offer a range of medical benefits for a monthly premium. Medical contributions by people using private health care are also subsidised to a very limited extent by certain tax reliefs. According to the tax guide on medical expenses for 2011 on the South African Revenue Service (SARS) website, capped amounts for the tax year ending on 28 February 2011 of contributions paid by a private contributor are as follows (SARS, 2011):

- R670 per month for the main member;
- R1 340 per month for the main member and one dependent; or
- R1 340 per month for the main member and one dependent, plus R410 per month for every additional dependent.

The capped amounts for the tax year ending on 28 February 2012 (SARS, 2011) as announced in the budget speech on 23 February 2011 are:

- R720 per month for the main member;
- R1 440 per month for the main member and one dependent; or
- R1 440 per month for the main member and one dependent, plus R440 per month for every additional dependent.

Any contributions made by an employer are fully taxable.

Therefore, any contribution to medical expenses that is greater than the capped amounts will be deductible from taxes, but to a maximum of 7.5% of deductible income.

It would seem that although public health care is provided mostly free of charge to users of public health services, private health care users are responsible for the bulk of their own medical expenses in the form of payments to medical schemes.

A report by the Health Economics Unit (2009:2) of the University of Cape Town paints the following picture of the medical scheme industry in SA using 2008 data:

- Sixteen percent of the population was covered by medical schemes and received most of their health care in the private sector. This group spent approximately R11 300 per person per annum, and this includes medical scheme spending and out-of-pocket payments.

- Sixteen percent of the population used the private sector on an out-of-pocket basis mainly for services from general practitioners and retail pharmacies, but were mostly dependent on the public sector for hospital care. For this group, in 2008, nearly R2 500 was spent per person per year. (This amount includes out-of-pocket payments to private primary care providers and government spending on hospital care).
- Sixty-eight percent of the population depends on the public sector for all their health care services. For this group, less than R1 900 was spent per person per annum for government primary care and hospital services.

The Council for Medical Scheme report for 2009 (CMS, 2010:157) states that an overall decline of 7.6% in the total number of medical schemes was observed when comparing 2008 to 2009. There were, for example, 144 schemes in 2000 and only 110 in 209. Furthermore, the number of registered medical schemes decreased from 105 in January 2010 to 99 in January 2011, a 5.7% decrease (CMS, 2011:35).

The number of beneficiaries, however, increased by 2.5% from 2008 to 2009 (CMS, 2010:159). This number increased again by 3.1% to 8 315 718 members in 2010 (CMS, 2011:43).

The decline in the number of medical schemes in SA can largely be attributed to the strict regulations imposed by the Medical Schemes Act, according to Pearmin (2000:2). Private financing of health care in South Africa dates back to 1889, and the Medical Schemes Act was introduced in 1967. Changes to the Act in 1993 were of a deregulatory nature, and included (Pearmin, 2000:2):

- No more compulsory direct payment to providers of services
- The cancellation of the statutory status of the Representatives Association of Medical Schemes (RAMS) as well as the scale of benefits
- The structuring of benefits and level of cover by schemes as they deemed appropriate
- Allowing schemes to operate pharmacies, hospitals and similar health care facilities

Effects of the 1993 deregulation, according to Pearmin (2000:20), were:

- The elderly received a decrease in benefits.
- Benefit structures attracted the young and healthy.
- High-risk individuals and groups were discouraged by higher premiums due to their higher risk profile.

The 1998 New Medical Schemes legislation proposed to solve these challenges by:

- Introducing a prescribed minimum benefits package for all medical schemes
- Discontinuing discrimination on the basis of age, medical history and health status (except on certain prescribed conditions)
- Ensuring that contributions were calculated only on the basis of income and/or number of dependents (depending on the scheme plan and option)
- Allowing schemes and public hospitals to agree to arrangements for the provision of minimum benefits to its members with payment for hospital
- Regulating outsourced scheme contractors e.g. brokers, managed health care organisations (MHOs), administrators and clearing houses (Medical Schemes Act 131 of 1998).

The new Medical Schemes Act and its accompanying regulations came into force on 1 January 2000. Some positive feedback was received from the WHO, who stated that "HIV-positive members of medical schemes now have access to subsidised care, including drugs for opportunistic infections, whereas previously they were excluded or their entitlement was limited" (WHO, 2000:126)

From sections 2.3.2.1 and 2.3.2.2 it can be seen that there is a vast difference in quality and number of resources allocated to private versus public health care services in South Africa. In order to regulate private health care, the SA government has imposed requirements such as prescribed minimum benefits (PMBs) to give private health care users coverage for a range of diseases. (PMBs are described further in paragraph 2.6.2). The government is now also in the process of reforming the public health sector and wants to integrate it with the private health care sector in order to establish a global health care providing system (National Health Insurance system) for all.

Health care is a very broad term and needs to be qualified. Section 2.4 highlights the categories of health care and more specifically focuses on the pharmaceutical component of health care, or medication, as that is the main focus of this study.

2.4. Reimbursement systems

2.4.1 International reimbursement structures

Health care cost is a major financial outlay for most countries. Decision makers in the health care environment are increasingly being expected to minimise expenditures while ensuring improvements in health care access and quality of care. International comparisons among health care systems may provide useful insight in solving these challenges (Anell & Willis, 2000:770).

According to the WHO, health care systems are not implemented successfully in many countries, as nearly 2 billion people (a third of the world's population) do not have access to essential medicines (WHO, 2010a). In low-income and middle-income countries, medicine constitutes 20-60% of health care costs, and 50-90% of these costs are paid out-of-pocket by patients.In Latin America, the average coverage of health insurance is 35%. This figure is 10% in Asia and less than 8% in Africa (WHO, 2010a). Medication costs are deemed one of the factors contributing to the limited access to medicines (WHO, 2010b).

Faden *et al.* (2010:1) shares this sentiment and also states that health insurance systems have the power to improve the cost-effective use of medicines by encouraging better provider prescribing habits and more cost-effective use by patients as well as by negotiating lower prices from industry. This should lead to more accessibility, which is the overall goal of all health care systems. The way in which insurance systems can improve access, according to Faden *et al.* (2010:3), is illustrated by Figure 2.4.

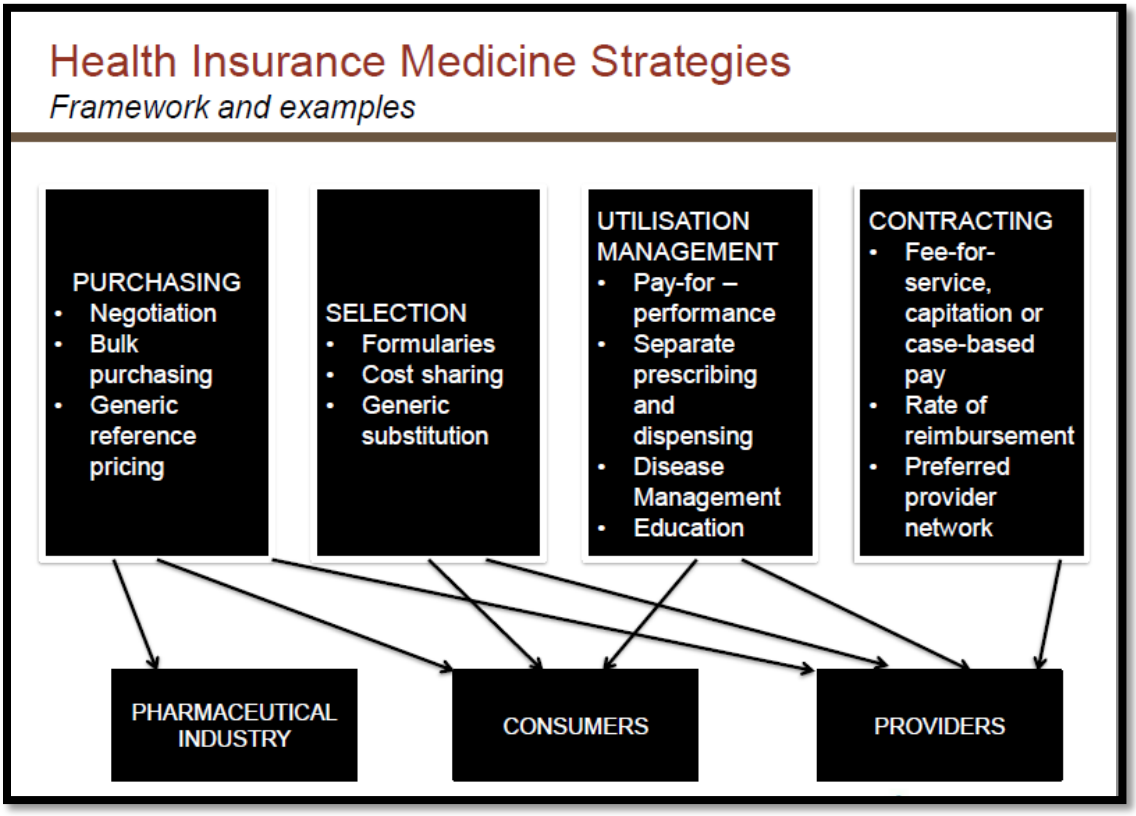

Figure 2.4: Health insurance strategies to improve access (adapted from Faden *et al*., 2010:3)

According to Figure 2.4, the process of purchasing pharmaceutical products, regulating the choice of products by formulary, regulating health care providers' service fees and having a wide network of such providers available all contribute to the success of a health insurance system.

The Commonwealth Fund published a document in 2008, comparing various aspects of health care plans of several European countries (Commonwealth Fund, 2010). Table 2.8 summarises some of its findings concerning health care structures in the Netherlands, Sweden and the United Kingdom.

Table 2.8: Comparison of health care systems between the Netherlands, Sweden and the United Kingdom

Country	Netherlands	Sweden	UK
Cover of services	• Since 2006, all residents/income tax payers are required to purchase health insurance coverage. • Coverage is statutory under the Health Insurance Act (Zorgverzekeringswet/ ZVW) but provided by private health insurers and regulated under private law. The uninsured proportion of the population is estimated to be 1.5%. • Insurers are legally required to provide a standard benefits package covering: medical care, including care by general practitioners (GPs), hospitals and midwives; hospitalisation; dental care (up to the age of 18); medical aids; medicines; maternity care; ambulance and patient transport services; paramedical care (limited physiotherapy/ remedial therapy, speech therapy, occupational therapy and dietary advice). • In addition to the	• Coverage is universal. All residents are entitled to publicly-financed health care. • There is a maximum amount to be paid out-of-pocket for publicly financed care in a 12-month period. • Children are exempt from cost-sharing for health services.	• Coverage is universal. All those 'ordinarily resident' in the United Kingdom are entitled to health care that is largely free at the point of use. • The National Health Service (NHS) covers preventative services; inpatient and outpatient (ambulatory) hospital (specialist) care; physician (general practitioner) services; inpatient and outpatient drugs; dental care; mental health care; learning disabilities; and rehabilitation. • The following are exempt from prescription drug co-payments: children under the age of 16 years and those in full-time education aged 16, 17 or 18; people aged 60 years or over; people with low income; pregnant women and those having had a baby in the last 12 months; people with certain medical conditions and disabilities.

	standard benefits package, all citizens are covered by the statutory Exceptional Medical Expenses Act (AWBZ) scheme for a wide range of chronic and mental health care services • Most people also purchase complementary private health insurance for services not covered by the standard benefits package.		
Cover: cost sharing	• The insured pay a flat-rate premium (set by insurers) to their private health insurer. • Out-of-pocket payments as a proportion of total health expenditure are around 8% (WHO, 2007b).	• There are cost-sharing arrangements for most publicly-financed services. • Out-of-pocket payments accounted for 13.9% of total health expenditure in 2005 (WHO, 2007b).	• There are few cost-sharing arrangements for publicly-covered services. Drugs prescribed by general practitioners are subject to a co-payment but about 88% of prescriptions are exempt from charges • Out-of-pocket payments accounted for 11.9% of total expenditure on health in 2005.
System financed by:	• *Statutory health insurance*: The statutory health insurance system (ZVW) is financed by a mixture of income-related contributions and premiums paid. • *Private health insurance*: Substitutive private health insurance	• *The publicly-financed system*: Public funding for health care mainly comes from central and local taxation. • *Private health insurance*: About 2.5% of the population is covered by supplemental private	• *National Health Service (NHS):* The NHS accounts for 86% of total health expenditure. It is mainly funded by general taxation (76%), but also by national insurance contributions (19%) and user charges (5%).

	was abolished in 2006. Most of the population purchase a mixture of complementary and supplementary private health insurance from the same health insurers who provide statutory coverage.	health insurance. • In 2005 private health insurance accounted for less than 1% of total expenditure on health (WHO, 2007b).	• *Private health insurance*: A mix of for-profit and not-for-profit insurers provides supplementary private health insurance. Private insurance offers choice of specialists, avoidance of queues for elective surgery and higher standards of comfort and privacy than the NHS. It covers 12% of the population and accounted for 1% of total health expenditure in 2004.
Service Delivery	• *Health insurance funds*: Insurers are private and governed by private law. They are permitted to have for-profit status. They must be registered with the Supervisory Board for Health Insurance (CTZ) to enable supervision of the services they provide under the Health Insurance Act and to qualify for payments from the risk equalisation fund. • *Physicians*: Physicians practice directly or indirectly under contracts negotiated with private health insurers. GPs receive a capitation payment for	• *Government*: The central government determines the health system's overall objectives and regulation, while local governments determine how services are to be delivered based on local conditions and priorities. As a result, the organisation of the delivery system varies at the local level. • *Primary care*: Most health centres are owned and operated by county councils, and general practitioners and other staff are salaried employees • *Hospitals*: Almost all hospitals are owned and	• *Government*: Responsibility for health legislation and general policy matters rests with Parliament at Westminster. The NHS is administered by the NHS Executive and the Department of Health • *Physicians*: General practitioners (GPs) are usually the first point of contact for patients and act as gatekeepers for access to secondary care services. Most GPs are paid directly by primary care trusts (PCTs) through a combination of methods: salary, capitation and fee-for-service. • *Hospitals*: These are

	each patient on their practice list and a fee per consultation. • *Hospitals*: Most hospitals are private non-profit organizations.	operated by the county councils. There are no private wings in public hospitals. • Hospitals have traditionally had large outpatient departments, reflecting low levels of investment in primary care. Physicians and other hospital staff are salaried employees.	organized as NHS trusts directly responsible to the Department of Health. • *Private insurance funds*: Private insurers provide their subscribers with health care at a range of private and NHS hospitals. Patients generally can choose from a number of health care providers.
Quality of service delivery	• At the health system level, quality of care is ensured through legislation. A national inspectorate for health is responsible for monitoring and other activities. The main methods used to ensure quality in institutions include accreditation and certification; compulsory and voluntary performance assessment based on indicators; and national quality improvement programmes based on the breakthrough method. Patient experiences are systematically assessed and, since 2007, a national centre has been working with validated measurement instruments comparable	• At the national level, the Swedish Council on Technology Assessment in Health Care (SBU) and the National Board of Health and Social Welfare support local governments by preparing systematic reviews of evidence and guidance for priority setting respectively. • At the local and clinical level, medical quality registers managed by specialist organisations play an increasingly important role in assessing new treatment options and providing a basis for comparison across providers.	A number of bodies monitor and assess the quality of health services from public and private providers. This involves regular assessment of all providers, investigation of individual providers where an issue has been drawn to the attention of the regulatory body, and consideration of key areas of provision in order to recommend best practice.

	to the CAHPS approach in the United States. The centre also generates publicly-available information for consumer choice.		

When analysing the summary provided by Table 2.8, it is clear that there are basically three types of health care systems:

- A “national” type health service where universal coverage is publicly financed through taxation and health care delivery is performed by publicly owned systems and professionals paid by the public sector
- An entrepreneurial health care model where people voluntarily purchase medical cover (employment-based or individual), and the providers and health care facilities are largely in the private sector
- A compulsory mandated insurance model, where universal coverage is publicly financed and health care is delivered by both public and private entities

Comprehensive or broad comparisons between different health care systems often do not lead to conclusive results (i.e. which system is the best performing one). However, Anell and Willis (2000:770) propose that measuring resources available in a health care service setting like human resources, medicines and medical equipment is often more valuable than measuring expenses or cost efficiencies alone.

A handy comparison by Dougherty (2008:1-2), a member of a project for different international health care systems called “Insured the Uninsured” (ITUP), is displayed in Table 2.9 and 2.10 and compares similar parameters for selected countries.

Table 2.9: International health care systems comparison (Dougherty, 2008:1-2)

	Government Control	Role of Government	Physician Financing	Hospital Financing	Cost Containment	Current Challenges
Australia	Moderate	National funding, states regulate public insurance and public delivery	Unregulated fee for service	State-set budget	Cost/benefit assessment of technology	Access limitations in certain regions
Canada	Extensive	Federal oversight and some funding, provinces fund and deliver care	Fee-for-service within a budget cap	Global operating budget	Rationing care, budget caps	Major access limitations
France	Moderate	Negotiates fees, regulates insurance, subsidises poor	Mainly private fee for service, salaried in public hospitals	Rates set by government	High co-payments	Disparity in quality and distribution of services
Germany	Moderate	National oversight, states regulate insurance, fees and public delivery, subsidise poor	Regional group/office-based doctors negotiate fees, hospitalists and specialists mostly salaried	Negotiate annual budgets with public insurers	Hospital budget caps, DRGs, limitations on pharmaceuti-cals	Preventive care, decrease in plan choices from mergers
Japan	Moderate	Sets all prices, regulates insurance, subsidises poor	Mostly fee for service	Rates set by government	Comparatively low prices	Overuse, aging population
Netherlands	Low	Enforces mandate, balances risk-pool, subsidises poor	Negotiate fee for service with insurers, hospitalists salaried	Market-based rates	Competition, risk equalization	Rising costs, quality issues
Sweden	Extensive	National oversight, counties regulate all prices and delivery	Public salary or capitated rate	Global operating budget	DRGs, cost/benefit assessment, rationing care	Access limitations, rising costs
Switzerland	Low	National oversight, local cantons set all prices,	Mostly fee for service	Public subsidies, canton-negotiated	Limited risk-adjustment, managed care	Costs, overuse, lacking consumer

		regulate public delivery, subsidise poor		rates		info
UK	Extensive	Regulates supply, pays all providers, sets all prices	Public salaries and contracts	Global operating budget	Cost/benefit assessment of technology, low overhead	Rising costs, access limitations

Table 2.10: International health care systems comparison - continued (Dougherty, 2008:1-2)

	% of Population Covered	Health Costs, % of GDP	% of Health Spending, Public Sources	System Structure	Main Sources of Financing	Insurance System
Australia	100	8.8	67.0	Public and private providers and plans	General tax revenues and private premium	Automatic public plans, private supplementary plans (43% of pop. purchases)
Canada	100	10.0	70.0	Private hospitals and MDs, gov't reimburses, public plan	General tax revenues	Automatic public plans, private plans illegal
France	100	11.1	80.2	Public and private providers, gov't reimbursement, public plans	Payroll tax (13% of income from employer, 0.75% employee), income taxation (5.5%)	Mandated public plans, private supplementary plans (87% of pop. purchases)
Germany	99.8	10.6	76.4	Private MDs and hospitals, private plans	Payroll tax (14% of income shared by employee and employer), income taxation	Mandated plans, alternative private plans (15% of pop. purchases)
Japan	100	8.2	81.7	Individual mandate, private/ public hospitals, MDs, plans	Payroll tax, 8% of income shared by employee/employer, limited taxation	Mandated private/public plans
Netherlands	98.5	9.3	81.7	Individual mandate, private hospitals, MDs, plans	Private premium/deductible (with income-based subsidy), limited taxation	Mandated private plans (non-profit), supplementary plans
Sweden	100	9.2	81.5	Decentralised gov't owns hospitals, hires MDs, public plan	General tax revenues	Automatic public plans, alternative private plans (2.3% of pop. purchases)
Switzerland	100	11.3	60.2	Individual mandate, private MDs and plans	Private premium/ deductible (with income-based subsidy, cost is no more than 8% of income), limited	Mandated private plans (non-profit)

					taxation	
UK	100	8.4	86.9	Gov't owns hospitals and hires MDs, public plan	General tax revenues	Automatic public plans, alternative private plans (11% of pop. purchases)
USA	85	15.3	45.8	Private MDs, hospitals and plans, public safety net, private and public coverage is voluntary (except seniors)	Employment-based premiums/ deductibles (variable), payroll taxes and general taxation	Public plans, voluntary private (for-profit and not-for-profit)

From Tables 2.9 and 2.10 it can be deduced that although coverage and spending on health care as a percentage of the GDP are relatively similar in the developed countries discussed, the degree to which private health care is allowed and/or regulated differs. Public health plans, however, are available in all of these countries.

2.4.2. Reimbursement schemes in South Africa

The South African health care system has followed a rather unusual path compared to other developing countries. Medical schemes in the private sector system have become very privatized, whether for individual or organizational health coverage (McLeod, 2007:126).

Medical schemes provide cover for only 7 million people or 14% of the population. For slightly less overall expenditure, public-sector facilities provide care for approximately 40 million people. The private sector is known for high cost escalations and affordability problems for low-income earners and retired people (McLeod, 2007:126)

The President announced the commitment to a social health Insurance scheme in his State of the Nation Address in 2003. In July 2003 the previous Director-General of Health, Dr Ayanda Ntsaluba, described these reforms significant.

In the opening address to the Consultative Forum on Risk Equalisation, Dr Ntsaluba (Department of Health, 2003) described the history of reform as follows:

> In the 1980's, when we started speaking about national health insurance, we were faced with a highly fragmented health care system, with great interprovincial inequalities and an unregulated private health care market contributing to extreme cost escalation in the health sector. When the ANC-led government came to power in 1994, it became clear to us that the problems we inherited would not be addressed by any magic bullet. Instead,

> we established two Committees of Inquiry, and later a departmental task team to advise us on how we should proceed towards our stated objective of achieving universal access to high quality health care services for all citizens. The Committees made various recommendations, but all three shared one common proposal: they proposed that we should move towards mandatory contributions for all citizens, be it national or social health insurance.

According to McLeod (2007:121-126), medical scheme reform was considered from the 1990s, and this resulted in the revised Medical Schemes Act, No. 131 of 1998. The revised act aimed at better governance of medical schemes. It also re-introduced three strategic policy issues regarding risk pooling:

- Open enrolment: open medical schemes have no choice but to accept anyone who wants to become a member at standard rates
- Community-rating: everyone must be charged the same standard rate, regardless of age or state of health (charging according to risk profile is banned)
- Prescribed minimum benefits (PMBs): a minimum package that is compulsory and has to be offered by all schemes. Beneficiaries must be covered in full for these conditions with no limits or co-payments. The PMB package is a list of 270 diagnosis-treatment pairs (DTPs) primarily offered in hospital (introduced January 2000); all emergency medical conditions (defined January 2003); diagnosis, treatment and medicine according to therapeutic algorithms for 26 defined chronic conditions on the Chronic Disease List (CDLs), introduced January 2004 (McLeod, 2007:121-126).

In South Africa, reimbursement schemes are therefore limited to the private sector. Typical rules include a contribution, which entitles the member to certain benefits (both hospital and day-to day care). For the purpose of this study, the 2013 benefits of one of the largest open medical schemes in SA is used as an example to describe typical benefit structures. This is illustrated in table 2.12.

According to the Council for Medical Schemes Report (CMS, 2011:177), the top ten medical schemes according to membership are listed in Table 2.11.

Table 2.11: Top 10 largest medical schemes in SA according to membership

Scheme	Membership	Open/Restricted
Discovery Health Medical Scheme	2 171 742	Open
Government Employees Medical Scheme (GEMS)	1 335 772	Restricted
Bonitas Medical Fund	628 542 8	Open
South African Police Service Medical Scheme (POLMED)	475 882	Restricted
Medihelp	237 282	Open
Bankmed	201 250	Restricted
Medshield Medical Scheme	193 636	Open
Fedhealth Medical Scheme	172 030	Open
Liberty Medical Scheme	170 008	Open
Momentum Health	168 060	Open

One of the largest open medical aid schemes' benefit structure is listed below in Table 2.12. As no individual scheme is analysed and identified in this study, the name of the scheme and scheme website address has been withheld.

Table 2.12 gives an example of a typical benefit structure of a private medical scheme in SA. It can be seen that there are three options, namely a "high", "medium" and "low" option. The option with the highest medical scheme contribution has more/ higher maximum benefits than, for example, the primary option. All options cover PMB conditions, but other chronic conditions are limited and also subject to formularies. It can also be seen that the Designated Pharmacy Service Provider this scheme is a mail order pharmacy called Pharmacy Direct. Limits also apply on all options for day-to-day benefits.

Table 2.12: Benefit structure of a large medical scheme for 2013 (Unidentified medical aid scheme's website)

HIGH OPTION		MEDIUM OPTION		PRIMARY CARE OPTION	
IN HOSPITAL BENEFIT		**IN HOSPITAL BENEFIT**		**IN HOSPITAL BENEFIT**	
150% Scheme Rate		100% Scheme Rate		100% Scheme Rate	
No Overall Annual Limit		No Overall Annual Limit		R1,000,000 per family per annum	
Co-payments apply for certain procedures		*R340 Take Home Medicine		Co-payments apply for certain procedures	
*R275 Take Home Medicine		**Annual Sub-limits:**		*R275 Take Home Medicine	
Annual Sub-limits:		Oncology	R 250,000	**Annual Sub-limits:**	
Oncology	R 250,000	Psychiatric Treatment	R29,500	Oncology	R 120,000
Psychiatric Treatment	R 23,500	Hospice Care	R12,000	Psychiatric Treatment	R11,500
Hospice Care	R 12,000	**CHRONIC MEDICATION BENEFIT**		Hospice Care	R12,000
CHRONIC MEDICATION BENEFIT		**100% Scheme Rate**		**CHRONIC MEDICATION BENEFIT**	
150% Scheme Rate		27 PMB Chronic Disease Conditions		**100% Scheme Rate**	
27 PMB Chronic Disease Conditions		Add. 16 Chronic Disease Conditions		27 PMB Chronic Disease Conditions	
Subject to scheme formulary, only from Pharmacy Direct		**Annual limit:**		Subject to scheme formulary, only from Pharmacy Direct	
ANNUAL DAY TO DAY BENEFIT (including savings)		Single	R 7,000	**ANNUAL DAY TO DAY BENEFIT (including savings)**	
100% Scheme Rate		Per Family	R 14,000	100% Scheme Rate	
Limits per annum:		**ANNUAL DAY TO DAY BENEFIT (including savings)**		**Limits per annum:**	
Member	R 2,868	100% Scheme Rate		Member	R 1,500
Member +Spouse	R 5,088	**Limits per annum:**		Member + 1	R 2,750
Member +Spouse +Child 1	R 5,952	Member	R 3,300	Member + 2	R 3,200
Member +Spouse +Child 2	R 6,816	Member + 1	R 5,000	Member + 3	R 3,500
Member +Spouse +Child 3	R 7,680	Member + 2	R 5,400	Member + 4 +	R 3,800
Member +Child 1	R 3,732	Member + 3	R 5,800	**Network GP Limit:**	
Plus Basic Dentistry		Member + 4 +	R 6,200	Member	R 1,400
ANNUAL THRESHOLD BENEFIT		**Network GP Limit:**		Member + 1	R 2,700
Does not apply		Member	R3, 000	Member + 2	R3, 100
MONTHLY CONTRIBUTIONS		Member + 1	R 4, 500	Member + 3	R3, 400
Principal Member	R 1,406	Member + 2	R 4, 900	Member + 4 +	R3, 800
Spouse/Adult dependant	R 1,089	Member + 3	R 5,200	Plus basic Dentistry and Optometry	
Per Child	R 422	Member + 4 +	R 5, 600	**ANNUAL THRESHOLD BENEFIT**	
		Plus basic and advanced Dentistry and Optometry		Does not apply	
		ANNUAL THRESHOLD BENEFIT		**MONTHLY CONTRIBUTIONS**	
		Does not apply		Principal Member	R 1,274
		MONTHLY CONTRIBUTIONS		Spouse/Adult dependant	R 997
		Principal Member	R 1,973	Per Child	R 406
		Spouse/Adult dependant	R 1,707		
		Per Child	R 577		

2.5. Health care types

The WHO (1948) defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”.

A health system focuses on the health of people and consists of many components (World Bank, 2007:1). The functions of a health care system are service provision, and also regulation, policy creation and management of resources (human or medical products such as medication or equipment). It is the responsibility of, among others, ministries of health, health care providers and organisations, pharmaceutical companies and health care funders. A health care system influences the lives of patients and their families in the broader community (World Bank, 2007:1).

Marmor and Wendt (2012:11) define health care as “the work that patients, doctors, nurses, druggists, and hospitals do when facing real or feared illness”.

Berry and Mirabito (2010:157-159) describe the basic functions of a health care system as including primary care, doctors’ visits, inpatient treatments and tests (ambulatory care) as well as emergency treatment. He also summarises the advantages and disadvantages of these services as portrayed in Table 2.13.

According to Table 2.13, health care is performed by a number of systems. This includes disease prevention as well as health care promotion, emergency care, ambulatory care (both for simple and more complex conditions), inpatient care for single limited inpatient conditions, inpatient care for complex multiple inpatient conditions, long term care, services for social and psychological conditions, rehabilitation services (both inpatient and ambulatory), dental services and pharmaceutical services.

Table 2.13: Most commonly utilised health care services (adapted from Berry *et al.*, 2010:159)

	Physician office visit	Retail Clinic	Urgent Care Clinic	Emergency Department
Features	Physicians consult with patients, conduct minor tests and provide ambulatory care. Most common method for delivering primary health care.	Delivery of limited range of services provided by nursing practitioners.	Broad range of services provided by family physicians.	Management of trauma, serious illness, disasters. Safety nets for patients lacking primary care.
Advantages	First contact access, comprehensive approach. Co-ordinated and personal care.	Convenient, walk-in service. Price transparency.	After hours, broad range of services. Less costly	Broad range of services guaranteed for all.

			than emergency services.	
Drawbacks	Delays to get appointment, shortage of physicians and limited hours. Many practices not open to uninsured/government insured patients.	May disrupt patient-physician relationship. Not always available in low-income areas. May lead to patients seeking unneeded care rather than looking after themselves.	May disrupt patient-physician relationship	Overcrowding, long waiting periods, high costs.

By dividing health care into four broad categories, namely primary care, ambulatory care, hospital care and pharmaceutical care, it is possible to define and describe expectations for each of these divisions within health care according to internationally acceptable standards:

2.5.1. Primary care

According to the WHO's Primary Care Division (WHO, 2010), the main goal of primary health care is better health for all. The five elements needed to achieve this goal are:

- reducing exclusion and social disparities in health (universal coverage reforms)
- organizing health services around people's needs and expectations (service delivery reforms)
- integrating health into all sectors (public policy reforms)
- pursuing collaborative models of policy dialogue (leadership reforms)
- increasing stakeholder participation

Although primary care is often seen as the patient's first contact with a general practitioner (GP), Jesson and Wilson (2003:253-261) notes that primary care centres including GPs, dentists, nurses, psychologists and also pharmacists have been noted as a trend in health care.

In South Africa, the concept of primary health care (PHC) emerged during the 1970s when health care concepts began to change generally and specifically in relation to the developing world (third-world countries) (Schaay & Sanders, 2008:4). The development of community-orientated primary care in South Africa led to more focus on outreach beyond hospitals to more outlying health centres. This even reached out as far as individual households.

In the Department of Health's 10-point plan as part of its strategic objectives (Department of Health, 2010b:24), revitalisation of primary health care entails completion of the audit of primary health care infrastructure and services, acceleration of infrastructure delivery of primary level facilities, and refurbishment and preventative maintenance of all hospitals. The plan is that "district teams" are to be appointed to manage the primary health care facilities in each of the 52 districts (Department of Health, 2010b:31).

Schaay *et al*. (2011:4) state that the primary health care system in SA has failed to reach several goals and standards over the past years and describe the envisaged primary health care re-engineering as follows (Schaay *et al*., 2011:11):

- Greater focus on the delivery of community-based services, with an emphasis on disease prevention, health promotion and community participation. This will not only cure but also prevent. These outreach activities are to be performed by a primary health care outreach team consisting of nurses and community health workers, who are supported by facility-based and specialist support teams of health professionals.
- Greater attention will be given to those factors outside the health sector that impact on health (social factors influencing health).

2.5.2. Ambulatory care

Stedman's Medical Dictionary (2005:57) describes ambulatory care as "medical or surgical health treatment provided during an episode of care that does not require an overnight stay in a medical facility and from which the patient goes home; outpatient rather than inpatient care".

According to Eggli *et al.* (2006: 36), ambulatory care is a growing avenue for health care in Switzerland, and there is a growing need for information about the cost and the quality of care to be made more widely available. There is also a need for performance measurement systems for ambulatory care in this country.

In Taiwan, the total ambulatory care was a cost driver in the health care system, with expenditure amounting to 66% of the total medical expenses. In the same year, inpatient care cost the country 34% of total medical expenses (Yeh *et al*., 2005:336).

In a study in the US performed by Trivedi *et al.* (2010:328) increasing copayments for ambulatory care reduced the use of outpatient care among elderly patients in managed-care plans. However, this decline was offset by an increase in hospitalisations. These expensive hospitalisations were particularly prevalent among beneficiaries with low socioeconomic status

and those with chronic disease. Increasing copayments for ambulatory care among elderly patients may therefore be seen to have negative health consequences and may increase spending for health care (Trivedi *et al*., 2010:328).

Ambulatory or outpatient care is therefore an important part of the health care provision chain, as it is more advanced than primary care, but it can still screen and prevent or recommend patients being admitted to hospital for inpatient care. Cost of ambulatory care, however, seems to be high in the instances mentioned.

Harris *et al*. (2011:111) state that in South Africa, primary health care is mostly utilised by lower income and education groups, while the rich are three times more likely to use private hospitals and private ambulatory care like GPs and dentists.

Peltzer (2009:1) agree that primary health care is the most frequently used system in SA and mention that, in many areas of South Africa, the primary health care (PHC) facilities are the only available or easily accessible health service for local communities. PHC services are therefore often overburdened.

2.5.3. Hospital care

According to Chen *et al*. (2010:340), high and growing hospital costs are a reality. Hospitals are therefore under more pressure to lower cost of care and still improve quality of care.

In a study by Wier *et al*. (2010:2) it was found that the top 10 conditions in US hospitals that generated the most rapid increases in total hospital costs from 2001 to 2007 amounted to $48.6 billion. This represents 14.2% of the costs of all hospitalisations in 2007. Many chronic conditions with high add-on costs and frequent hospitalisations like heart disease, cancer, stroke and diabetes were not even among these top 10 conditions (Wier *et al*., 2010:2). According to their study, “As health care costs continue to rise and the population ages, policy makers are increasingly concerned about the growing burden of hospital-based medical care expenses on the government, tax payers, consumers, and employers” (Wier *et al*., 2010:1).

The study also found that, from 2001 to 2007, inflation-adjusted hospital costs grew by 24.6%. From 2001 to 2007, there was a 17.2% rise in mean costs per stay and a 6.3% increase in the number of hospital discharges in the United States.

Hospital care is a big cost driver in health care systems, as can be deduced from the examples discussed. In the Council for Medical Schemes report for 2010, hospital care consumed 37% of

all health care costs, making it the number one expenditure in the SA private health care sector (CMS, 2011:161).

When comparing hospital costs in the private and public sector using Council for Medical Schemes (CMS) data, Schussler (2008:23) found that the total cost per admission into private hospitals increased by 22.1% from 2001 to 2006, and the total cost per admission into public hospitals from 2001 to 2006 increased even more, by 57.7%.

Hospital costs, however, are just one of the components of health care that have increased over the past years in SA. Schussler (2008:22) discusses changes in health care costs when compared to Consumer Price Inflation (CPI) and found that, when comparing price increases from 2000 to April 2008, medical schemes had the highest increase (158% to CPI), followed by doctors (which includes nursing fees) at 137% over the total period. Optician fees increased by 87% and private hospital inflation were 74%. Overall Consumer Price Index (CPIX) was relatively lower at 64%, whilst public hospitals inflation was only 13%.

Litvak and Bisognano (2011:76) found that the new Affordable Care Act in the US will likely have the net effect of a large influx of new patients who have health insurance, including many who are likely to be older and sicker than current patients. At the same time, hospitals may face greater financial pressure than ever before. They further proposed that US hospitals will need to become more efficient in order to lower costs, and the activities suggested to achieve this include (Litvak & Bisognano, 2011:77):

- Reducing patient length of stay (LOS)
- Expanding hospital capacity
- Expanding staff
- Increasing bed occupancy

Quality of hospital care is also an important element to measure, and effective hospital management can incur cost savings. In South Africa, there are three big national private hospital groups namely Netcare, Mediclinic and Life Healthcare. These groups have made an effort to retain quality but cut costs by methods such as implementing formularies for hospital medication and consumables.

Chang *et al*. (2004:491-492) describe several input factors that were taken into consideration when determining the quality of hospital care in Taiwan:

a. Number of patient beds (including general beds, special treatment beds, psychiatric beds, chronic beds, tuberculosis beds and leprosy beds)
b. Number of doctors and physicians
c. Number of nurses (including registered professional nurses and registered nurses)
d. Number of medical support personnel (including pharmacists, assistant pharmacists, medical technologists, medical technicians, medical radiological technologists, midwives and dieticians)

The three outputs considered were:

a. Number of patient days which include general care, acute and intensive care, and chronic care patient days
b. Number of ambulatory and emergency clinic visits
c. Number of patients receiving surgery

There are various ways of measuring the cost effectiveness of hospital care, but this does not fall within the scope of this study. The focus will rather be on the pharmaceutical component of medical care.

According to calculations by Econex (2010b:5), South Africa currently has 211 private hospitals (about half as many as the public hospitals), representing a total of just more than 34,000 hospital beds (compared to 87,870 beds in the public sector).

Occupancy in hospital beds in South Africa is discussed by Childs (2009:51-53) who modeled occupancy rates of 2007 and found that there is a 20.1% probability to find a private hospital 60-69% full of patients on any given day, and a 3.4% chance of finding it 100% occupied. Increasing hospital occupancy will have significant effects on the distribution of hospital occupancy.

Based on Childs' model, increasing overall 2007 occupancy levels by 20% will increase the chances of finding a hospital operating at maximum capacity (over 80% full) to 41%. The model further indicates that there will be a 15% probability of a hospital being 100% full, i.e. 3 out of every 20 people will arrive at a hospital with no beds available.

Matesebula and Willie (2008:156) found that Gauteng has the highest number of private hospital beds followed by the Western Cape, with the least number of beds located in the Northern Cape. The Free State is has several mine hospital facilities. The hospital beds at these

facilities are, however, not always available to the general public, according to Matesebula and Willie (2008:156).

When comparing private hospital distribution to the distribution of medical scheme beneficiaries per province using data for 2008 from the Hospital Association of SA (HASA) and the Council for Medical Schemes (CMS), it is found that the pictures are almost identical. Figures 2.5 and 2.6 indicate that where the most members of medical schemes reside, the most private hospital facilities are also available.

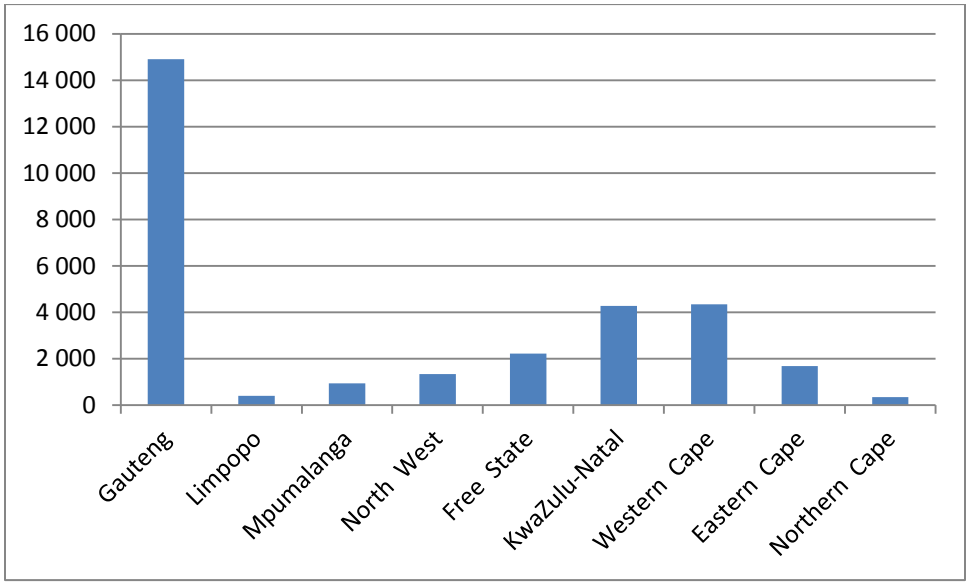

Figure 2.5: Private hospital beds per province (2008) (adapted from HASA, 2009:15)

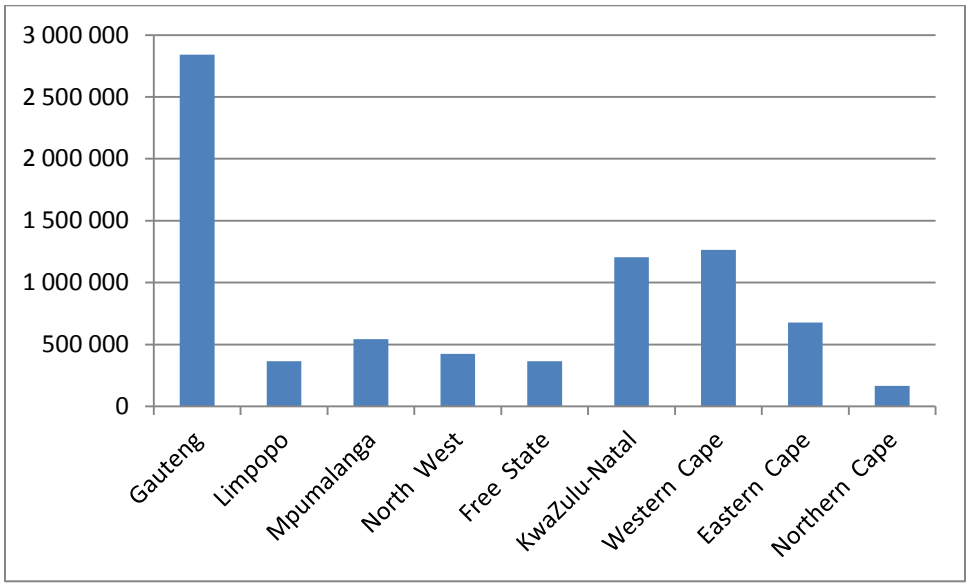

Figure 2.6: Medical scheme beneficiaries per province (2008) (adapted from HASA, 2009:15)

According to web-based data by the Health Systems Trust (2012a), the number of hospital beds in 2010 did not differ much from 2006 and 2008 as shown in Figures 2.5 and 2.6.

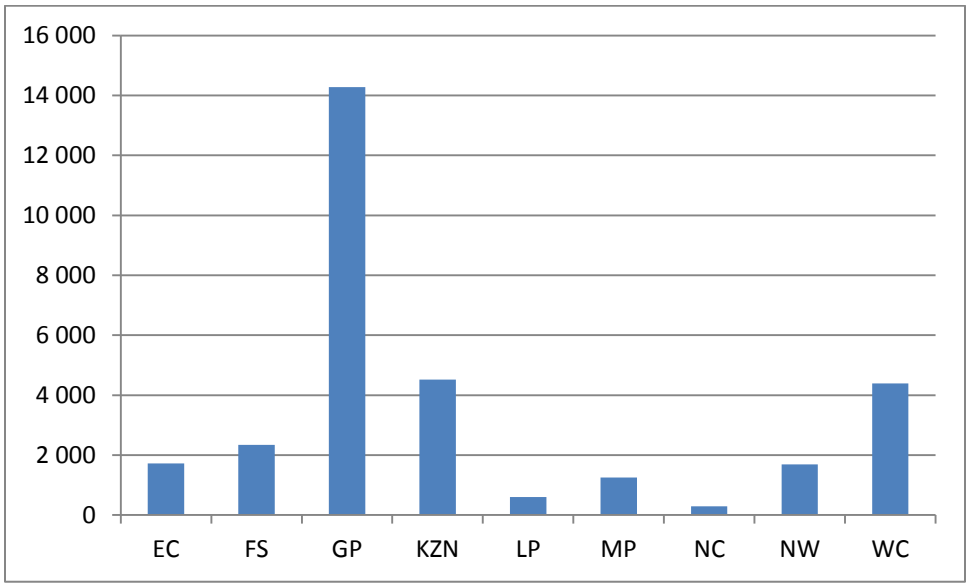

Figure 2.7: Number of private hospital beds per province in 2010 (Health Systems Trust, 2012a)

From the figures discussed, it would seem that medical scheme beneficiaries and hospital beds are related. Gauteng constantly had the most hospital beds (and also members belonging to medical schemes), followed by Western Cape and KZN.

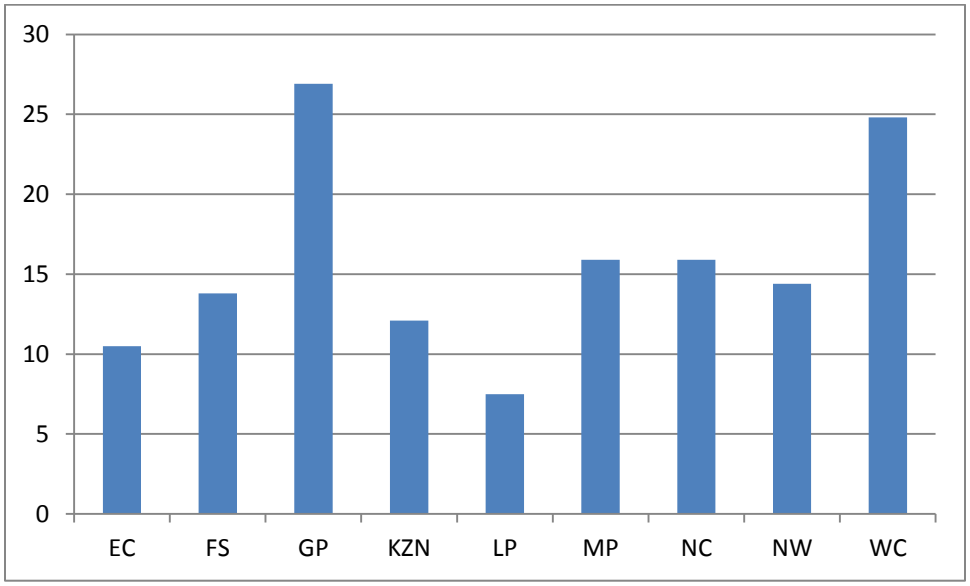

Figure 2.8: Medical scheme coverage per province in 2010 (Health Systems Trust, 2012b)

The 2010 medical schemes data in Figure 2.8 refer to percentage medical scheme coverage within the population. This gives a better reflection of medical scheme coverage as it takes the

number of people residing in the province into consideration. Hospital beds should also correlate to the population in an area and it therefore makes sense that a province such as Gauteng, with a high density population, also has more hospital beds than a province with a smaller population such as the Northern Cape. Figure 2.9 shows the distribution of the South African population per province (Statistics SA, 2012). In this figure it is clear that Gauteng has the highest proportion of the population and Northern Cape the lowest.

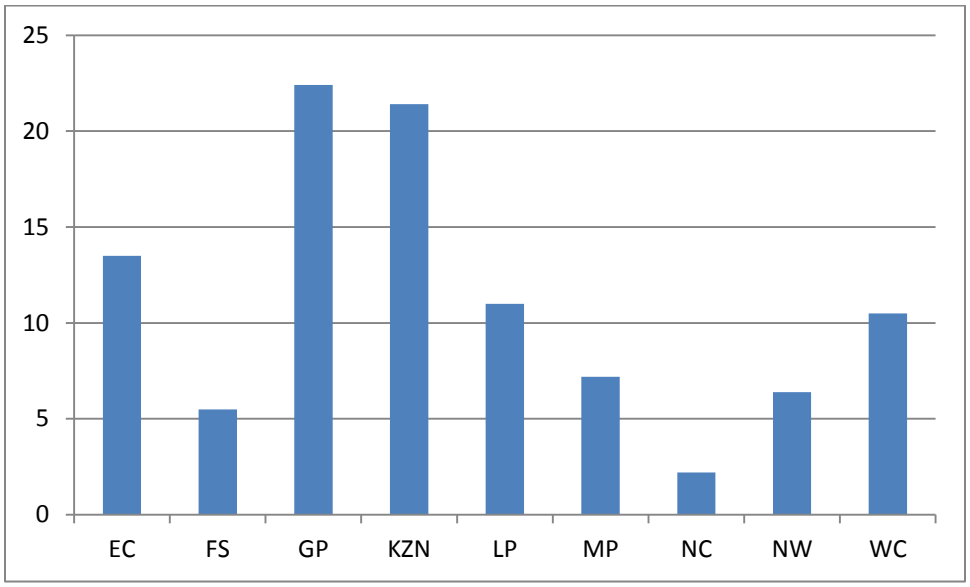

Figure 2.9: distribution of population per province (data from Statistics SA 2012)

2.5.4. Pharmaceutical care

A fourth pillar of health care after primary care, ambulatory care and hospital care is pharmaceutical care.

In 1975, pharmaceutical care was defined by Mikael *et al*. as "the care that a given patient requires and receives which assures safe and rational drug usage" (Mikael *et al.*, 1975:567). Strand *et al*. (1992:13) define pharmaceutical services as "all other services the pharmacist might require for resolving a patient's drug-related problems".

2.5.4.1. Pharmaceutical care in the community

Figure 2.10 expands on this definition by Strand by showing that properly managed pharmaceutical services lead to effective pharmaceutical care, which in turns affects the patients and families in a community.

According to Björkman *et al.* (2008:333), pharmaceutical care is a worldwide movement among pharmacists. The term presents new ideas about how to take care of patients' medication-related needs and has stimulated pharmacists to develop the pharmaceutical profession.

The philosophy of pharmaceutical care encourages pharmacists to practice beyond ensuring that patients receive the right drug in the right dose in the right form at the right time. Pharmacists should now also see to it that medication-related health outcomes are optimized (Hepler & Strand, 1990:533-534).

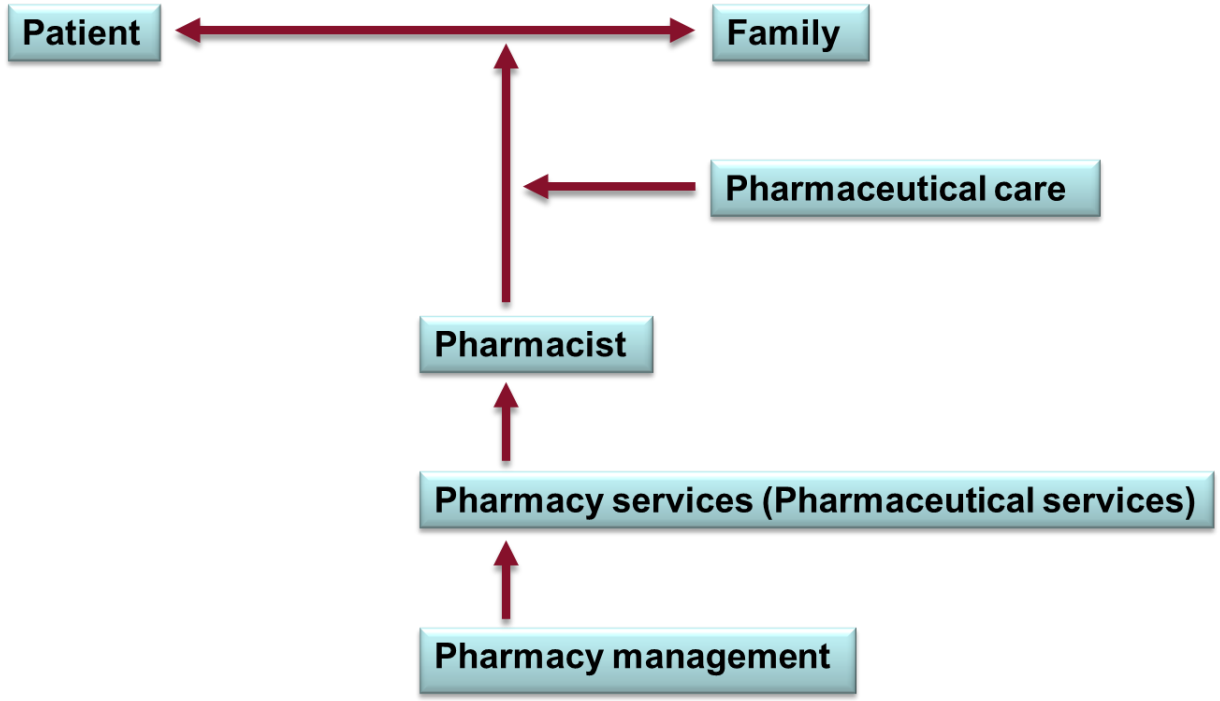

Figure 2.10: Definition of pharmaceutical services (Strand *et al.*, 1991:547)

According to the American Society of Hospital Pharmacists (ASHP, 1993:252), the mission of the pharmacist is to provide pharmaceutical care. Pharmaceutical care is defined as "the direct, responsible provision of medication-related care for the purpose of achieving definite outcomes that improve a patient's quality of life".

The ASHP (1993:252) also lists the following outcomes to be achieved by pharmaceutical care:

- Cure of a patient's disease
- Elimination or reduction of a patient's symptomatology
- Arresting or slowing of a disease process
- Prevention of a disease or symptomatology

Pharmaceutical care therefore also encompasses medication-related care. Some more information on the supply of this medication follows in section 2.5.4.2.

2.5.4.2. Pharmaceutical care (Prescription medication supply)

The Stedman's Medical Dictionary (2005:1118) describes pharmaceutical care as "the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life." Furthermore, the term "pharmaceutical" relates to pharmacy, pharmaceutics or drugs, according to Stedman's Medical Dictionary (2005:1118).

Supply of medication to different geographical areas, patients of different ages and genders will be quantitatively analysed in Chapter 4. Some background on the geographic distribution, age and gender distribution is therefore provided here.

- **Geographic distribution**

Medications are utilised differently across various geographic areas, even across provinces within one country. This could be due to a multitude of factors such as different climates, health care facilities, urbanisation, cultural differences and many more.

Morgan (2005:93) summarises the changes in Canadian provinces' medication spending from 1998 to 2004, and concludes that spending varies across the provinces.

Chong *et al.,* (2011:1) reported that in Australia, even generic substitution rates differ in different areas. Overall, pharmacists recommend generics for 96.4% (1461 out of 1515 tested) of the prescription items which were eligible for substitution. The generic substitution recommendation rate in urban areas (98.7%) and rural areas (98.0%) was significantly higher than in remote areas (91.6%). In contrast, the acceptance of patients in remote areas (84.5%) was significantly higher than rural (78.6%) and urban areas (73.2%). Patients with chronic diseases were not as susceptible to substitution (72.4%), while 81.6% of patients with acute conditions accepted the substitution recommendation. In the areas where patients and health care professionals were more in favour of substitution, the medicine expenditure was reduced by 21% for patients.

According to the Council for Medical Scheme's annual reports, the number of beneficiaries per province in SA was distributed as set out in Figure 2.11 (CMS, 2010:165 and CMS, 2011:161).

Based on Figure 2.11, it is clear that most members belonging to private sector medical schemes are in Gauteng, with the least number of people found in the Northern Cape. This co-incides with the finding of Statistics SA (2011) that Gauteng comprises the largest share of the South African population with approximately 11.19 million people (22.4%) living in this province.

KwaZulu-Natal has the second largest population, with 10.65 million people (21.3%). With a population of approximately 1.10 million people, the Northern Cape is the province with the smallest share of the South African population: only 2.2% of the population resides there.

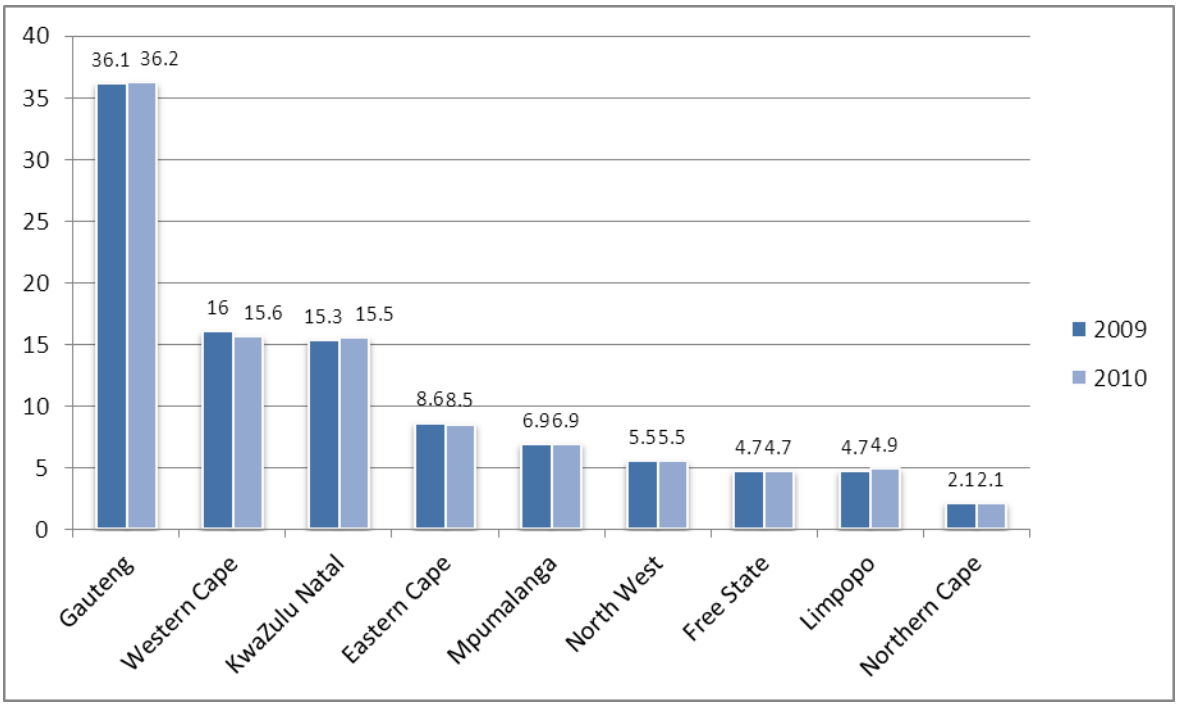

Figure 2.11 Percentage distributions of beneficiaries per province (adapted from CMS, 2010:165 and CMS, 2011:161)

The quantitative investigation in Chapter 4 will test the variances in chronic medication usage per province in South Africa.

- **Age**

Due to age-related increases in the burden of morbidity, older populations are expected to have other and higher medical needs than younger populations (Morgan, 2005:997).

Nolte and McKee (2008:2-3) agree, stating that health care for older persons is linked to chronic disease. Chronic disease is a prominent factor in health care for all ages, but its predominance is especially high for older persons. Because chronic conditions accumulate with time, older people are disproportionately costly users of health care as a result of heavier illness burden.

In a study by Morgan (2005:996-1008) on age-related medication costs in British Columbia, a Canadian province, it was found that medication expenditures per person grew at a rate of 11.6% per annum. Growth in costs was the result of more costly drug selections and increases in the number of same-time treatments received per patient. Morgan found that population aging

did not have a major impact on expenditures. However, expenditure per capita grew the most under residents aged 45 to 64. This leads to the conclusion that there is a direct correlation between increased age and higher medication costs.

Age of members contributes not only to the likelihood of utilising chronic medication but also to the risks of medication and compliance errors. According to Doucette *et al*. (2005:1104) adverse drug events are a frequent and costly consequence of medical errors. Poly-pharmacy among ambulatory patients has been shown to increase the risk of adverse drug events significantly. Older patients (aged older than 65 years) may be more susceptible to poly-pharmacy because they are more likely to have aggregate chronic medical conditions requiring multiple pharmacological treatments. More than 75% of older patients reported using more than one prescription medication, and 21% used more than five prescription medications.

Roe *et al.* (2002:302) are of the opinion that "[b]ecause poly-pharmacy is so common in this group, older adults have an increased risk of having an adverse drug event due to use of a potentially inappropriate medication".

Shiyanbola and Farris (2010:245) agree that adverse drug events can be especially problematic in aged patients. These adverse events can often be prevented by detecting potential risk factors. Concerns and beliefs about medicines (sociopsychological factors relating to patients' anxieties about the harmful effects of prescribed medications) are included in these risk factors.

Morgan (2005:999) also found that expenditures per capita vary significantly with age. He found that expenditures per capita more than doubled each step along the age gradient through to the category aged 65 to 84. Residents aged 85 and older had slightly lower drug expenditures per capita than the cohort of 65 to 84 years. This is due to the fact that, although the elderly use higher quantities of medication and are growing in number, they make out a relatively small proportion of the population. Due to the larger size of the baby boomer generation, the group aged 45 to 64 accounted for most of the population-wide change in expenditures. This age group also accounted for the largest portion of the population.

From the age-related studies discussed, it is clear that a higher age is often associated with higher medication costs, albeit because of increased dosage, number of items or cost incurred due to adverse side effects.According to the Mediscor Medicines Review report (Bester & Badenhorst, 2009:10), age is an important factor that impacts on medicine utilisation. They hold that "[a]n increase in age is generally associated with an increase in medicine utilisation and a subsequent increase in total medicine expenditure".

In South Africa, the average age of medical scheme beneficiaries according to the 2008 and 2009 Mediscor Medicines Review for the past five years is illustrated in Table 2.14 (Bester & Badenhorst, 2009:10, Bester & Badenhorst, 2010:12 and Bester & Badenhorst, 2011:8).

Table 2.14: Average beneficiary age in years (adapted from Bester & Badenhorst, 2009:10, Bester & Badenhorst, 2010:12 and Bester & Badenhorst, 2011:8)

Year	Average beneficiary age	% of patients older than 65
2006	34.5	10.1
2007	33.4	8.8
2008	34.0	9.3
2009	34.1	9.7
2010	35.1	10.7

In this study, similar results are expected for the privately insured population of South Africa to be tested. Population age versus medication cost and number of items will be empirically investigated in Chapter 4.

- **Gender**

Franconi *et al.* (2007:81-91) argue that men and women react differently to the same medication due to their basic genetic differences, and that women encounter more adverse drug events than men.

This then also raises the question about medication utilisation – does it differ between males and females?

In a study by Roe *et al.* (2002:301), 1 295 948 members of a large US pharmacy benefit manager with chronic conditions were examined. The use of chronic medications by males and females during 1999 was examined overall and within 16 commonly-used chronic drug groups. Dependent variables both within each drug group and overall were:

- use of a drug group
- number of drug groups used
- number of prescriptions filled
- sum of costs

Combination therapy was defined as using at least two of the 16 chronic therapy groups during 1999.It was found that females were more likely than males to use chronic medications during the study year (36.5% vs. 22.4%, $p < 0.001$). The chance of using a chronic medication increased with age for both genders. Commonly-used chronic medications represented 54% of

prescriptions for females and 50% of male prescriptions. These medications also represented 53% of total drug costs for both males and females. The genders did not have many significant differences in the likelihood of using particular drug groups. Of those who took chronic drugs, 14% used combination chronic therapy (Roe *et al.,* 2002:302).

Table 2.15 further illustrates the split between male and female beneficiaries for approximately 1 million beneficiaries of medical schemes managed by a key pharmacy benefit manager in South Africa:

Table 2.15: Percentage male versus female beneficiaries (adapted from Bester & Badenhorst, 2009:10 and Bester & Badenhorst, 2010:12)

Year	Male	Female
2006	45.4	54.3
2007	46.3	53.7
2008	46.4	53.6
2009	46.4	53.6

It is of importance to note that the data in Table 2.14 and 2.15 are applicable to all beneficiaries, not just claimants of chronic medication. The chronic medication users will possibly be older than the average beneficiary age, as many chronic conditions are age related. The ratio of male to female beneficiaries has remained very constant over a three year period. More females are medical scheme beneficiaries than males.

According to the annual report of the Council for Medical Schemes SA, women represent 52.1% of all medical scheme beneficiaries and men 47.9% (CMS, 2010:161). This number did not change much in the 2011 CMS report (CMS, 2011:160), with females representing 52.35 and males 47.7% of all beneficiaries.

The relationship between male and female chronic medication users will also be investigated in Chapter 4.

The manner in which chronic medication is provided to different areas and patients will be investigated in section 2.5.4.2.1.

2.5.4.2.1. Chronic medication provision

According to the WHO (2001), a key element in any health system is to ensure timely access to safe and efficacious medicines at affordable costs for consumers.

In a study on accessibility of medication across low-income and middle-income countries, Cameron *et al.* (2011:1) found that both acute and chronic medication availability were limited

across countries, specifically in the public sector. Generic medicines for chronic conditions were significantly less available than generic medicines for acute conditions in both the public sector and the private sector.

Cameron *et al*. (2011:10) propose that governments should prioritise the supply of medicines for chronic conditions through their public health systems to ensure that people have access to the treatment they need: “Low availability in the public sector can be improved through improved procurement efficiency and supply chain management as well as adequate, equitable and sustainable financing”.

In a study investigating the affordability of cardiovascular medication in 36 countries, Van Mourik *et al*. (2010:1) found that the overall availability of cardiovascular medicines was poor (on average 26.3% in the public sector found it affordable and 57.3% in the private sector). Procurement processes varied, patient prices were generally higher than international references prices, and, as an example, chronic treatment with anti-hypertensive medication cost more than one day's wages in many cases. It was also found that treatment costs became too high to afford when more than one drug was to be used (Van Mourik *et al*., 2010:1).

In the South African environment, Coovadia *et al.* (2009:824) found that there are substantial inequities in health care, and also within provinces concerning medication distribution.

In South Africa, there are two parallel systems of medication distribution used in the private and public health sectors. Public facilities such as clinics, hospitals, mobile clinics and day clinics distribute medication free of charge or at minimal fees to patients who do not have private medical scheme cover. This dispensing of medication is usually done through the pharmacy in these public facilities or through central dispensing. Central dispensing units (CDUs) are a relatively recent method of chronic medication distribution pioneered in the Western Cape and encompass a public-private partnership (Du Toit *et al.*, 2008:18-20). Medication prepared and dispensed at the CDU is delivered to public sector facilities to be distributed to patients.

In the South African private sector, dispensing prescriptions via pharmacies are also by far the most common way of providing patients with their medication. This is supported by the Mediscor Medicines Review of 2010 (Bester & Badenhorst, 2011:6), where the breakdown of prescriptions claimed is stated as 89.5% of all medication being claimed by pharmacies. Of this total, 9.2% of claims were from courier pharmacies and 90.8% from retail pharmacies (Bester & Badenhorst, 2011:6). This is similar to a trend in the United States, where dispensing prescriptions via pharmacy is the most common way to distribute medication.

On a per capita basis, international retail prescription volumes have been stable since 2006, increasing from 12.7 prescriptions per person dispensed in 2007 to 12.9 in 2010, compared to 11.2 in 2011 (IMS, 2011:8).

Now that it has been established that pharmacies are a common way of distributing medication to patients, a further breakdown in the types of pharmacies needs to be explored. According to the official website of the South African Pharmacy Council, the types and number of registered pharmacies in South Africa as in November 2011 are as portrayed in table 2.16.

Table 2.16: Types and numbers of registered pharmacies in SA in 2011 (adapted from SAPC, 2011).

Sector	Province									
	EC	**FS**	**GP**	**KZN**	**LP**	**MP**	**NW**	**NC**	**WC**	**Total**
Academic Institution	2	0	2	1	1	0	1	0	1	8
Community Pharmacy	227	148	1082	503	134	216	199	58	470	3037
Consultant Pharmacy	0	0	9	2	0	0	0	0	3	14
Institutional Private	21	17	88	38	7	16	24	4	41	256
Institutional Public	92	55	80	98	39	43	53	46	134	640
Manufacturing Pharmacy	9	1	209	10	0	2	5	0	27	263
Wholesale Pharmacy	23	9	161	31	5	3	3	2	49	286

All practising pharmacists are obliged to ensure that the service they provide is of high quality and complies with Good Pharmacy Practice Standards as published by Council in its rules. The Good Pharmacy Practice in South Africa indicates how that obligation can be met. Good Pharmacy Practice is obligatory in terms of Section 35A of the Pharmacy Act 53 of 1974.

In Table 2.16, no reference to mail order or courier pharmacy can be found. This is due to the fact that the South African Pharmacy Council (SAPC, 2011) classifies both of these pharmacies under “community” pharmacy. As discussed in Chapter 1, these two pharmacy types need to be defined separately for the purpose of this study. The term *mail order* or *courier* pharmacy is defined as a pharmacy primarily dispensing medication to its clients via courier or postal or other delivery services. Contact with the pharmacist is usually limited to telephonic contact, and these pharmacies are especially utilised to dispense chronic medication to patients which can be reimbursed by medical schemes.

Retail or community pharmacy is defined as a pharmacy where the patient can “walk in” and have a face-to-face consultation with the pharmacist. The pharmacy is situated within a patient community. Acute and chronic medications are dispensed to patients. Over-the-counter medication and basic clinical services can also be offered.

When closely investigating retail pharmacies in South Africa, one can further describe these pharmacies as being either “independent” or as part of a “chain”.

Chain pharmacies are seen as retail pharmacy groups that operate under the same trade name across many areas. A chain pharmacy may have a centralised dispensing system. These pharmacies may also have a centralised ordering system and formulary of medications that have to be used by the pharmacists. Examples include retail hospital pharmacy groups, retail pharmacy chains and food store retail pharmacy chains.

Independent pharmacy is viewed as a pharmacy that is not connected to another pharmacy or retail chain. The pharmacy purchases medication on an individual account does, not have an official medication formulary in place and has a unique name and owner (does not belong to an umbrella group of pharmacies).

Figure 2.12 and table 2.17 describe the different classifications of pharmacies in South Africa as defined in this study. This information has been gathered by in-field experience of the researcher.

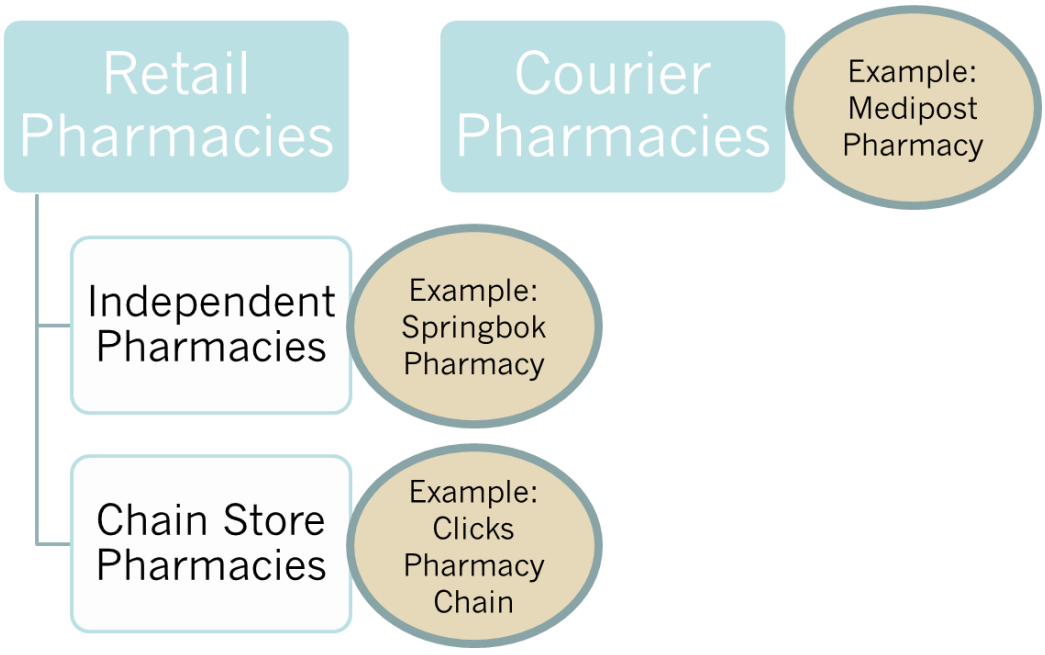

Figure 2.12: Pharmacy types in South Africa

Examples of the different types of pharmacies as defined in this study are given in Table 2.17.

Table 2.17: Classification of pharmacies in South Africa with examples

Mail order pharmacies (examples)	**Chain pharmacies (examples)**	**Independents (examples)**
Medipost Pharmacy	Clicks	Community Pharmacies not belonging to column 1 and 2
Optipharm (which also provides an HIV managed-care facility)	Dischem	
UTI Specialist Pharmacy (previously Chronic Medicines Dispensary)	Pharma Value	
Direct Medicines (a subsidiary of the Clicks retail chain group)	Mediclinic pharmacies	
Pharmacy Direct	Life Health care Pharmacies	
Pharma Logistic Solutions t/a Dischem Direct	Link Group	

According to the 2009 Mediscor Medicines Report (Bester & Badenhorst, 2010:9), the majority of medical scheme claims in 2009 were submitted by retail pharmacies (79.7%), increasing from 74.4% in 2007 and 77.4% in 2008. General practitioners were responsible for 11.4% of the total number of items claimed, and claims received from these dispensing doctors are decreasing year by year. In 2010, the majority of claims were submitted by pharmacies, of which retail pharmacies represented 89.5% of total item volume, and 9.2% of all pharmacy claims were from courier pharmacies. (Bester & Badenhorst, 2011:6).

The volume of claims from courier pharmacies remained unchanged, although the percentage of total cost increased (from 16.2% in 2007 to 18% in 2009) (Bester & Badenhorst, 2011:6). In 2009, the average cost per item for courier pharmacies was R272 compared to R130 for retail pharmacies and R45 for general practitioners. (*Standard deviations not available.)* Courier pharmacies also claimed more items per patient. These pharmacies claimed 28.0 items per patient compared to 18.2 for retail pharmacies and 9.0 for general practitioners in 2010 (Bester & Badenhorst, 2011:6).

Bester and Badenhorst (2010:9; 2011:6) propose that the reason for this increased cost and number of items claimed by courier pharmacies are specialisation in selected therapeutic groups, such as oncology and other high cost medicines. “These are products that most retail pharmacies do not typically stock, due to their high cost and/or special handling requirements. Apart from these specialized treatments, courier pharmacies traditionally also supply chronic medicine” (Bester & Badenhorst, 2010:9).

This finding is supported by Kirking *et al.* (1990:43) who agree that the mail order pharmacy service is generally limited to chronic or maintenance medications since delays inherent in mailing prescriptions preclude extensive Mail Pharmacy Service use for patients with acute medication needs.

Table 2.18 summarises the differences in expenditure per provider type for 2007, 2008 and 2009.

Table 2.18: Expenditure per provider type for 2007, 2008 and 2009 (Bester & Badenhorst, 2010:10)

Year	Provider Type	%of total expenditure	% of total items	Ave cost per beneficiary (R)	Ave cost per utilising beneficiary (R)	Ave cost per item (R)
2007	Retail pharmacies	77.7	74.4	1 447	1 849	111
	Courier pharmacies	16.2	8.8	301	5 311	195
	General practitioners	6.1	16.7	113	381	39
	Medical specialists	0.1	0.1	1	362	115
2008	Retail pharmacies	78.3	77.4	1 667	2 061	119
	Courier pharmacies	16.9	8.7	359	6 170	229
	General practitioners	4.7	13.9	101	375	40
	Medical specialists	0.1	<0.1	1	412	159
2009	Retail pharmacies	78.0	79.7	1 952	2 367	130
	Courier pharmacies	18.0	8.8	451	7 607	272
	General practitioners	3.9	11.4	97	405	45
	Medical specialists	0.1	0.1	3	789	271

The average cost per item for each of the various provider types also remained much the same for 2010, as can be seen in Table 2.19.

Table 2.19: Average cost per item for each provider type in 2010 (Bester & Badenhorst, 2011:6)

2010	Ave cost per item (R)
Retail pharmacies	129
Courier pharmacies	300
General practitioners	47
Medical specialists	287

Kirking *et al.* (1990:41) discuss the concerns raised about whether mail order and community pharmacies can provide the same quality of pharmaceutical services to patients. They divide these professional services into three areas: providing information to patients, monitoring drug therapy, and dispensing the correct medication to the patient.

Over and above the concerns regarding quality of service mentioned by Kirking *et al.*, total cost of medication dispensed and compliance of a patient to the routine of collecting or receiving his/her medication is of essence.

Archie Cochrane, the pioneering clinical epidemiologist, stated almost 40 years ago that certain evidence is needed to support change or interventions in any health care setting. The questions that Cochrane believed were pertinent to any such study were (Jarvinen *et al*., 2011:1):

- Can it work? (efficacy)
- Does it work? (effectiveness)
- Is it worth it? (cost effectiveness)

These matters are investigated below for mail order pharmacies and retail pharmacies in terms of cost, service and compliance.

Mail order/courier pharmacy

- *Background*

The term “mail order” needs to be classified in the South African environment, as some definitions might differ from international interpretations.

For the mail order pharmacies investigated, delivery of medication parcels were done via courier services directly to the patient (at a home or work address), via courier services to the Post Office parcel counter, via courier to the doctor’s rooms of the patients, or via the pharmacy’s own drivers to the patient directly. The term “mail order” may therefore seem somewhat misdirected, as it infers delivery of medication via mail only. In the international context, mail order usually refers to the mailing service of that particular country, and a patient receives the medication from the mail service at home.

Shadid (2010:336) found that increased options in the delivery of pharmaceutical care has led to more patients receiving pharmacy services in ways other than face-to face encounters with pharmacists. Mail order pharmacies are dispensing more prescriptions to patients than previous years.

Wosinska and Huckman (2004:409) expressed a similar view in stating that, in 2003, the growth of mail-order pharmacies in the US outpaced total prescription growth threefold. These types of mail order pharmacies in the US are more often than not owned and operated by pharmacy benefit managers (PBMs) and they are becoming competition to retail pharmacies, with 5.5% of all prescriptions filled by mail order pharmacies (Wosinska & Huckman, 2004:409).

In the 2011 IMS report of the use of medicines in the US, it was found that patients filled most of their prescriptions at chain pharmacies, accounting for more than 54% of all prescriptions, or 2.2 billion USD, in 2010. Fewer prescriptions were filled at independent pharmacies whose share declined to 18.7% in 2010, compared to 20.6% in in 2006 (IMS, 2011:9).

The distribution of prescriptions filled by the different outlets available in the US in 2010 is presented in Figure 2.13.

Although it can be seen that mail order pharmacies received the lowest number of prescriptions of all pharmacy types in the US, it still accounted for the second biggest spending, indicating that more expensive prescriptions are dispensed by these pharmacies. This correlates with Bester and Badenhorst (2010:9; 2011:6) who propose that the reason for this increased cost and number of items claimed by courier pharmacies is specialisation in selected therapeutic groups such as oncology and other high cost medicines.

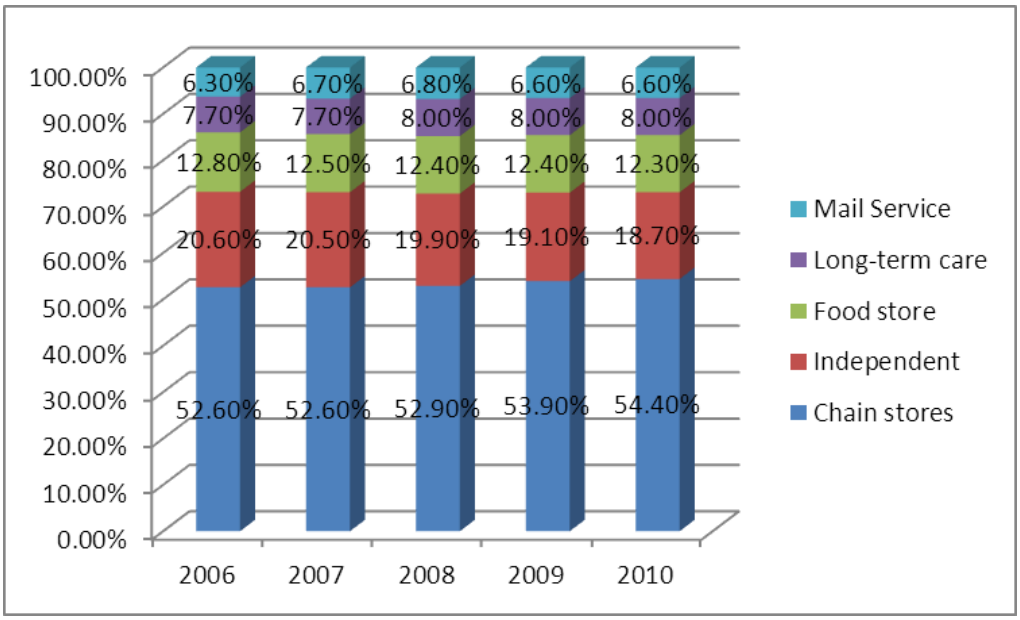

Figure 2.13: Prescriptions by type of pharmacy (IMS, 2011:9)

Table 2.20 reflects spending in the different pharmacy types in the US from 2006 to 2010 (IMS, 2011:34).

Table 2.20: Spending in the different pharmacy types in the US from 2006 to 2010 (adapted from IMS, 2011:34)

SPENDING US$ BN	2010	2009	2008	2007	2006
Total US prescription market	307.4	300.3	285.7	280.5	270.3
Chain stores	108.1	105.4	99.7	96	91.9
Mail service	52.6	51.5	46.5	44.1	42.7
Independent	37.9	37.3	36.9	37.5	36.5
Clinics	36.2	34.8	33	32.7	29.8
Non-federal hospitals	28	27.6	26.8	26.4	26.1
Food stores	21.3	21.2	20.4	21.5	21.9
Long-term care	14.8	13.8	13.7	13.3	12.8
Federal facilities	3.9	4.1	3.9	4	3.7
Home health care	2.5	2.5	2.5	2.5	2.4
HMO*	1.1	1.1	1.3	1.5	1.6
Miscellaneous	1	1	1	1	0.9

*Health Maintenance Organisation

Spending at mail order pharmacies were the second highest of all pharmacy types in the US. It is still, however, only about half of value of retail pharmacies. This trend in South Africa has also been investigated in the empirical chapter. In SA, the pharmacy types are less, as, for example, long term care facilities have either arrangements with retail or mail order pharmacies and cannot be classified as a dispensing pharmacy on its own. Food stores in SA are not allowed to sell prescription medication, and pharmacies within food stores are registered retail pharmacies. In this study these pharmacies will be classified as chain store pharmacies.

- *Cost*

According to the Express Scripts Guidelines Review in 2010, mail order pharmacies in the US usually offer lower prices or dispensing fees than retail pharmacy chains. The standard mail order prescription in the US makes provision for a 90-day supply. This avoids additional dispensing fees that would be incurred when purchasing a standard 30-day prescription drug at retail (Express Scripts, 2010).

In South Africa, prescriptions are usually dispensed with 30 days' medication supply at a time, and medical schemes also have early refill rate rules, prohibiting medication from being dispensed more than 30 days in advance (Bester, 2013).

It would seem that receiving medication from a mail-order pharmacy is considered to be cost-effective, and this is supported by key findings from the University of California Los Angeles

Campus (UCLA) and Kaiser Permanente's Division of Research (Duru *et.al*., 2010:37), which include the following findings:

- Of patients who received their medications by mail at least two-thirds of the time, 84.7% complied to their physician-prescribed regimen, versus 76.9% who claimed their medications at community pharmacies.
- Mail-order pharmacy users were more likely than local pharmacy users to have a financial incentive to fill their prescriptions by mail (49.6% vs. 23.0%). They were also more likely to live a greater distance from a local pharmacy (8.0 miles vs. 6.7 miles).

According to an article in the *New York Times* of 3 March 2011, mail order pharmacies in the US argue that, because they have invested in sophisticated computer systems to monitor all prescriptions, they can intervene swiftly in the case of drug interactions. Another advantage listed is patient privacy, as health care conversations can take place over a telephone rather than in the retail pharmacy environment (Abelson & Singer, 2011).

Mail order pharmacy has claimed cost-effectiveness and compliance as two of its key attributes. Clark *et al*. (2009) investigated prescription data from 484 987 claims in the US and came to the conclusion that co-payment incentives to use mail-service pharmacies instead of community pharmacies were one of the key reasons for these patients to use this option. However, it also seemed to increase costs to the employers/sponsors. Where no co-payment incentive to use mail-service pharmacies was in place, costs to employers/sponsors were lower, and patients made used of retail pharmacies as well as courier pharmacies (Clark *et al.,* 2009:133).

The cost-effectiveness claimed by mail order pharmacies raises the question of how it can be accomplished in the very regulated pharmaceutical environment. In South Africa, the Single Exit Price (SEP) of a drug is regulated and drug discounting is prohibited by law. This leaves space for a mail-order pharmacy to either reduce its dispensing fee or its operating costs (bottom line), and also to make use of economies of scale to deliver medication at a fraction of the cost of a retail competitor.

Sergeant and Kingston (2005:918) investigated the cost of some of these components and found that the basic cost of delivering medication consists of four components: (1) purchase price of the drug, (2) cost of supplies necessary to deliver it, (3) cost of labour to deliver it, and (4) overhead costs necessary for the medication to be available to clinical staff.

Clark *et al.* (2009:136) suggest the following calculation to determine the difference in cost to patient and medical aid between mail order and retail pharmacies in the US:

Total mail-service cost/

quantity dispensed i:e: QTY

= (mail-service drug ingredient cost /QTY)

+ (mail-service dispensing fee/QTY)

Total mail-service cost to the plan sponsor

/QTY = (total mail-service cost/QTY)

−(mail-service cost to plan member i.e co-payment /QTY)

Total community pharmacy cost /QTY

= community pharmacy drug ingredient cost/QTY) + (community pharmacy dispensing fee/QTY)

Total community pharmacy cost to

the plan sponsor/QTY

= (total community pharmacy cost/QTY − (community pharmacy cost to plan member i.e. co-payment/QTY)

There are therefore different components involved when dispensing medication from a retail pharmacy versus a mail order pharmacy, and these components may influence the type of and cost of services rendered. This is also true for South Africa and the total cost, medical scheme contributions and patient levies for mail order and retail pharmacies specifically, are discussed in chapter 4.

- *Compliance and service*

In a study by Moczygemba *et al.* (2010) to evaluate telephonic medication therapy management by pharmacists, it was found that, overall, patients were satisfied with a telephone medication therapy management program (Moczygemba *et al.,* 2010).

In a similar study, a survey among users of a mail order pharmacy versus retail pharmacy, Shadid (2010:336) found that the self-reported rating for satisfaction with pharmacy services

was higher for the walk-in patients than for their mail service counterparts. The ratings, however, were very similar with only 2.8% difference in satisfaction levels in 2007.

Duru *et al.* (2010:33) did not measure member satisfaction, but they did find that mail order pharmacy usage encourages compliance. For a total of 13 922 patients who refilled a specific medication, those who used only local retail pharmacies were less likely to have good adherence than patients who received medications by mail (84.7% for mail order vs. 76.9% for retail pharmacy, P <0.001).

It was found that mail order users had better adherence to anti-glycemic, antihypertensive and lipid-lowering medications (P <0.001 for all) (Duru *et al.*, 2010:33).

Devine *et al*. (2010:210) found that individuals who switch to mail order pharmacy services are more likely to maintain possession of their medication and continue to fill their medication, and they generally utilise fewer total and diabetes-related health care services over time, which results in lower costs. It was found that the use of a mail order pharmacy decreased the possibility of non-adherence by ensuring medication supply, requiring less travel by patients and decreasing patient payments (Devine *et al*., 2010:210).

Liberman *et al*. (2011:260-269), found evidence to the contrary, concluding that mandatory mail order pharmacy utilisation appears to cause some members to discontinue therapy prematurely, particularly those without previous mail service pharmacy experience.

It would therefore seem that some research have found mail order pharmacies to be cost-effective as well as compliance-friendly. In this study, one of the key objectives will be to establish the differences in compliance and cost between retail and mail order pharmacies in the South African private sector.

Retail/community pharmacy

- *Background*

Retail pharmacies in South Africa will, for the purpose of this study, be classified as pharmacies situated within the patient community, where the patient has a “face to face” consultation with his/her pharmacist (also refer to Chapter 1). A retail pharmacy may either be an individual pharmacy or part of a pharmacy chain, as described in the first part of section 2.5.4.2.1 of this document. Although there may be other co-operative agreements between pharmacies, i.e. buying groups or associations, the broad classifications to be differentiated will be independent and chain store pharmacies.

In a study by Lowe and Montagu (2009:38), where 12 low/middle income countries were analysed with regards to their pharmacy legislation, it was concluded that very few of these low/middle income countries had retail pharmacy chains. It was found that the few pharmacy chains in Nigeria, Pakistan, Uganda and Ghana were small, consisting of three to six stores each. In South Africa, pharmacy chain growth has increased over the past years, as have the chain stores in India. The growth of pharmacy chain stores in SA may be a result of legislation changes in 2003 that permitted corporate ownership of pharmacies for the first time (Lowe and Montagu, 2009:38).

This finding is supported by the growth rates of South African pharmacy chains:

- Clicks has the largest retail pharmacy chain with over 280 in-store dispensaries, including a direct-to-patient courier pharmacy service. It also owns United Pharmaceutical Distributors (UPD), South Africa's leading full-range national pharmaceutical wholesaler (New Clicks Holdings, 2011). Clicks owned 15.4% of the retail pharmacy market share in August 2011 vs. 13.1% in 2010, according to the group annual results of 2011. Clicks also stated that it had 283 dispensaries at August 2011, with 32 dispensaries opened in 2011. This means that 71% of stores have dispensaries, of which 77 pharmacies are less than two years old (New Clicks Holdings, 2011).
- Dis-Chem was established in 1978 as a small pharmacy in Mondeor, south of Johannesburg. The group is still privately owned and run by the original founders. In 2011 it had over 56 stores nationwide (Dischem, 2011).
- MediRite Pharmacy Group is part of the Shoprite group and it has 129 branches nationwide, according to their website as in December 2011. The drive to enable customers to do all of their shopping under one roof led to the inception of in-store pharmacies (under the name MediRite) within Shoprite and Checkers stores (Shoprite Holdings, 2011). During the financial year June 2010 to June 2011, MediRite increased its number of retail pharmacy outlets by 16%. The pharmacies buy from Transpharm Pharmaceutical Wholesalers.
- Pick n Pay pharmacies have only 18 in-store retail pharmacies, but the growth since 2007 has been steady, as can be seen in Figure 2.14, as adapted from the Pick n Pay annual report for 2011 (Pick n Pay Holdings, 2011):

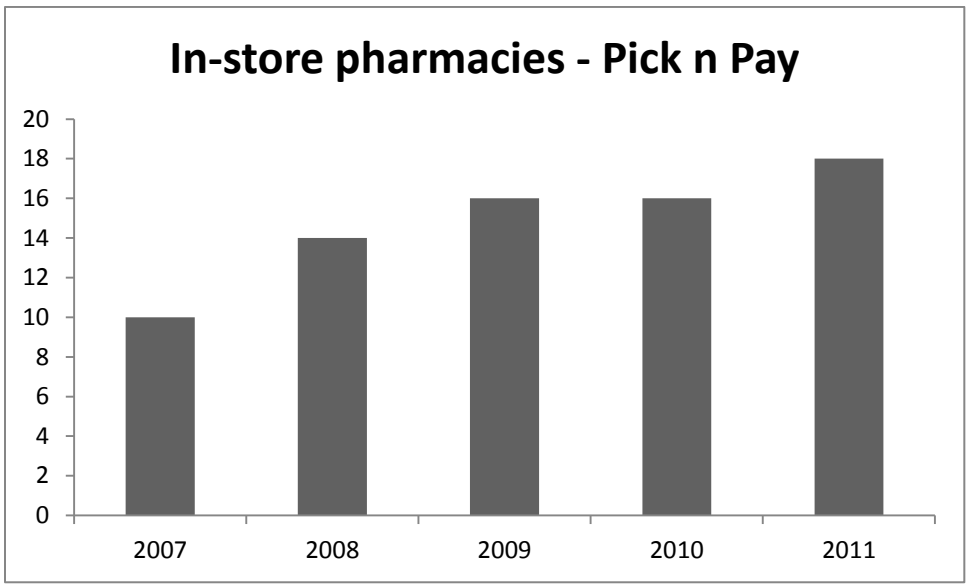

Figure 2.14: Number of in-store pharmacies in Pick n Pay (Pick n Pay Holdings, 2011)

A similar trend of "corporatisation" of pharmacies can also be seen in the UK, where most community pharmacies are not owned by self-employed community pharmacists. This change is also due to the takeover of independent pharmacies by larger pharmacy chains and supermarkets (Bush *et al*., 2009:306).

- *Cost*

In a study by Gellad *et al*. (2009:606-629) on cost difference between types of retail pharmacies, i.e. independent and chain pharmacies, independent pharmacies were found to have higher price variability than chain store pharmacies. In this instance, poorer areas of the community also experienced the higher end of the pricing variance at independent retail pharmacies.

Some studies have found mail order pharmacies to lead to cost savings for patients (Duru *et al.*, 2010:33, Devine *et al*., 2010:210). Others, like Clark *et al*., (2009: 133-142), found that although the mail-order incentivised patients received lower cost medication, the overall net effect of non-incentivised patients remained much the same. In this study, the cost per item and per prescription for chronic medication will be evaluated and a comparison between mail order and retail pharmacies will be drawn. The cost component will be driven by various factors to be analysed in Chapter 4, including:

- Benefit type of medication dispensed per pharmacy type (e.g. acute/chronic/ oncology medication)

- Age of population receiving medication
- Number of items/utilisation per patient
- Average cost per item
- Type of medication dispensed (e.g. originator or generic medication)

- *Compliance and service*

The J.D. Power and Associates 2008 National Pharmacy Study in the US was based on the responses from 15,163 consumers who claimed a new prescription or refilled a prescription during the three months prior to the survey period. The web-based study was done June to August of 2008 (Power, 2008:1).

The study found that customers 65 years and older account for 26% of mail order prescriptions. Only 18% of this age group filled their prescriptions at brick-and-mortar or community pharmacies. Customer satisfaction was found to be similar between retail and mail order pharmacies, except where there was a cost-saving, flat-rate medication deal in place, where this led to higher satisfaction rates at either pharmacy (Power, 2008:1).

Since customer satisfaction is also related to cost, one could argue that cost-effectiveness is one of the factors to be considered when determining the level of service rendered by a mail order or retail pharmacy. Although customer service and satisfaction does not form part of this study, cost differences will be compared in the quantitative analysis.

2.6. Medicine usage trends

According to International Marketing Services (IMS) in their global report for 2010, the size of the global market for pharmaceuticals is expected to grow almost $300 billion over the next five years, reaching $1.1 trillion in 2014 (IMS,2010a). Reasons for the the 5% to 8% compound annual growth rate expected during this period include blockbuster drugs losing patent protection in developed markets, as well as a strong overall growth in the world's emerging countries (IMS, 2010a).

In the IMS Outlook report of 2012 (IMS, 2012a:3) it is predicted that annual global spending on medicines will reach nearly $1.2 trillion by 2016, as the emerging pharmaceutical markets, biologics and generics contribute more to spending. It is also envisaged that the medicine spending in developed markets such as the United States, Europe and Japan, will decline to 57% of the global total due to expiring patents for a number of high value brand-name drugs, less spending on branded products and increased cost containment measures by payers (IMS,

2012a:3). Emerging pharmaceutical markets, however, are to make up 30% of global spending by 2016, as population and economic growth lead to higher use of medication use in these markets.

Hoffman *et al*. (2012:5) concur when predicting that the spending on all medication in the US will have a 3–5% increase in total drug expenditures across all settings, a 5–7% increase in expenditures for clinic-administered drugs, and a 0–2% increase in hospital drug expenditures.

Table 2.21 gives a list of the top-selling drugs in the US for 2011 according to Hoffman *et al*. (2012:15).

Table 2.21: Top-selling medication in the US in 2011 (Hoffman *et al*., 2012:15).

Drug	2010 Expenditures ($ Thousands)	Percent Change from 2009	2011 Expenditures ($ Thousands)	Percent Change from 2010
Atorvastatin (Lipitor)	7,251,641	–4.0	6,011,423	10.5
Clopidogrel (Plavix)	6,138,308	9.8	5,140,649	12.1
Esomeprazole (Nexium)	6,359,489	0.1	4,683,369	–2.1
Quetiapine (Seroquel)	5,175,899	12.1	4,243,676	9
Aripiprazole (Abilify)	4,555,969	13.8	3,865,269	14.6
Fluticasone, salmeterol (Advair)	4,971,590	1.9	3,698,560	–1.0
Montelukast (Singulair)	4,076,360	8.9	3,414,188	12.2
Rosuvastatin (Crestor)	3,762,279	23.7	3,274,375	17.4
Erythropoietin alfa (Epogen, Procrit)	4,790,957	–0.8	3,031,508	–16.8
Olanzapine (Zyprexa, Zydis)	3,304,796	10.3	2,880,131	17.7
Pioglitazone (Actos)	3,539,430	3.5	2,753,702	3.7
Duloxetine (Cymbalta)	3,156,487	11.2	2,676,746	15.4
Infliximab (Remicade)	3,302,455	3.3	2,629,836	2.8
Insulin glargine (Lantus)	3,044,854	16.3	2,618,357	16.9
Etanercept (Enbrel)	3,291,506	1.2	2,605,516	6.9
All others	240,778,881	1.8	184,784,405	3.2

From Table 2.21 it can be seen that the medication most prescribed and used in the US has already experienced patent expiration e.g. atorvastatin, clopidogrel and quetiapine. This will directly influence spending on medication as generic alternatives cost less than the originator products.

In its 2010 analysis, IMS identified the following key pharmaceutical market dynamics (IMS, 2010a):

- **Geographic balance of the pharmaceutical market is shifting toward pharmaceutically emerging countries.**

These emerging markets are expected to grow 14% to 17% until 2014, while developed markets will grow only 3% to 6%. As a result, the aggregate growth up to 2014 from these emerging pharmaceutical markets will be similar to the growth experienced in the developed market.

In reviewing each of the world's emerging economies, IMS identify three levels of pharmerging markets. The number of countries rated as "pharmerging" in 2006 was only seven. They were China, Brazil, Mexico, India, Russia, South Korea and Turkey. In 2010, there were 17 of these pharmerging markets worldwide (IMS, 2010b). An additional 13 countries are also expected to contribute $1 to $5 billion each in annual sales growth by 2013. They are: Venezuela, Poland, Argentina, Turkey, Mexico, Vietnam, South Africa, Thailand, Indonesia, Romania, Egypt, Pakistan and the Ukraine.

- **Growth per therapy area is according to need.**

Higher revenue (up to 10% growth) is expected to come from innovation in areas such as oncology, diabetes, multiple sclerosis and HIV/AIDS, and not from mainstream conditions where the treatments have been generecised.

- **Publicly funded health systems are under increased pressure to reduce medication budgets following the global economic downturn**.

Countries including Turkey, Spain, Germany and France have announced restrictions in reimbursements to reduce drug spending growth. Governments in other countries may follow suit (IMS, 2010b).

- **Patent expiries lead to increased generic usage.**

In 2009 to 2014, products with sales of more than $142 billion will face generic competition in major developed markets. Patients will be utilising lower-cost generics in major therapeutic areas such as cholesterol regulators, antipsychotics and anti-ulcerants and this will reduce spending on medication by $80 - $100 billion worldwide.

- **New products are investigated closely and not reimbursed by all payers.**

All newly developed products (expected to be only 30-35 new entities) will be assessed according to strict rules and formularies in order to ensure sufficient patient benefit. Only then will payers consider reimbursement.

Now that global trends and elements of the pharmaceutical landscape have been discussed, a closer look at the South African pharmaceutical market is needed.

In South Africa, the pharmaceutical sector (sample of 74% of all pharmaceutical companies in SA) yielded revenue of R26.7 billion, which is approximately 1.17% of the national GDP (Deloittes, 2010:12).

This sector is split into several categories of trade, namely fast moving consumer goods (FMCG), schedule 0 medication, schedule 1 and 2 medication, and prescription medication. Table 2.22 (Deloittes, 2010:12) describes these sectors in revenue.

Table 2.22: Revenue from different sources within the pharmaceutical market in 2009 (adapted from Deloittes, 2010:12)

	Operational Revenue	**Export Revenue**	**Other Revenue**	**Total**
FMCG	R 2.89bn	R 277.19m		R 3.17bn
Schedule 0	R 2.48bn	R 72.95m		R 2.55bn
Schedule 1&2	R 2.93bn	R 72.93m		R 3.01bn
Prescription Medications	R 15.7bn	R 1.38bn		R 17.09bn
Sub total			R 783.01m	R 26.59bn
Unallocated Revenue	R 73.02m	R 39.00m	R 0	R 112.02m
Total Revenue	R 24.07bn	R 1.85bn	R 783.01m	R 26.70bn
% contribution	90.16%	6.91%	2.93%	

Furthermore, of the operational revenue amounting to R22.3 billion, 76.26% of operational revenue is derived from the private sector with more than 85% of revenue being derived from prescription pharmaceuticals (Deloittes, 2010:14).

Pharmaceutical trends in South Africa are described in the IMS Market Prognosis Report for 2010 to 2014 (IMS, 2011b). According to this report,

- Pharmaceutical prices were increased by a maximum of 13.2% in February 2009 to reflect the substantial difficulties faced by the industry in 2008 when the sharp depreciation of the rand made raw materials and imported products unaffordable.
- Managed care formularies will exert ever greater influence on the market.
- Generic prices will be under further pressure by formulary reference pricing systems and capped at lower or lowest rather than average price levels.
- Original products will be affected more frequently in future by reference pricing groups of similar products, not just those that are interchangeable. Formularies will also become a

more powerful tool for negotiating the price of original new products. Market access will be the key challenge for manufacturers of expensive new therapies.

According to the same report, the total pharmaceutical market in South Africa is also forecast to have a compound annual growth rate of 10.2% between 2009 and 2014, as depicted in Table 2.23 (adapted from IMS, 2010b).

Table 2.23: Forecast summary of SA pharmaceutical market in actual sales in Rand (million) (adapted from IMS, 2010b:8)

	2009	2010	2011	2012	2013	2014
Retail Sector	11 719	12 775	14 056	15 420	16 889	18 475
Hospital Sector	3 866	4 378	4 974	5 582	6 214	6 871
Other Outlets	7 002	7 706	8 550	9 435	10 379	11 387
Total Market	22 588	24 859	27 581	30 437	33 482	36 733
Annual Growth	14.7%	10.1%	10.9%	10.4%	10.0%	9.7%

It seems that the pharmaceutical market may be declining in growth percentage over the next few years in SA. This may indicate that prices will lower because of more generic launches in this period, or to expect price decreases in general.

Medication usage trends in terms of monetary value have now been discussed. Utilisation of medication by patients and the manner in which medications are utilised (compliance) will be discussed in the sections to follow.

Medication utilisation

Drug utilisation research was defined by WHO in 1977 as “the marketing, distribution, prescription, and use of drugs in a society, with special emphasis on the resulting medical, social and economic consequences” (WHO, 2003a). Navarro (2008:215-229) defines DUR as an ongoing, systematic process designed to maintain the appropriate and effective use of medications.

Epidemiology is defined as “the study of the distribution and determinants of health-related states and events in the population, and the application of this study to control of health problems” (WHO, 2003a). Detels (2010:1) define epidemiology as the basic science of public health, because it is the science that describes the relationship of health or disease with other health-related factors in human populations, such as human pathogens

Pharmacoepidemiology is the study of the use and effects of drugs It is a growing discipline that applies epidemiological techniques to study drug use in a large population (Luo *et al.*, 2007:2608). Pharmacoepidemiology is also defined as the study of the use and effects/side

effects of drugs in large numbers of people with the purpose of supporting the rational and cost-effective use of drugs in the population thereby improving health outcomes (WHO, 2003a).

Drug utilisation research is therefore an essential part of pharmacoepidemiology as it describes the extent, nature and determinants of drug exposure. Over time, these two terms have been used interchangeably. However, while drug utilisation studies use a number of information sources that focus on medication (e.g. compound data from wholesale and prescription databases), epidemiology implies defined populations in which drug use can be expressed in terms of incidence and prevalence.

The main goal of drug utilisation research is to help ensure rational use of drugs in populations. For the individual patient, rational use of a drug is defined as the prescription of an appropriate medication in an optimal dose on the right indication with the correct information and at an affordable price.

Drug utilisation contributes to rational drug use in describing usage patterns in the following ways (Sjöqvist & Birkett, 2003:77; WHO, 2003a):

a. Making estimates of the numbers of patients exposed to drugs within a given time period. Such estimates may either refer to all drug users, regardless of when they started to use the drug (**prevalence**), or focus on patients who started to use the drug within the selected period (**incidence**).

b. Describing the extent of use at a certain moment and/or in a certain area (e.g. country, region, community, hospital). These descriptions are most meaningful and accurate when they are part of a continuous evaluation system, i.e. when the patterns are followed over time and trends in drug use can be described.

c. Estimating (e.g. on the basis of epidemiological data on a disease) to what extent drugs are properly used, overused, or underused.

d. Describing the pattern or profile of drug use – assessing which alternative drugs are being used for particular conditions and to what extent.

e. Comparing observed patterns of drug use with current recommendations or guidelines for the treatment of a certain disease.

f. Applying quality indicators to drug utilisation patterns.

g. Feeding back drug utilisation data to prescribers. This is particularly useful when the individual's drug prescribing can be compared with some form of "gold standard", or best practice, and with the average prescriptions in the country, the region, or the area.

h. Relating the number of case reports about a drug problem or adverse effects to the number of patients exposed in order to assess the potential magnitude of the problem. If it is possible to detect that the reaction is more common in a certain age group, in certain conditions or at a special dose level, improving the information on proper use such as indications, contraindications and appropriate dosages may be sufficient to assure a safer use, potentially avoiding withdrawal of the drug from the market.

Thodorus and Slezak (2009:55) state that utilisation is the primary driver for a trend. As new drugs become available, the population grows older and new treatment guidelines call for more aggressive management of conditions such as high cholesterol and diabetes.

In this section, therapeutic categories of medications utilised will be compared from various literature sources. These categories therefore have to be standard. The classification system used is referred to as ATC (Anatomical Therapeutic Classification), and a brief introductory paragraph follows.

The Anatomical Therapeutic Chemical Classification system (ATC) is a system where medications are classified according to the methods in which they act and according to their therapeutic, pharmacological and chemical properties. Drugs are classified in groups at five different levels. The drugs are divided into fourteen main groups (1st level), with pharmacological/therapeutic subgroups (2nd level). The 3rd and 4th levels are chemical/pharmacological/therapeutic subgroups and the 5th level is the chemical substance. The 2nd, 3rd and 4th levels are often used to identify pharmacological subgroups when that is considered more appropriate than therapeutic or chemical subgroups (WHO, 2008a). In order to define some of the ATC classes of medication to be discussed in this section, some of the most frequently utilised medication classes are highlighted in Table 2.24.

Table 2.24: Top ATC level 4 medication classes and their indications

ATC level 4 group	Background	Mechanism of action	Example
HMG CoA reductase inhibitors	The statins (or HMG-CoA reductase inhibitors) are the most effective and best tolerated agents for treating dislipidaemia (Brunton *et al*, 2006:948)	Reduction of LDL levels through mevalonic acid-like moiety that completely inhibits HMG Co-A Reductase and therefore inhibits an early rate-limiting step in cholesterol biosynthesis (Brunton *et al.,* 2006:948)	Fluvastatin, Simvastatin, Lovastatin, Pravastatin, Atorvastatin, Rosuvastatin, Mevastatin (Brunton *et al.,* 2006:949)
ACE inhibitors plain	Inhibition of ACE lowers systemic vascular resistance and mean, diastolic and systolic blood pressures in various hypertensive states (Brunton *et al.*, 2006:804)	Inhibits the conversion of angiotensin I to angiotensin II (Brunton *et al*, 2006:800)	Captopril, Enalapril, Lisinoporil, Quinapril, Ramipril, Moexipril, Perindopril (Brunton *et al*., 2006:802-804)
Biguanides	Biguanide can refer to a molecule, or to a class of drugs based upon this molecule. Biguanides can function as oral antihyperglycemic drugs used for diabetes mellitus or pre-diabetes treatment.	Is antihyperglycemic and not hypoglycaemic. Does not cause insulin release from the pancreas and does not cause hypoglycaemia (Brunton *et al.*, 2006:1638)	Metformin, Phenformin, Buformin (Brunton *et al.*, 2006:1638)
Platelet aggregation inhibitors excl. heparin	An antiplatelet drug is a member of a class of pharmaceuticals that decreases platelet aggregation and inhibits thrombus formation (Brunton *et al.*, 2006:1482)	Inhibits platelet aggregation. Platelets participate inpathological thromboses that lead to myocardial infarction, stroke and peripheral vascular thrombosis (Brunton *et al.,* 2006:1482)	Aspirin, Dipyrimadole, Ticlopidine, Clopidogrel, Glycoprotein IIb/IIa inhibitors, Abciximab, Eptifibatide, Tirofiban (Brunton *et al*., 2006:1484)

ATC level 4 group	Background	Mechanism of action	Example
Dihydro-pyridine derivative	The main clinical usage of calcium channel blockers is to decrease blood pressure. It is for this action that they are used in individuals with hypertension. Also indicated in Angina, Myocardial Infarction (Brunton *et al.*, 2006:832-838).	Increased cytosolic calcium causes increase contraction in cardiac and vascular smooth muscle cells. Calcium channel blockers act by binding to the α1 subunit of the L-type calcium channels and reducing calcium influx through the channel (Brunton *et al.,* 2006:832)	Felodipine, Nifedipine, Amlodipine, Nicardipine (Brunton *et al.,* 2006:835).
ACE inhibitors and diuretics	A diuretic is any drug that elevates the rate of urination and sodium excretion and thus provides a means of forced diuresis. There are several categories of diuretics. All diuretics increase the excretion of water from bodies, although each class does so in a distinct way. ACE inhibitors in combination with diuretics have a synergistic effect on lowering blood pressure. (Brunton *et al.*, 2006:737).	They act by diminishing sodium chloride reabsorption at different sites in the nephron, thereby increasing urinary sodium chloride and water losses. Loop diuretics act in the thick ascending limb of the loop of Henle • Thiazide-type diuretics in the distal tubule and connecting segment (and perhaps the early cortical collecting tubule) • Potassium-sparing diuretics in the aldosterone-sensitive principal cells in the cortical collecting tubule (Brunton *et al.,* 2006:737-742)	Lisinapril + hydrochlorothiazide, Cilazepril + hydrochlorothiazide, Enalapril + hydrochlorothiazide, Quinapril + hydrochlorothiazide (Snyman *et al.,* 2013).

ATC level 4 group	Background	Mechanism of action	Example
Thyroid hormones	The thyroid hormones, thyroxine (T_4) and triiodothyronine (T_3) are tyrosine-based hormones produced by the thyroid gland. An important component in the synthesis of thyroid hormones is iodine. The major form of thyroid hormone in the blood is thyroxine (T_4), which has a longer half life than T_3. The ratio of T_4 to T_3 released in the blood is roughly 20 to 1. Thyroxine is converted to the active T_3 (three to four times more potent than T_4) within cells by deiodinases (5'-iodinase). These are further processed by decarboxylation and deiodination to produce iodothyronamine (T_1a) and thyronamine (T_0a) (Brunton *et al.,* 2006:1511).	Synthetic Thyroid hormones are used for replacement therapy where there are insufficient thyroid levels (hypothyroidism) (Brunton *et al.,* 2006:1524).	Levothyroxine Sodium
Beta blocking agents selective	Beta receptor antagonists are used extensively in the treatment of hypertension, angina, acute coronary syndromes and congestive heart failure (Brunton *et al.,* 2006:288).	Antiarrhythmic benefit seems likely, possibly reflecting a reduced propensity to develop hypokalaemia, or perhaps as a direct anti-ischemic effect (Brunton *et al.,* 2006:883).	Metoprolol, Bisoprolol, atenolol (Brunton *et al.,* 2006:882-883)

ATC level 4 group	Background	Mechanism of action	Example
Sulfona-mides plain	Sulfonamide is the basis of several groups of drugs. The original antibacterial sulfonamides (sometimes called simply sulfa drugs) are synthetic antimicrobial agents that contain the sulfonamide group. Some sulfonamides are also devoid of antibacterial activity, e.g., the anticonvulsant sultiame. The sulfonylureas and thiazide diuretics are newer drug groups based on the antibacterial sulfonamides (Brunton *et al.*, 2006:742-752).	The thiazide diuretic effect, which is the most prominent in this study, increases NaCl excretion independent of carbonic anhydrase inhibition (Brunton *et al*., 2006:753).	Hydrochlorothiazide,Indapamide
Sulfona-mides urea derivative	Sulphonylureas are used to control hyperglycaemia in type 2 Diabetes Mellitus patients who cannot achieve appropriate control with changes in di*et al*one (Brunton *et al*., 2006:1637).	Sulphonylureas scause hypoglycaemnia by stimulating insulin release from pancreatic beta cells. Administration thereof to Diabetes Mellitus type 2 patients increases insulin release from the pancreas and may reduce the hepatic clearance of the hormone (Brunton *et al.,* 2006:1634).	Chlorpropamide, Glibenclamide, Gliclazide, Glimepiride, Glipizide, Gliquidone, Glisoxepide, Tolazamide, Tolbutamide

The top classes of medication dispensed may vary from country to country and even district to district.

In a retrospective study of 377.3 million prescription claims in the US in a computerised database, it was found that the top utilised prescription medication were HMG Co-A reductase inhibitors, followed by antihypertensive and anticonvulsants (Theodorou & Slezak, 2008:55). Table 2.25 illustrates the prescription medication most utilised in this study.

Table 2.25: Prescription medication most utilised (Theodorou & Slezak, 2008:55)

Therapeutic class	Utilisation %	Contribution to utilisation trend %
HMG-CoAa Reductase Inhibitors	6.0	0.39
Antihypertensive combinations	6.0	0.20
Anticonvulsants, miscellaneous	13.0	0.18
Proton pump inhibitors	4.3	0.17
Thyroid hormones	3.7	0.14
Antihyperlipidemics combinations	-9.3	-0.09
Intestinal cholesterol absorption inhibitors	-13.5	-0.10
Cough/cold/allergy combinations	-20.8	-0.21
Insulin-sensitizing agents	-24.3	-0.22
Antihistamines-nonsedating	-36.4	-0.82

According to the prescription drug trend report by IMS, the top five classes in 2010 in the US based on spending were oncologics/cytostatics ($22.3 bn), respiratory agents ($19.3 bn), lipid regulators ($18.7 bn), antidiabetic drugs ($16.9 bn) and antipsychotics ($16.1 bn) (IMS, 2011a:23).

In the South African private sector, the top five most costly therapeutic categories were antihypertensives, cytostatics, antidepressants, antidiabetic agents and hypolipidaemic agents (Bester & Badenhorst, 2011:11).

The top 20 therapeutic classes in the private sector in SA according to Bester and Badenhorst (2011:11) are listed in Table 2.26.

Table 2.26: The top 20 therapeutic classes in the SA private sector (Bester & Badenhorst, 2011:11)

Ranking 2010	Therapeutic class	% of total expenditure	% of total volume
1	Antihypertensives	11.0	11.1
2	Cytostatics	6.2	0.3
3	Antidepressants	4.8	3.8
4	Antidiabetic agents	4.6	3.2

5	Hypolipidaemic agents	4.5	4.5
6	Gastric acid reducers	4.4	3.2
7	Beta-lactam antibiotics	3.0	4.0
8	Anti-viral agents	3.0	1.5
9	Bronchodilators	2.8	2.0
10	Combination analgesics	2.7	5.9
11	Sex hormones	2.7	2.2
12	Non-steroidal anti-inflammatory drugs (NSAIDs)	2.6	3.8
13	Anti-epileptics	2.4	1.3
14	Cough & cold preparations	2.2	7.3
15	Topical nasal preparations	2.0	2.1
16	Sedative hypnotics	1.6	2.0
17	Antipsychotics	1.6	0.4
18	Anti-anginal agents	1.5	1.1
19	Immunosuppressives	1.4	0.1
20	Anti-asthmatics	1.4	0.7

According to the Council for Medical Schemes report of 2011 (CMS, 2011:167), the most prevalent PMB chronic condition in medical schemes was hypertension at 112.5 cases per 1 000 beneficiaries, followed by hyperlipidaemia at 50.9 per 1000 beneficiaries, diabetes mellitus Type 2 at 31.2 per 1000 beneficiaries and asthma at 27.9 per 1000 beneficiaries.

The ranking of the PMB conditions as per the CMS report (CMS, 2011:167) is illustrated in Table 2.27.

Table 2.27: Ranking of most prevalent PMB conditions according to Council of Medical Schemes' Report 2011

Ranking	Condition
1	Hypertension
2	Hyperlipidaemia
3	Diabetes Mellitus Type 2
4	Asthma
5	Hypothyroidism
6	Coronary Artery Disease
7	HIV/AIDS
8	Epilepsy
9	Diabetes Mellitus Type 1
10	Cardiac Failure
11	Dysrythmias
12	Bipolar Mood Disorder
13	Glaucoma
14	Rheumatoid Arthritis
15	Chronic Obstructive Pulmonary Disease

16	Cardiomyopathy Disease
17	Parkinson's Disease
18	Chronic Renal Disease
19	Ulcerative Colitis
20	Schizophrenia
21	Systematic Lupus Erythromatosis
22	Multiple Sclerosis
23	Crohn's Disease
24	Bronchiectasis
25	Addison's Disease
26	Diabetes Insipidus
27	Haemophilia

The most prevalent conditions as listed by the CMS report co-incide with the top medication groups featured in the Mediscor Medicines Review (Table 2.26). Hypertension and diabetes are, for example, some of the most prevalent diseases. Antihypertensive and antidiabetic medication is also in the top medication groups according to expenditure in Table 2.26.

In the US, the top therapeutic areas for 2009 are indicated in Table 2.28.

Table 2.28: Top therapeutic areas for 2009 in the US (IMS, 2011a:32)

Ranking	Therapeutic Area	2009 USD Mn
1	Lipid regulators	249.7
2	Antidepressants	246.1
3	Narcotic analgesics	241
4	Beta Blockers	167.8
5	ACE Inhibitors	165.7
6	Anti-diabetics	159
7	Respiratory Agents	152.4
8	Anti-ulcerants	145.7
9	Diuretics	131.7
10	Anti-epileptics	115.3
11	Tranquilizers	104
12	Thyroid preps	105.3
13	Calcium antagonists	94.9
14	Antirheumatics	92.5
15	Hormonal contraceptives	93.9
16	Angiotensin II	84.4
17	Penicillins	76.6
18	Macrolides & Similar	69.3
19	Vitamins & Minerals	69.8
20	Hypnotics & Sedatives	65.5

There are many similarities between the top ATC classes in US and SA, with antihypertensives, antihyperlipidemics, oncologics and gastric acid reducers featuring as top items. When refining the top medication classes to top medications dispensed, tables 2.29 and 2.30 provide lists of the top prescription medications dispensed in pharmacies in 2008 in the US, according to Wynn (2010:361) and Choudry and Shrank (2010:1886).

Table 2.29: The top 40 medications most frequently dispensed in US community pharmacies in 2008 (Wynn, 2010:361)

2008	Generic name	Category
1	Hydrocodone/lacetaminophen	Narcotic Analgesic
2	Lisinopril	Ace Inhibitor
3	Simvastatin	HMG-Co-A Reductase Inhibitor
4	Levothyroxine	Hormone
5	Amoxicillin	Penicillin-Type Antibiotic
6	Azithromycin	Antibiotic
7	Atorvastatin	HMG-Co-A Reductase Inhibitor
8	Hydrochlorothiazide	Thiazide Diuretic
9	Alprazolam	Benzodiazepine Tranquilizer
10	Atenolol	Beta-Adrenergic Receptor Blocker
11	Metformin	Anti-diabetic
12	Metoprolol succinate	Beta Adrenergic Receptor Blocker
13	Furosemide	Loop Diuretic
14	Metoprolol tartrate	Beta Adrenergic Receptor Blocker
15	Sertraline	SSRI Antidepressant
16	Omeprazole	Proton Pump Inhibitor
17	Zolpidem tartrate	Hypnotic
18	Esomeprazole	Proton Pump Inhibitor
19	Escitalopram	SSRI Antidepressant
20	Oxycodone	Narcotic Analgesic
21	Montelukast	Leukotriene Antagonist
22	Ibuprofen	Analgesic/Anti-Inflammatory
23	Clopidogrel	Platelet Aggregation
24	Prednisone oral	Corticosteroid
25	Fluoxetine	SSRI Antidepressant
26	Levothyroxine	Hormone
27	Warfarin	Anticoagulant
28	Cephalexin	Cephalosporin-Type Antibiotic

29	Lorazepam	Benzodiazepine Tranquilizer
30	Clonazepam	Antiepileptic
31	Citalopram	Antidepressant
32	Tramadol	Analgesic
33	Gabapentin	Anticonvulsant; Pain Reliever
34	Ciprofloxacin	Antibiotic
35	Dextro-Proxyphene	Analgesic
36	Lisinoprol/HCTZ	ACE Inhibitor/diuretic
37	Triamterene/HCTZ	Potassium-Sparing Diuretic
38	Amoxicillin/clavulanic acid	Antibiotic
39	Cyclobenzaprine	Central Muscle Relaxant
40	Lansoprazole	Proton Pump Inhibitor

Niteesh *et al.* (2010:1886) had similar findings and present the chronic medications most frequently prescribed in the US in 2009 as set out in Table 2.30.

Table 2.30: Most frequently prescribed chronic medication in the US, 2009 (adapted from Niteesh *et al.*, 2010:1886)

Medication	**No. of Prescriptions in the U.S. in 2009 (millions)**
Simvastatin	83.0
Lisinopril	81.3
Levothyroxine	66.0
Metformin	52.0
Atorvastatin	51.5
Amlodipine	50.9
Hydrochlorothiazide	47.1
Omeprazole	45.4
Furosemide	42.8
Metoprolol	40.5
Atenolol	38.6

Niteesh *et al.* and Wynn's findings are strikingly similar, which leads to the next question − what are the top selling medications in South Africa?

In the South African private sector, the top 25 therapeutic groups represent 73.1% of the overall expenditure and 67.2% of the total number of items paid for in 2009. The top five therapeutic groups represent 31.1% of total expenditure, and include anti-hypertensives, cytostatics, hypolipidaemic agents, antidepressants and gastric acid reducers. Oncology medicine is increasing in cost and was responsible for 8.7% of expenditure in 2009, with the volume only

contributing 0.6% of all items processed. This is according to the annual report of one of SA's largest Pharmacy Benefit Management Companies (Bester & Badenhorst, 2010:1-34).

This is supported by an analysis from the Council for Medical Schemes in South Africa, indicating that the most prevalent chronic condition in medical schemes is hypertension (10.79%), hyperlipidaemia (4.85%), diabetes mellitus type 2 (2.89%) and asthma (2.66%) (CMS, 2010:172). In the CMS report of 2010-2011, the picture has not changed much, with hypertension at 112.5 cases per 1 000 beneficiaries (97.4 in 2009), followed by hyperlipidaemia at 50.9 (44.1 in 2009), diabetes mellitus type 2 at 31.2 (26.2 in 2009) and asthma at 27.9 (24.1 in 2009) (CMS, 2011:167).

The top products in South Africa's private sector according to expenditure (based on claims by medical aid schemes) are listed in Table 2.31 (Bester & Badenhorst, 2011:13).

Table 2.31: Top 20 products according to total expenditure 2010 (adapted from Bester & Badenhorst, 2011:13)

	Brand Name	Therapeutic Group	Type*	% of total expenditure	% of total volume	Ave cost per utilising beneficiary (R)	Ave cost per Item (R)
1	Nexiam 40mg Tab	Proton pump inhibitor	N	0.9	0.3	808	400
2	Prexum Plus Tab	ACE inhibitor and diuretic combination	Gen	0.8	0.7	1 149	172
3	Gleevec 400mg Tab	Cytostatic	N	0.8	<0.1	251 789	27 762
4	Celebrex 200mg Caps	Selective COX2 inhibitor	N	0.8	0.5	463	232
5	NovoMix 30 Flexpen 3ml	Insulin	N	0.8	0.1	4 736	691
6	Lantus Solostar 100iu/ml Inj	Insulin	N	0.7	0.1	3 889	675
7	Crestor 10mg Tab	Statin	NCE	0.7	0.4	1 497	223
8	Synap Forte Tab	Combination analgesic	N	0.7	0.6	243	157
9	Herceptin IV Soln	Cytostatic	N	0.7	<0.1	176 681	29 501
10	Truvada Tab	Anti-retroviral agent	NCE	0.7	0.2	3 106	434
11	Prexum 4mg Tab	ACE inhibitor	Gen	0.6	0.6	827	136
12	MabThera 500mg Vial	Cytostatic	N	0.6	<0.1	65 123	17 594
13	Altosec 20mg Cap	Proton pump inhibitor	Gen	0.6	0.5	430	156
14	Eltroxin 100mcg Tab	Thyroid hormone	O	0.5	1.4	396	50
15	Aspavor 10mg Tab	Statin	Gen	0.5	0.5	882	129
16	Seretide 50/250 Accuhaler	Bronchodilator combination	O	0.5	0.2	1 425	362
17	Aspavor 20mg Tab	Statin	Gen	0.5	0.4	1 043	163
18	Symbicord Turbuhaler 160/4.5	Bronchodilator combination	N	0.4	0.1	1 507	431
19	Nexiam 20mg Tab	Proton pump inhibitor	N	0.4	0.2	871	295

20	Aspen Lamzid Tab	Anti-retroviral agent	Gen	0.4	0.2	2 624	346

*N = Original product without generic equivalents

NCE = New chemical entity

O = Original product with generic equivalents

Gen = Generic equivalent

From Table 2.31 it can be deduced that antihypertensives, antidiabetic medication and gastric acid reducers are among the top costing medication in the private sector in SA.To illustrate how these products may have changed in ranking over the past four years, Table 2.32 was adapted from the Mediscor reports of previous years.

Table 2.32: Rankings of top products 2007-2010 (adapted from Bester and Badenhorst, 2010:17 and Bester and Badenhorst, 2011:13)

Brand name	Therapeutic group	Rank 2007	Rank 2008	Rank 2009	Rank 2010
Nexiam 40mg Tab	Proton pump inhibitor	4	2	1	1
Prexum Plus Tab	ACE inhibitor	5	3	2	2
Herceptin IV Soln	Cytostatic	16	4	3	9
Celebrex 200mg Caps	COXIB	6	6	4	4
Novomix 30 Flexpen 3ml	Insulin	11	7	5	5
Gleevec 400mg Tab	Cytostatic	21	9	6	3
Aspavor 10mg Tab	Statin	86	10	7	15
Synap Forte Tab	Combination analgesic	7	8	8	8
Prexum 4mg Tab	ACE inhibitor	3	5	9	11
Crestor 10mg Tab	Statin	24	13	10	7
Truvada Tab	Anti-retroviral agent	199	16	11	10
Aspavor 20mg Tab	Statin	135	19	12	17
MabThera 500mg Vial	Cytostatic	20	18	13	12
Eltroxin 100mcg Tab	Thyroid hormone	17	14	14	14
Seretide 50/250 Accuhaler	Bronchodilator combination	19	17	15	16
Cipralex 10mg Tab	SSRI	1	1	16	23
Altosec 20mg Cap	Proton pump inhibitor	46	24	17	13
Avelon 400mg Tab	Quinolone antibiotic	12	15	18	31
Lantus Solostar 100iu/ml Inj	Insulin	-	185	19	6
Nasonex AQ 140 Dose	Glucocortico-steroid nasal	28	21	20	38

Table 2.32 shows that Nexium®, a PPI, has moved from fourth to first over the past two years. Prexum®, an ACE inhibitor, has been a constant in the top drug rankings. Herceptin and Gleevec, cytostatic drugs, have both moved up in the rankings over the past few years. Celebrex 200® remains the top-selling pain product.

According to South African IMS Total Private Market (TPM) data as on 31 October 2011, the top products sold in South Africa are as illustrated in Table 2.33.

Table 2.33: Top selling scheduled medicine (in value) in South Africa (IMS, 2012b)

Brand		Rand Value Oct 2008 To Oct 2009	Rand Value Oct 2009 To Oct 2010	Rand Value Oct 2010 To Oct 2011	Rand Value Oct 2011 To Oct 2012
Nexiam	A2B2 Acid Pump Inhibitors	201 737 865	267 665 639	301 563 036	323 447 685
Targocid	J1X1 Glycopeptide Antibact	107 813 312	160 782 484	195 026 509	205 993 595
Crestor	C10A1 Statins (Hmg-Co-a Red)	81 949 556	134 080 189	173 606 010	190 552 894
Meronem	J1P2 Penems And Carbapenems	87 865 065	141 297 697	172 373 699	156 333 612
Epilim	N3A0 Anti-Epileptics	74 664 930	105 338 811	126 524 529	154 015 723
Clexane	B1B2 Fractionated Heparins	98 517 366	128 604 453	143 540 417	150 354 237
Novomix 30	A10C3 H Insul+Ang Int+Fast Act	83 573 910	109 242 546	120 331 044	141 567 843
Adco-Dol	N2B2 Non-Script Non-Narc&A/P	83 381 449	107 805 192	121 739 371	135 448 626
Celebrex	M1A3 Coxibs Plain	78 837 928	99 918 192	111 249 842	130 053 081
Augmentin GSK	J1C1 Broad Spec Penicill Oral	65 084 063	100 421 894	111 433 102	126 570 426

It can be seen that many of the top selling medication brands (Table 2.33) are also reflected in the top claimed line items (Table 2.32).

Roe *et al.* (2002:306) found that 14% of all chronic medication users use medication in at least two chronic therapy classes. Furthermore, it was established that antidepressants were present in over 50% of males in the 18-24 age group using combination therapy. In the 25 to 34 year age group, gastrointestinal and cardiovascular medications were more frequent in the medication combinations, and antidiabetic medication was frequently found in combination therapy for males 45 years and older (Roe *et al.,* 2002:306).

Compliance

In utilisation of medicines, the way in which they are used (correct frequency and for the correct period of time as prescribed) also warrants investigation and this is labelled “compliance”.

Adherence has been defined as “the extent to which a patient acts in accordance with the prescribed interval and dose of a dosing regimen” (Cramer *et al,* 2008:45).

According to McHorney *et al.* (2009:2584), half of patients that start to use chronic medication become non-compliant within the first year of medication usage.

In a study by Hugtenburg *et al.* (2005:352), the following conclusion was made with regards to adherence of chronic medication users:

> About 50% of patients who have been prescribed chronic medication for the first time stop using their drugs within a matter of months. Perceived drug side-effects, drug ineffectiveness and personal considerations related to use and a lack of need of treatment were the main reasons for discontinuing chronic drug therapy. This kind of noncompliance may result in an increased health risk as well as constituting a waste of a large amount of money. Adequate patient counselling and shared decision making

between doctors and patients are needed to prevent the unnecessary cessation of chronic drug therapy.

Vanelli *et al.* (2009) support this in a study that found that uninformed patients had a higher risk of discontinuing their medication therapy during the first 30 days of use than experienced medication users, regardless of the medication class prescribed. This led to shorter median times to discontinuation (Vanelli *et al.,* 2009:2628-2652).

Theodorou and Slezak (2010:58) propose that only 17% of people with diabetes receive appropriate therapies and have at least 80% adherence to these medications. The potential risk of adverse events for the remaining 83% of the diabetes population should concern the health care industry. Figure 2.15 illustrates this trend.

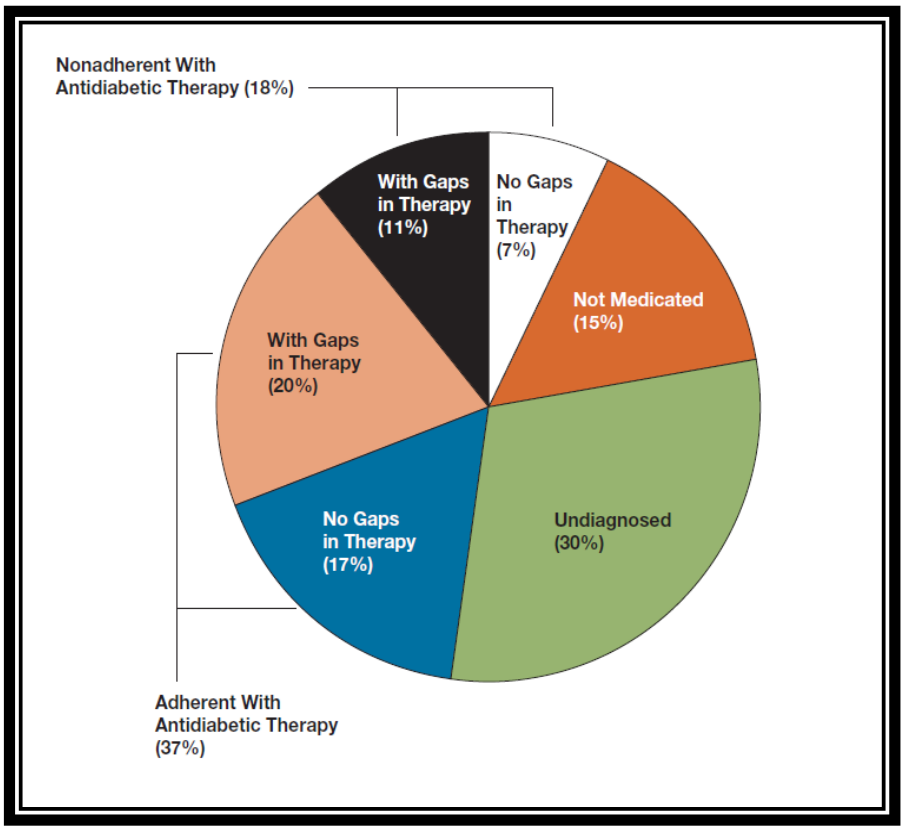

Figure 2.15: Adherence of diabetic population to antidiabetic therapies (adapted from Theodorou & Slezak, 2010:58)

Murray *et al.* (2004:36) reason that patient age also plays an important role in medication adherence, as the cognitive processes needed to manage and take medications may decrease the older a patient gets. Conversely, the number of medications consumed increases. Other factors such as vision, hearing, health literacy, disability, and social and financial resources may

all complicate the ability of older adults to adhere to the pharmacologic prescription, according to Murray *et al.* (2004:36).

Sikka *et al.* agree that many factors may influence medication adherence and that it can therefore be calculated in a number of ways. They further postulate that the goal in medication persistency measurement is to capture the amount of time that an individual remains on chronic drug therapy. The methods to calculate medication persistency can be classified into one of three categories: 1) persistency as a function of the medication possession ratio, 2) persistency as a function of medication availability at a fixed point in time, and 3) persistency as a function of the gaps between refills (Sikka *et al.,* 2005:449).

Table 2.34 illustrates the differences between the medication persistency measurement methods, as described by Steiner and Prochazka (1997:107):

Table 2.34: Differences between the medication persistency measurement methods (Steiner and Prochazka, 1997:107)

Persistency Measure	Distribution of Compliance Variable	Number of Refill Intervals Evaluated	Measurement of Medication Availability or Gaps
Persistency as a function of the MPR	Dichotomous	Multiple	Availability
Persistency as a function of medication possession at a fixed point in time	Dichotomous	Single	Availability
Persistency as a function of the gaps between refills	Continuous	Multiple	Gaps

Cramer *et al*., (2008:44) describe the difference between medication adherence and persistence as follows: Compliance is synonymous with adherence and is "the extent to which a patient acts in accordance with the prescribed interval, and dose of a dosing regimen." Medication persistence is "the duration of time from initiation to discontinuation of therapy."

According to Hess *et al.* (2006:1280), adherence can be defined as the degree to which a person's behaviour coincides with medical or health counselling. The adherence ratio can be calculated from pharmacy administrative data if the days between refills and the total days' supply are known by using the following formula:

$$\%\,Adherence = \left(1 - \frac{DBR - total\ days\ supply}{DBR}\right) \times 100$$

In a study conducted by the Kaiser pharmacy group on diabetic patients in order to determine adherence in retail and mail order pharmacies, a similar formula was used: a pharmacy utilisation-based measure of secondary adherence, the continuous measure of medication gaps (CMG). The CMG uses refill data to determine the cumulative period for which no medication was available to the patient (gaps), dividing the number of days for which the patient did not have the medication by the number of days in the study window for that participant. The CMG values range from 0% (completely adherent) to 100% (completely non-adherent). CMG values were dichotomized, classifying values of 20% or less as good and greater than 20% as inadequate (Duru *et.al,* 2010:34)

This range has been applied in previous studies examining the relationship between medication adherence, hospitalizations and mortality rates, for example a study conducted by Ho *et.al.* in order to determine the effect of non-adherence to chronic medication prescribed in Coronary Artery Disease.

In this study, medication adherence was calculated using the medication possession ratio (MPR), based on the total number of days supplied for each selected class of medication, divided by the observation time interval. Patients were classified as "non-adherent" based on a MPR of less than 0.80 (Ho *et al.*, 2008:773). This calculation is therefore similar to that utilised in the Kaiser Pharmacy group study previously mentioned.

The MPR is often defined as the sum of the days' supply of medication divided by the number of days between the first fill and the last refill plus the days' supply of the last refill. This calculation usually results in a ratio of less than 1.0 if there are gaps in prescription refilling. Early refilling would lead to an MPR of more than 1.0; the MPR in such a case is often limited to the maximum value of 1.0 (Sikka *et al.,* 2005:449).

To illustrate the calculation of the MPR, the following example is given by Stroupe *et al.* (2006:782):

Say a prescription was collected on September 30, with the next refill expected on October 30. If the patient obtained the next (actual) refill on October 30, then the MPR would be 1.0 (30 expected days between refills divided by 30 actual days between refills). If the patient instead received the next refill on October 15, then the MPR would be 2.0 (30 expected days divided by 15 actual days), indicating the patient received twice the supply needed over that period. If the patient obtained the next refill on November 29, then the MPR would be 0.5 (30 expected days

divided by 60 actual days), indicating the patient obtained half the supply needed over that period.

An MPR of 80% or 0.8 is deemed a reasonable threshold for medication persistence as it suggests very few days without drug possession and, consequently, fairly continuous medication usage.

In this study, 0.8 has been chosen as the threshold for undersupply because studies have suggested that therapeutic response to long-term treatment is preserved when patients take at least 80% of their prescribed drug.

The calculation of persistency as a function of the MPR is, however, also limited because of its assumption of a uniform follow-up period for all individuals. For instance, individuals with a 3-month follow-up period have fewer days of observation and fewer opportunities for non-compliance than individuals with a follow-up period of 12 months (Sikka *et al.,* 2005:450).

In this study, results will also be classified in order to establish an adequate adherence rate, with compliance of more than 80% (or less than 20% non-compliance) being regarded as good adherence. The results found in mail order pharmacy data will be compared to that of retail pharmacy data.

Table 2.35 illustrates the parameters to be utilised to classify adherence.

Table 2.35: Adherence classifications for this study

MPR	**Classification**
> 110%	Overuse/oversupply of medication
≥80% to ≤110%	Good medication adherence
<80%	Poor/insufficient medication adherence

When investigating the reasons for non-compliance, it must be considered that a possible reason for non-adherence could be cost of medication.

In a survey of 1 695 adults by the Kaiser Family Foundation/Harvard School of Public Health in 2008, it was found that 41% of adults said it was "somewhat of a problem" for their family to pay for prescription drugs they need, including 16% who said it was a serious problem. Of the study population, 29% indicated that a prescription was not collected in the last two years due to the cost, and 23% said they had halved their pills or skipped doses in order to make medication last longer. Four in ten reported at least one of these three problems (not being able to pay for medication, not filling a prescription because of cost, and/or skipping doses in the past two years) (Kaiser Family Foundation, 2008:3).

Goldman *et al.* (2004:2344-2349) concur that patients are sensitive to costs, with specific reference to co-payments. They further note that the type of medication plays a role in the co-payment variances:

> Rapid changes in drug benefits have shifted a larger burden of pharmacy costs onto beneficiaries. Beneficiaries have responded by reducing their use of drugs, but their responsiveness varies substantially among the top-selling therapeutic classes (Goldman *et al*., 2004: 2349).

For example, antihistamines and NSAIDs that are taken intermittently to treat symptoms are more sensitive to co-payment changes than other medications, for example antihypertensive, anti-asthmatic, antidepressant, antihyperlipidemic, anti-ulcerant and anti-diabetic agents (Goldman *et al.,* 2004:2349).

According to Devine *et al*. (2010:203), there are few reports which indicate that improvements in a patient's medication adherence will result in a decrease in long-term medical service utilisation and costs.

In a study to monitor adherence, resulting costs and cardiovascular hospitalizations associated with statins, Pittman *et al*. (2011:1) found that, compared to the statin-adherent patients, cardiovascular disease-related hospitalizations were more likely for the patients with an MPR of 60% to 79% or MPR of 0% to 59%, than for those patients with an MPR or 90% to 100%. Statin adherence was therefore associated with reductions in subsequent total health care costs and cardiovascular disease-related hospitalizations.

It therefore seems that patients' adherence to chronic medication, especially after initiation of therapy, is not ideal. In South Africa, it is possible that adherence to chronic medication is also inadequate, and this assumption will be tested during the course of this study, especially in Chapter 4, where chronic medication utilisation will be investigated.

2.6.1. General medication trends

Although the term "health care" encompasses a variety of systems and acts performed, the purpose of this study will be to define health care in terms of prescription medication distribution, and more specifically, chronic medication.

Prescription medication in this study refers to all medication in South Africa that cannot be accessed over the pharmacy counter and therefore require a valid prescription by an authorised health care provider.

Although prescriptions are required for several acute medication types (e.g. antibiotics), this thesis will focus specifically on prescription medication for chronic disease conditions.

The handwritten prescription has been the method of choice for the physician to communicate drug therapy decisions and for the pharmacist to dispense the medication for many years. Regulation of the written prescriptions appeared in one of the earliest known statutes on the control of drugs (Griffin, 2004:320). However, in modern times, medication "prescriptions" can be written in different formats.

In Sweden, electronic prescriptions (or ePrescriptions) are defined as personal drug prescriptions electronically transferred from the prescriber's computer system to a national ePrescription mailbox which is accessible to all Swedish pharmacies (Astrand *et al*., 2009:2).

In 1984, Swedish authorities regulated the Electronic Transfer of Prescription (ETP) system for the first time, and in December 2007 68% of all new prescriptions were transferred electronically in Sweden (Astrand *et. al*, 2009:2).

According to Santana *et al.* (2010:1), an estimated 1.8% of the population surveyed in European countries in 2007 (residents of Denmark, Germany, Greece, Latvia, Norway, Poland and Portugal) had used the Internet to request or renew a prescription; 3.2% had used the Internet to schedule an appointment and 2.5% had used the Internet to ask a particular health question. Eighteen per cent of the populations of these countries expected that in the near future they would have consultations with health professionals online, and 25.4% expected that in the near future they would be able to schedule an appointment online. Of those patients already using Internet health options, 40% considered the provision of these eHealth services to be important when choosing a new doctor (Santana *et al.*, 2010:1).

In South Africa, this trend of doctors regularly providing prescriptions electronically via a regulated Internet system is not yet practised. According to the South African Medicines and Related Substances Control Act 101 of 1965, any schedule 2, schedule 3, schedule 4, schedule 5 or schedule 6 substance shall not be sold by any person other than "a pharmacist or a pharmacist intern or pharmacist's assistant acting under the personal supervision of a pharmacist, upon a written prescription issued by an authorized prescriber or on the verbal instructions of an authorized prescriber who is known to such pharmacist", among others. It therefore seems that the written prescription or a verbal prescription when the prescriber is known to the pharmacist is still the only acceptable forms of medication prescription in South Africa.

Prescription drugs tend to contribute towards general health care costs around the world. In a 2010 study by Price Waterhouse Coopers in the US, it was found that the biggest share of the private health insurance benefit is paid to physicians (35%). The next biggest portion was in patient hospital services (30%) followed by 16% on outpatient services and 15% on prescription drugs (Price Waterhouse Coopers' Health Research Institute, 2010).

The annual Council for Medical Scheme's report of 2010-2011 indicates that in South Africa, 37% of private spending was on hospitals and 17% on medication. GPs represented 7% of medical aid spending and specialists 22.4%. Expenditure on managed care was 3% (CMS, 2011:161).

Another interesting trend noted was that health plans in the US are experiencing much smaller growth in drug spending, as the generic dispensing rate has continued to increase. In 2007, 67% of all drugs were generic, an increase of 7% from 2005. Another factor affecting the growth in drug spending is the lack of new "blockbuster" or high revenue drugs coming to market. Specialty drugs (i.e. oncologicals) are very expensive and are also a growing market, but they are more narrowly focused (Price Waterhouse Coopers' Health Research Institute, 2010).

Theodorou and Slezak (2010:53) support this observation by stating that growth trends in retail prescription drugs slowed to historically low levels in 2008. An increase in generic alternatives, changes in utilisation patterns, a significantly higher number of black box warnings, and a reduction in the number of significant new drug approvals of new molecular entities over the past two years have resulted in single-digit overall growth trends for prescription drugs.

In a 2007 analysis by Roland Berger Strategy Consultants, 30% of European health care expenditure was found to be for hospital services and 25% for ambulatory care. Medical goods and pharmaceuticals amounted to 20%, whereas 10% was directed towards nursing and residential care. Public health organisations and administration accounted for 7% (Roland Berger Strategy Consultants, 2007).

In South Africa, medication comprises 17.4 % of medical spending in the private sector, and this percentage increased to 18.4% from 2008 to 2009 (CMS, 2010:165). This trend could be related to more frequent utilisation of medication as well as the annual price increase of 10.2% that was permitted by the DoH for 2009. In the CMS 2010-2011 report it is stated that expenditure on medicines increased by 11.1% to R14.0 billion in 2010 from R12.6 billion in 2000. However, as a proportion of total health care benefits, it decreased from 27.0% in 2000 to 19.0% in 2004. In

2005-2010, medicine expenditure in fact remained consistently at 17.0% relative to all benefits paid (CMS, 2011:167).

This is supported by the annual Mediscor Medicines Review which states that medicines remain one of the most important factors influencing health care costs in the medical schemes environment. According to this report, medication expenditure increased by 7.6% from 2009 to 2010 (Bester & Badenhorst, 2011:1) and 17.6% from 2008 to 2009, compared to 14.4% between 2007 and 2008 (Bester & Badenhorst, 2010:1, 3).

The Single Exit Price (SEP) was a key driver of medicine costs. The SEP increased on average year-on-year by 10.2% from 2008 to 2009 compared to 2.6% from 2007 to 2008 (Bester & Badenhorst, 2010:1, 3). There was an SEP increase of 13.2% in February 2009 and of 7.4% in April 2010 (Bester & Badenhorst, 2011:4). SEP remained static in 2011.

From the American, European and South African trends mentioned, it would seem that pharmaceuticals or prescription medication comprise up to 20% of national health care spending. This therefore warrants further investigation.

- **Generic and originator medication**

Cameron *et al.* (2009: 247) are of opinion that the cost of medicines to both patients and health systems can be reduced by promoting low-cost generic medicines through preferential registration procedures and financial incentives for prescribing and dispensing generics. An addition to this, programmes to enhance the trust in generics should be implemented.

The WHO (2011) defines a generic medicine as a multisource pharmaceutical product which is intended to be interchangeable with the comparator product. It is usually manufactured without a license from the innovator company and marketed after the expiry of patent or other exclusivity rights.

An innovator pharmaceutical product is one which was first authorised for marketing, on the basis of documentation of quality, safety and efficacy (WHO, 2011).

An originator medicine in South Africa can be defined as a medicine, registered in South Africa, where such a medicine is currently protected by a patent or had been protected by a patent previously. Such medicine may be marketed either by the original patent holder or another entity (Medicines and Related Substances Act 101 of 1965).

Generic/independent multi-source medicines are medicines, registered in South Africa, where such a medicine has never been protected by patent legislation. Such medicines are being

manufactured by companies other than the company that originally held the patent (Medicines and Related Substances Act 101 of 1965).

Generic medications have the same dosage, intended use, side effects, risks, administration, safety and strength as the original medicine, but they may differ in flavour, colour or combination of inactive ingredients (Badjatya, 2013:222).

By bypassing the considerable resources spent on the initial introduction of the drug to market by the brand name manufacturer (including research and development costs, clinical trials and legal fees), a generic company can manufacture and market a cheaper equivalent medication (Badjatya,2013:222).

Alternatively, generics are sometimes defined as medicines "for which the patent of the active substance has expired", thus including all out-of-patent products including originator brands (Nilsson & Melander, 2000:1195). Decollogny *et al*. (2011:1) state that, since generic drugs have the same therapeutic effect as the original formulation but at generally lower costs, their use should be more heavily promoted.

Decollogny *et al.* (2011:2-3) propose that there are three main stakeholders determining generic drug usage, namely physicians, pharmacies and patients:

> Patients with poor health status (the old, complex treatments) tend to be reluctant to use generic drugs. However, in a co-payment setting (high deductible and out-of-pocket participation), patients tend to prefer saving money, and are likely to choose a generic over a branded drug, especially if the price of the latter is much higher than that of the former.
> (Decollogny *et al.,* 2011:3)

These determinants of generic medication usage rates are illustrated in Figure 2.16.

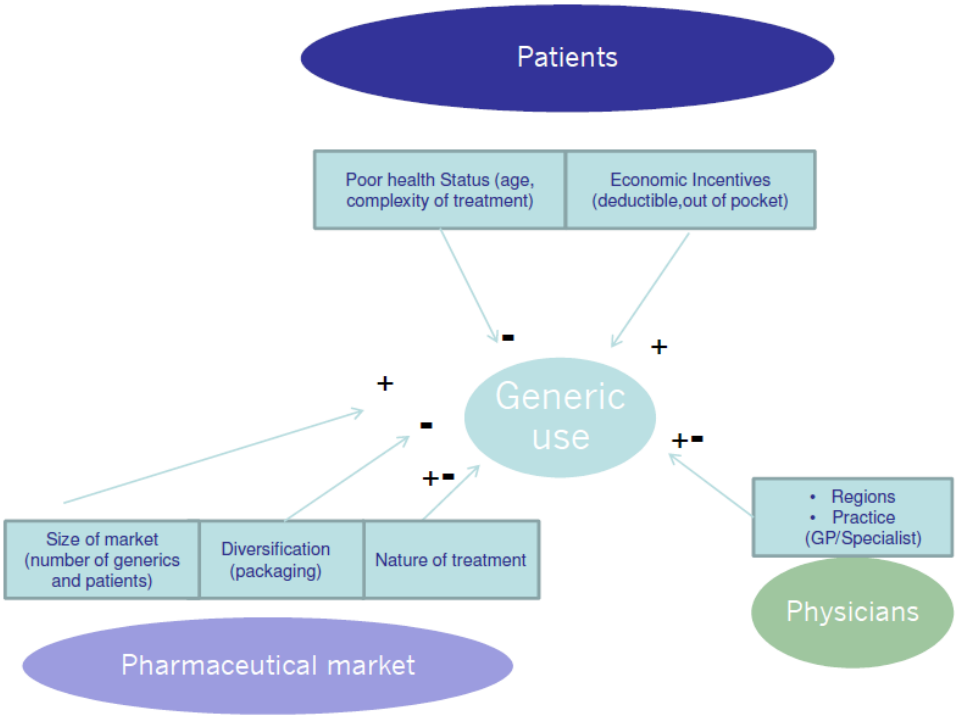

Figure 2.16: Assumed determinants of generic use (adapted from Decollogny *et al*., 2011:4)

Figure 2.16 portrays the different factors that Decollogny *et al.* (2011:4) believe to play a role in generic medication use. Factors include the number of generics available for the nature of the treatment, the number of drugs taken by the patient and the cost implication for the patient in relation to his/her economic position. Physicians also play a role in prescribing generic medication.

Theodorou and Slezak (2010:58) agree that prescription medication cost trends are influenced by generics due to a number of reasons, as illustrated in Figure 2.16.

Switching brand medication to generic medication is probably the most frequently used method to minimise the cost associated with prescription medication usage. In Australia, this concept has been strongly enforced since 1994. The Australian government started to encourage the use of generic medicines by applying a generic substitution policy. This policy allowed community pharmacists to substitute specified listed brand name (originator) medicines with equivalent generics, provided consent was obtained from both the prescriber and the patient (Chong *et al.*, 2011:2).

Andersson *et al.* (2007:382) also found that the introduction of generic substitution has had an impact on the growth of pharmaceutical expenditure as a whole. This was due to a decrease in expenditure for both patients and the community.

In the US in 2010, spending on originator medication was $229 Billion, but declined by 0.7%, to 2011, while spending on unbranded generics increased 21.7% and branded generics by 4.5% (IMS, 2011a:6). The reason for this could be the very high utilisation rate of generics in America; within six months of patent loss, patients received the generic form of the molecule 80% of the time in 2010 (IMS, 2011a:6).

According to IMS (2011a:22), this indicates an efficient set of mechanisms for encouraging generic usage versus original brands. In 2006, only 55% generic share was obtained of the molecule for those products that faced generic competition for the first time. In the same report, it was also found that 3.2 million more patients started their therapy with a generic while 6.6 million fewer patients started therapy with a brand.

It would therefore seem that spending on medication decreased in the US in 2010, and increased generic medication usage could have contributed to this trend.

In South Africa, the situation is summarised as follows by a leading pharmacy benefit manager (Bester & Badenhorst, 2011:10):

> An increase in generic utilisation can result in substantial cost savings for individuals and funders of health care. In 2010, the average cost per item for an originator with generic equivalents was R140 compared to R85 per generic equivalent. Original medicines without generic alternatives cost an average of R213 per item. Significant savings can be realised by utilising the generic equivalent of an appropriate therapeutic alternative. This can be achieved through the implementation of formularies, therapeutic reference pricing and other benefit design strategies. It can also be argued that the use of generic alternatives encourages adherence to medicine therapy, since they are more affordable.

Substitution of branded drugs with generic drugs seems to be a worldwide trend. In comparing generic substitution practices, it was found that Germany has a 36% rate of generic substitution, France 85% and Spain 4% (Decollogny *et al.,* 2011:7). Heikkilä *et al*. (2007:367) describe the generic substitution system in Finland as based on the pricing principles illustrated in Figure 2.17.

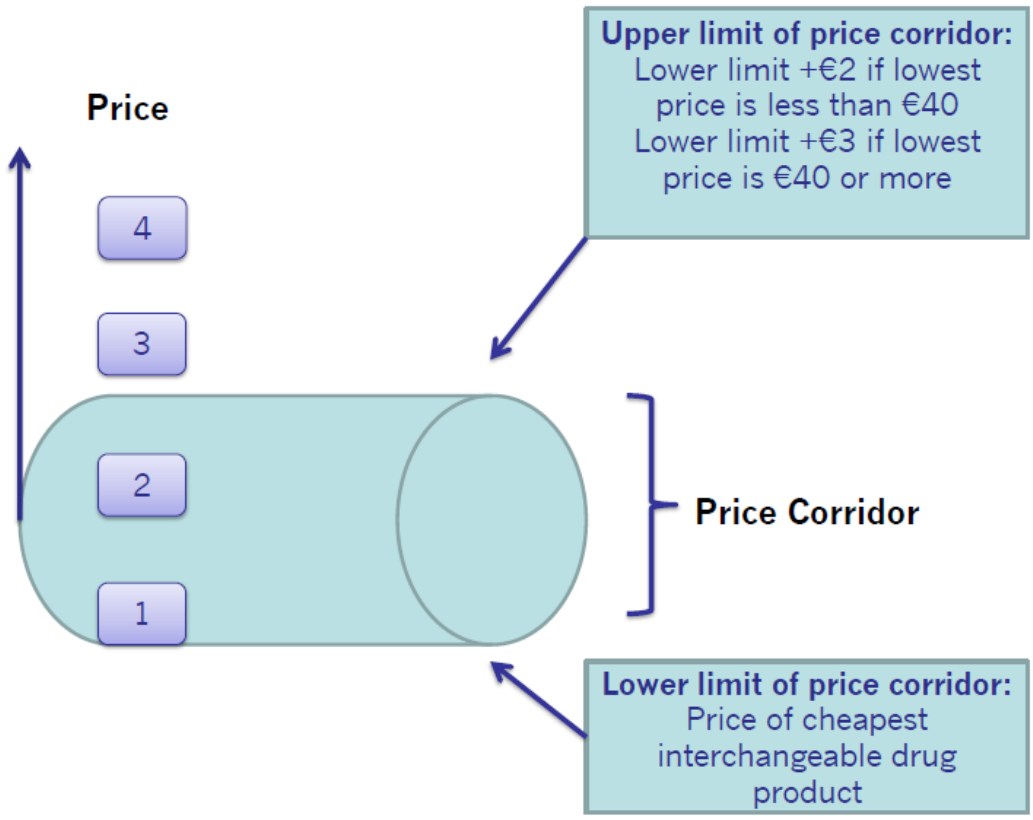

Figure 2.17: Price corridor for generic substitution (adapted from Heikkilä *et al.,* 2007:367)

Price corridor 1, 2, 3 and 4 represent interchangeable medicines. If the physician has prescribed medicine 3 or 4 and has not forbidden substitution, the pharmacy will offer to substitute it with 1 or 2, provided these are available from the wholesaler. Savings in Finland after the first year of generic substitution were 88.3 million Euro (Heikkilä *et al*., 2007:367). These savings were incurred by substitution and reduced drug prices. A total of 39.2 million Euro was saved by customers and a further 49.1 million Euro by the drug reimbursement system. The biggest portion of the savings (59.5 million Euro) was accomplished through drug price reduction. For example, the prices of angiotensin-converting enzyme (ACE) inhibitors fell by more than 40% and the prices of antiviral and serum lipid reducing agents by more than 35%, with wholesale prices also falling by 1.8% in 2003 (Hekkilä *et al*., 2007:368).

With the global increase in health care cost, governments in many countries have applied several cost-containment rules and regulations in an effort to use limited financial resources effectively so that health care could be provided equitably (Chong *et al.*, 2011:139-148; Puig-Junoy, 2007:14-29; Faden *et al.,* 2011:134-143*).*

Chua *et al.* (2010:229) agree that one of the ways to control health care expenditure is to promote the use of more inexpensive generic medication instead of the more expensive branded equivalents. Savings achieved by using generic medicines allow more patients to be treated with the same amount of money and more funds are available to finance other treatment modalities (Chua *et al.,* 2010:229).

In a study conducted in Malaysia in 2009 under general practitioners to determine their perceptions about chronic medication, it was found that there were misconceptions among the respondents about the concepts of "bioequivalence", "efficacy", "safety" and "manufacturing standards" of generic medicines (Chua *et al.,* 2010:232). GPs in this survey believed that a standard guideline on originator medication substitution, collaboration with pharmacists, patient education and information on safety and efficacy of generic medicines is necessary to ensure quality use of generics. They also reported that advertisements and product bonuses offered by pharmaceutical companies, patient's socio-economic factors as well as credibility of manufacturers influenced their choice of medicine (Chua *et al.,* 2010:232).

In a study conducted from 2001 to 2003 over almost 6000 pharmacy-filled prescriptions by Shrank *et al.* (2007), generic substitution rates in the US were determined and the following conclusion was made:

> Physician and patient factors have an important influence on generic drug initiation, with the patients who live in the poorest zip codes paradoxically receiving generic drugs least often. While tiered pharmacy benefit designs and mail-order pharmacies helped steer patients towards generic medications once the first prescription has been filled, they had little effect on initial prescriptions. Providing patients and physicians with information about generic alternatives may reduce costs and lead to more equitable care. (Shrank *et al.*, 2007:1295)

This belief that health care providers need to be more educated to play a role in the dispensing of generic medicines agrees with Okunade and Suraratdecha (2006:228) who propose that pharmacists can play a big role in alerting and advising patients on the financial advantages of generic drugs.

> Pharmacists have professional and moral obligations to promote the rational use of all drugs and ensure safe and effective patient use of medicines, recommend preventive care to contain overall cost of medical care, and participate in drug use policy, formulary, and purchasing. (Okunade & Suraratdecha, 2006:228)

Doucette *et al.,* (2005:1104) agree that drug therapy for outpatients taking multiple medications to treat chronic conditions can be improved through collaboration between physicians and community pharmacists. This is supported by Decollogny *et al*. (2011:7) who concluded that

pricing and reimbursement regulations are extremely important to increase generic usage. Consumers that had high out-of-pocket costs bought more generics. They were also more likely to substitute generics when the savings relative to brand name price would be high.

The generic usage rate (the percentage of all dispensed prescriptions that are generic) has increased to more than 70% for most major payers in the US in 2010 (Generic Pharmaceutical Association, 2011). The price of these medications has decreased substantially. Approximately three quarters of Food and Drug Administration (FDA)-approved drugs have generic counterparts according to the US Generic Pharmaceutical Association's 2011 report. It also reports that, in 2007, 21% of total prescription drug sales and 65% of total prescriptions dispensed were generic medicines (Generic Pharmaceutical Association, 2011).

In South Africa, the use of generic medication increased annually from 2007 to 2009. In the private sector, the percentage of generic products compared to non-generics increased to 48.8% in 2009 from 48.1% in 2007 (Bester & Badenhorst, 2010: 13).

An increase in the use of generic medication in SA could be attributed to legislation (more stringent reference pricing and mandatory generic substitution at pharmacy level) and greater acceptance of generic medicines by prescribers and pharmacists (Deroukakis, 2007:63). Bester and Badenhorst postulate that there are a number of reasons for this including more generic alternatives and their use being encouraged by medical schemes and by the South African government. These reasons as set out in the Mediscor Medicines Review of 2009 (Bester & Badenhorst, 2011:13) include:

- More generic alternatives having become available on the market as more branded drugs have lost patent protection
- Managed care (regulatory initiatives) such as the implementation of generic reference pricing and formularies that promote the use of generic equivalents
- More awareness of the availability and use of generics by patients as well as health care providers
- Mandatory generic substitution at pharmacy level

It is also interesting to note that, in 2009, 60% of all ethical medicines on the South African market were originators without generic alternatives, 31% were generic equivalents and 9% represented originators with generic equivalents (Bester & Badenhorst, 2011:13).

Decollogny *et al*. (2011:1) address the issue of responsible generic substitution and cautions that brand-to-generic or generic-to-generic switches might be confusing to patients. These patients are taking the same substance but in a new form, and this may be problematic for certain medication classes with a narrow therapeutic margin.

Not all patients and providers are equally susceptible to generic substitution, and it was found that generic substitution may even vary in different provinces of a country, as proven in Switzerland (Decollogny *et al.,* 2011:5). The overall substitution rate for generics was found to be 31%, with the three different cantons having rates of 43%, 12% and 35% respectively (Decollogny *et al.,* 2011:5).

Patel *et al.* (2012:1) found that promotion of medication and brand names influenced people's perceptions of efficacy and safety, and that generic medication still had a connection of inferior quality, which need to be corrected.

According to Bester and Badenhorst (2011:13) generic utilisation can be encouraged by:

- Generic reference pricing
- Initiation of medicine therapy with the most cost-effective and beneficial medicine, usually a generic (step therapy)
- Formulary design that promotes generic utilisation
- Benefit design that assigns a higher co-payment to original medicines
- Consumer education through media campaigns, direct communication to medical scheme members or information supplied through pharmacies and prescribers
- Prescriber and provider education through academic detailing

In a study among pharmacists in New-Zealand, Babar *et al.* (2001:298) found that pharmacists play a very big role in generic utilisation rates in the country. Generic substitution was supported by 89.4% of pharmacist respondents in this study. Among those, most substitute with generics most of the time, and approximately 8% believe that generic substitution is appropriate all of the time. Approximately 60% of respondents routinely recommend generics, whereas 5.6% of respondents never recommend generic medicines. The foremost reasons given to support generic substitution is cost, consumer preference or demand, appearance and availability.

The benefits of utilising generic medication are, however, not perceived in the same light by all patients. In a study undertaken in Durban, Cape Town and Johannesburg in South Africa

between December 2005 and January 2006, perceptions about free medication were tested (Patel *et al.,* 2010:61). Generic medicines as well as medicines supplied at no cost by the state were considered to be poor quality and treated with suspicion (Patel *et al.,* 2010:61).

It can therefore be deduced that generic medication could result in lower overall medication expenditure when being dispensed in the place of an originator or more expensive generic drug. The differences in generic and originator dispensing habits (and the associated cost) between retail and courier pharmacies will be investigated through quantitative analysis in Chapter 4.

2.6.2. Chronic medication

Medication for the purpose of this study can be divided in two main categories: acute medication and chronic medication. To better understand the role of chronic medication, the term "chronic disease", namely the conditions for which chronic medications are utilised, must also be clarified.

Acute conditions are severe and sudden in onset. This could describe anything from a broken bone to an asthma attack. A chronic condition, however, is a long-developing syndrome, such as osteoporosis or asthma (Medline Plus, 2013).

The National Academy of an Aging Society (1999:2) provides the following definition for chronic conditions and medication:

> Chronic conditions have persistent or recurring health consequences lasting for years. They are illnesses or impairments that cannot be cured. Some of the most prevalent chronic conditions, such as sinusitis or hay fever, are generally not disabling; however, others, such as heart disease and arthritis, can cause significant limitations in people's ability to perform certain basic activities of daily living. Thus, in addition to medical services, people who have chronic conditions often need personal, social, or rehabilitative care over a prolonged period of time.

It is also projected that by 2040, the number of people with chronic disease in the US will have increased by 50% (National Academy of an Aging Society, 1999:5).

Stedman's Medical Dictionary (2005:283) defines "chronic" as "a term to describe persistent disease or illness" and "referring to exposure, prolonged or long term, sometimes meaning also low intensity". Once a patient is diagnosed with a chronic condition, the associated chronic medication is a long-term (in some instances life-long) necessity. Untreated, a chronic condition could worsen and lead to a heavier economic burden, incapacity and death. Compliance to one's chronic medication is therefore an ideal that is strived towards world-wide. Reimbursement strategies to help make chronic medication accessible are applied in various forms across the world.

The word *chronic* in terms of medication usage can be defined as "[o]f long duration" and "[u]sed of a disease of slow progress and long continuance" according to the American Heritage Medical Dictionary (2007).

Chronic can also be defined as: "Of long duration and slow progression. Illnesses that are chronic develop slowly over time, and do not end. Symptoms may be continual or intermittent, but the patient usually has the condition for life" (Gale Encyclopaedia of Medicine, 2008).

Chronic medication is therefore taken for extended periods of time, and in many cases chronic medicine will be taken by patients for the rest of their natural lives.

The National Academy of an Aging Society (1999:1) states that chronic conditions are the major cause of illness, disability, and death in the United States:

> Almost 100 million Americans have chronic conditions and millions more will develop them as America ages. The continued growth in the number of elderly – as baby boomers age and as people live longer − will cause an increase in the number of people who are most vulnerable to and most affected by chronic conditions.

According to Kung *et al.* (2005:2), seven out of ten deaths among Americans can be attributed to chronic diseases on an annual basis. Heart disease, cancer and stroke account for more than 50% of all deaths each year. Obesity has also become a major health concern, as one in every three adults in the US is obese and almost one in five youth between the ages of 6 and 19 is obese (BMI ≥ 95th percentile of the CDC growth chart) (Odgen *et al*., 2007:1). Furthermore, arthritis is the most common cause of disability, with about 19 million Americans living with limitations in activity, according to the Centers for Disease Control and Prevention Report 2003-2005 (Centers for Disease Control and Prevention, 2006).

In an evaluation of 25 European Union (EU) member states, it was found that two thirds of deaths in the EU member states are caused by circulatory diseases and cancer. Heart attacks, strokes and other circulatory diseases are responsible for 41% of all deaths. Cancer accounted for 25% of all deaths and is the biggest killer of people in the cohort 45-64 years. Among the elderly (65-84 years), diseases of the circulatory system account for 42% of all deaths (Niederlaender, 2006:5).

According to the WHO (2005), chronic, non-communicable diseases such as cardiovascular diseases, diabetes and asthma represent a substantial health burden to developing countries. Chronic diseases are responsible for at least 50% of the deaths that occur in all WHO regions except Africa, where they cause 25% of all deaths.

> While the proportion of deaths from chronic diseases is largest in high-income countries, in low and middle-income countries chronic diseases continue to cause 39% and 72% of all deaths, respectively. Cardiovascular diseases alone account for 30% of all deaths in the world, 80% of which occur in low- and middle-income countries (WHO, 2008d).

Chronic conditions also cause significant morbidity in terms of disability-adjusted life years (DALYs). This calculation measures the potential of a life lost due to premature mortality and of the productive life lost due to disability. Chronic conditions account for one third of DALYs in low-income countries and for nearly two thirds in middle-income countries. In Africa, where chronic disease morbidity is the lowest, these conditions still account for 21% of DALYs (WHO, 2008d).

The National Vital Statistic Report compiled by the National Centre for Health Statistics (part of the US Department of Health and Vital Services) made a summary of the top 15 leading causes of death in the US in 2007. They are depicted in Table 2.36.

Table 2.36: The 15 leading causes of death in 2007 in the US according to Department of Health and Vital Services (Xu *et al*., 2010:2)

1.Diseases of heart (heart disease)
2.Malignant neoplasms (cancer)
3.Cerebrovascular diseases (stroke)
4.Chronic lower respiratory diseases
5.Accidents (unintentional injuries)
6.Alzheimer's disease
7.Diabetes mellitus (diabetes)
8.Influenza and pneumonia
9.Nephritis, nephrotic syndrome and nephrosis (kidney disease)
10.Septicemia
11.Intentional self-harm (suicide)
12.Chronic liver disease and cirrhosis
13.Essential hypertension and hypertensive renal disease (hypertension)
14.Parkinson's disease
15.Assault (homicide)

According to the Burden of Disease Unit of the National Medicines Research Council in South Africa, the top 20 causes of mortality in the country for 2000 are summarised in Table 2.37.

Table 2.37: Top 20 causes of death in South Africa in 2000 (Norman *et al.*, 2006:12)

ALL			**MALE**			**FEMALE**		
Rank	**Cause of death**	**%**	**Rank**	**Cause of death**	**%**	**Rank**	**Cause of death**	**%**
1	HIV/AIDS	25.5	1	HIV/AIDS	23.5	1	HIV/AIDS	27.8
2	Ischaemic heart disease	6.6	2	Interpersonal violence	8.4	2	Stroke	8.2
3	Stroke	6.5	3	Tuberculosis	6.8	3	Ischaemic heart disease	6.7
4	Tuberculosis	5.5	4	Ischaemic heart disease	6.5	4	Hypertensive disease	4.6
5	Interpersonal violence	5.3	5	Stroke	4.9	5	Lower respiratory infections	4.6
6	Lower respiratory infections	4.4	6	Lower respiratory infections	4.2	6	Tuberculosis	4.1
7	Hypertensive disease	3.2	7	Road traffic accidents	4.1	7	Diabetes mellitus	3.5
8	Diarrhoeal diseases	3.1	8	Diarrhoeal diseases	2.9	8	Diarrhoeal diseases	3.2
9	Road traffic accidents	3.1	9	Chronic obstructive pulmonary disease	2.9	9	Low birth weight	2.2
10	Diabetes mellitus	2.6	10	Low birth weight	2.3	10	Chronic obstructive pulmonary disease	2.0
11	Chronic obstructive pulmonary disease	2.5	11	Hypertensive disease	1.9	11	Road traffic accidents	1.9
12	Low birth weight	2.2	12	Diabetes mellitus	1.8	12	Interpersonal violence	1.8
13	Asthma	1.3	13	Trachea/ bronchi/ lung cancer	1.7	13	Cervix cancer	1.4
14	Trachea/ bronchi/ lung cancer	1.3	14	Suicide	1.5	14	Asthma	1.4
15	Nephritis/ nephrosis	1.3	15	Oesophageal cancer	1.3	15	Nephritis/ nephrosis	1.4
16	Septicaemia	1.2	16	Asthma	1.3	16	Septicaemia	1.3
17	Oesophageal cancer	1.1	17	Cirrhosis of liver	1.2	17	Breast cancer	1.3
18	Protein-energy malnutrition	1.1	18	Nephritis/ nephrosis	1.2	18	Inflammatory heart disease	1.1
19	Suicide	1.0	19	Protein-energy malnutrition	1.1	19	Protein-energy malnutrition	1.0
20	Cirrhosis of liver	1.0	20	Septicaemia	1.1	20	Trachea/ bronchi/ lung cancer	1.0
	All causes	**100**		**All causes**	**100**		**All causes**	**100**

According to Statistics SA (2008:19) in the section called “Mortality and causes of death in South Africa, 2006: Findings from death notification”, the top ranking main group of causes of death in 2006 was *certain infections and parasitic diseases*, comprising just over a quarter

(26.0%) of all deaths. This group also includes a total of 607 deaths due to *multidrug-resistant tuberculosis (MDR-TB)* and *extensively drug-resistant tuberculosis (XDR-TB)*.

The second most common main group of causes of death was *diseases of the respiratory system* (14.2%), followed by *diseases of the circulatory system* (13.7%). *Neoplasms* accounted for 5.6% of all deaths, *perinatal conditions* 2.1%, while *pregnancy, childbirth and puerperium* contributed to 0.2% of all deaths. Deaths due to *external causes of morbidity and mortality* comprised 8.7% of all deaths (Statistics SA, 2008:19).

The WHO presents a holistic approach in summarising leading causes of death for different countries, and the causes of death are divided between low-, middle- and high-income countries.

According to fact sheet 310 of the World Health Organisation (WHO, 2008c), the leading causes of deaths by income groups in 2004 are illustrated in Tables 2.38 to 2.39.

Table 2.38: Top 10 causes of death in low-income, middle-income and high-income countries in 2004 (WHO, 2008c)

Low-income countries	**Deaths in millions**	**% of deaths**	**Middle-income countries**	**Deaths in millions**	**% of deaths**	**High-income countries**	**Deaths in millions**	**% of deaths**
Lower respiratory infections	2.94	11.2	Stroke and other cerebrovascular disease	3.47	14.2	Coronary heart disease	1.33	16.3
Coronary heart disease	2.47	9.4	Coronary heart disease	3.4	13.9	Stroke and other cerebrovascular diseases	0.76	9.3
Diarrhoeal diseases	1.81	6.9	Chronic obstructive pulmonary disease	1.8	7.4	Trachea, bronchus, lung cancers	0.48	5.9
HIV/AIDS	1.51	5.7	Lower respiratory infection	0.92	3.8	Lower respiratory infections	0.31	3.8
Stroke and other cerebrovascular diseases	1.48	5.6	Trachea, bronchus, lung cancers	0.69	2.9	Chronic obstructive pulmonary disease	0.29	3.5
Chronic obstructive pulmonary disease	0.94	3.6	Road traffic accidents	0.67	2.8	Alzheimer and other dementias	0.28	3.4

Tuberculosis	0.91	3.5	Hypertensive heart disease	0.62	2.5	Colon and rectum cancers	0.27	3.3
Neonatal infections	0.9	3.4	Stomach cancer	0.55	2.2	Diabetes mellitus	0.22	2.8
Malaria	0.86	3.3	Tuberculosis	0.54	2.2	Breast cancer	0.16	2
Prematurity and low birth weight	0.84	3.2	Diabetes mellitus	0.52	2.1	Stomach cancer	0.14	1.8

Table 2.39: Combined leading causes of death worldwide in 2004 (WHO, 2008c)

World	**Deaths in millions**	**% of deaths**
Coronary heart disease	7.20	12.2
Stroke and other cerebrovascular diseases	5.71	9.7
Lower respiratory infections	4.18	7.1
Chronic obstructive pulmonary disease	3.02	5.1
Diarrhoeal diseases	2.16	3.7
HIV/AIDS	2.04	3.5
Tuberculosis	1.46	2.5
Trachea, bronchus, lung cancers	1.32	2.3
Road traffic accidents	1.27	2.2
Prematurity and low birth weight	1.18	2.0

A comparison of the role of chronic disease in mortality between the US, SA and the WHO worldwide statistics gives an indication of the extent and severity of different chronic conditions around the world.

Of the 57 million global deaths in 2008, 36 million, or 63%, were due to non-communicable diseases (WHO, 2008b). Non-communicable/chronic diseases account for a large portion of deaths worldwide. The leading cause of death worldwide is ischaemic heart disease (12.8%), followed by stroke and other cerebrovascular diseases (10.8%). Also in the top ten leading causes of death are chronic obstructive pulmonary disease (5.8%); trachea, bronchus and lung cancers (2.4%); and diabetes mellitus (2.2%) (WHO, 2008b).

Table 2.40 summarises the different leading causes of death in the US, SA and worldwide combined as described by Tables 2.38 to 2.40.

Table 2.40: Summary of leading causes of death in US, SA and worldwide.

Ranking	US 2006	SA 2000	Worldwide 2008
1.	Diseases of heart (heart disease)	HIV/AIDS	Coronary heart disease
2.	Malignant neoplasms (cancer)	Ischaemic heart disease	Stroke and other cerebrovascular diseases
3.	Cerebrovascular diseases (stroke)	Stroke	Lower respiratory infections
4.	Chronic lower respiratory diseases	Tuberculosis	Chronic obstructive pulmonary disease
5.	Accidents (unintentional injuries)	Interpersonal violence	Diarrhoeal diseases
6.	Alzheimer's disease	Lower respiratory infections	HIV/AIDS
7.	Diabetes mellitus (diabetes)	Hypertensive disease	Tuberculosis
8.	Influenza and pneumonia	Diarrhoeal diseases	Trachea, bronchus, lung cancers
9.	Nephritis, nephrotic syndrome and nephrosis (kidney disease)	Road traffic accidents	Road traffic accidents
10.	Septicaemia	Diabetes mellitus	Prematurity and low birth weight
11.	Intentional self-harm (suicide)	Chronic obstructive pulmonary disease	N/A
12.	Chronic liver disease and cirrhosis	Low birth weight	N/A
13.	Essential hypertension and hypertensive renal disease (hypertension)	Asthma	N/A
14.	Parkinson's disease	Trachea/ bronchi/ lung cancer	N/A
15.	Assault (homicide)	Nephritis/nephrosis	N/A

From Tables 2.39 to 2.40 it can be seen that chronic conditions such as ischaemic heart disease, coronary heart disease, asthma, respiratory diseases and diabetes mellitus form a large part of all mortalities worldwide, and the usage of chronic medication therefore warrants further investigation. It is also clear that conditions such as HIV/AIDS, TB and lower respiratory tract infections (LRTIs) are more prevalent in leading to death in South Africa than in other parts of the world.

As it can be deduced that some chronic conditions are more prevalent and serious in nature than others, some distinction is needed to focus on certain conditions only. In South Africa, the prescribed minimum benefits (PMBs) provide these distinctions;

The PMBs were introduced in 2000 by the Council for Medical Schemes as a policy instrument for defining minimum levels of medical scheme cover that must be provided by a medical scheme. These minimum benefits are for the protection of members and to ensure that they are

not left without care for certain major medical expenses because they cannot afford it (BHF, 2011).

According to the Board of Healthcare Funders (BHF, 2011) in SA, PMB's are minimum benefits which by law must be provided to all medical scheme members and include the provision of diagnosis, treatment and care costs for:

- Any emergency medical condition
- A range of conditions as specified in Annexure A of the Regulations to the Medical Schemes Act (No. 131 of 1998), subject to limitations specified in Annexure A. Included in this list of conditions is the list of chronic conditions. This list of chronic Diseases is often referred to as the “Chronic Diseases List” or CDL.

According to the Medical Schemes Act (131/1998), in Annexure A of the Regulations, 26 chronic conditions have been specified (BHF, 2008):

- Addison’s disease
- Asthma
- Bipolar mood disease
- Bronchiectasis
- Cardiac failure
- Cardiomyopathy
- Chronic obstructive pulmonary disease
- Chronic kidney disease
- Coronary artery disease
- Crohn's disease
- Diabetes insipidus
- Diabetes mellitus (type 1 and type 2)
- Dysrhythmia (irregular heartbeat)
- Epilepsy
- Glaucoma
- Haemophilia

- HIV
- Hyperlipidaemia (high cholesterol)
- Hypertension (high blood pressure)
- Hypothyroidism (inactive thyroid gland)
- Multiple sclerosis
- Parkinson's disease
- Rheumatoid arthritis
- Schizophrenia
- Systemic lupus erythematosis
- Ulcerative colitis

McLeod (2009:6) estimates that the burden of chronic disease (with specific reference to the conditions mentioned) will potentially be critical in South Africa when extrapolating current disease prevalence to population growth.

Because this study focuses primarily on chronic medication, most medication and diseases studied will fall within one of these chronic diseases.

In the US, several factors have contributed to the growth in spending on pharmaceuticals, including:

- Increased utilisation and demand for prescription drugs - From 1997 to 2007, the number of prescriptions purchased in the United States increased by 72%, (Aitken *et al*., 2009:28). In contrast to this, the population only grew by 11%.
- Price increases - Retail prescription prices have annually increased by 6.9% on average between 1997 and 2007 (Agency for Healthcare Research and Quality, 2007), much faster than the average inflation rate of 2.6%.
- Research and development – Manufacturers try to recoup the costs of research and development for marketed drugs as well as those that do not enter the marketplace. Only one in five drugs that make it to the clinical testing process receive FDA approval and are brought to market, and this costs about $900 million (DiMasi *et al*., 2003:180).
- Advertising and marketing - Pharmaceutical manufacturers invest heavily in marketing to consumers and physicians. This may influence consumer demand and physician

prescribing practices. Marketing costs exceed 30% of revenues for the pharmaceutical industry, with over 90% of the effort aimed at physicians (McFadden *et al.,*2007:1).

According to the Centres for Medicare & Medicaid Services, Office of the Actuary, National Health Statistics Group, prescription medication formed 10% of total health care expenditure in 2008 in the United States (Centres for Medicare & Medicaid Services, 2009). In South Africa, medication price increases (as discussed in section 2.6.2.1) may have also lead to a higher cost in medication costs. As more people join medical aid schemes each year (3.1% increase in scheme membership 2009 to 2010, CMS, 2011:159) more medication claims are captured in the private sector and this may also contribute to the increase in medication spend of 5.1% 2009 to 2010 (CMS, 2011:161).

In order to provide a background to the analysis in Chapter 4, the 26 chronic PMB conditions will be discussed briefly.

- **Chronic PMB Conditions**

i. Addison's disease

According to the Mayo Clinic (2012a), Addison's disease is a disorder that occurs when the body produces insufficient amounts of certain hormones produced by your adrenal glands. The adrenal glands produce too little cortisol and often insufficient levels of aldosterone as well.

Treatment involves hormone replacement therapy to correct the low levels of steroid hormones, and include oral or injectable corticosteroids and androgen replacement therapy (Chakera, 2010:409).

ii. Asthma

Asthma is a condition witch high incidence in South Africa, and SA is ranked 25th worldwide in terms of asthma prevalence. Concerning to note is that SA is ranked 4th highest when it comes to mortality attributed to asthma in the age group 5-35 years (Ehrlich & Jithoo, 2006:123).

In the 1950s and 60s, asthma was considered an acute, episodic illness (Berg, 2006:17). The primary feature of asthma was bronchospasm, which was treated with bronchodilators as needed. Typically, patients saw a physician only when they were wheezing, and when the symptoms improved, they would not use any medication. In the late 70s and early 80s, experts realised that asthma was a chronic, inflammatory disease and should be treated with anti-inflammatory medications such as inhaled corticosteroids, which had been newly developed at that time. The 1991 Expert Panel Report recommended that physicians categorise severity of

asthma in patients as “mild, moderate, or severe” and use the suggested treatment for each level of severity (Berg, 2006:17).

Asthma is a chronic inflammatory disorder of the airways characterised by bronchial hyper responsiveness (BHR) and airflow obstruction. It is a substantial and growing health burden in the United States and around the world. In the US, recent data indicate that approximately 20 million persons reported asthma symptoms in 2003 (Hanania, 2007:483).

According to Busse (2011:2), asthma can be diagnosed when:

- episodic symptoms of airflow obstruction or airway hyper responsiveness is present
- airflow obstruction is at least partially reversible
- alternative diagnoses are excluded

Recommended methods to establish the diagnosis are detailed medical history and physical examination focusing on the upper respiratory tract, chest, and skin spirometry to demonstrate obstruction and assess reversibility, including in children older than five years of age.

Chanez *et al.* (2007:1338) state that most patients with asthma have mild-to-moderate cases of the disease that can be well controlled. Standard treatment includes the regular use of inhaled corticosteroids (ICSs) combined with short-acting inhaled β2-agonists (SABAs) or long-acting inhaled β2-agonists (LABAs). However, there is a group of asthma patients in whom even high doses of these drugs fail to control the disease.

The exact cause of the asthmatic process is not well understood but it is thought to be triggered off by an allergy or when the lungs are irritated by something in the air (Green, 2012:1-2).

iii. Bipolar mood disease

According to the South African Depression and Anxiety Group (SADAG) in their Depression Treatment Guide, bipolar mood disease, also known as manic depression, can be defined a physical illness marked by extreme changes in mood, energy and behaviour.

Bipolar disorder is a mental illness involving episodes of serious mania and depression. The person’s mood usually swings from overly “high” and irritable to sad and hopeless, and then back again, with periods of normal mood in between. According to the SADAG guideline (SADAG, 2011), manic episodes are characterised by the following symptoms:

- At least one week of profound mood disturbance is present, characterised by elation, irritability or expansiveness.

- Three or more of the following symptoms are present:
  - Grandiosity
  - Diminished need for sleep
  - Excessive talking or pressured speech
  - Racing thoughts or flight of ideas
  - Clear evidence of distractibility
  - Increased level of goal-focused activity at home, at work, or sexually
  - Excessive pleasurable activities, often with painful consequences
- The mood disturbance is sufficient to cause impairment at work or danger to the patient or others.
- The mood is not the result of substance abuse or a medical condition.

Manic episodes are alternated by major depressive episodes according to the SADAG guideline (SADAG, 2011), and are characterized by the following:

- For two weeks, the person experiences five or more of the following symptoms, with at least one of them being either a depressed mood or characterised by a loss of pleasure or interest:
  - Depressed mood
  - Markedly diminished pleasure or interest in nearly all activities
  - Significant weight loss or gain, or significant loss or increase in appetite
  - Hypersomnia or insomnia
  - Psychomotor retardation or agitation
  - Loss of energy or fatigue
  - Decreased concentration ability or marked indecisiveness
  - Preoccupation with death or suicide; patient has a plan or has attempted suicide

Hirschfeld (2004:S83) declares that bipolar disorder is a serious, recurrent illness which is characterized by mood disturbances. This includes risk-taking and impulsivity, interpersonal difficulties and depression. Hirschfield states that current treatments for bipolar disorder have

focused on mania although the symptoms of bipolar depression occur more frequently. This depressive phase also lasts longer, is more disruptive and is associated with greater risk of suicide than mania.

Fountoulakis (2007:22) agrees that the treatment of bipolar disorder is complex due to the fact that treatment needs to be considered separately for manic, hypomanic, mixed and bipolar depression episodes. Different compounds and treatment modalities seem to be differentially effective against specific facets of the illness. The efficacy during the acute and the maintenance phase should also be monitored separately (Fountoulakis *et al*., 2007:22).

iv. Bronchiectasis

Bronchiectasis is defined as irreversible, abnormal dilatation of one or more bronchi, with chronic airway inflammation, associated chronic cough and sputum production, recurrent chest infections, and airflow obstruction. The diagnosis of bronchiectasis is made clinically and confirmed by high-resolution computed tomography (HRCT) of the chest. Patients with a diagnosis of bronchiectasis should be referred to a specialist unit for investigation and management (Boyton, 2008:316).

Boyton (2008:316) illustrates the cycle of inflammation in the lung as in Figure 2.18.

Patients with mild disease may be asymptomatic except during clearly defined exacerbations. The most common symptoms are (Boyton, 2008: 317):

- chronic cough and daily sputum production
- intermittent haemoptysis, foetor and pleuritic chest pain (usually associated with infective exacerbations)
- breathlessness, wheeze, tiredness with poor concentration, low-grade fever and chronic rhinosinusitis

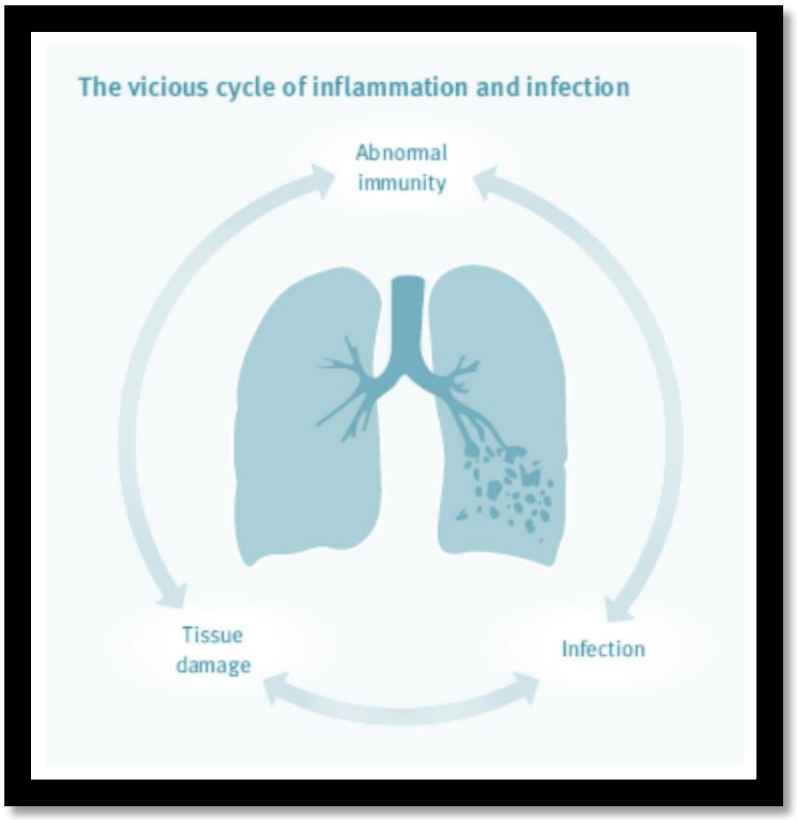

Figure 2.18: Cycle of inflammation in the lung (Boyton, 2008:316)

v. Cardiac failure

According to Medline Plus (2012), cardiac failure occurs when the heart becomes unable to pump blood efficiently. Symptoms include difficulty with breathing and leg swelling. High blood pressure and narrow blood vessels of the heart are the most common causes of cardiac failure.Congestive cardiac failure is a common condition with a prevalence of between 1% and 3% (Cleland *et al*., 2001:623). It has a poor prognosis with a five-year mortality rate ranging from 26%-75%. In the over 65 years' age group, it is the single most common cause for admission to hospital in the USA. It is responsible for up to 2% of total annual health care expenditure in western countries. Angiotensin-converting enzyme (ACE) inhibitors have been shown to reduce mortality and hospitalisation rates. Findings of epidemiological studies suggest that there are 50 million people with suspected or confirmed heart failure in Europe and neighbouring countries (Cleland *et al.,* 2002:1631). The diagnostic and treatment burden of this disorder is large. Heart failure is also malignant and costly, both in terms of morbidity and resources (Cleland *et al.,* 2002:1631). Medline Plus (2012) describes cardiac failure as a chronic condition that may develop suddenly. It may be caused by many different mechanisms, and is present when the heart muscle cannot pump (eject) the blood out of the heart very well

(systolic heart failure) or heart muscles are stiff and do not fill up with blood easily (diastolic heart failure).

vi. Cardiomyopathy

Cardiomyopathy refers to diseases of the heart muscle. These diseases have many causes, symptoms, and treatments. In cardiomyopathy, the heart muscle becomes enlarged, thick, or rigid. As cardiomyopathy worsens, the heart becomes weaker. It's less able to pump blood through the body and maintain a normal electrical rhythm (National Heart, Lung and Blood Institute, 2012).

Cardiomyopathies and the resultant systolic and diastolic heart failure remain the main cause of cardiovascular morbidity and mortality in both children and adults and are a frequent indication for cardiac transplantation. According to the American Heart Association 2005 Heart and Stroke Update, more than 26 000 deaths each year in the United States are caused by cardiomyopathy (Daughenbaugh, 2007:1). Second to coronary artery disease, cardiomyopathy is the most common direct cause of sudden death in the United States and is a leading cause of heart failure (Daughenbaugh, 2007:1).

vii. Chronic obstructive pulmonary disease

Chronic obstructive pulmonary disease (COPD) is an increasing health burden and one of the leading causes of morbidity and mortality worldwide (Cazzola *et al*., 2008:1049.The disease results from interaction between individual risk factors and environmental exposures to agents like cigarette smoking, occupational dusts, air pollution and infections in childhood. The narrowing of small airways, emphysema and luminal obstruction with mucus secretions are some of the main mechanisms causing airflow limitations. (Cazzola *et al*., 2008:1049)

According to the WHO (2011), COPD was the fifth-leading cause of death in 2002, and deaths from COPD are projected to increase by more than 30% in the next 10 years. Estimates indicate that COPD should become the third leading cause of death worldwide in 2030 (WHO, 2011).

viii. Chronic kidney disease

According to the National Kidney Foundation of the US, chronic kidney disease includes conditions that damage the kidneys and decrease their ability to function optimally. Chronic kidney disease may be caused by diabetes, high blood pressure and other disorders. 26 million American adults have this disease and millions more are at risk (National Kidney Foundation, 2013).

In South Africa, limited resources are available to African nephrologists and kidney disease patients. Bihl (2002) comments that diabetes mellitus, which is closely associated with kidney disease, is reaching epidemic proportions in Southern Africa (500 per million population).Approximately 42% of patients receiving renal replacement therapy in South Africa receive haemodialysis, 40% receive peritoneal dialysis and 18% receive kidney transplantation. The disease is generally not optimally managed in South Africa (Bihl, 2002).

ix. Coronary artery disease

Coronary artery disease (CAD) is the leading cause of morbidity and mortality in developed countries (Boudik *et al*., 2006:86). Although mortality from CAD has fallen significantly in the past three decades, it remains the main cause of death in men over 45 years and women over 65 years in Europe and the United States (Boudik *et al*, 2006:86). According to Superko (1998:34), atherosclerosis / coronary artery disease (CAD) is mostly as a result of genetically linked dyslipidemias that can often be identified in clinical practice.

Whereas elevated low density lipoprotein (LDL) cholesterol is strongly correlated with CAD risk, reduction of LDL cholesterol alone is not a sufficient treatment strategy in many cases. Patients with the small, dense LDL of the atherogenic lipoprotein profile (pattern B) experience a three-fold increased risk of CAD, and pattern B is also linked to the development of type 2 diabetes. Elevated lipoprotein increases atherosclerotic risk, especially in the presence of other risk factors, and is predictive of CAD risk in both genders (Superko, 1998:34).

x. Crohn's disease

Angelberger *et al.* (2009:157) describe Crohn's disease (CD) and ulcerative colitis (UC) as lifelong inflammatory bowel diseases (IBD) progressing over time. Angelberger continues to state that lack of public awareness may contribute to insufficient consultation of primary care physicians, late diagnosis and development of potentially preventable complications of disease.

Hart and Siew (2011:227) support this definition by adding that Crohn’s disease is a chronic inflammatory bowel disease affecting any part of the gastrointestinal tract from the mouth to the anus. The ileum, colon and perineum are, however, most commonly affected. It is characterized by transmural granulomatous inflammation. Although the aetiology is unknown, Crohn’s disease is thought to result from a complex combination of various genetic and environmental factors.

According to Hart and Siew (2001:228), the incidence of Crohn’s disease varies worldwide, and rates vary between 0.1 and 16 per 100 000 inhabitants, with highest incidence recorded in

northern and western Europe and North America. Lower rates are recorded in Africa, South America and Asia.

xi. Diabetes insipidus

Diabetes insipidus (DI) is a condition that occurs when the kidneys are unable to conserve water as they perform their function of filtering blood. The amount of water conserved is controlled by the antidiuretic hormone called ADH or vasopressin (Medline Plus, 2011). Diabetes insipidus can be caused by a lack of ADH (central DI) or a failure of the kidneys to respond to ADH (nephrogenic DI), according to Medline Plus (2011).

Ball (2005:18) also defines diabetes insipidus as characterised by excess production of dilute urine – more than 40 ml/kg per 24 hours in adults and more than 100 ml/kg per 24 hours in children. It is divided into three subtypes:

• hypothalamic diabetes insipidus (HDI) – relative or absolute lack of the posterior pituitary hormone vasopressin (AVP)

• nephrogenic diabetes insipidus (NDI) – partial or total resistance to the renal antidiuretic effects of AVP

• dipsogenic diabetes insipidus (DDI, primary polydipsia) – excessive, inappropriate fluid intake

Ball (2005:18) further states that hypothalamic diabetes insipidus is rare. It has an estimated prevalence of 1/ 25 000 and affects males and females equally.

xii. Diabetes mellitus (type 1 and type 2)

Type 1 Diabetes Mellitus

The incidence of type 1 diabetes mellitus (T1DM) is increasing worldwide at a rate of approximately 3% per year with the fastest increase occurring in the youngest age group (Shulman and Daneman, 2010:280).

Type 1 diabetes mellitus is also the most common chronic metabolic condition in youth and its incidence is increasing worldwide. It is differentiated from type 2 diabetes which is also increasing in prevalence as childhood obesity increases worldwide. T1DM presents initially with ketoacidosis (DKA) in 15%-67% of cases (Shulman & Daneman, 2010:280).

Kuzuya *et al*. (2002:65) state that diabetes mellitus includes a group of diseases characterised by chronic hyperglycemia and other metabolic abnormalities, which are due to deficiency of insulin effect. After a long duration of metabolic impairment, specific complications of diabetes

such as retinopathy, nephropathy and neuropathy may be present. Arteriosclerosis is also accelerated. Depending on the severity of the metabolic abnormality, diabetes may be asymptomatic, it may be associated with symptoms (thirst, polyuria, and weight loss), or it may progress to ketoacidosis and coma.

The etiological classification of diabetes and related disorders of glycaemia includes type 1, type 2, those due to specific mechanisms and diseases as well as gestational diabetes mellitus. Type 1 is characterised by destructive lesions of pancreatic cells either by an autoimmune mechanism or of unknown cause. Type 2 diabetes is characterised by combinations of decreased insulin secretion and decreased insulin sensitivity (insulin resistance) (Kuzuya *et al*., 2002:66).

The rate of new cases among youth is estimated at 19 per 100,000 each year for type 1 diabetes and 5.3 per 100,000 for type 2 diabetes. Furthermore, diabetes was the seventh leading cause of death listed on U.S. death certificates in 2006. Diseases associated with diabetes include heart disease and stroke (NDIC, 2007). In South Africa; diabetes is ranked as the 10th leading cause of death (Norman *et al.,* 2006:12).

According to the National US Diabetes Clearing House (NDIC, 2007) type 1 diabetes is a serious condition, and heart disease was noted on 68% of diabetes-related death certificates among people ages 65 years or older, while stroke was noted on 16% of diabetes-related death certificates among people ages 65 years or older in 2004.

Adults with diabetes have heart disease death rates and stroke risk two to four times higher than adults without diabetes. Blood pressure is also increased in up to 75% of diabetics (NDIC, 2007).

Type 2 Diabetes Mellitus

Type 2 diabetes (formerly called non-insulin-dependent or adult-onset) results from the body's ineffective use of insulin. Up to 90% of people with diabetes around the world have type 2, and it is mostly the result of excess body weight and physical inactivity (WHO, 2009). WHO (2009) projects that diabetes deaths will double between 2005 and 2030.

The following conditions are associated with diabetes according to the WHO (2009) fact sheet:

- Diabetes mellitus increases the risk of *heart disease and stroke*.
- Combined with reduced blood flow, neuropathy in the feet increases the chance of *foot ulcers* and eventual *limb amputation*.

- *Diabetic retinopathy* is an important cause of blindness.
- Diabetes is among the leading causes of kidney failure.
- *Diabetic neuropathy*, damage to the nerves as a result of diabetes, affects up to 50% of people with diabetes.
- The overall risk of dying among people with diabetes is at least double the risk of their peers without diabetes.

Riu *et al.* (2003:235) agree that type 2 diabetes mellitus is a risk factor for cardiovascular disease (CVD). Conversely, CVD is also the main cause of death in DM-2 .In a 10 year follow up of patients with DM type 2, Gerich (2007:63) found that CVD is the major cause of mortality for individuals with type 2 DM, partially because type 2 DM often co-exists with other cardiometabolic risk factors such as hypertension and dyslipidemia. Type 2 DM is an independent risk factor for macrovascular disease and is often accompanied by other CVD risk factors. Patients with type 2 DM have an increased prevalence of lipid abnormalities that contribute to higher rates of CVD.

Metabolic syndrome is closely related to diabetes mellitus and is a group of abnormalities such as abdominal obesity, dyslipidemia, high blood pressure, dysglycemia, inflammation and prothrombotic factors (Ford and Chaoyang, 2008:165).

Metabolic syndrome can also be defined as a cluster of risk factors that increase the risk of cardiovascular disease (CVD). The syndrome is characterised by abdominal obesity, atherogenic dyslipidemia, hypertension, insulin resistance with or without hyperglycemia, a prothrombotic state and a proinflammatory state. CVD is the most important clinical result of metabolic syndrome (Zieve, 2004:S6).

The syndrome also carries a greatly increased risk for development of type 2 diabetes mellitus, which in turn increases cardiovascular risk even further. Management of metabolic syndrome should focus on weight loss, increased physical activity and improvement of an atherogenic diet (Zieve, 2004:S6).

xiii. Dysrhythmia (irregular heartbeat)

Cardiac irregularities are often manifested as arrhythmia, with disruption of the normal periodicity and regularity of the electromechanical activity of the heart. Cardiac arrhythmias are associated with a diverse group of conditions, including congenital, metabolic, structural, physiological, immunological and infectious abnormalities. Dysrhythmia can be classified as

primary because of endogenous electrical abnormalities, or secondary because of exogenous influences such as ischemia or adrenergic stimuli (Vumkir, 1995:204).

xiv. Epilepsy

Epilepsy encompasses a number of different syndromes, the cardinal feature of which is a predisposition to recurrent unprovoked seizures (Fisher *et al.,* 2005:470).

Epilepsy is a clinical syndrome in which seizures have a tendency to recur. The traditional approach of a clinician to a patient with epilepsy is first to classify the epilepsy and then to formulate a treatment plan (Milton, 2010:33).The incidence rate of epilepsy is highest in the age group 65 and older in the US. By age 70 the incidence of epilepsy is approximately double that seen in children, and by age 80 nearly triple. The greatest prevalence is among patients older than 85, an important statistic given that this age group is the most rapidly increasing subset of the U.S. population (Ettinger *et al.,* 2010:72).

Epilepsy is among the most common serious brain disorders. It can occur at all ages and is characterised by a variety of presentations and causes. Diagnosis of epilepsy remains clinical, and neurophysiological investigations support the diagnosis of the syndrome. Epilepsy is also associated with an increased prevalence of mental health disorders including anxiety, depression and suicidal thoughts (Elger & Schmidt, 2008:501). Modern antiepileptic drugs AEDs have provided considerable benefits for patients with epilepsy. Up to 60-70% of newly treated patients achieve satisfactory control of seizures with these newer AEDs (Elger & Schmidt , 2008:501).

An epileptic seizure is an occurrence of signs and/or symptoms due to abnormal excessive or synchronous neuronal activity in the brain. Seizures associated with epilepsy are sudden, brief attacks of altered consciousness; motor, sensory, cognitive, psychic or autonomic disturbances; or inappropriate behaviour caused by this neuronal activity in the brain. The diagnosis of epilepsy requires that the patient has had at least two unprovoked seizures. The estimated incidence is one case per 2000 persons in the Western population per year. For unknown reasons, the incidence of epilepsy is highest in the first year of life and increases again for those over 60 years of age (Fisher *et al*., 2005:471; Elger & Schmidt., 2008:502).

According to Fisher *et al*. (2005:470), epilepsy is a disorder of the brain characterised by an enduring predisposition to generate epileptic seizures and by the neurobiological, cognitive, psychological, and social consequences of this condition. The definition of epilepsy requires the occurrence of at least one epileptic seizure (Fisher *et al*., 2005:470).

xv. Glaucoma

Glaucoma is a chronic neurodegenerative disease characterised by loss of retinal ganglion cells, resulting in distinctive changes in the optic nerve head and retinal nerve fiber layer. Early diagnosis is critical to prevent permanent structural damage and irreversible vision loss. Detection of glaucoma relies on examination of structural damage to the optic nerve combined with measurements of visual function (Sharma *et al.*, 2008:S17). The National US Eye Institute (2012), define glaucoma as a group of diseases that damage the eye's optic nerve and can result in vision loss and blindness. Increased pressure in the eye is one of the main causes.

xvi. Haemophilia

Mahlangu and Gillham (2008:130) define haemophilia is an inherited, x-linked, lifelong bleeding disorder which affects mostly males. The South African Haemophilia Association (2011) state that Haemophilia causes dangerous haemorrhages internally and into the joints and muscles, and that 0.01% of any given population is affected.

According to Hay (1998:287), haemophilia is a rare but life-threatening acquired disease caused by autoimmune depletion of factor VIII. Acquired haemophilia may also arise in association with rheumatoid arthritis, Sjrgren's syndrome, other autoimmune conditions, lympho proliferative malignancy, pregnancy and as a drug reaction.

Hay (1998:287) further proposes that the aims of treatment are to eliminate the inhibitor by immunosuppression and to treat bleeding, which is the most common cause of death in patients with this condition. The inhibitor is abolished in up to 70% of patients using prednisolone and cyclophosphamide, although other immunosuppressive regimens may also be used.

xvii. HIV/AIDS

AIDS is diagnosed when the immune system of a person infected with HIV becomes severely compromised (measured by CD4 cell count) and/or the person becomes ill with an opportunistic infection or illness (Centers for Disease Control and Prevention, 2013). In 2000, South Africa accounted for more than 50% of newly reported HIV cases in sub-Saharan Africa annually. In 1993, approximately 90% of those reported as HIV positive in SA were of African descent (Mitton, 2000:17).

Approximately 40 million people currently have HIV/AIDS worldwide and sub-Saharan Africa is the focal point of the epidemic, with 60% of those living with HIV/AIDS residing in this region (UNAIDS, 2005).

The South African Department of Health introduced new HIV guidelines in 2013 (Department of Health, 2013) and the goals of these guidelines are to

- Save lives and improve the quality of life of people living with HIV
- Achieve best health outcomes in the most cost-efficient manner
- Implement nurse-initiated treatment
- Decentralise service delivery to PHC facilities
- Integrate services for HIV, TB, MCH, SRH and wellness
- Diagnose HIV earlier
- Prevent HIV disease progression
- Avert AIDS-related deaths
- Retain patients on lifelong therapy
- Prevent new infections among children, adolescents, and adults
- Mitigate the impact of HIV and AIDS

xviii. Hyperlipidaemia

Cardiovascular disease is the most common cause of mortality and morbidity in the United Kingdom (UK). The treatment of lipid disorders such as hyperlipidemia in adults has had a sizable impact in reducing the overall burden of cardiovascular disease, particularly in individuals who have sustained a cardiovascular event such as myocardial infarction or stroke (secondary prevention) (Datta *et al*., 2011:94).

Hyperlipidaemia is a well-known condition and refers to the following biochemical states: hypercholesterolaemia, hypertriglyceridaemia and mixed hyperlipidaemia. Hypercholesterolaemia is commonly polygenetically inherited (Park, 2009:497).

Park (2009:497) defines hyperlipidaemia as being classified into three different types:

- Hypercholesterolaemia, where a patient's serum cholesterol concentration requires treatment and can be for either primary or secondary prevention of cardiovascular disease (CVD)
- Hypertriglyceridaemia, where a patient's serum fasting triglyceride concentration is elevated; can be defined as mild (1.8-6.0 mmol/litre), moderate (>6.0-10.0 mmol/litre) or severe (>10.0 mmol/litre)
- Mixed hyperlipidaemia, where the patient has both an elevated total serum cholesterol and triglyceride concentration.

xix. Hypertension

Hypertension is one of the primary risk factors for heart disease and stroke, and these two conditions are the leading causes of death worldwide. Since a quarter of the world population suffers from hypertension, this disease can therefore be classified as an epidemic (Chockalingam *et al*., 2006:553).

The target blood pressure (BP) for antihypertensive management is less than 140/90 mmHg, and less than 130/80 mmHg in patients with co-morbidities such as end-organ damage or co-existing risk factors. Benefits of management include reduced risk of death, stroke, cardiac failure, chronic kidney disease and coronary heart disease (Seedat & Rayner, 2011:S4). Hypertension is approximately twice as frequent in patients with diabetes compared to patients without the disease, and hypertensive persons are also more predisposed to the development of diabetes than their healthy peers (Sowers *et al.*, 2001:1053).

Norman *et al*. (2006:638) found that hypertension was responsible for 2.4% out of 16.2 million disability adjusted life years (DALYs) in South Africa in 2000.

xx. Hypothyroidism

Hypothyroidism is a common clinical syndrome that results from deficiency of the thyroid hormones thyroxine (T4) and tri-iodothyronine (T3). The diagnosis must be confirmed by biochemical testing. Primary hypothyroidism is indicated by a rise in serum thyrotrophin (TSH). Hypothyroidism is readily treated by T4 replacement, the aims of treatment being relief of symptoms and restoration of serum TSH to the reference range (Franklyn, 2009:426).

Congenital hypothyroidism (CH) is the most common cause of preventable mental retardation with an incidence of 1 in 3500–4500 newborns. Thyroxine (T4) is essential for neurological development and by the time clinical symptoms and signs of CH have developed, irreversible damage will have occurred (Beardsall & Ogilvy-Stuart, 2004:422).

Congenital hypothyroidism is usually caused by a defect in the thyroid gland itself (primary hypothyroidism) but may less frequently also be due to a pituitary or hypothalamic defect (central hypothyroidism) (Beardsall & Ogilvy-Stuart, 2004:423).

The different causes of hypothyroidism according to Franklin (2009:427) are:

- Primary thyroid failure
- Autoimmune (Hashimoto's) thyroiditis*

- Idiopathic atrophy*
- Previous treatment with radioiodine or thyroidectomy*
- Iodine deficiency (common worldwide)
- Antithyroid drugs
- Other drugs (e.g. lithium and amiodarone)
- Subacute and silent thyroiditis
- Dyshormonogenesis
- Agenesis
- Infiltrative disease
- Secondary thyroid failure
- Disease of the hypothalamus or pituitary

* These conditions together account for 90% of cases in developed countries.

xxi. Multiple sclerosis

Multiple sclerosis (MS) is an inflammatory disease of the central nervous system (CNS) that is characterised by a demyelination of axons in inflammatory plaques which leads to a deficiency or complete loss in the transmission of nerve impulses (Reipert, 2004:334).

The majority of patients have either relapsing remitting multiple sclerosis (RRMS) or secondary progressive MS (SPMS). Both forms affect women more than men in a 2:1 ratio. The difference in the susceptibility to these forms of MS is probably due to sex hormones (Reipert, 2004:334).

Reipert (2004:336) explains the symptoms of MS as follows:

> In principal, people with MS can experience partial or complete loss of any function that is controlled by the CNS. Depending on which areas of the CNS are affected and how badly they are damaged, the type and severity of symptoms can vary greatly.

MS can dramatically affect the quality of life experienced by patients and their family. Many MS patients have a normal life span and have to live with a degree of disability for perhaps many years (Nuijten & Hutton, 2002:44).

MS is generally treated with inteferons. The rationale behind this therapy is that MS is generally thought of as an autoimmune disease. Interferons have, by definition, antiviral properties, but they also have immunomodulating and antiproliferative properties (Nuijten & Hutton, 2002:45).

Ziemssen (2009:257) and Diamond *et al. (*2008:189) add that depression and fatigue are often symptoms of multiple sclerosis and are the primary determinants of impaired quality of life in this demyelinating neurological disease. The 12-month prevalence of major depression in patients with multiple sclerosis is about 15% (Ziemssen, 2009:257).

xxii. Parkinson's disease

Parkinson's disease is a progressive disorder of the nervous system that affects a patient's movement (Mayo Clinic, 2012b).

Parkinsonism is a clinical syndrome characterised by bradykinesia, hypo-/akinesia, muscular rigidity and resting tremor mainly caused by Parkinson's disease (PD). Symptoms of PD are due to a progressive loss of nigral neurons causing striatal dopaminergic denervation (Wolters, 2008:197). New insight into the pathological process has led PD to be considered the clinical manifestation of a multi-system degenerative process. The dopaminergic, noradrenergic, serotoninergic, cholinergic and other central neurotransmitter systems are affected (Wolters, 2008:197).

Menza *et al. (*2009:1325) concurs and adds that PD is a common neurodegenerative disease affecting up to one million individuals in the United States. Depression is also found in 40 to 50% of these patients.

xxiii. Rheumatoid arthritis

Edwards and Edwards (2010:5) define rheumatoid arthritis (RA) as a multisystem autoimmune disorder which classically presents as a peripheral symmetrical polyarthropathy. It can lead to significant disability and reduced life expectancy.

The joint destruction and resulting functional disability characteristic of RA are associated with substantial morbidity and even accelerated mortality. The severe sequelae of untreated or inadequately treated RA result directly in significant economic costs to RA patients, their families and society (Kavanaugh, 2007:929).

RA is an autoimmune disease, which affects about 1% of the general population. It is more common in women and can occur at any age. It tends to cause inflammation in multiple joints and in severe cases this leads to progressive joint destruction (Edwards & Edwards, 2010:5).

xxiv. Schizophrenia

According to the WHO (1998) the term *schizophrenia* was introduced by the Swiss psychiatrist Bleuler in the early 1900s. It refers to a major mental disorder or group of disorders whose

causes are still largely unknown. It involves a complex set of disturbances of thinking, perception, affect and social behaviour (WHO, 1998). Tandon *et al*. (2008:1) estimate that the annual incidence of schizophrenia is 15 per 100,000 and that the risk of developing the illness over a person's lifetime averages 0.7%. Schizophrenia runs in families and the following risk factors have been identified (Tandon *et al*., 2008:1):

- Urbanization
- Male gender
- History of migration
- Genetic factors (contribute to over 80%of the liability for developing schizophrenia)

Schizophrenia is a severe, debilitating mental illness. It is characterised by a progressive decline of the patient's functioning and relationship with the outside world. Although some patients recover, the illness usually follows a chronic relapsing course. The chronic nature of the illness leads to many issues, such as poor general health and non-adherence to treatment. This, in turn, can have a substantial impact on the clinical effectiveness of antipsychotic therapy (Peuskens, 2004:S453).

Atypical antipsychotics have become the treatment of choice for chronic schizophrenia. In various cases, treatment with these atypical antipsychotics has replaced treatment with conventional antipsychotics, which is associated with a high ratio of adverse events, particularly acute and tardive extrapyramidal symptoms. These atypical antipsychotics have been shown to have a broader spectrum of efficacy than conventional antipsychotics (Peuskens, 2004 S453).

xxv. Systemic lupus erythematosis

Systemic lupus erythematosis (SLE) is a diverse auto-immune rheumatic disease mainly affecting women during childbearing years (Gordon, 2010:73).The female-to-male ratio is about 9:1. Although most patients have skin and joint disease, between 30% and 50% will also develop renal, lung, heart and central nervous system involvement (Gordon, 2010:73). The Mayo Clinic (2011) defines LE as a chronic inflammatory disease that occurs when the body's immune system attacks its own tissues and organs. Inflammation caused by lupus can affect many different body systems — including your joints, skin, kidneys, blood cells, brain, heart and lungs.

Patients with SLE are now living longer as a result of more appropriate use of standard drugs, such as hydroxychloroquine, prednisolone, azathioprine and cyclophosphamide, and adjunctive

therapies, such as antihypertensives and cholesterol lowering drugs. The use of dialysis and renal transplantation has also improved survival, and new immunotherapies are under development (Gordon, 2010:73).

xxvi. Ulcerative colitis

Ulcerative colitis is a chronic disease arising from an interaction between genetic and environmental factors, but observed predominantly in the developed countries of the world. The precise etiology is unknown and therefore medical therapy to cure the disease is not yet available (Stange *et al*., 2008:3).

2.6.2.1. Chronic medication costs

Expenditure on medication in the SA private sector increased by 18.6% from 2008 to 2009, and amounts to 17.4% of all benefits paid by medical aid schemes (CMS, 2010:165).

Spending on medicines in the US exceeded $307 billion in 2010, up 2.3% on a nominal basis. On a real per capita basis, spending increased by 0.6% compared to a 3.1% increase in 2009. These lower levels of growth in spending in recent years may be due to increased use of generics, loss of patent protection for major branded products and less spending on new drugs (IMS, 2011a:3-4).

According to Morgan (2005:997), medical needs translate into prescription drug use and consequently expenditures, only when a physician prescribes a drug and a patient fills the prescription. Morgan (2005:997) further states that the cost impact of changes in exposure to at least one type of medication is the difference between growth in expenditures per capita and growth in expenditures per user of one or more prescription drugs. This overall expenditure is also mathematically proportional to the change in share of the age group that fills one or more prescriptions multiplied by the age-specific expenditures per prescription user. This factor in expenditures is affected by age-specific morbidity, access to medicines, technology, doctors and patient preferences. (Morgan, 2005:997).

Morgan (2005:90) further explores per capita medication expenditure trends and states that volume changes, prescription size changes, therapeutic mix, medication mix, price changes of medication as well as the influence of generic substitution all play a role in determining general medication cost. This is illustrated in Figure 2.19. All of these factors will be measured and compared for the different pharmacy types (mail order and retail) in Chapter 4.

In a Canadian study, Morgan (2005:999) found that approximately 40% of the total change in per capita prescription drug expenditures was concentrated in four therapeutic categories: hypertension drugs, antidepressants, lipid reducing agents, and antacids. In South Africa, a large portion of medication costs is for chronic medication, the top chronic conditions being hypertension, hyperlipidaemia, diabetes mellitus type 2, asthma and hyperthyroidism (CMS, 2011:167).

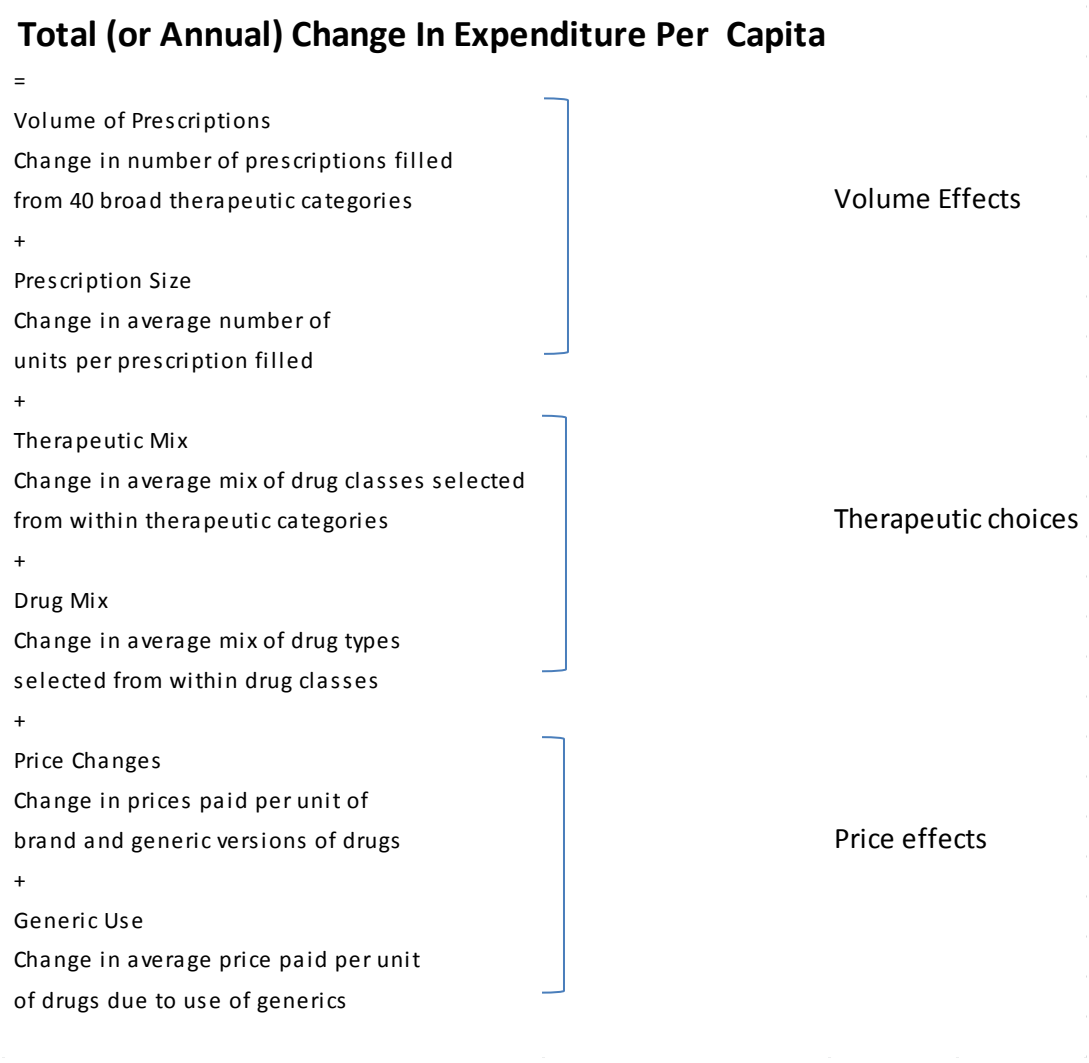

Figure 2.19: Determinants of per capita expenditure trends in Canada (Morgan, 2005:90)

- **Chronic medication costs in South Africa**

According to the annual report from the Council of Medical Schemes for 2009 (CMS 2010:165), medication comprises 17.4% of all claims paid by medical schemes in SA. In 2010, medicines accounted for 17% of total health care benefits paid. This presented an increase of 5.3% from 2009 (CMS, 2011:161).

The claim percentages for various providers are illustrated in Figure 2.20. From this figure it can be deduced that, although medication is responsible for 17.4% of all claims by medical schemes (private sector) in South Africa, it is far from the biggest cost driver, which in South Africa is expenditure on hospitals.

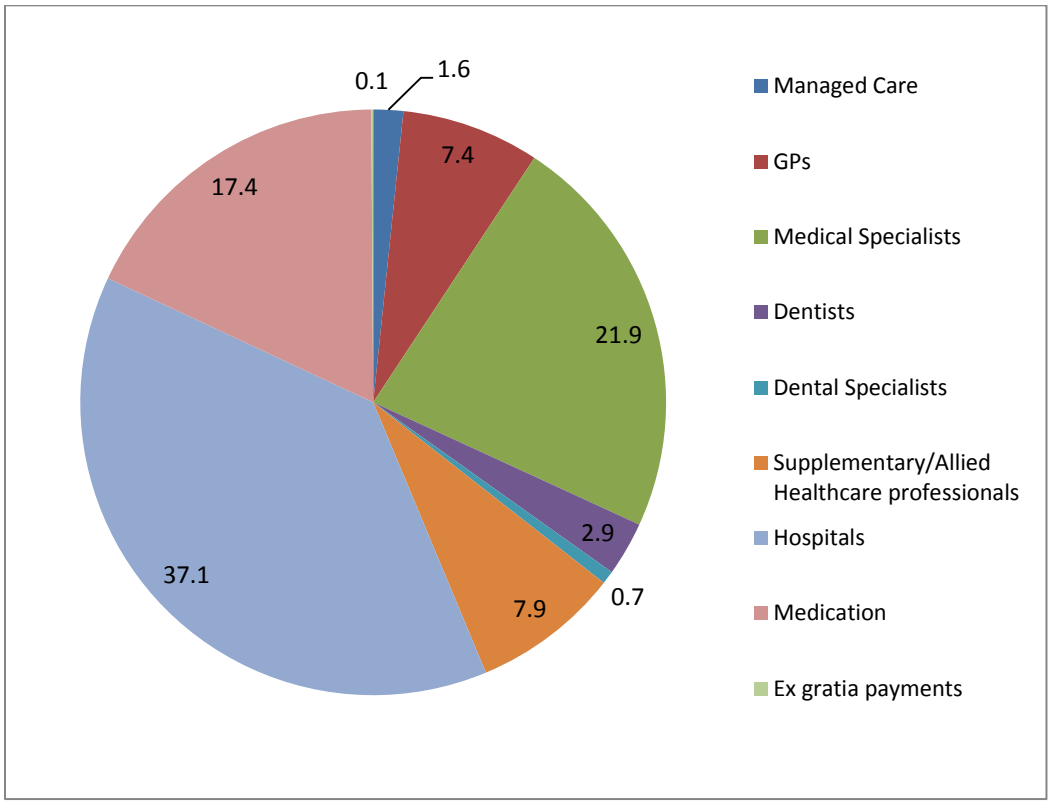

Figure 2.20: Percentage health care benefits paid in 2009 (adapted from CMS, 2010:165)

In the 2010/2011 report by the Council of Medical schemes, the distribution for 2010 did not vary greatly, as illustrated by Figure 2.21 (adapted from CMS, 2011:161).

If the trends in the United States are similar to those in South Africa, we might also see medication spending slowing down from the 18% increase from 2008 to 2009 experienced in the SA private sector (CMS, 2010:165). In calculating medication spending and increases in spending, one should factor in increased age of members (increases in age groups 45-49 and 85+ years (CMS, 2009:161)), price increases (SEP increase of 10.2% in 2008-2009 (Bester & Badenhorst, 2010:3) but no increase in 2010), and new members belonging to medical schemes (2.5% increase from 2008 to 2009 (CMS, 2009:159)). In the CMS report for 2009, these factors are not explained under the "total benefits paid" section and an 18.6% growth in medication spending seems high. However, hospital spending (increase of 18%), specialist

spending (increase of 19.1%) and GP spending (increase of 8.4%) are all indicative of a general upward trend in medical aid spending in 2009 (CMS, 2009:165).

Mayosi et al. (2009:934) state that the increase in non-communicable diseases in South Africa contributes to increased cost pressure across all health sectors.

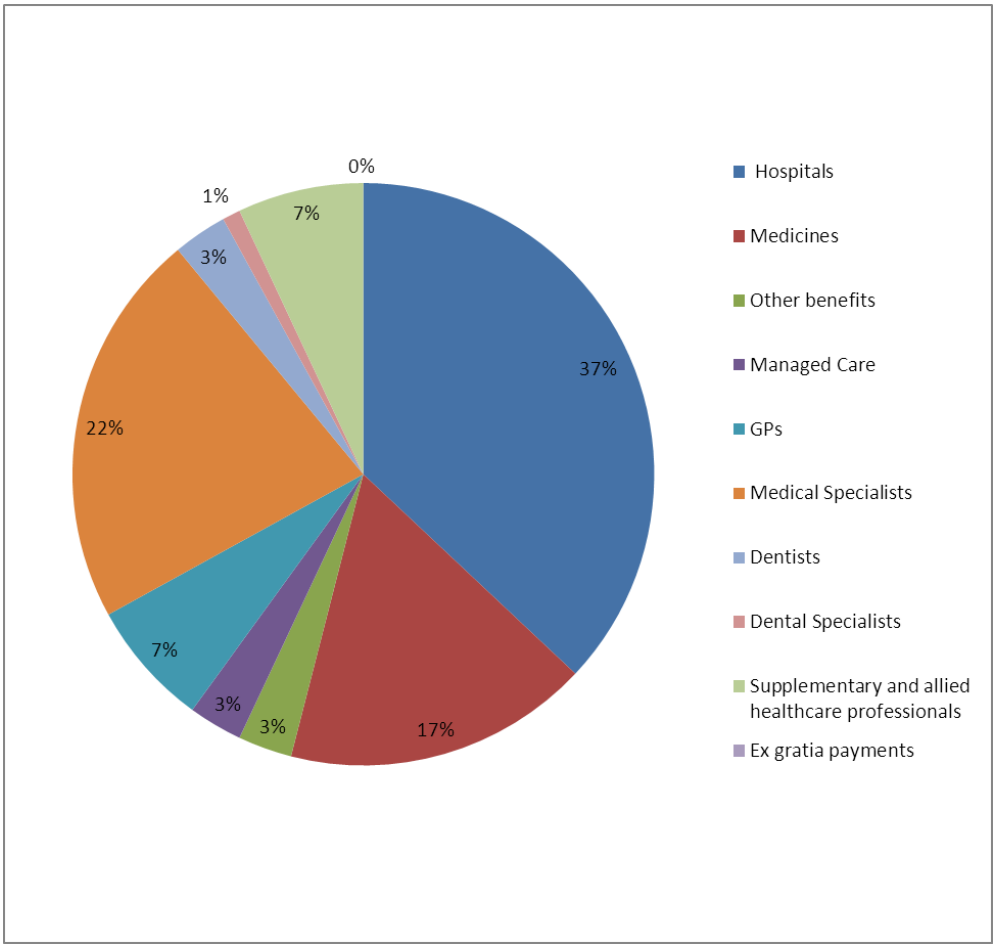

Figure 2.21: Percentage health care benefits paid in 2010 (adapted from CMS, 2011:161)

When investigating the private health care sector, Mediscor PBM's annual medicines reviews provides a good reference to measure the status of medication costs in the private sector. This PBM manages the medicine benefits of about 1.5 million beneficiaries on behalf of 38 medical schemes and four capitation providers. All of South Africa's pharmacies and 98% of all dispensing doctors are on the Mediscor service provider database (Bester & Badenhorst, 2010:35).

According to the Mediscor Medicines Review of 2008 (Bester & Badenhorst, 2009:1), medication costs increased by 26% from 2006 to 2008. Conversely, the generic utilisation rate has shown a steady increase from 45.5% in 2006 to 47.4% in 2008. It generally led to a

decrease in medication costs and could be attributed to the fact that more generic alternatives are available on the market. At the same time, managed care initiatives driving generic utilisation are having the required effect.

In the 2010 Mediscor Medicines Review, it was found that medicine expenditure still increased, but only by 7.6% from 2009. Cost increased by 5.85% and utilisation by only 1.7% (Bester & Badenhorst, 2011:1). Gray and Matsebula (2003:203-204) argue that the cost of medication in SA may be too high and that the high prices of medication generally contribute to the annual increase in medication costs both on the private and public health sectors.

The Single Exit Price (SEP) was also a pronounced driver of medicine costs. The SEP increased on average year-on-year by 10.2% from 2008 to 2009, compared to 2.6% from 2007 to 2008 (Bester & Badenhorst, 2010:3). From 2009 to 2010, the SEP increased by 13.2% in 2009 and again by 7.4% in 2010 (Bester & Badenhorst, 2011:4).

The year-on-year SEP increases from 2007 to 2011 are as follows, as gazetted by the South African Department of Health:

- No increase in SEP for 2011 (Department of Health, 2011b).
- Increase in SEP for 2010 was 7.4% (Department of Health, 2010a).
- SEP increase for 2009 was a maximum of 13.2% (Department of Health, 2008b).
- A maximum SEP increase of 6.5% was allowed for 2008 (Department of Health, 2008a).
- The maximum price increase for 2007 was 5.2% (Department of Health, 2006b).

The main focus of this study is on chronic medication. According to the Mediscor Medicines review categorisation, differentiation is made between acute, OTC, chronic, PMB CDL, HIV/AIDS, oncology and other medication (Bester & Badenhorst, 2010:9; Bester & Badenhorst, 2011:5). Acute medication was responsible for the biggest portion of medication costs in 2008 (46.9%) and in 2009 (45.6%). This is illustrated in Table 2.41.

Figure 2.22 portrays the statistics of Table 2.41 graphically**.** Oncology has been omitted due to the disproportionately high value, skewing the figure.

From Figure 2.22, it can be seen that, except for oncology which was excluded from the graph (representing a cost of more than R30 000 per beneficiary), HIV/AIDS medication followed by PMB medication cost the most per beneficiary. These costs could be influenced by all the factors indicated by Morgan (2005:90), i.e. more beneficiaries with these conditions, change in

therapeutic mix, drug mix and number of items dispensed to patients, as well as cost of medications. It can also be seen that cost per utilising beneficiary is stabilising, with the cost for acute and OTC medication actually decreasing from 2009 to 2010. According to Bester and Badenhorst (2010:3) and Bester and Badenhorst (2011:4), SEP increased on average year-on-year by 2.6% from 2007 to 2008 and 10.2% from 2008 to 2009. SEP increased again by 7.4% in April 2010 (Bester & Badenhorst, 2011:4). This also contributed to increased medication costs.

When considering the cost of chronic medication, one cannot only look at the chronic category as defined in this report. For the purpose of this study, chronic medication has been defined as "repeatable medication related to a chronic/incurable illness" (refer to paragraph 2.6.2), and therefore acute, other, OTC, oncology and HIV medication does not form part of the chronic medication definition.

Keeping this in mind, chronic medication totals 47.8% of annual insured spending on medication, therefore overtaking acute medication as cost driver in 2008 (Bester & Badenhorst 2010:16).

The largest increase in expenditure per beneficiary was in the cytostatics group (97.0%). This was due to a 58.0% increase in item cost, as well as a 23.3% increase in prevalence. Both antihypertensives and hypolipidaemic agents experienced larger increases in utilisation compared to item cost. Gastric acid reducers experienced a larger increase in item cost compared to utilisation (Bester & Badenhorst, 2010:16).

Table 2.41: Contribution per benefit category to total medication expenditure 2007 to 2009 (adapted from Bester & Badenhorst, 2010:9 and Bester & Badenhorst, 2011:6)

Year	Benefit Category	% of total expenditure	% of total items	Average cost per beneficiary (ZAR)	Average cost per utilising beneficiary (ZAR)	Average cost per item (ZAR)	Utilising beneficiary as % of total beneficiaries	Average number of items per utilising beneficiary
2007	Acute	48.7	60.8	906	1 102	85	82.2	12.9
	Non-CDL chronic	15.4	11.3	287	2 014	145	14.3	13.9
	HIV/AIDS	2.0	1.2	38	4 481	182	0.8	24.6
	Oncology	6.0	0.4	112	25 043	1 729	0.4	14.5
	Other	1.5	0.9	29	724	187	4.0	3.9
	OTC	3.8	8.1	71	251	50	28.3	5.0
	PMB	22.5	17.4	419	2 731	138	15.4	19.8
2008	Acute	47.3	58.8	1 008	1 208	95	83.4	12.8
	Non-CDL chronic	13.6	11.0	290	2 016	145	14.4	13.9
	HIV/AIDS	2.2	1.3	47	4 708	195	1.0	24.2
	Oncology	7.6	0.5	162	28 205	1 956	0.6	14.4
	Other	1.8	0.9	38	904	226	4.2	4.0
	OTC	3.8	7.7	80	276	57	28.9	4.8
	PMB	23.7	19.8	504	2 810	141	17.9	20.0
2009	Acute	45.6	56.4	1 142	1 386	107	82.4	12.9
	Non-CDL chronic	12.2	10.2	305	2 253	159	13.5	14.2
	HIV/AIDS	2.1	1.2	52	4 952	232	1.0	21.3
	Oncology	8.7	0.6	219	33 574	2 084	0.7	16.1
	Other	2.0	1.3	51	979	213	5.2	4.6
	OTC	3.9	8.0	97	319	65	30.4	4.9
	PMB	25.5	22.5	638	3 148	151	20.3	20.9
2010	Acute	43.1	54.4	1 071	1 371	107	78.1	12.9
	Non-CDL chronic	10.9	8.8	272	2 287	168	11.9	13.6
	HIV/AIDS	2.4	1.3	59	5 273	247	1.1	21.3
	Oncology	8.9	0.6	221	31 924	1 940	0.7	16.5
	Other	2.5	1.4	63	1 076	241	5.8	4.5
	OTC	3.6	8.6	90	290	57	31.0	5.1
	PMB	28.6	24.9	712	3 352	154	21.2	21.7

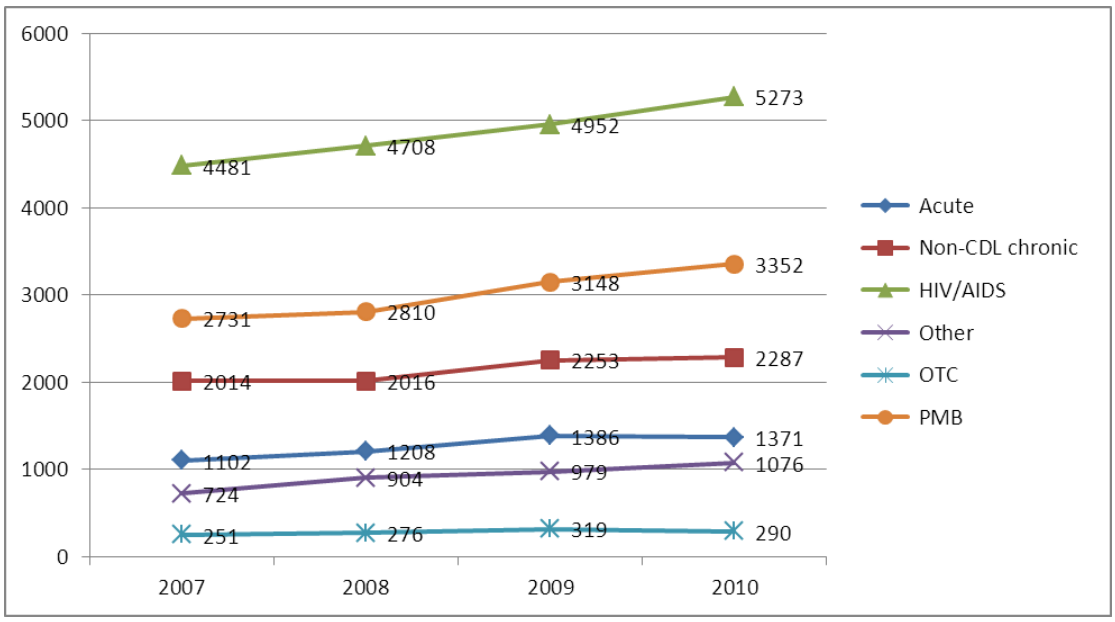

Figure 2.22: Contribution per benefit category to total medication expenditure 2007 to 2009 (adapted from Bester & Badenhorst, 2010:9 and Bester & Badenhorst, 2011: 6)

2.7.Summary

In Chapter 2, the concept of health care, the facets of health care and the means of delivering health care have been discussed. Various countries' approaches to health care delivery and re-imbursement structures were compared. Furthermore, pharmaceutical health care (both generally and in the community) were discussed. Chronic medication was specifically investigated. Private sector chronic medication internationally and locally received closer attention and the distribution of these medications within South Africa was investigated. The two main pharmacy categories, retail and mail order, was also discussed. Chapter 3 will detail the measuring tools used to extract and interpret the data in Chapter 4.