

The potential market demand for biokinetics in South Africa

by

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In loving memory of:

My father – Piet Nel

(1924 – 2009)



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DECLARATION

This study was not possible without the input of a team of researchers. The names and the contributions of the researchers involved in the study, of which the results are presented in this mini-dissertation, are given in Table 1.

Table 1: Members of the research team and their contribution to this study

Name and signature	Affiliation	Role in the study
Dr. S.J. Moss (MBA student)	PhASRec within the School for Biokinetics, Recreation and Sport Science at the Potchefstroom Campus of the North-West University.	Responsible for the conceptualisation, planning and execution of the study and writing of the manuscript.
Prof. M. Lubbe	MUSA within the School for Pharmacy at the Potchefstroom Campus of the North-West University.	Owner of the dataset, statistical analysis, and co-author of the article presented in Chapter 2.
Prof. C.A. Bisschoff (Supervisor)	Potchefstroom Business School at the Potchefstroom Campus of the North-West University.	Supervisor and guidance with regard to the writing of this manuscript.
With my signature I declare that I have approved the above-mentioned article, that my role in the study, as indicated above, is representative of my actual contribution and that I hereby give consent that it may be published as part of the MBA mini-dissertation of Dr. S.J. Moss.		

MUSA = Medicine use in South Africa (Niche area);

PhASRec = Physical activity, Sport and Recreation (Niche area)

ABSTRACT

Chronic diseases of lifestyle (CDLs) are on the increase in South Africa and appears to be increasing the financial burden on the economy. Biokinetics is a health profession addressing CDL, with exercise as the treatment modality. The scope of practice includes the prevention and treatment of CDL. Biokinetics as a profession has been registered with the Health Professions Council of South Africa (HPCSA), previously the South African Medical and Dental Council (SAMDC), since 1983. In this period of 25 years, the profession has only been practising in the private health care sector of South Africa. There has been no investigations to determine the market demand for this health profession. Therefore the purpose of this investigation is to determine the potential market demand for biokinetics in the private health care sector of South Africa. This investigation will take into account the potential market demand based on the patients that can be treated for CDL by biokinetics, and not the number of persons that are at risk of developing CDL.

For this investigation secondary data from a pharmaceutical benefit management company (PBM) were analysed to determine the prevalence of chronic diseases in the private health care sector based on chronic medication usage in 2007. These numbers were linked to the postal codes that made it possible to determine the medication usage at municipality level. Telephonic interviews provided information about the average number of patients treated per biokineticist per month, while the number of biokineticists with active practice numbers were obtained from the Board of Health Care Funders (BHF).

The results indicate that about 56% (911,212 out of 1,600,000) of the subscribers managed by the PBM were treated with medication for CDL. The prevalence of non-steroid anti-inflammatory medication (20.8%) gave an indication of medication prescribed mostly for chronic musculo-skeletal injuries. Cardiovascular diseases (13.1%), bronchodilators (10.95%) and hypertension (9.8%) were the most prevalent chronic diseases treated with medication. In 2007, the profession consisted of 284 biokinetic practices with 625 actively practicing biokineticists. The majority of the practices were located in Gauteng (130) with 63 in the Western Cape. The sub-sample of 50 biokineticists indicated that an average of 100 patients can realistically be treated by one biokineticist per month. The potential

market demand calculated from these figures indicate that 9,112 biokineticists are needed in the private health care sector. These numbers indicate that in 2007, only an estimated 6.2% of CDL could potentially be treated by the number of registered biokineticists.

The conclusion that can be drawn from this study is that there is an immense potential market for biokinetics in the private health care sector. This study has only investigated the diseased persons and has not taken into account those who are at risk of developing a chronic disease of lifestyle, which are also treated by biokinetics intervention with exercise as modality.

Key terms: potential market, physical activity, private health care.

OPSOMMING

In Suid Africa is die voorkoms van chroniese leefstylsiektes aan die toeneem. Dit plaas toenemend 'n lading op die land se ekonomie. Biokinetika is 'n gesondheidsberoep wat chroniese leefstylsiektes aanspreek deur van oefening as behandelingsmodaliteit gebruik te maak. Die beroepsomskrywing sluit in die voorkoming en behandeling van chroniese leefstylsiektes deur middel van wetenskaplik-gebaseerde oefenprogramme. Biokinetika as gesondheidsberoep is sedert 1983 by die Raad vir Gesondheidsberoepe van Suid-Afrika (RGSA) geregistreer (voorheen die Suid-Afrikaanse Gesondheid- en Tandheelkundige Raad (SAGTR)). Hoewel 'n periode van 25 jaar verloop het sedert registrasie, is biokinetici steeds net in die private gesondheidsorgsektor van Suid-Afrika werksaam. Daar is ook in die geskiedenis van die beroep nog geen navorsing gedoen om te potensiële behoeftes in die mark vir die professie te bepaal nie. Daarom is die doel van hierdie ondersoek om die potensiële behoefte van die mark vir biokinetici te bepaal. Die potensiële mark sal bepaal word gebaseer op die aantal pasiënte met chroniese leefstylsiektes wat deur biokinetiese ingryping aangespreek word. Hoewel biokinetici ook oefening gebruik om te voorkom dat persone met 'n hoër risiko wel chroniese leefstylsiektes opdoen, word hierdie getalle nie in berekening gebring nie.

Om die potensiële mark behoefte vir biokinetici te bepaal is sekondêre data van 'n farmaseutiese voordele bestuursmaatskappy ontleed vir die voorkoms van chroniese leefstylsiektes gebaseer op medikasie wat in 2007 in die private gesondheidsorg sektor gebruik is. Die getalle verkry is aan poskodes gekoppel wat dit moontlik maak om die getalle tot op munisipale vlak te bereken. Om die aantal pasiënte wat per biokinetikus maandeliks hanteer kan word, te bepaal, is telefoniese onderhoude met 'n sub-groep van 50 biokinetici uitgevoer. Die getal aktiewe praktyknommers van biokinetici om die aantal praktiserende biokinetici te bepaal is vanaf 'n register by die Raad vir Mediese Skemas verkry.

Die resultate van hierdie studie toon dat ongeveer 56% (911,212 uit 1,600,000) van die lede van die mediese fondse wat deur die farmaseutiese voordele bestuursmaatskappy hanteer word, medikasie vir chroniese leefstylsiektes gebruik. Die gebruik van nie-

steroïede anti-inflammatoriese medikasie (20.8%) gee 'n goeie weerspieëling van die voorkoms van chroniese muskulo-skeletale beserings. Die medikasie vir chroniese siektes met die hoogste voorkoms was vir kardiovaskulêre siektes (13.1%), bronchodilatore (10.95%) en hipertensie (9.8%). In 2007 was daar 284 biokinetici praktyke met 625 praktiserende biokinetici (op grond van hul aktiewe praktyknommers). Die meerderheid praktyke is in Gauteng (130) gevolg deur die Wes-Kaap (63). Die sub-groep van 50 biokinetici het aangetoon dat hulle realisties 'n gemiddeld van 100 pasiënte elk per maand kan behandel. Hierdie getalle is gebruik om die potensiële behoefte van die mark bepaal. Berekeninge het aangetoon dat die private gesondheidssektor in Suid-Afrika ongeveer 9,112 biokinetici benodig. Hierdie getal toon aan dat in 2007, slegs ongeveer 6.2% van die persone wat medikasie gebruik het vir chroniese leefstyl siektes deur geregistreerde biokinetici behandel kon word.

Die gevolgtrekking wat uit hierdie studie gemaak kan word is dat daar 'n enorme potensiële behoefte in die private gesondheidsorgmark is vir biokinetici. Indien in ag geneem word dat hierdie studie slegs die kuratiewe getalle vir behandeling ingesluit het en nie die getalle wat voorkomende behandeling ook benodig nie, is dit duidelik dat biokinetici se benadering deur oefening as behandeling 'n baie groot potensiële mark het.

Sleuteltermes: potensiële mark, fisieke aktiwiteit, privaat gesondheidsorg.

TABLE OF CONTENTS

	<i>Page</i>
ACKNOWLEDGEMENTS	ii
DECLARATION	iii
ABSTRACT.....	iv
OPSOMMING	vi
TABLE OF CONTENTS	viii
LIST OF FIGURES.....	x
LIST OF TABLES	xi
LIST OF ABBREVIATIONS	xii
CHAPTER 1: INTRODUCTION.....	1
1.1 INTRODUCTION.....	1
1.2 PROBLEM STATEMENT	2
1.3 RESEARCH OBJECTIVES	4
1.3.1 Primary objective	4
1.3.2 Secondary objectives.....	4
1.4 RESEARCH METHODOLOGY.....	5
1.4.1 Literature review	5
1.4.2 Empirical study	5
1.4.2.1 <i>Research Design</i>	5
1.4.2.2 <i>Participants</i>	5
1.4.2.3 <i>Measuring Instrument</i>	6
1.4.3 Statistical Analysis	7
1.5 LIMITATIONS/ANTICIPATED PROBLEMS	7
1.6 LAYOUT OF THE STUDY	7
1.7 SUMMARY	8

CHAPTER 2: RESEARCH ARTICLE: THE POTENTIAL MARKET DEMAND FOR BIOKINETICS IN THE PRIVATE HEALTH CARE SECTOR OF SOUTH AFRICA	9
ABSTRACT	11
INTRODUCTION.....	12
RESEARCH METHODOLOGY.....	13
RESULTS	16
DISCUSSION	22
CONCLUSIONS	24
REFERENCES.....	25
CHAPTER 3: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.....	27
3.1 INTRODUCTION.....	27
3.2 CONCLUSIONS.....	28
3.3 RECOMMENDATIONS	28
3.4 AREAS FOR FUTURE RESEARCH	28
3.5 SUMMARY.....	29
REFERENCES	30
APPENDIX A: Guidelines to the authors for <i>The South African Medical Journal</i>.....	31

LIST OF FIGURES

Page

FIGURES IN CHAPTER 2

FIGURE I:	A schematic presentation of the methodological approach followed in this study	14
FIGURE II:	The percentage of participants on the PBM database taking medication for the different chronic diseases of lifestyle.....	19
FIGURE III:	Frequency distribution of biokinetic practices in the different provinces of South Africa servicing the private health care sector.....	20

1.

LIST OF TABLES

Page

Table 1: Members of the research team and their contribution to this studyiii

TABLES IN CHAPTER 2

TABLE I: The prevalence of chronic diseases in the private health care sector based on a PBM company database in 2007 for the different provinces in South Africa..... 17

TABLE II: The average age (mean \pm SD) of the participants claiming medication (2007) for chronic diseases of lifestyle in the private health care sector based on a PBM company database 18

TABLE III: A summary of the prevalence (%) of the physical inactivity reported in different surveys 20

TABLE IV: The relationship between the current number of practising biokineticists and the potential market need for the different provinces..... 21

LIST OF ABBREVIATIONS

A

ACSM American college of Sports Medicine

B

BHF Board of Health Care Funders

C

CDL Chronic Diseases of Lifestyle

CVD Cardiovascular disease

H

HST Health Systems Trust

HPCSA Health Professions Council of South Africa

M

MIMS Monthly Index of Medical Specialities

MRC Medical Research Council

N

NHR National Health Review

S

SAMDC South African Medical and Dental Council

W

WHO World Health Organisation

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Biokinetics as a health discipline was first registered with the former South African Medical and Dental Council (SAMDC) in September 1983 (Strydom, 2005:120). The restructuring of governing bodies following the 1994 elections, resulted in the transformation of the SAMDC to the Health Professions Council of South Africa (HPCSA). As a result of the restructuring, biokinetics moved from the category "medical scientists" to the Board of Physiotherapy, Podiatry and Biokinetics. The main scope of practice of the profession of Biokinetics is:

- 1) promotion of physical abilities, prevention of certain ailments, and physical selection;
- 2) final phase rehabilitation of the musculoskeletal system; and
- 3) final phase rehabilitation of medical conditions (SA, 1983:19)

The most significant differences between biokinetics and physiotherapy is the area of preventative medicine and the final phase rehabilitation of medical conditions. Most of the professionals trained as medical practitioners and physiotherapists focus and deal with the pathology of injuries or diseases. In addition to rehabilitation, biokinetics also focus on the salutary effect of physical activity. A vast number of national and international studies have repeatedly indicated that regular physical activity reduces the prevalence of chronic diseases of lifestyle (CDL), and it contributes to reducing mortality and morbidity of chronic diseases (ACSM, 2006).

Although 25 years have lapsed since its registration as a medical profession, only 799 professionals are currently officially registered as practising Biokinetics (Biokinetics Association of South Africa, 2008). The majority of these practices are in the major cities such as Johannesburg, Pretoria, Port Elizabeth and Cape Town. This is a very small number when considered that an average of 10 students per year have been trained at an

average of 5 tertiary institutions over the last 20 years. Of the more than 1,000 biokineticists trained during the last 20 years, approximately 400 are not currently practising Biokinetics. Personal experience has indicated that a percentage of the biokineticists work in specialist areas in the United Kingdom, practising as cardiac and pulmonary technicians. Those that stay in South Africa often take up positions as medical representatives.

Currently between 20 and 25 students are trained annually at 11 accredited universities. The limited number of biokinetic practices creates the impression that this profession does not pose enough opportunity to graduating students to be entrepreneurial in starting an independent practice.

1.2 PROBLEM STATEMENT

Biokinetics is a relatively young discipline compared to other health disciplines. This discipline has only recently received recognition as a preventative medicine with the *South African Academy for Science and Arts* awarding the *Albert Strating Award* for preventative medicine to GL Strydom .

Biokineticist students are trained in Human Movement studies over a period of three years. Thereafter, based on academic performance, psychological profile and a personal interview, some graduate students are selected to proceed with the Honours qualification in Human Movements studies with specialisation in Biokinetics. The students are then also registered as students-in-training with the HPCSA for two consecutive years. During these two years the students are subjected to compulsory practical training. The first year of practical training runs simultaneously with the Honours degree in Biokinetics. To register as a biokineticist at the HPCSA, a person should have obtained an Honours degree in Biokinetics and completed a two year internship. Students have the opportunity to complete the second year of internship at any accredited private practice under supervision of a registered biokineticist that has been in practice for more than three years.

Currently biokinetics is only functional in the private health care system, as no biokineticists are appointed at any government institutions at present, except for the

National Defence Force where they have contributed to the rehabilitation of soldiers since the Bush-war in Angola of the mid 1970's.

Biokinetics is a profession focussing on the health and wellness of persons by implementing physical activity as a modality for prevention and treatment of injury and chronic diseases of lifestyle. This focus is unique and has changed the lives of many individuals on a physiological and psychological level. The potential impact of biokinetics in the South African health sector has, however, not been investigated or studied. Neither has research been performed on the number of students that need to be trained in order to meet the potential demand. Finally, no information is available on the number of practices that are required to ensure that the potential market can be served and that the number of students trained annually are able to do a practical internship for registration with the HPCSA.

Institutions train any number of students between 8 and 24, depending on the capacity of the various universities to deliver qualified biokineticists. No investigation has ever been performed to determine the market need for biokineticists in the public or private health sector, even though the biokinetics profession has been active in South Africa for the past 25 years. Information on the market potential in South Africa in total, will also impact the number of students that are trained as biokineticists.

In order to determine the potential demand for biokinetics it is important to understand who the potential patient/client is. Therefore the potential market for biokinetics in the South African health sector should be analysed in conjunction with the scope of practice for biokinetics.

As biokinetics address chronic diseases and other ailments by means of physical activity, it is possible to determine the direct costs that physical inactivity contribute to the health sector. A study by Garrett *et al.* (2004) indicated that nearly 12% of depression and anxiety and 31% of colon cancer, heart disease, osteoporosis and stroke cases were attributable to physical inactivity. In South Africa where the first and third world meet, the situation is significantly different. Heart disease has been the major cause of death in South Africa for the last 15 years, but this situation has now changed with HIV/AIDS and related diseases as the first three causes of death, followed by crime and coronary heart

disease only listed in the 10th position (MRC, 2008). Although the other chronic diseases that biokineticists address are even lower down the order, a large part of the population can still be educated and treated with physical activity and exercise to improve health outcomes, quality of life and reduce medical expenses related to chronic diseases of lifestyle.

The research question to be answered by this investigation is therefore to determine the market potential for biokinetics in the private health care sector of South Africa. The results obtained from this investigation will indicate the potential market for biokineticists to open practices in urban and rural areas. A study investigating the demand for health care in South Africa indicated that most people choose private care, but is influenced by demographic and location variables, characteristics of the care provided, and characteristics of the illness (Havemann & Van der Berg, 2003). The contribution of a study investigating the market potential for Biokinetics in the South African private health sector will be of value to qualified biokineticists in selecting a region for establishing a practice. Training institutions will benefit from the knowledge as to the appropriate number of students to train annually.

1.3 RESEARCH OBJECTIVES

The research objectives are divided into primary and secondary objectives.

1.3.1 Primary objective

The primary objective of this investigation is to determine the market potential for biokinetics in the South African private health care sector.

1.3.2 Secondary objectives

The specific secondary objectives of this research are to determine the:

- prevalence of chronic diseases addressed by biokinetics within the private health care sector of South Africa for each province; and
- patient/biokineticist ratio within the public health sector of South Africa.

1.4 RESEARCH METHODOLOGY

1.4.1 Literature review

In order to compile the literature review, the search engine EbscoHost was used to search the following databases: Business Source Premier, CINAHL, Health Source-Consumer Edition, Sport Discus and Medline. The following key words were used: health economics, preventative health, exercise, physical activity, chronic diseases and market potential.

1.4.2 Empirical study

1.4.2.1 Research Design

The aim of the research design is to determine the potential demand in the market for biokineticists to start an independent practice within the public health sector of South Africa. The study was of an observational nature. The study design is indicated to ensure that the correct design is applied, to be able to answer the research question.

The research can be classified as descriptive and explorative as the current potential market demand for biokinetics within the private care health sector was investigated.

1.4.2.2 Participants

Data for this study was calculated from a pharmaceutical benefit management (PBM) system. The system represents the medication claimed at pharmacies and dispensing doctors, by 1.6 million members. This is a representation of about 35% of the private health care subscribers in South Africa. The database is kept on the prescription of all medication according to the classification in the Monthly Index of Medical Specialities (MIMS). Data for chronic diseases of lifestyle that are addressed by the scope of practice of biokineticists, were extracted from the database.

1.4.2.3 Measuring Instrument

- *Prevalence of chronic disease of lifestyle*

The Niche Area: Medicine use in South Africa (MUSA) within the School of Pharmacy at the Potchefstroom Campus of the North-West University (NWU) has the rights to a PBM system. This system is a fully integrated management system for more than 42 medical scheme clients administered by 17 different health care administrators. In 2007, 1.6 million South Africans benefited from this system. All medication prescribed for chronic diseases are classified according to the coding in the MIMS. A further classification of information is performed with regard to the location of the place of distribution (province, municipal area, town/city). From the database, all conditions that are addressed by biokineticists in their scope of practice, was extracted for the national and regional prevalence of the following chronic diseases in South Africa: hypertension, diabetes, obesity, dislipidemias, coronary heart disease, osteoporosis, depression and chronic obstructive pulmonary diseases (COPD), Parkinsonism and epilepsy.

- *Biokineticists practicing in the private health care sector and biokineticist to patient/client ratio*

In order to determine the potential market for biokinetics in the private health care sector, the number of biokineticists in the sector as well as the ratio of biokineticist to patient or client should be determined. In order to achieve this, a telephone survey was conducted where the owners of biokinetics practices registered on the website of the Biokinetics Association of South Africa (BASA), were asked to indicate the average number of active clients/patients treated at their facility monthly, as well as the number of biokineticists and intern-biokineticists working in the practice. The ratio of biokineticist to patient/client was determined from this information.

- *South African patterns of inactivity*

Data available from 5 large surveys are to be collected in order to determine the levels of inactivity in the South African population. The outcome of this determination will indicate whether the potential is present to introduce exercise and physical activity as a modality for treatment to the population. If the current activity levels are high, it would be difficult to motivate people to be even more active in order to address their CDL.

1.4.3 Statistical Analysis

Descriptive statistics with frequency tables and graphs are to be performed in order to determine the potential market demand for biokinetics in the private health care sector. These analyses will make use of the prevalence of the various chronic diseases treated by biokinetics as the basis to calculate the number of persons living with chronic diseases of lifestyle. A further calculation will be performed in order to determine the potential number of biokineticists required in the private health care sector of South Africa based on the number of current practices and the ratio of biokineticists to patients/clients.

1.5 LIMITATIONS/ANTICIPATED PROBLEMS

The most significant constraint is that the secondary data is based on medication use of only one service provider and that the perceptions and knowledge about biokinetics among the general public will not be known. No financial viability studies will be performed to indicate whether the potential market need will be financially viable in the areas that indicate a shortage of biokineticists. The data that will be used will also be that of 2007 and may not reflect the current situation.

1.6 LAYOUT OF THE STUDY

The mini-dissertation will be in article format. Chapter 1 contains the background information of the study that places the problem in context. Chapter 2 is the original research article presenting the results of the empirical investigation. The mini-dissertation will be concluded with Chapter 3 that presents a summary, conclusions and recommendations for future research in the related area. Referencing of Chapter 1 and 3 is according to the Harvard style as required by the North-West University. Referencing in Chapter 2 will be according to the guidelines for authors of the *South African Medical Journal* that the article will be submitted to for publication. A summary of the chapters that form the mini-dissertation are:

- Chapter 1: Introduction and problem statement.
- Chapter 2: Research article: The market potential for Biokinetics in the South African private health sector (*South African Medical Journal*).
- Chapter 3: Summary, conclusions and recommendations.

1.7 SUMMARY

Biokinetics as a profession improved the quality of life of thousands of people within the private health care sector for the past 25 years. In spite of spending a quarter of a century in health care, the real market potential has never been investigated in either the private or public health care sector of South Africa. This investigation of the market potential for biokinetics in the private health care sector of South Africa, based on the prescription of chronic medication by general practitioners and specialists, gives an indication of the number of professionals that need to be trained, as well as indicate the areas in South Africa where chronic diseases of lifestyle are not yet addressed by biokinetic intervention. This study also serves as a platform to investigate the situation in the public health care sector in future.

CHAPTER 2

THE POTENTIAL MARKET DEMAND FOR BIOKINETIC SERVICES IN THE PRIVATE HEALTH CARE SECTOR OF SOUTH AFRICA

This research is presented in article format. Chapter 2 consists of an article to be submitted to the *South African Medical Journal*. As such, the technical specifications and requirements of the article are used in this chapter. It could, therefore, differ from the specification of the North-West University.

**The potential market demand for biokinetic services in the private health care sector
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ABSTRACT

Objective. Biokinetics is a health profession addressing chronic diseases of lifestyle (CDL) with exercise as the treatment modality. The purpose of this investigation is therefore to determine the potential market demand for biokinetic services in the private health care sector of South Africa.

Design. Secondary data from a pharmaceutical benefit management system (PBM) were analysed to determine the prevalence of chronic diseases in the private health care sector for 2007. Telephonic interviews on a sub sample of 50 biokineticists revealed the average number of patients that can be treated per biokineticist per month. The number of biokineticists with active practice numbers were obtained from the Board of Health Care Funders (BHF).

Results. The results indicate that 56% (911,212/1,600,000) of the patients managed by the PBM are treated with medication for CDL. The prevalence of non-steroid anti-inflammatory medication (20.8%), cardiovascular diseases (13.1%) and bronchodilators (10.95%) had the highest prevalence. The sub-sample indicated that a biokineticist can treat an average of 100 patients per month. The potential market demand calculated from the above numbers indicate that 9,112 biokineticists are needed in the private health care sector, while only 625 active practice numbers were registered with the BHF in 2007.

Conclusion. In conclusion, it is estimated that only 6.2% of CDL can potentially be treated by the number of registered biokineticists. Therefore there is an enormous potential market for biokinetics in the private health care sector of South Africa.

Key words: Biokinetics, private health care sector, chronic diseases of lifestyle.

INTRODUCTION

Chronic diseases of lifestyle (CDL) are on the increase in South Africa as in the rest of the world. This increase in the number of communicable and non-communicable diseases has labeled South Africa as a country with a "double burden of disease"¹. Chronic diseases of lifestyle are a group of diseases that share similar risk factors as a result of exposure, over many decades, to unhealthy diets, smoking and lack of exercise and possibly stress². These risk factors further include *inter alia* high blood pressure, high blood cholesterol, diabetes and obesity. These risk factors present in various disease processes such as stroke, heart attacks, certain cancers, chronic bronchitis and many others that culminate in high mortality and morbidity rates³.

Research has indicated that regular physical activity can positively address all above-mentioned pathological conditions and thereby reduce the mortality and morbidity rates in populations³. Biokinetics have drawn on and implemented this body of evidence to prescribe scientifically based exercise programmes to prevent and manage non-communicable diseases in South Africa. In developed countries physical inactivity is estimated to cause 6.0% of all deaths for men and 6.7% for women⁴. A study investigating the cost-effectiveness of healthcare-based interventions aimed at improving physical activity found evidence for cost-effectiveness in groups with high risk such as older persons and persons with heart failure⁵.

In South Africa, biokinetics have been practised for the last 25 years after the scope of practice was published in the Government Gazette⁶. Although the road to obtaining recognition was very difficult⁷, the profession has continued growing with 12 training institutions training about 150 students every year. More than 1,000 biokineticists have completed their training during the last 25 years with the current register of the Board of Health Care Funders (BHF) reporting 799 active practice numbers for 2009⁸. The scope of practice for biokinetics deals with the prescription of scientifically based exercise for preventing and treating chronic diseases of lifestyle (CDL) as well as for final phase rehabilitation of orthopedic injuries⁹.

Biokinetics usually form part of a multi-disciplinary team in the treatment of chronic diseases and orthopedic injuries together with the medical practitioners, physicians, physiotherapists and dieticians. In the South African health care sector, however, biokinetics only form part of the multi-disciplinary team in the private health care sector. Research indicates that this formal private health sector is a large, well-developed, resource intensive and highly specialised sector that provide health insurance coverage to some 7 million people¹⁰. The other estimated 40

million South Africans make use of either the public health care system or traditional healers, or pay out of their pockets for private health care services. As biokineticists are not employed in the public health sector, except in the National Defence Force, people making use of the public health care system are not exposed to biokinetic intervention.

Although other health disciplines are attracted away from the public health sector with large financial and personal incentives¹⁰, this is not the case with biokinetics. This lack of job opportunities in the public health sector has forced biokineticists to become entrepreneurs by starting private practices. These practices are solo practitioners, associations or partnerships with other biokineticists or other health practitioners. This is, however, not as straight forward as other entrepreneurial ventures. Strict ethical guidelines set by the HPCSA to guide the profession and protect the public against exploitation hamper biokineticists to do marketing to the same extent as unregistered/unregulated professions⁹.

In order to start any new venture, determining the market potential for the product is extremely important. As the purpose of all businesses is to create wealth, the product, price, packaging and place of sale should be thoroughly investigated¹¹. Health professionals are unfortunately often not trained in business principles. This lack of business skills often results in the failure of biokinetic practices to be sustainable over a long period. This may cause the perception to arise that the potential market demand is too small to sustain the number of biokineticists trained annually. In the history of biokinetics in South Africa no studies have investigated the potential market demand for biokinetics, based on the services delivered by the profession to the public.

Therefore the purpose of this study was to determine the potential market demand for biokinetics in the private health care sector of South Africa. The results obtained from this investigation will shed some light on the potential number of biokinetics that could be trained per year given no restrictions from the training institutions with regard to lecturing staff.

RESEARCH METHODOLOGY

Data collection

The study was an observational study to determine the potential market need for biokinetics. In order to understand the methodology, it is important to define the market. According to Wood¹² the market potential is all the customers who may be interested in the service that is presented. It

is, however, important to remember that some customers in this potential market are unaware of the product, some may not have access to it, some may not be able to use it and some may not be able to afford it. The potential market represents the maximum number of customers who might buy the product - but not the number who will realistically buy it¹³.

The approach that was followed (Figure I) was to determine the number of persons in the identified segment (persons with a chronic disease of lifestyle) that potentially require the service and the number of potential service delivery points (practicing biokineticists) matching each other. This was performed within the South African private health care framework.

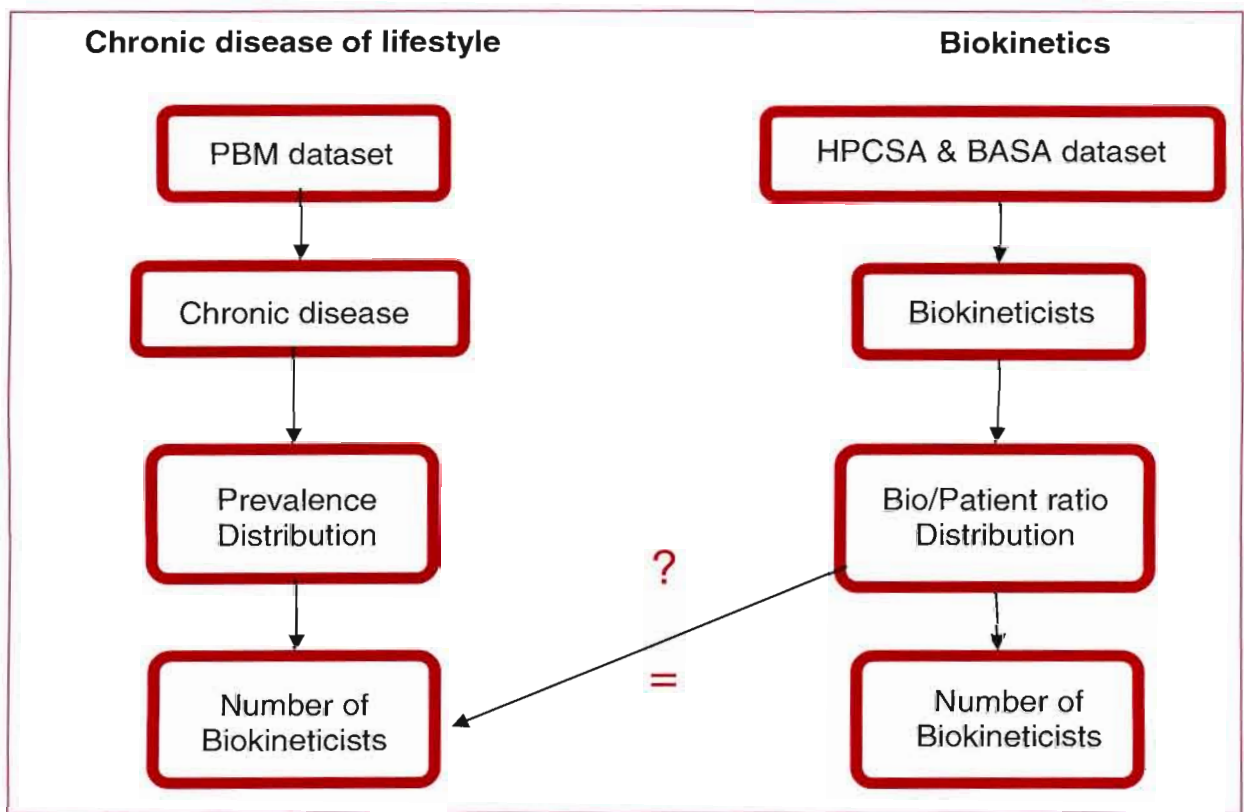


FIGURE I: A schematic presentation of the methodological approach followed in this study

For the purpose of this study, the market segment that was identified to base the potential market demand on, was that of persons with chronic diseases of lifestyle and orthopedic abnormalities. Although the scope of practice for biokineticists⁹ include the pathogenic and the fortogenic paradigms, it was decided to focus only on the pathogenic paradigm for the purpose of this study. Because secondary data were used for the analyses, it was important to ensure that the secondary data are timely, unbiased, legitimate, reliable and qualified¹². In order to comply with

this criteria, it was decided to make use of timely (2007), unbiased and reliable information from a private sector medicine claims database. The data is reliable as the database is created online in real time as patients collect their prescriptions. The geographic area where the prescription is dispensed is also captured.

The medicine claims data were from a pharmacy benefit management company (PBM). The PBM company administered medicine claims data from almost all community pharmacies and 98% of the dispensing doctors¹⁴. For security, ethical, patient and provider identification reasons, the pharmacy benefit management company is not identified by name.

Prevalence of chronic disease of lifestyle. The Niche Area: Medicine use in South Africa (MUSA) has the rights to use the medicine claims database of the specific PBM for research purposes. Ethical clearance was obtained from the Ethics Committee of the North-West University (Project number: NWU-0046-08-S5). This system is a fully integrated management system for more than 42 medical scheme clients administered by 17 different health care administrators¹⁴. In 2007, 1.6 million South Africans benefited from this system. All medication prescribed for chronic diseases were classified according to the coding system in the Monthly Index of Medical Specialties (MIMS) classification system, which classifies medicine according to its pharmacological action¹⁵. A further classification of medicine information was performed with regard to the place of prescriber (province, district council, municipality and main place level).

The Statistical Analysis System[®], SAS 9.1^{®16} programme was used to group all prescribed practice addresses according to province, district council, municipality and main place level. This allowed the researchers to investigate the prescribing patterns of chronic medicine in a section of the private health care sector according to different geographical areas in South Africa.

From the database all conditions where exercise is considered an appropriate treatment modality and that is addressed by biokineticists in their scope of practice as announced in the *Government Gazette*⁶ in 1983, was extracted to determine the national and provincial prevalence of the following chronic diseases in South Africa: hypertension, diabetes, obesity, dislipidemias, cardiovascular diseases, osteoporosis, depression and chronic obstructive pulmonary diseases (COPD).

Biokineticist to patient/client ratio. In order to determine the potential market for biokinetics in the private health care sector, the ratio of biokineticist to patient or client was also determined by means of a telephone survey. Biokinetics practice owners registered with the Biokinetics Association of South Africa (BASA) website were asked to indicate the average number of active clients/patients treated at their facility monthly, the number of biokineticists and intern-biokineticists working in the practice. The ratio of biokineticist to patient/client was determined from this information.

Statistical analysis

Descriptive statistics with frequency tables and graphs were performed in order to determine the market potential for biokinetics in the private health sector. Regression analysis will be performed in order to predict the number of biokineticists to be trained annually as well as the potential number of practices that will be considered as existing entrepreneurial opportunities

RESULTS

The purpose of this study is to determine the potential market demand in the broad term for biokinetics in the private health care sector, specifically with reference to the pathogenic paradigm. In order to determine this potential demand the results will be presented by determining the prevalence of CDL, reporting on the physical activity levels of the population and the available biokineticists and practices that address the CDL with exercise.

The prevalence of chronic diseases of lifestyle as represented by chronic medication use from a medicine claims database of a PBM company indicate that (Table I) 911,212 subjects of the 1.6 million subscribers with an average age of 36.8 (\pm 21.8 years) were taking chronic medication for diseases related to CDL. The average age was calculated according to the age at the first prescription date. The females were slightly older than the males (M = 35.4 \pm 21.9 years; F = 37.9 \pm 21.8 years). Totals in the table do not add up, as a few claims could not be placed according to geographical region (provinces) but are included in the calculations.

TABLE I: The prevalence of chronic diseases in the private health care sector based on a PBM company database in 2007 for the different provinces in South Africa

CDL*	Eastern Cape	Free State	Gauteng	Kwazulu- Natal	Limpopo	Mpuma- langa	North- West	Northern Cape	Western Cape	TOTAL
	6,906,200[§]	2,965,600[§]	9,688,100[§]	10,014,500[§]	5,402,900[§]	3,536,300[§]	3,394,200[§]	1,102,200[§]	4,839,800[§]	47,849,800[§]
Depression	9,080	8,149	50,763	16,106	6,854	5,650	7,692	2,314	14,993	122,026
Epilepsy	1,547	1,604	13,583	5,091	958	1,081	1,476	324	2,717	28,481
Parkinsonism	291	268	1,807	593	145	154	235	60	557	4,123
NSAID	23,214	16,022	137,497	48,487	23,156	19,820	23,304	5,130	33,836	332,173
Gout	1,333	994	7,708	2,113	913	1,150	999	233	2,196	17,681
Osteoporosis	855	607	4,815	1,670	211	292	429	100	1,851	10,872
CVD										210,248
Ionotropies	507	495	2,384	1,028	286	259	310	131	925	6,345
Arrhythmias	258	478	2,155	610	83	157	210	66	735	4,774
Hypertension	11,570	9,249	66,102	22,151	6,365	6,945	8,467	2,455	23,559	157,354
Angina	4,553	3,012	19,081	7,236	2,613	2,415	2,869	10,704	7,588	50,587
Vasodilator	50	104	782	97	54	69	142	32	107	1,444
Vasoconstrictors	233	270	2,746	514	156	303	386	89	442	5,138
Hyperlipidemia	6,393	4,166	36,455	10,509	1,986	2,891	3,519	875	14,133	81,204
Bronchodilators	12,471	7,639	68,409	27,495	11,095	10,548	12,764	2,739	21,642	175,277
Asthma	2,478	2,533	19,964	6,463	3,479	1,959	3,083	508	4,805	45,367
Diabetes	3,388	2,335	19,638	7,981	2,557	2,129	2,586	693	6,010	47,459
TOTAL	76,543	45,905	403,129	135,009	54,314	45,662	46,683	11,029	92,774	911,212

* CDL = Chronic diseases of lifestyle; [§] Total mid-year population estimates, 2007¹⁷.

When the results from Table I are further divided by age and ratio of female/male (Table II) it is indicated that except for gout, the ratio of women obtaining chronic medication is higher than for men. The average age of the patients also indicate that lung disease is mainly present in the younger population at around the age of 33 years. The average age of people obtaining medication for cardiovascular diseases are between 60-70 years. Non-steroid anti-inflammatory medication (NSAID) are mostly prescribed to person around the age of 45 years. This may be due to the onset of arthritis and joint and muscle pain from previous injuries.

TABLE II: The average age (mean \pm SD) of the participants claiming medication (2007) for chronic diseases of lifestyle in the private health care sector based on a PBM company database

Chronic Diseases of Lifestyle	Average Age (mean \pm SD)	Ratio of Female/Male	Number of Participants
Depression	48.8 17.5	2.3/1	122,026
Epilepsy	47.7 19.5	1.5/1	28,481
Parkinsonism	64.5 18.3	1.4/1	4,123
NSAID	44.1 18.8	1.4/1	332,173
Gout	55.5 14.0	1/3	17,681
Osteoporosis	68.3 12.2	8/1	10,872
CVD	58.3 15.1	1.25/1	210,248
Inotropies	71.2 15.1	1.2/1	6,345
Arrhythmias	69.8 12.4	1/1	4,774
Hypertension	59.8 14.3	1.2/1	157,354
Angina	58.9 16.4	1.5/1	50,587
Vasodilators	62.2 18.8	1.8/1	1,444
Vasoconstrictors	40.7 17.5	4/1	5,138
Hyperlipidemia	60.4 13.5	1/1	81,204
Bronchodilators	33.6 23.2	1.2/1	175,277
Asthma	32.6 25.3	2/1	45,367
Diabetes	54.5 14.7	1/1	47,459

Therefore, to determine the percentage prevalence for the various diseases, it is necessary to determine the percentage subjects for each disease in accordance with the number of members to which the benefit is available, in this scenario 1.6 million people.

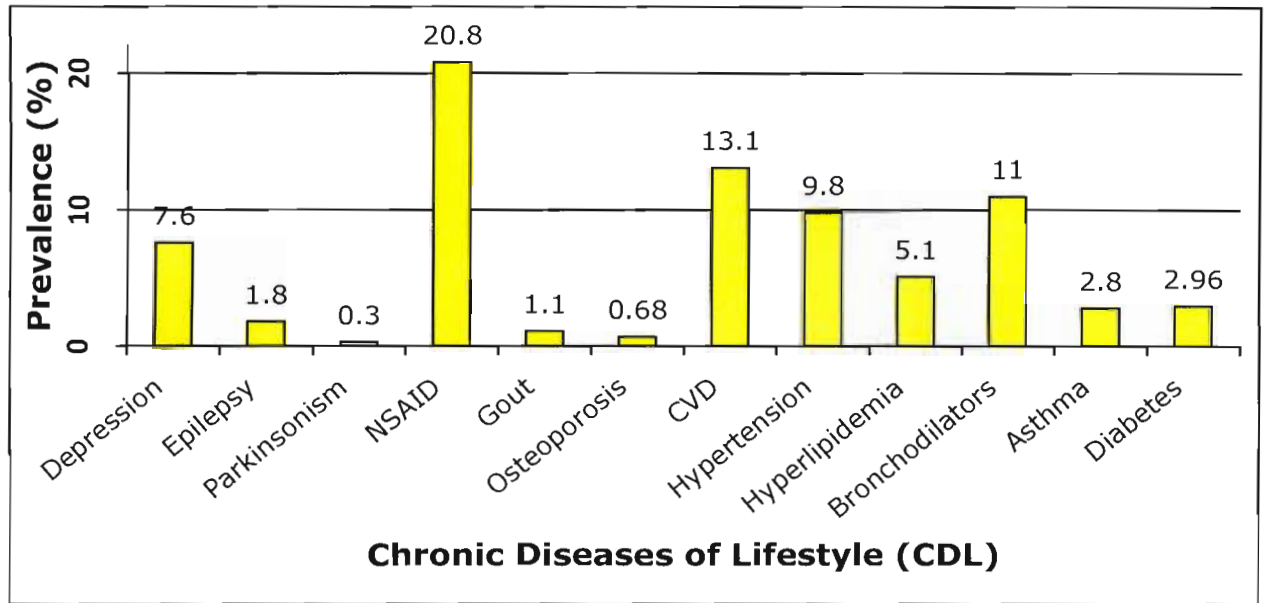


FIGURE II: The percentage of participants on the PBM database taking medication for the different chronic diseases of lifestyle

NSAID =Non-steroid anti-inflammatory drugs; CVD = cardiovascular disease

The calculation from Figure II indicates that from 1.6 million persons, 911,212 persons are on medication for a disease that could be treated through exercise intervention such as presented by biokinetics. That is, a calculated 56.95% of persons subscribing to the PBM company are collecting the prescription for one or more CDL. The prevalence for anti-inflammatory medication is the highest (20,8%), followed by cardiovascular disease (13.1%) and then bronchodilators (10.95%) and hypertension (9.8%).

Physical inactivity profiles of South Africans. As biokineticists address CDL with exercise as treatment, it is also important to report on the current levels of physical inactivity as it is a risk factor for CDL³. Secondary data reported in the South African Health Review¹⁰ compared the levels of inactivity reported in the general population to those reported in a corporate survey (Table III). The results indicate that about 50% of the general population does not participate in levels of physical activity that would reduce or manage CDL.

TABLE III: A summary of the prevalence (%) of physical inactivity reported in different surveys

Surveys	Total (%)	Males (%)	Females (%)
51 -country survey ¹⁸	46.2	44.7	47.6
Youth Risk behaviour ¹⁹	36.8	30.5	43
Corporate survey ²⁰	69	62	75
SADHS ²¹	46	43	49
World Health Survey ²²	46	43	49

SADHS = South African Demographic and Health Survey

Current biokinetic practices. In order to determine the market potential, the current number of biokineticists who render this service had to be determined. The number of practising biokineticists according to the BASA website, which is an optional place to register and not compulsory (Figure III) indicate 284 biokinetic practices. Seventy one of the 284 practices are accredited to employ biokinetic interns (students in training who have to complete a final year of practical training before final registration with the HPCSA can be obtained). These practices may employ more than one biokineticist and a maximum of two interns per registered biokineticist⁹.

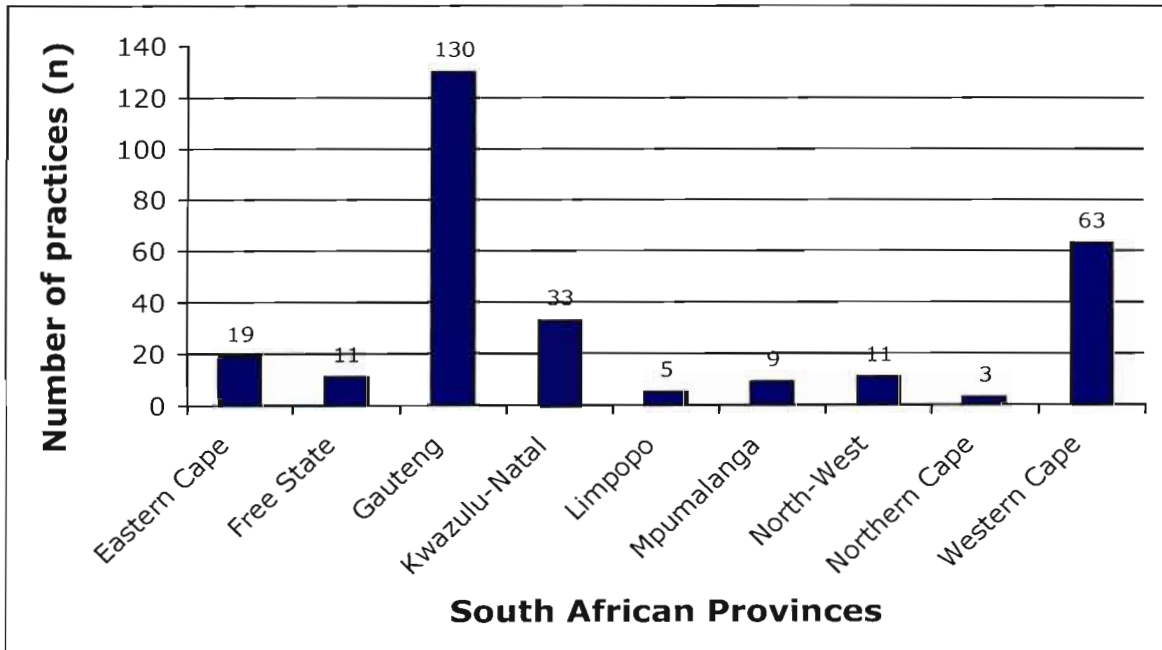


FIGURE III: Frequency distribution of biokinetic practices in the different provinces of South Africa servicing the private health care sector

Data obtained from the Board of Health Care Funders⁸, who is the management system for practice numbers that enable biokineticists and patients to claim from medical insurance, indicate 625 biokineticists with active practice numbers that were also registered with the HPCSA in 2007. The distribution of these practices within South Africa (Figure III) indicates that the majority of the practices are in the Gauteng province (130) with the second most in the Western Cape (63). This means that 46% of biokineticists are practicing in and around Gauteng, while about 22% of the total pool of practising biokineticists is active in the Western Cape. This leaves about 32% of the biokineticists practicing in the rest of South Africa

Ratio of biokineticist to patient/client. A telephonic interview with 50 randomly selected available biokineticists indicated that each biokineticist could manage about 100 [40 – 160] patients per month depending on the type of practice and the business strategy followed. There was an average of 2 biokineticists working in each practice. If every biokineticist managed 100 clients in South Africa from the specific PBM, where 911,212 clients are treated for chronic diseases of lifestyle, then 9,112 biokineticists will be required in South Africa. Table 4 indicates the current number of practising biokineticists with regard to each province together with the market potential based on the prevalence of chronic disease as indicated by the PBM system.

TABLE IV: The relationship between the current number of practising biokineticists and the potential market need for the different provinces

Province	Current number of practices (n)	Market need for biokineticists* (n)
Eastern Cape	19	765
Free State	11	459
Gauteng	130	4 031
Kwazulu-Natal	33	1 350
Limpopo	5	543
Mpumalanga	9	456
North-West Province	11	466
Northern Cape	3	110
Western Cape	63	927
TOTAL	284	9 107[§]

*Based on 100 patients/biokineticist

[§] Numbers differ due to some claims not being linked to original place of prescribing of medication

DISCUSSION

Chronic diseases of lifestyle (CDL) are a reality in South Africa, a country with a double burden of disease that is created between CDL, also known as non-communicable diseases, and the infectious diseases such as HIV/Aids and tuberculosis, that are also known as communicable diseases. The results of this study indicate that the prevalence of the CDL in this PBM system is 56%. The major three conditions represent nearly a third of all the total medicine expenditure managed by this studied PBM¹⁴. This is much higher than the reported 37% of deaths attributed to CDL as reported in previous surveys¹⁹. Considering that most of the surveys report on data that were obtained either during 1998²¹ (SADHS) or until 2005², It is therefore possible that the prevalence of CDL has increased substantially since the last survey.

Although the percentages are not very high, the corresponding numbers of persons that require treatment are substantial. If these percentages of prevalence for the various CDLs are extrapolated to the general population, estimated to be 47,849,800¹⁷ (StatsSA, 2009) at June 2007, it could mean that about 26,795,888 people in South Africa are diseased by one of the CDLs. Steyn *et al.*² report that about 6 million people are living with hypertension, 4 million with diabetes and about 4 million have hyperlipidemia. Steyn *et al.*² also mention that about 56% of the population has at least one of these risk factors. The prevalence of CDL as found in this investigation based on the prescription of medication, observed comparable prevalence for hypertension and diabetes as reported in Puoane *et al.*²³. Studies investigating the cost of managing CDL have highlighted the burden of CDL on an economy (Kouris-Blazos & Wahlqvist²⁴; Ruchlin & Dasbach²⁵).

When interpreting the data on CDL from a biokineticist's point of view, it is important to also consider the inactivity patterns in South Africa. The results indicate that females are more inactive than males, with people in the corporate sector reporting inactivity levels of close to 70% in the total for males and females¹⁰. This is a daunting number of physically inactive persons that are often also exposed to high levels of stress in the work environment. These high levels of physical inactivity indicate that there is a huge potential for the management of chronic diseases with exercise and physical activity interventions, as the majority of the population are currently not participating in the required amount of activity as prescribed by the ACSM³ to achieve health outcomes.

The results of the number of biokineticists registered with the HPCSA that also have active

practice numbers, indicate that the about 625 biokineticists are most likely accommodated within the 284 biokinetics practices in South Africa. These are crude delineations as it is impossible to obtain the exact number of biokineticists that are actively earning a living as biokineticists. The reason being that persons on the register of the HPCSA continue to pay registration fees annually to ensure they stay on the role, even if they are not practising in order to keep their registration. The reason for this behaviour is that it is difficult to obtain registration again once you have been deregistered and have not practiced for a number of years. Another reason for inaccurate numbers on the BASA website is the fact that it is optional to register practices on the website. In spite of the inaccurate numbers, the data described are still the most accurate available that was used in the analysis and assumptions made.

The distribution of the biokinetics practices simulate the areas of high income in South Africa, with the most practices being in the Gauteng area and the least practices in the Northern Cape with the lowest income per capita¹⁷. The population density in Gauteng is also higher than in the Northern Cape, resulting in shorter travelling distances between home and biokinetic practices. The analyses of the number of patients/clients that a biokineticist is able to treat per month indicated an average of 100 persons with a range of between 40 and 160. There was an average of 2 biokineticists working per accredited practice.

In order to calculate the potential market demand for biokinetics, the potential number of persons taking medication for CDL according to the analysed PBM system, was divided by 100 to determine the number of potential biokineticists needed. This calculation indicated that about 9,111 biokineticists are needed. If an average of 2 persons work together, that means that about 4,556 practices are potentially needed. The current number of biokinetic practices is therefore calculated to be only rendering a service to 6.2% of the potential market. As these are pure calculations, in determining the market potential it is necessary to take into account the factors that may hamper people from visiting a biokineticist for exercise as treatment of a CDL.

When calculating a market potential, the broadest market is first determined¹² as was done with this study. It is important to remember that these results are a crude indication of the potential market demand for biokinetics in the private health care sector. This study also only focussed on the pathogenic paradigm, and not the fortogenic paradigm, where biokinetic intervention addresses the prevention of CDL. Investigating the section of the market that has the income to afford the service and have access to the product should be determined. Important factors that can influence the behaviour of the potential consumers will include gender, level of education,

age, ethnic background, the perceived value for the client/patient, various social connections and personal elements of which lifestyle would be the most prominent together with motivation.

A study investigating the factors that influence the demand for health care in South Africa using a multinomial logit estimation, found that there are three categories of factors that influence the demand. These factors are: a) demographic and locational variables (e.g. income, race and location); b) characteristics of the care provided (e.g. cost, and distance from the respondent); and c) characteristics of the illness (such as severity)²⁶. This study also found that an increase in income indicated a decrease in the use of primary health care. Where income was above R2,785 per month, it was indicated that primary health care was only utilised in less than 5% of the respondents²⁶. These results give an indication of the income group that can be expected to seek treatment for CDL as offered by biokinetics.

The limitations of this study was that the numbers on which the calculations are based are relative, although the most accurate available currently. The calculations from the PBM are also based on the prevalence of the 2007 data, as the classification of the 2008 data is not available. The number of biokineticists is also a crude number as accurate numbers are difficult to obtain. Registered biokineticists often become pharmaceutical representatives to earn a larger income while also learning business and marketing skills before returning to the profession.

CONCLUSIONS

The conclusion that can be drawn from this study is that there is a large potential market for biokinetics in the private health care sector of South Africa. Currently only an estimated 6.2% of the potential market is addressed by biokinetics with exercise as a treatment modality. This is only the calculation for the pathogenic paradigm. It therefore seems that the number of biokineticists trained annually could be increased to address the shortage in the market. However, an investigation is recommended to determine the factors that may prevent the large potential market demand from realising.

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CHAPTER 3

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

3.1 INTRODUCTION

Biokinetics is a profession that was announced in a Government Gazette in 1983 as a health care profession treating and preventing chronic diseases of lifestyle (CDL) and orthopaedic injuries with exercise as the treatment modality. After 25 years in the South African health sector, the profession is still only available to patients/clients in the private health care sector. During the 25 year period, about 1,000 students have completed their training at tertiary institutions and were placed on the register of the HPCSA (previously the South African Medical and Dental Council).

Although research indicate that South Africans prefer the private health care sector for treating these kind of illness, the potential market demand for biokinetics in the private or public health care sector of South Africa has never been investigated.

Chapter 1 of this mini-dissertation deals with the problem statement, primary and secondary objectives of this study together with the potential limitations of the study and the format of the mini-dissertation. Chapter 2, the body of the mini-dissertation, is in the form of a manuscript prepared for submission to the *South African Medical Journal*. The manuscript is prepared in accordance with the guidelines for authors (Appendix A). Chapter 3 is the summary of the mini-dissertation presenting the conclusion and recommendation for future investigations. Referencing in Chapter 1 and 3 are presented in accordance with the Harvard style commonly used at the North-West University.

3.2 CONCLUSIONS

The main conclusion that can be derived from this investigation is that there is a huge potential market demand for biokinetics in the private health care sector. This demand is due to the shortage of practitioners in the private health care sector, resulting in an inability to address the potential demand as determined based on the prescription of medication for CDL during 2007. The current number of biokinetics practices with their biokineticist/s are only able to treat 6.2% of the potential demand if the prevalence of CDL in the PBM system is extrapolated to the entire private health care system.

3.3 RECOMMENDATIONS

The purpose of this investigation was to determine the potential market demand for biokinetics in the private health care sector. Recommendations for future studies include the following:

- Instead of secondary data, an effort should be made to obtain primary data for analysis. The problem is, however, that these surveys are very labour-intensive and time-consuming.
- A recommendation should be made to the Biokinetics Association of South Africa to establish a reliable database of all registered and practising biokineticists. The database should include more than the contact details of the business. Practising biokineticists should upload the database regularly. This will add reliability to the known number of biokineticists in private practice, which will aid further research on this topic.
- The findings in the mini-dissertation were based on the private health care sector, and it is considered extremely important to duplicate this investigation for the public health care system.

3.4 AREAS FOR FUTURE RESEARCH

In order to better understand the potential market demand the following recommendations are suggested:

- Determine the barriers that prevent people from accessing biokinetics practices.
- Determine the perceptions in the private and public health sector about biokinetics.
- Determine the market segment where biokinetics will have the most significant impact.
- Determine the income category that will be able to afford biokinetic services as a modality of treatment for CDL.

3.5 SUMMARY

In summary, this investigation has identified, with a crude analyses, that there is a considerable potential market demand for biokinetics in South Africa. Although the profession has only been in operation for 25 years, the impact that it has had on the 6.2% of the population is heartwarming. A true cost-effectiveness analysis should be performed in order to determine the financial impact of treating physical inactivity with exercise in South Africa. The study should also be repeated in the public health care sector in order to drive policy change toward "Exercise is Medicine" as is currently happening in the USA and the rest of the European Union.

Biokineticists should also become more knowledgeable on basic business operations to acquire the necessary skills to be able to manage a biokinetics practise profitably.

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(The article presented in Chapter 2 will be submitted for publication in the *South African Medical Journal*, therefore the referencing style was used as prescribed by the journal, and it is not included here).

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ANNEXURE A



South African Medical Journal

Author Guidelines (www.samj.co.za)

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Original articles of 3 000 words or less, with up to 6 tables or illustrations, should normally report observations or research of relevance to clinical medicine. References should preferably be limited to no more than 15.

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Refer to articles in recent issues for guidance on the presentation of headings and subheadings.

Abbreviations should be spelt out when first used in the text and thereafter used consistently.

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Journal references should appear thus: Price NC . Importance of asking about glaucoma. *BMJ* 1983; 286: 349-350.

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