

Are There Sufficient Number of Exercise Therapists in South Africa In Order To Equitably Manage the Noncommunicable Disease Epidemic?

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Abstract

The mortality of South African noncommunicable diseases (NCDs) is rising. One of its primary contributors is physical inactivity. Therefore, South African National Health Plan included exercise therapy as part of their strategy to inhibit the NCDs upsurge. This study aimed to determine whether the number of South African exercise therapists is sufficient to equitably manage this NCD epidemic. The 2013 and 2017 Health Professions Council of South Africa reports identified the number of physiotherapists, biokineticists, and their respective students-in-training. In 2012, 10,623,820 people were identified with NCDs; however, South African Department of Health only treated 6,058,186 patients (57.0%) ($p < .05$). South African Health Review has estimated a 28.7% increase in the number of NCDs patients treated from 2012 (6,058,186) to 2025 (7,799,770) ($p < .05$). The average yearly growth of practicing physiotherapists (3.4%) and the physiotherapy student-in-training (2.2%) is inequitable to manage this NCD epidemic. In 2012, the extrapolated physiotherapist-to-NCD patient ratio was 1:5667. The South African Department of Health should consider including biokineticists to aid in the management of the NCD epidemic.

Keywords

noncommunicable diseases, exercise therapy, physiotherapy, biokinetics

Introduction

Noncommunicable diseases (NCDs) or chronic lifestyle diseases are a global epidemic; the mortality prevalence of NCDs ranged from 36% to 39.5% people in 2015.^{1,2} This constellation of diseases includes chronic noninfectious diseases such as diabetes mellitus, cancer, chronic respiratory, and cardiovascular diseases as well as other lifestyles diseases that inhibit one's quality of life.³ The World Health Organization (WHO)² has estimated that 70% of all the global deaths in 2015 can be attributed to NCDs. Cardiovascular diseases and their related comorbidities have become the principal diseases of the NCD group.¹ Stats SA⁴ reported that within South Africa, NCDs were responsible for 61.2% (282,128) of all deaths recorded in 2015. The leading causes of death attributed to NCDs in 2015 were cardiovascular diseases (27.1%), metabolic diseases (10%), and respiratory diseases (7.8%).⁴ Due to the prevalence of NCDs in South Africa, the WHO estimates that the longevity of the South African populace is approximately 59 years.⁵

NCDs are characterized by an unhealthy lifestyle and are strongly influenced by personal choice. Predisposing risk

factors for NCDs include smoking of tobacco, poor nutrition, physical inactivity, hypertension, hyperglycemia, obesity, and dyslipidaemia.¹ In 2008, physical inactivity (sedentariness) was estimated to be responsible for 5.3 million deaths worldwide.⁶ The WHO² recently identified physical inactivity to be the fourth leading cause of premature deaths globally. Mickelsfield et al.⁷ identified the prevalence of physical sedentariness among South Africans' 15 years and older to range between 43% and 49%.⁷ In 2000, physical inactivity was identified as a predisposing risk factor for premature death, accounting for 3.3% of all South African deaths.^{8,9} Both poor diet and poor quality of food are positively associated with the development of overweight and obesity, which substantially contributes to development of

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NCDs.¹ Excessive eating and physical inactivity are further contributing factors that are associated with overweight and obesity.¹² The percentage of the South African population that has been classified as either overweight or obese has progressively escalated, with the South African National Health and Nutrition Report of 2012, identifying approximately two thirds (66%) of women and one third (33%) of men as being overweight.¹⁰ At the same time, obesity among women and men has risen to 39% and 11%, respectively.^{10,11}

The philosophy of *exercise is medicine* is not a new idea, but rather predates the structured physical activity-based epidemiological interventions of Drs. Jeremy Morris (1940s) and Ralph Paffenbarger (1990s) who have become world renowned proponents of the aforementioned philosophy.¹² The salutogenic effect of exercise and physical activity has its origins in both Greek mythology, and ancient China (2500 BC), as well as ancient Indian Ayurvedic medicine (600 BC). This philosophy, when interpreted, suggests that exercise or physical activity can be used to rehabilitate orthopedic and chronic lifestyle diseases within the pathogenic health paradigm (care and prevention health dimensions) and enhance an individual's quality of life in the fortogenic health paradigm (health and wellness dimension) through injury and disease protection.

The South African history of the philosophy of *exercise is medicine* is primarily articulated through the professions of physiotherapy and of biokinetics. Physiotherapy is the auxiliary management of various medical conditions being *inter alia* singular or combinations of conditions which are orthopedic, neurological, respiratory, cardiovascular, obstetric, gynecological, pediatric, and geriatric in nature and that present themselves in both the pathogenic and illness prevention paradigms. These conditions are treated and managed through electrotherapeutic modalities, massage, manipulation, hydrotherapy, and exercise.¹³ The South African profession of physiotherapy provides acute-phase treatment as well as sub-acute and final-phase rehabilitation of the aforementioned diseases and injuries. Frantz¹⁴ and Maharaj¹⁵ reported that physiotherapists are predominantly involved in curative treatment in the illness care health dimension, while being sparsely involved in preventive rehabilitation in the illness prevention and the health and wellness health dimensions. These statements hint that South African physiotherapy profession needs to more holistically embrace the philosophy of *exercise is medicine*.

Biokinetic rehabilitation includes clinically structured cardiorespiratory, stretching (passive, active, and resisted), strengthening (isometric, isotonic, and isokinetic devices), hydrotherapy, proprioception, and balance exercises as well as functional activities aimed at improving either the patient's or healthy individual's relative health status, quality of life, physical, occupational, or sport performance.^{13,16} Ellapen et al.¹⁷ underlined the fact that biokineticists are auxiliary medical personnel who are secondary health-care practitioners functioning in the late illness care (postmedical

rehabilitation phase), illness prevention, and the health and wellness promotion dimensions.

The international interprofessional medical management strategy of NCDs includes pharmaceutical medication, education, and counselling, as well as diet management and regular physical activity.¹ Evans et al.³ reported that while exercise therapy is financially the cheapest modality of treatment for NCDs, it is nevertheless a very effective option. The South African National Health Plan has identified regular exercise and physical activity as one of the fundamental elements of the possible solution, which will assist in the management of the NCD epidemic.³ This commentary will therefore review whether there are sufficient South African exercise therapists (both physiotherapists and biokineticists) to meet the challenge of the NCD epidemic.

Methods

This study adopted an observational, descriptive design. The South African Health Review¹⁸ of 2011 identified the number of NCD patients treated in 2012 by the South African Department of Health (SADH) and predicted number of patients in 2025 (Table 1). The 2013 and 2017 Health Professions Council of South Africa (HPCSA) annual reports provided insight into the registration numbers of students-in-training (2014–2017) and of practicing physiotherapists and biokineticists (2007–2017)^{19,20} (Table 2). All the literature analyzed in the study was found in the public domain and therefore did not require ethical approval. Descriptive (mean, standard deviation, percentages, and frequencies) and inferential statistics (*t* test) were used. Probability was set at $p < .05$.

Results

In 2012, 10,623,820 people were identified with NCDs; however, only 6,058,186 patients (57.0%) were treated by SADH (Table 1 & 2) ($p < .05$). The SADH extrapolated that the number of NCDs patients to be treated in 2025, in South Africa will be an estimated 28.7% increase of that in 2012 ($p < .05$; Table 3). The average annual growth rates of practicing registered physiotherapists and biokineticists are 3.4% and 6.5% (Table 4), respectively. Furthermore, the physiotherapy and biokinetics students-in-training registries are growing at an average rate of 2.2% and 6.7% per year, respectively (Table 5). In 2012, the SADH only employed 1,069 (17.3%) physiotherapists out of a potential pool of 6,159 drawn from the HPCSA registry. The extrapolated physiotherapist to NCD patients' ratio of 2012 was 1:5,667. This leads us to conclude that, at the present time, the number of practicing South African physiotherapists is inequitable as concern to the management of the upsurge in the NCD epidemic.

Table 1. The Number of NCD Patients Identified and Subsequently Treated in South Africa in 2012 and the Predicted Number of Patients to be Treated in 2025 (SAHR).¹⁸

NCDs	2012 total patients identified	2012 patients treated	2025 predicted treated patients	Predicted % growth
Addison's disease	4,057	2,347	2,973	21.0
Asthma	1,631,682	797,152	888,785	10.3
Bronchiectasis	17,535	2,671	3,228	17.2
Bipolar mood disorder	92,193	25,600	30,428	15.6
Cardiac failure, myopathy, and CAD	909,527	464,259	630,682	26.3
Chronic obstructed pulmonary disease	197,312	108,598	146,272	25.7
Chronic renal disease	76,987	10,485	13,298	21.1
Crohn's disease	20,163	7,788	9,492	17.9
Diabetes insipidus	4,402	667	746	10.5
Diabetes Type 1	232,314	112,204	134,381	16.5
Diabetes Type 2	800,667	480,990	625,877	23.1
Dysrhythmia	89,882	54,870	74,941	26.7
Epilepsy	365,400	167,428	194,788	14.0
Glaucoma	175,033	77,572	106,240	26.9
Hemophilia	1,520	779	825	5.5
Hyperlipidemia	1,586,909	946,842	1,259,678	24.8
Hypertension	3,384,598	2,132,926	2,874,692	24.0
Hypothyroidism	655,818	451,462	593,247	23.8
Multiple sclerosis	10,952	5,605	6,645	15.6
Parkinson's disease	46,921	24,664	34,379	28.2
Rheumatoid arthritis	214,757	98,515	127,177	22.5
Schizophrenia	29,431	13,155	15,927	17.4
Systemic lupus erythematosus	19,541	7,739	9,265	16.4
Ulcerative colitis	56,219	12,793	15,804	19.0
Sum	10,623,820	6,058,186	7,799,770	22.3
Mean ($\pm$ SD)	424,952.8 ($\pm$ 762,906)	242,327.4 ($\pm$ 476,536.1)	311,990.8 ($\pm$ 621,299)	

Note. % growth = (2025 stats–2012 stats)/2025 stats $\times$ 100, where (% growth) represents the growth percentage of the pathology that is estimated to be treated in 2025 by the SADH.

Table 2. Comparative Analyses Between the Total Numbers NCDs Patients Identified Versus the Number of Patients Treated in 2012.

Variables	Total number of NCDs patients identified	Number of patients treated	<i>p</i>
Mean ($\pm$ SD)	424,952.8 ($\pm$ 762,906)	242,327.4 ($\pm$ 476,536.1)	.004

Discussion

The discussion revolves around the question of whether there are sufficient exercise therapists available to meet of the NCD epidemic in South Africa. Although the philosophy of *exercise is medicine* encompasses the rehabilitation of both orthopedic and chronic lifestyle diseases, chronic lifestyle diseases or NCDs have been brought to the fore of epidemiological interest and discussion within the context of scientific exercise.¹² This is primarily due to the radical escalation in the global prevalence of NCDs and the consequent premature mortality rates.¹ Stats SA⁴ reported that NCDs were contributing factors to 61.2% of South African deaths, thereby warranting an immediate medical intervention. The NCDs

Table 3. Comparative Analyses Between the Numbers of Treated NCDs Patients (2012) Versus the Predicted Number of Patients (2025).

Variables	Number of NCDs patients treated (2012)	Number of patients treated in 2025	<i>p</i>
Mean ($\pm$ SD)	242,327.4 ($\pm$ 476,536.1)	311,990.8 ($\pm$ 621,299)	.02
2015	2,474 (+12.8%)	635 (+10.8%)	3,109 (+12.4%)
2017	2,271 (–8.9%)	684 (+7.1%)	2,955 (–5.2%)
Mean %	+2.2%	+6.7%	+3.5%

management strategy employed by European countries and the United States of America includes a multidisciplinary interprofessional health-care approach involving specialist medical practitioners, pharmacists, education, and counseling psychologists as well as social scientists, dieticians, physical therapists, and the American College of Sports Medicine clinical exercise specialists and physiologists.^{1,12} The South African National Health Plan has adopted a similar strategy in their attempt to curb the NCD epidemic.

Table 4. Comparative Growth of HPCSA Registered Physiotherapists and Biokineticists (2007–2017).

Year	Practicing physiotherapists (% growth rate)	Practicing biokineticists (% growth rate)	Practicing exercise therapists (% growth rate)
2007	5,240	823	6,063
2008	5,081 (−3.1%)	844 (+2.4%)	5,925 (−2.3%)
2009	5,261 (+3.4%)	902 (+6.4%)	6,163 (3.8%)
2010	5,746 (+8.4%)	959 (+5.9%)	6,705 (+8.0%)
2011	5,919 (+2.9%)	1,020 (+5.9%)	6,939 (+3.3%)
2012	6,159 (+3.8%)	1,099 (+7.1%)	7,258 (+4.3%)
2013	6,389 (+3.5%)	1,191 (+7.7%)	7,580 (+4.2%)
2014	6,670 (+4.2%)	1,305 (+8.7%)	7,975 (+4.9%)
2015	6,902 (+3.3%)	1,384 (+5.7%)	8,286 (+3.7%)
2015	7,196 (+4.0%)	1,505 (+8.0%)	8,701 (+4.7%)
2017	7,473 (+3.7%)	1,618 (+6.9%)	9,091 (+4.2%)
Mean %	+3.4%	+6.5%	+3.9%

Note. Growth rate was calculated as present year – previous year/pre-sent year × 100.

Table 5. Growth of Physiotherapy and Biokinetic Students-in-Training (2014–2017).

Year	Physiotherapy students-in-training (% growth)	Biokinetics students-in-training (% growth)	Combined growth (%) physiotherapy + biokinetics
2014	2,097	529 (+2.4%)	2,626 (+2.4%)
2015	2,155 (+2.6%)	566 (+6.5%)	2,721 (+3.4%)

In South Africa, physiotherapists have been identified as the only exercise therapy practitioners able to institute these exercise recommendations in the public health-care sector, despite the fact that biokineticists are equally trained to perform such a task.³ In 2012, the South African Health Report identified 10,623,820 people with NCDs; however, only 6,058,186 (57.0%) patients received treatment from SADH.¹⁸ While the number of registered practicing physiotherapists in South Africa in 2012 was 6,159, only 1,069 (17.3%) were employed by the SADH.²¹ Moss and Lubbe²² identified that the South African populace needs one exercise therapist in order to optimally manage 100 NCD patients per month, thereby requiring 60,582 therapists if we take the aforementioned statistics regarded treated patients at face value. We can therefore conclude that in 2012, an additional 59,513 physiotherapists were required in order to meet this demand. That is to say that in 2012, the extrapolated ratio of physiotherapist to NCDs patients was 1:5667 based on treated patients. The SAHR¹⁸ predicts that in 2025, there will be 7,799,770 NCD treatable patients, creating a

demand for 77,998 physiotherapists in order to provide optimal treatment. The growth rate of the number of practicing physiotherapists is 3.4%, at the current time, thereby allowing us to project that approximately 10,071 physiotherapists will be available in 2025, a number which falls far short of the estimate number of exercise therapists required. Frantz¹⁴ and Maharaj¹⁵ reported that physiotherapists are predominantly involved curative treatment in the illness care health dimension; this may further limit their needed expertise in the illness prevention and health and wellness dimensions where NCDs are located. In Australia, the United States of American and in various European countries, clinical exercise physiologists are part of the multi-disciplinary teams involved in the campaign to manage NCDs.^{1,23} Ellapen et al. have shown that South African biokineticists have similar expertise to American College of Sports Medicine clinical exercise physiologists, thereby equipping them to manage NCD patients through clinical exercise or physical activity rehabilitation.^{24,25} Both Moss and Lubbe²² and Ellapen et al.¹⁷ have further reported that biokineticists have successfully been rehabilitating NCD patients in the South African private health-care sector for the past 34 years.

The authors propose the inclusion of well-trained biokineticists who are able to rehabilitate NCD patients through the medium of clinical exercise and physical activity in the needed cohort of exercise therapists. The profession of biokinetics is steadily growing at a rate of 6.5% per year¹³ and the predicted number of registered biokineticists in 2025 would be 2,678 helping to alleviate the shortfall in professionals able to aid in the treatment of NCDs. Unfortunately, the combined sum of the predicted number of physiotherapists and biokineticists managing the estimated South African NCDs population will be 12,749 (10,071 physiotherapists + 2,678 biokineticists), leaving a shortfall of 65,249. These extrapolated statistics suggest that the South African Departments of Education and of Health urgently need to undertake collaboratively work in order to educate, train, and employ more physiotherapists and biokineticists so as to meet the needs of the NCD epidemic. Presently, the number of physiotherapy and biokinetics students-in-training is growing at average annual rate of 2.2% and 6.7%, respectively.¹⁷ The predicted number of students-in-training in 2021 that would graduate and be applicable for national employment is 3,296 (2,477 physiotherapists and 819 biokineticists). These students-in-training register with the HPCSA in the first year of study, thereby making them applicable candidates 3 years later. Therefore, the 2021 graduates will only be available for service in 2025. These 3,296 exercise therapists would augment the total number of exercise therapists eligible to be employed by the SADH, bringing the total pool of therapists to 16,045.

However, these growth rates will not be able to adequately augment the number of exercise therapists required to equitably meet the needs that arise out of the NCD epidemic in 2025. South African NCD patients require more exercise therapists.

Conclusion

In South Africa, the philosophy of *exercise is medicine* is propagated through the professions of physiotherapy and biokinetics. However due to the increased number of NCD patients in South Africa, insufficient physiotherapists are unable to meet the demand. The inclusion of biokineticists in the exercise therapy cohort would help, but ultimately even with their inclusion the total number of available therapists falls short of the predicted number of exercise therapists needed to equitably manage the NCDs epidemic through structured exercise and physical activity.

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Reference

1. Arena R, Guazzi M, Lianov L, et al. Healthy lifestyle interventions to combat non-communicable diseases—a novel on-hierarchical connectivity model for stakeholders: a policy statement from the American Heart Association, European Society for Cardiology, European Society for Cardiovascular Prevention and American College Preventive Medicine. *Europe Heart J* 2015; 36: 2097–2109.
2. World Health Organization. *Global action plan for the prevention and control of non-communicable diseases: 2013-2020*. Geneva: WHO Press, 2013.
3. Evans RV, Smith T, Kay P, et al. The need for biokineticists in the South African public healthcare system. *S Afr J Sport Med* 2016; 28: 85–86.
4. Statistics South Africa. *Mortality and causes of deaths in South Africa*, <http://www.statssa.gov.za/publications/P03093/P030932015.pdf> (2015, accessed 24 October 2018).
5. Gumede M. Non-communicable disease kills most people in SA, according to Stats SA report. *Daily News*, 2 May 2017; 1.
6. Kohl HW, Craig CL and Lambert EV. Lancet physical activity series working group. The pandemic of physical inactivity: global action for public health. *Lancet* 2012; 380: 294–305.
7. Mickelsfield L, Lambert EV, Hume DJ, et al. Socio-cultural, environmental and behavioral determinants of obesity in black South African women. *Cardio J Afr* 2013; 24: 369–375.
8. Joubert J, Norman R, Lambert EV, et al. Estimating the burden of disease attributable to physical inactivity in South Africa in 2000. *S Afr Med J* 2007; 97: 725–731.
9. Malambo P, Kenene AP, Lambert EV, et al. Prevalence and socio-demographic correlates of physical activity levels among South African adults in Cape Town and Mount Frere communities in 2008-2009. *Arch Pub Health* 2016; 74: 54.
10. SANHANES. South African National Health and Nutrition Survey, [http://www.hsrc.ac.za/uploads/pageNews/SANHANES_launchedition\(onlineversion\).pdf](http://www.hsrc.ac.za/uploads/pageNews/SANHANES_launchedition(onlineversion).pdf) (2013, accessed 1 June 2018).
11. Clark-Riddell J and Sanpath A. Obesity a new threat to South Africa. *Independent Newspaper*, 30 April 2016; 1.
12. Dishman K, Heath GW and Lee I. *Physical activity epidemiology*. 2nd ed. Champaign: Human Kinetics, 2013.
13. HPCSA (Health Professions Council of South Africa), Act 56 of 1974. *Regulations defining the scope of practise for the profession of Physiotherapy, Podiatry and Biokinetics*, <http://www.hpcsa.ac.za> (2018, accessed 24 October 2018).
14. Frantz JM. Physiotherapy in the management of non-communicable diseases: facing the challenge. *South Afr J Physio* 2005; 61: 8–10.
15. Maharaj S. *Comments on the overlap of scope of practice with physiotherapy*. Johannesburg: South African Society of Physiotherapy, 2011.
16. Strydom GL. Biokinetics—the development of a health profession from physical education: a historical perspective. *South Afr J Res Sport Phys Educ Recreat* 2005; 27: 113–128.
17. Ellapen TJ and Swanepoel M. The evolution of the profession of biokinetics. *South Afr J Res Sport Phys Educ Recreat* 2017; 39: 41–50.
18. SAHR. *South African health review*, http://www.hst.org.za/publications/South%20African%20Health%20Reviews/sahr_2011.pdf (2011, accessed 24 October 2018).
19. HPCSA. *Health professions council of South Africa annual report*, <http://www.hpcsa.ac.za> (2013, accessed 1 June 2018).
20. HPCSA. *Health professions council of South Africa annual report*, <http://www.hpcsa.ac.za> (2017, accessed 1 June 2018).
21. SAHR. *South African health review*, <http://www.hst.org.za/publications/South%20African%20Health%20Reviews/HST%20SAHR%202017%20Web%20Version.pdf> (2017, accessed 30 May 2018).
22. Moss SJ and Lubbe MS. The potential market demand for biokineticists in the private health care sector of South Africa. *South Afr Sports Med Assoc* 2011; 23: 14–19.
23. Soan EJ, Street SJ, Brownie SM, et al. Exercise physiologists: essential players in interdisciplinary teams for non-communicable chronic disease management. *J Multi Health* 2014; 7: 65–68.
24. Ellapen TJ, Paul Y, Swanepoel M, et al. A comparative overview of exercise and health related professions: athletic training, clinical exercise physiology and biokinetics. *Afr J Phys Act Health Sci* 2017; 23: 1–12.
25. Ellapen TJ, Barnard M, Swanepoel M, et al. Emerging trends in the profession of biokinetics: a 10 year perspective. *Inter J Med Med Sci* 2018; 71–78.

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