



Non- Communicable Diseases in the Western Cape

Burden of Disease Update

*Sadiyya Sheik, Juliet Evans, Erna Morden, David Coetzee
Epidemiology and Surveillance sub-directorate, Health Impact Assessment Unit
Western Cape Government: Health*

December 2016

Table of Contents

Background	1
Section A: Burden of Non-Communicable Disease	2
Mortality	3
Premature mortality	3
Disability adjusted life years (DALYs)	4
Societal and economic costs.....	4
Prevalence	6
Caseload and Incidence	8
Risk Factors for Non-Communicable Disease.....	8
Non-Communicable Disease comorbidity and multi-morbidity	10
Communicable and Non-Communicable Disease comorbidity.....	10
Section B: Non-Communicable Disease Prevention and Control	12
Burden of Disease Reduction Project –Recommendations	12
Interventions.....	15
Preventing NCDs and Promoting Wellness.....	15
Health System Strengthening and Reform	18
Research	21
Recommendations	23
Acknowledgements	25
References	25
Annexure A: Summary of Findings from Systematic Reviews on Interventions for the prevention and management of Non-Communicable Disease	29
References For Annexure A	31

Table of Figures

Figure 1 Non-Communicable Disease Cost Categories	5
Figure 2 Western Cape Integrated Chronic Care Model.....	18

Table of Tables

Table 1 Estimates of non-communicable disease prevalence in the Western Cape	7
Table 2 Top ten risk factors in terms of attributable DALYS (Global Burden of Disease Study, 2015)	9
Table 3 Prevalence of major NCD risk factors (SANHANES-1), 2012	10
Table 4 Recommendations made following the Burden of Disease Reduction Project in 2007	13

BACKGROUND

Non-communicable diseases (NCDs) contribute significantly to the global burden of disease, particularly in low to middle income countries where almost three-quarters of all NCD deaths and the majority of premature NCD deaths occur.¹ NCDs include any medical condition or disease that is non-infectious, however four groups of NCDs account for 82% of all NCD deaths globally. These four groups are cardiovascular diseases (including cerebrovascular disease), cancers, chronic respiratory diseases and diabetes. The terms NCD and chronic disease are often used interchangeably, however in some instances reference to a chronic disease may include HIV. Other NCDs include mental health and injuries, however for the purposes of this report, only the four major NCD groups will be discussed. Mental health has been addressed in a previous edition and an update of the burden of disease relating to injuries will form part of future work.

In 2007, the Western Cape Burden of Disease Reduction project was undertaken.² The overall aim of the project was to advise on how to reduce the burden of disease and promote equity in health in the Western Cape Province. Expert groups were identified for five major disease categories. Of these expert groups, the cardiovascular workgroup conducted a review of cardiovascular disease mortality. At the time, it was appreciated that NCDs accounted for a much larger proportion of deaths in the Western Cape than nationally. This trend has persisted over the years with current estimates indicating that NCDs account for 38.9% of all deaths nationally³ and 61% in the Western Cape.⁴

The function of the cardiovascular workgroup was an initial review of epidemiological data pertaining to cardiovascular disease morbidity and mortality including the contribution of cardiovascular risk factors. This was followed by a review of existing interventions targeting cardiovascular disease and the compilation of a number of recommendations to reduce cardiovascular disease burden in the province. The specific focus was on upstream interventions, addressing lifestyle factors such as diet, physical activity and alcohol and tobacco use. While the workgroup concentrated their efforts on cardiovascular disease, the risk factors addressed are common to the four major NCD groups.

This report forms part of the work of the Epidemiology and Surveillance sub-directorate of the Health Impact Assessment Unit to provide an update on NCD burden in the Western Cape.

Aim

The overall aim of the project is to provide an update on the burden of NCDs in the Western Cape using the 2007 Burden of Disease Reduction Project as a reference point.

Objectives

The specific objectives are:

- To present current epidemiological data pertaining to NCDs and their risk factors in the Western Cape
- To summarise the recommendations made by the cardiovascular workgroup of the Burden of Disease Reduction Project in 2007 and evaluate the extent to which they have been actioned
- To highlight current interventions including upstream and service-level or downstream interventions not specifically recommended by the cardiovascular workgroup aimed at reducing NCD burden of disease
- To propose recommendations for future intervention

Methods

The project was carried out by multiple iterations of desktop document review and key informant discussions. Epidemiological data was obtained from provincial reports, research reports, national surveys with provincial-level profiles and routine data. Information about interventions was obtained from discussions with key informants.

SECTION A: BURDEN OF NON-COMMUNICABLE DISEASE

A comprehensive understanding of burden of disease estimates includes an assessment of:

- Mortality
- Disability adjusted life years (DALYs)
- Societal and economic costs
- Prevalence
- Caseload and Incidence
- Risk factors

In this section of the report, we provide an update on burden of disease estimates for the Western Cape in terms of each of these elements for the four major NCD groups.

MORTALITY

The most recent mortality data reported in the 2013 Western Cape Mortality Profile ⁴ indicate that NCDs have accounted for an increasing proportion of deaths between 2009 and 2013 (57 and 61% respectively). During that period, there was a significant reduction in the proportion of deaths due to communicable disease (particularly HIV/AIDS and TB) and a subsequent increase in the NCD proportion. The proportion of deaths due to diabetes and cardiovascular disease remained unchanged but there has been an increase in the proportion attributed to cancers and other NCDs.

In 2013, ischaemic heart disease remained the leading cause of death in the province, with an age-standardised death rate (ASR) of approximately 90 deaths per 100 000 population. Cerebrovascular disease, which in 2009 ranked third behind HIV/AIDS, was the second leading cause of mortality in 2013 in the Western Cape. ASR mortality from cerebrovascular disease, however, has decreased in recent years and the escalation in rank is mainly due to the significant reduction in HIV/AIDS and tuberculosis (TB) deaths. Diabetes mellitus remains the fourth leading cause of ASR mortality however there is a declining mortality rate from 59 deaths per 100 000 population in 2009 to 50 deaths per 100 000 population in 2013. Chronic obstructive pulmonary disease (COPD) (46 deaths per 100 000) and respiratory cancers (33 deaths per 100 000) are also among the leading causes of mortality in the province.

Sex differences in the mortality profile of NCDs identified globally and in the initial burden of disease study for South Africa⁵ have been upheld in subsequent mortality estimates. In 2013, NCD deaths contributed 68% of deaths in women compared with 56% among men and diabetes continues to rank higher in women (fourth) than men (eighth) in terms of leading causes of mortality.

Ischaemic heart disease and cerebrovascular disease are ranked among the top two causes of death in all Western Cape districts with the exception of the Central Karoo where HIV/AIDS is the leading cause of death and the West Coast where TB occupies the second position. COPD is generally ranked higher in the rural districts than the Cape Metro, particularly in the Cape Winelands where COPD is the leading cause of death in men and is ranked third overall.

PREMATURE MORTALITY

Premature mortality is assessed by the measure years of life lost (YLL). This is calculated by multiplying the number of deaths by a standard life expectancy at the age at which death occurs. This gives greater weight to deaths occurring at a younger age and can be used in

public health planning for comparison of the relative importance of different causes of premature deaths.

The initial National Burden of Disease Study conducted in 2000⁶ indicated that in the Western Cape, ischaemic heart disease and cerebrovascular disease were ranked fifth and sixth respectively in terms of the leading single causes of premature mortality. Together, they contributed 10.5% of the total YLL. In 2012, these two conditions moved up in rank to third and fourth place respectively and together contributed 13% of years of life lost.⁷ While there is a slight difference in ranking, this finding is similar to the 11.8% contribution reported by the more recent 2013 Western Cape Mortality Profile report.

NCDs contribute a larger proportion to premature mortality in women than men. In 2013, cerebrovascular disease, ischaemic heart disease and diabetes mellitus together contributed nearly 20% of the premature burden in women. COPD and respiratory cancers are consistently among the top ten contributors to premature mortality and are ranked higher in men than women.⁴ At a district level, the contribution of NCDs to premature mortality is relatively consistent with the findings for the province as a whole.

DISABILITY ADJUSTED LIFE YEARS (DALYS)

Disability-adjusted life years (DALYs) is a combined measure of morbidity and premature mortality and can be thought of as the measurement gap between current health status and an ideal health situation where the entire population lives to an advanced age, free of disease and disability.⁸ The measure is a sum of years of life lost (YLL) and years lived with disability (YLD). One DALY refers to one lost year of healthy life.

Globally, ischaemic heart disease is the leading contributor to DALYs in both developed and developing countries.⁹ Recent estimates for South Africa from the World Health Organisation (WHO) show that the top DALY contributors are communicable diseases but NCDs such as diabetes, ischaemic heart disease and stroke feature in the top 10. Currently, DALY estimates for the Western Cape Province are not available. This is because currently available data does not allow for the calculation of YLD, for which the inputs are number of incident cases, disability weighting and average duration of the case until remission or death in years.

SOCIETAL AND ECONOMIC COSTS

Costs attributed to NCDs have been described as comprising two categories i.e. tangible and intangible costs.¹⁰ This framework for appreciating costs related to NCDs is based on a

summary of work done by the World Bank in identifying key drivers and impact areas of NCD costs.¹¹ The figure below provides a graphic representation of these costs categories.

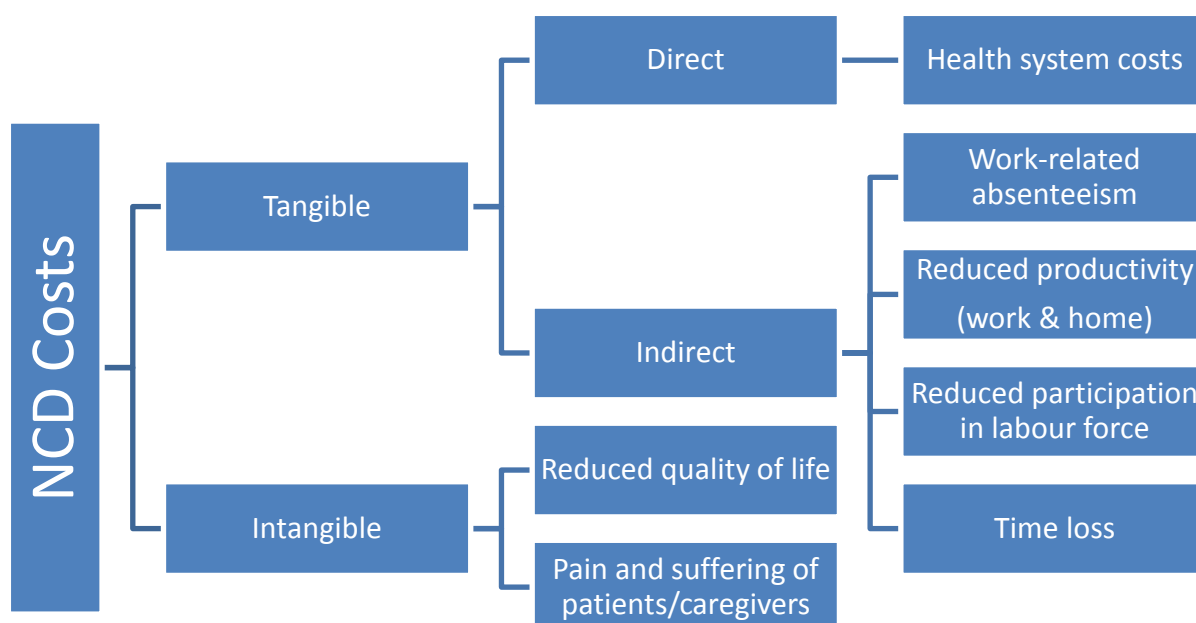


Figure 1 Non-Communicable Disease Cost Categories

Tangible costs include the direct costs of managing the disease, including those incurred by individuals, households and governments. Indirect tangible costs relate to consequences of illness and include absenteeism and reduced productivity and labour force participation. Also included is the time lost by caregivers and family members in helping the patient seek care and cope with the burden of disease.

Intangible costs relate to a reduction in the quality of life and the pain and suffering of patients, their relatives and friends.

In South Africa, not much is known about the true economic and societal costs of NCDs. In a WHO paper estimating the loss of economic output associated with chronic diseases in 23 low and middle income countries, it was estimated that in South Africa between 2006 and 2015, cumulative gross domestic product (GDP) losses due to heart disease, stroke and diabetes alone amounted to US\$1.88 billion.¹²

There is insufficient data quantifying all NCD cost categories for the Western Cape. One study which looked at prescription costs compared acute and chronic conditions at ten primary healthcare facilities.¹³ The average prescription cost for patients with chronic

conditions was significantly higher (R61.01) compared to patients with acute conditions (R15.43).

PREVALENCE

An assessment of the prevalence of NCDs is an essential component of burden of disease and contributes to an understanding of the service-related implications of NCDs.

Estimates of the prevalence of NCDs in the Western Cape vary greatly. Much of the data available on NCD prevalence in South Africa comes from national surveys which provide prevalence estimates based on varying definitions and data collection measures. Since 2007, there have been 2 national surveys viz. The South African National Health and Nutrition Examination Survey (SANHANES-1)¹⁴ which was conducted in 2012 and The General Household Survey which is conducted annually.¹⁵

Table 1 summarises estimates of prevalence for selected NCDs in the Western Cape. As can be seen, there is considerable variation in the estimates of hypertension prevalence for the Western Cape. However, the SANHANES-1 estimate is similar to that reported by the South African Demographic and Health Survey (SADHS) in 2003¹⁶ and that reported by the WHO in a global status report on NCDs (1). The National Income Dynamics Study in 2012 reported a much higher prevalence, similar to that reported in the CRIBSA (Cardiovascular Risk in Black South Africans) study¹⁷ which looked at a select group, sampling only 25 - 74 year old urban blacks from 5 townships in Cape Town.

In comparison to the SADHS 2003, the recent national surveys suggest an increasing prevalence of high cholesterol, stroke and diabetes while ischaemic heart disease, chronic respiratory disease and cancers appear to be declining in prevalence. Compared to clinical examination and biomarker analysis, self-reported estimates are unreliable and tend to underestimate prevalence due to recall bias. The SANHANES-1 study identified a much higher prevalence of dyslipidaemia determined by serum biomarker than self-report. While this discrepancy may be due to self-reported recall bias, there is also likely to be under-diagnosis of dyslipidaemia. Similarly, diabetes prevalence estimates determined by glycated haemoglobin (HbA1c) levels was higher than estimates obtained from self-report.

Table 1 Estimates of non-communicable disease prevalence in the Western Cape

	South African Demographic and Health Survey (2003)	South African National Health and Nutrition Examination Survey (2012)	General Household Survey (2015)
Hypertension			
Self-report	20.2%	21.2%	10.3%
Clinical: BP≥140/90		9.4%	
SBP≥140 OR DBP≥90 OR On treatment		36.7%	
Heart disease			
Self- report heart disease	3.85%	1.8%	
Self- report heart attack/MI			1%
High blood cholesterol			
Self-report	4%	7.0%	2.3%
Biomarker: Total Cholesterol >5mmol/l		37.2%	
Stroke			
Self-report	1.23%	3.5%	0.34%
Diabetes			
Self-report	5.53%	6.7%	3.87%
Clinical: HbA1c > 6.5%		11.2%	
HbA1c > 6.1 and <6.5%		10%	
Asthma			
Self-report	7.71%		3.71%
Bronchitis			
Self-report	4.85%		0.35%
Cancer			
Self-report	1.34%		0.51%

CASELOAD AND INCIDENCE

Currently, in the Western Cape, there are limited data pertaining to NCD caseload at a facility-level. One study which looked at the disease profile of patients at ten primary health care facilities identified rates mirroring that of the SANHANES-1 study.¹³

While a number of indicators relating to NCDs are collected on the routine primary health and hospital data platform, there are no prevalence indicators and the following incident case indicators pertaining to hypertension and diabetes are the only routinely collected data:

- Diabetes mellitus case put on treatment
- Diabetes patient put on treatment 18 years and older-new
- Diabetes patient put on treatment under 18 years-new
- Hypertension case put on treatment
- Hypertension case put on treatment 18 years and older-new
- Hypertension case put on treatment under 18 years-new

Ideally, these indicators should provide an estimate of the incidence of diabetes and hypertension for the Western Cape. However, there is difficulty in identifying an accurate denominator to obtain rates and screening and reporting practices are not standardised, impacting on the accuracy of data. Nevertheless, trends in the data show that as a proportion of PHC headcounts 5 years and older, there is a small but steady decrease in new hypertension cases between 2012 and 2016 and no change in the proportion of new diabetes cases in the same period. There is however no clear reason to explain the apparent decline in hypertension incidence.

RISK FACTORS FOR NON-COMMUNICABLE DISEASE

Four major modifiable risk factors contribute to NCD burden. These are tobacco use, physical inactivity, unhealthy diets and the harmful use of alcohol. In South Africa, half of the ten leading risk factors in terms of attributable DALYs are associated with NCDs.¹⁸

Table 2 Top ten risk factors in terms of attributable DALYS (Global Burden of Disease Study, 2015)

1	Unsafe sex
2	High body-mass index
3	High fasting plasma glucose
4	High systolic blood pressure
5	Alcohol use
6	Smoking
7	Ambient particulate matter pollution
8	Childhood undernutrition
9	Diet low in fruits
10	Intimate partner violence

As can be seen in Table 2, high body mass index (BMI) is the second leading risk overall after unsafe sex. Historically high rates of obesity, particularly amongst women remain high according to current estimates. According to the SANHANES-1 study, three out of five women in the Western Cape are classified as overweight (BMI 25.0-29.9) or obese (BMI \geq 30). Contributing to high levels of overweight and obesity is a high prevalence of physical inactivity, again particularly amongst women, and poor diet.

Tobacco use is a known risk factor for three of the four major NCD groups. In the recent past, South Africa has seen declining trends in tobacco use, strongly influenced by tobacco control legislation. However, this decline in prevalence has reached a plateau and in the Western Cape rates of tobacco smoking remain the highest in the country. This is particularly so amongst women. Environmental tobacco smoke exposure is also high in the province. An emerging concern, particularly among the youth, is hookah pipe smoking. Several studies from South Africa have found that the prevalence of hookah or water pipe smoking is high among students and that misperceptions pertaining to the associated health risks are concerning, even among health science students i.e. future health professionals.¹⁹⁻²²

Alcohol use is another important risk factor. In South Africa, the prevalence of heavy episodic drinking is concerning. Despite the fact that nearly 60% of the population abstained from alcohol in the previous 12 months, alcohol consumption per capita was high.²³ This is due to a quarter of alcohol consumers reporting heavy episodic drinking. In the Western Cape, rates of alcohol use for both men and women are the highest in the country and the prevalence of risky drinking is 16%.²⁴

Table 3 summarises the prevalence of major risk factors for non-communicable disease in the Western Cape from the SANHANES-1 study.

Table 3 Prevalence of major NCD risk factors (SANHANES-1), 2012

Risk Factor	Males	Females
Overweight	26.9%	24.5%
Obese	16.1%	37.9%
Unfit	35.5%	67.2%
Tobacco Use	46%	31.7%

NON-COMMUNICABLE DISEASE COMORBIDITY AND MULTI-MORBIDITY

In the Western Cape rates of NCD comorbidity in a primary healthcare setting is reportedly as high as 65%.¹³ A South African study analysing data from primary healthcare facilities in four provinces found that the combination of diabetes and hypertension was the commonest comorbid condition.²⁵ In the Eden and Overberg districts, it was found that 84% of diabetics also had hypertension and 47% of hypertensives were diabetic.²⁶ An important additional finding of this study was poor disease control. Fifty-nine percent of hypertensives were uncontrolled and 77% of diabetics had an HbA1c level above the therapeutic target. In addition, the study identified a significant unmet need, reflected by elevated blood pressure recordings in 25% of participants not in the hypertension group.

These findings indicate that the prevalence of non-communicable disease co- and multi-morbidity is concerning, as it adds to the complexity of patient management.

COMMUNICABLE AND NON-COMMUNICABLE DISEASE COMORBIDITY

South Africa's quadruple burden of disease characterised by communicable, non-communicable, perinatal and maternal and injury-related disorders has been well-described.^{5,27} Alongside a rise in NCD burden, the large-scale roll-out of antiretroviral therapy (ART) has resulted in increased life expectancy in people living with HIV and a new challenge of combined HIV and NCD comorbidity. In the HIV positive population, NCDs occur due to immune activation, medication side-effects, coinfections and the aging process.²⁸

Premature aging associated with HIV infection is likely to result in multi-morbidity in younger age groups. A study looking at communicable and NCD multi-morbidity in Khayelitsha found a high prevalence of multi-morbidity among young patients on antiretroviral therapy,

compared to those not on ART.²⁹ This study found that hypertension was the most common co-morbidity in patients being treated for HIV.

The convergent burdens of communicable and non-communicable disease have major implications for public health, in particular the design of health systems to effectively manage this complex situation.³⁰

SECTION B: NON-COMMUNICABLE DISEASE PREVENTION AND CONTROL

In 2007, the cardiovascular workgroup of the Burden of Disease Reduction project made a number of policy recommendations for the prevention of NCDs in the Western Cape. These recommendations comprised interventions largely targeting upstream factors which are generally outside the direct influence of the health sector and require inter-sectoral collaboration.

More recently, the National Department of Health committed to a set of 10 goals and targets to be achieved by 2020 and outlined a Strategic Plan for the Prevention and Control of Non-Communicable Diseases 2013-2017.³¹ This strategic plan consists of three sub-strategies, the first of which aligns closely with the recommendations made by the cardiovascular workgroup in 2007.

In this section of the report, we provide a summary of the recommendations made by the cardiovascular workgroup in 2007 and discuss the extent to which they have been implemented. We will then describe existing interventions and look at their progress before proposing revised recommendations.

BURDEN OF DISEASE REDUCTION PROJECT –RECOMMENDATIONS

The recommendations were grouped into four categories viz. lifestyle modification to improve diet; to improve physical activity; to reduce alcohol and tobacco consumption; and immediate actions to be taken. Three areas of intervention were identified from a review of best practice studies.

Multicomponent school programmes

- A nutrition-based curriculum offered by trained teachers
- A physical activity component
- A healthy school environment
- Parental involvement

Worksite interventions

- Nutrition and physical activity advice and group sessions
- A physical activity programme
- Changes in the food service canteens

- The use of printed and multi-media materials to promote health messages

Interventions in primary health care and the community

- Physicians to endorse healthy programmes
- Dieticians or nurses to do group counselling
- The use of self-help materials for patients to use on their own

Table 4 lists the recommendations that were made by the workgroup in 2007, indicates whether each recommendation was implemented and comments on the name, nature and progress of the intervention.

Table 4 Recommendations made following the Burden of Disease Reduction Project in 2007

	Recommendation	Implemented Yes/No	Comment
<i>Lifestyle Modification to Improve Diet</i>			
1	Ban advertising of foods during children's programmes on radio & TV, or reduce the market pressure on children by regulating advertising and obtaining cooperation from the mass media and internet providers	No	Outside of provincial health sector control
2	Introduce advertising and educational campaigns to promote the increased consumption of fruit and vegetables and the decreased consumption of fat, saturated fats, sugar and salt. Include the development of and building onto the dietary guidelines of the Department of Health	Yes	WoW! Educational campaigns
3	Ensure that communities have access to healthy and safe foods	Yes	WoW! Food gardens
4	Develop and implement a policy for schools on those foods which are allowed to be sold or provided free at the schools –including feeding schemes and tuck shops	No	WoW! Planned revision of healthy catering guidelines
5	Introduce a nutrition and healthy lifestyle curriculum aimed at school children for the prevention of cardiovascular diseases	Yes	Integrated School Health

			Programme
6	Ensure that all state facilities provide healthy foods to inmates and patients	No	
7	Develop a system of incentives for companies who introduce healthy canteens and physical activity facilities for their staff	No	
Lifestyle Modification to Improve Physical Activity			
1	Ensure that urban development includes access to areas for physical activity	Yes	Outdoor Gyms
2	Introduce advertising campaigns to promote physical activity	Yes	WoW! advertising campaigns
3	Introduce a physical activity curriculum aimed at school children for the prevention of cardiovascular diseases	Yes	WoW! school clubs
4	Ensure that all schools have adequate space and facilities for physical activity	No	
5	Ensure that all communities have access to safe areas where they can be physically active	No	
Lifestyle Modification to Reduce Tobacco and Alcohol use			
1	Increase the price of alcohol and cigarettes	No	Outside of health sector control
2	Ban all advertising of alcohol	No	Draft Control of Marketing of Alcoholic Beverages Bill
3	Introduce a school policy of a smoke-free environment	Yes	Western Cape Education Department Smoking Policy, 2015
Immediate Actions to be taken			
1	Evaluate foods currently sold or provided free at schools	No	
2	Evaluate the current nutrition (and healthy lifestyle) curriculum taught	No	

3	Pilot a school-based intervention on healthy nutrition, physical activity and against smoking	Yes	WoW! school clubs
4	Develop a school-based programme for overweight and obese children	No	
5	Determine whether there have been any "Healthy Lifestyle" interventions in schools, worksites, communities	No	

INTERVENTIONS

In order to provide a structured review of the types of interventions that have been implemented or are currently being implemented, they will be grouped according to three broad areas:

- Preventing NCDs and promoting wellness
- Health system strengthening and reform
- Research

PREVENTING NCDs AND PROMOTING WELLNESS

Western Cape on Wellness (WoW!)

The Western Cape on Wellness Initiative (WoW!) was launched in 2015. This initiative is linked to Provincial Strategic Goal 3 (Increasing Wellness, Community Safety and addressing Social Ills). The cluster of departments involved in addressing this strategic goal includes Health, Education, Social Development, Community Safety, Cultural Affairs and Sport and Transport and Public Works. The initiative aims to prevent and reduce the burden of NCDs by advocating for and activating physical activity and healthy eating in the Western Cape.

The WoW! initiative trains and supports champions across school, worksite and community settings. The role of a champion is to recruit team members and establish a WoW! Club which is a space to initiate and motivate for the development of healthy habits. The champions are provided with a starter pack which includes items such as a scale, tape measure, stop watch, exercise mats and recipe books.

WoW! has also partnered with Metrorail Western Cape to make use of public spaces to promote wellness amongst senior citizens. Activities include chair-based exercising, balance assessments to prevent falls and healthy eating demonstrations.

Food security is being addressed by establishing school, home and community based food gardens as part of a partnership with the WCG: Agriculture and City of Cape Town: Urban Agriculture.

A social media platform plays a part in health promotion by providing participants with regular reminders pertaining to healthy eating, physical activity and behavioural change. Further, an online wellness tracking system enables the setting of personal goals and provides participants with wellness resources. Ongoing projects include the revision of healthy catering guidelines for schools and worksites.

An evaluation of the first 3 months of the initiative has been undertaken, the results of which are pending at the time of compiling this report.

Reduction of sodium content of certain foods

Average salt consumption in South Africa is higher than recommended by the WHO and it is understood that non-discretionary intake of salt is a significant contributor. As a result, regulations for a two-step reduction in salt content of certain foods over a three-year period was promulgated by the National Department of Health in 2013. The first step of these reductions was brought into effect from 30 June 2016. The expected impact of these regulations is 7400 fewer deaths due to cardiovascular disease and 4300 fewer non-fatal strokes per year. It is estimated that cost savings would be up to R300 million.³²

Sugar-sweetened beverage tax

In July, the National Treasury published for public comment a policy paper and proposals relating to a sugar-sweetened beverage (SSB) tax which is to come into effect from April 2017. The tax is a move to reduce excessive sugar intake and is part of a broader strategy to reduce the prevalence of obesity by 10% by 2020. Taxation of foods high in sugar is considered very cost-effective as a measure to reduce diet related disease.³³

Mathematical modelling indicates that over a 20 year period a 20% SSB tax could see a reduction in incident diabetes cases and avert 21 000 deaths, 374 000 DALYS and R 10 billion in healthcare costs relating to Type 2 Diabetes mellitus.³⁴ Similar results have been found in models pertaining to cerebrovascular disease.³⁵

There is, however, ongoing concern around the validity of the assumptions made in these modelling exercises i.e. that the tax will be passed on to consumers, that consumption of SSB will be reduced and that there will be reduction in number of calories consumed.³⁶

Integrated School Health Policy

The Integrated School Health Policy and programme is a joint venture by the National Departments of Basic Education, Health and Social Development. A critical component of the programme is health education and promotion. The topics that specifically address NCDs are Nutrition and Exercise and they are covered through the subject Life Orientation and supplemented through co-curricular activities. The health screening component also includes a nutritional and physical assessment. In the Western Cape, the phased implementation of the Integrated School Health Programme began in the Eden district in 2013.

Western Cape Education Smoking Policy, 2015

The Western Cape Provincial Administration Smoking Policy which was approved in 2002 declared all workplaces of the Western Cape Provincial Administration smoke-free environments. Education institutions were included in this policy. A new policy was developed for the Western Cape Education Department in 2015 to reflect the provincial policy.

Outdoor gyms

While not part of a broader health strategy or collaboration, outdoor open access gyms are gaining popularity in South Africa. The City of Cape Town partnered with Outdoor Gyms by Play on Art to install open access gym equipment at two parks in the city. There is limited research available regarding the subsequent impact on health outcomes, however, a before-after time series study from Australia has shown significant increase in moderate to vigorous physical activity and an increase in seniors' park use in a community with access to an outdoor gym³⁷.

Alcohol game changer

In addition to the five strategic goals outlined in the Provincial Strategic Plan 2014-2019, the Western Cape Government has identified priority interventions referred to as "game changers." Reducing alcohol related harms has been identified as one such priority area. Components of the intervention to achieve this aim include reducing access to alcohol, enhancing participation in recreational alternatives, facilitating access to alternative economic pathways and enhancing the quality of alcohol related health and social services

While the primary target of the game changer is an impact on injuries relating to alcohol use, gains in this sphere will also impact on alcohol use as a risk factor for NCDs.

HEALTH SYSTEM STRENGTHENING AND REFORM

Chronic Disease Management Policy

In 2009, the Western Cape Government: Health (WCG: H) outlined a policy framework for chronic disease management in the province. Cardiovascular diseases, asthma and COPD, diabetes, hypertension and epilepsy were prioritised for targeted interventions.

This policy has recently been revised to reflect a framework for the integrated management of chronic conditions including both communicable and non-communicable diseases and is referred to as the policy for the Integrated Management of Chronic Conditions. The policy document outlines the Western Cape's framework for the integrated management of chronic conditions which includes three approaches i.e. whole of society approach to address social determinants, systems approach to health system organisation and systems approach to service organisation. Included in the foundation of the model is the concept of productive interaction between the informed, empowered patient and the prepared proactive provider. The model is represented graphically in the figure below.

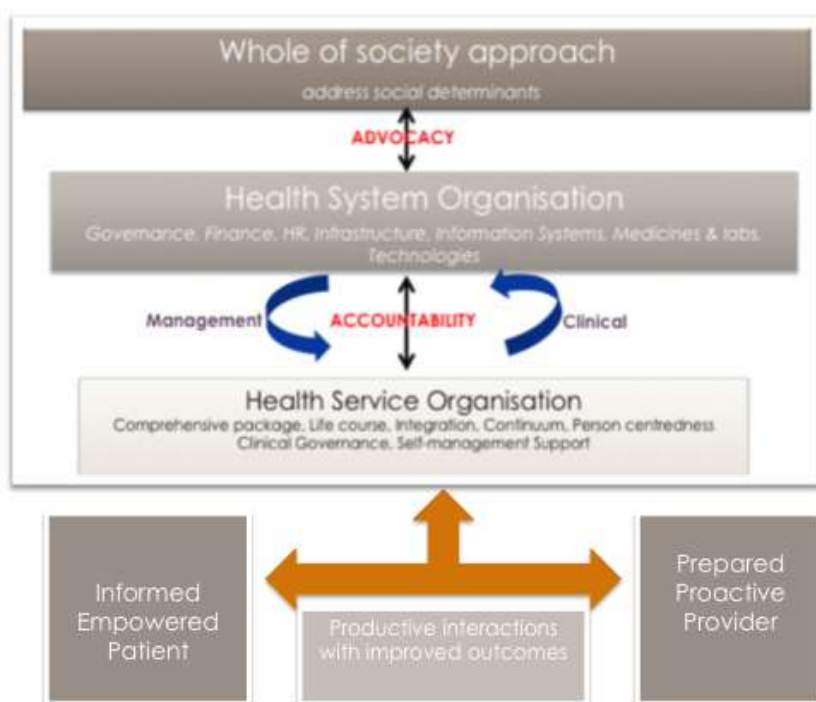


Figure 2 Western Cape Integrated Chronic Care Model

Practical Approach to Care Kit (PACK)

The Practical Approach to Care Kit (PACK) is a comprehensive clinical practice guideline facilitating the diagnosis and management of common conditions at a primary care level. The WCG: H, in collaboration with the University of Cape Town's Knowledge Translation Unit,

are implementing the PACK guidelines for adults in primary health care facilities throughout the Western Cape. The guideline outlines the common symptoms of each condition as a starting point to provide an opportunity to identify important chronic conditions.³⁸ PACK is revised annually and new policies and management guidelines are reflected. NCDs are targeted in two of the PACK modules:

Chronic respiratory diseases – Diagnosis and management for asthma and COPD including the use of inhalers and spacers

Chronic diseases of lifestyle – Cardiovascular disease risk assessment and management, diagnosis and routine care for diabetes, hypertension, heart failure, stroke and ischaemic heart disease

A process evaluation of the PACK programme was conducted in 2015³⁹ with the aim of measuring the programme's coverage and quality. The findings indicate that there is high awareness and use of the PACK guideline and that it is perceived as helpful by clinicians. Notably, at the time of the evaluation there was no clearly defined monitoring and evaluation strategy for the programme and the difficulty in evaluating the impact on clinical outcomes was highlighted.

Integrated audit tool for chronic diseases

NCD management is evaluated annually by means of the Integrated Audit Tool for Chronic Diseases. The audit evaluates both clinical and managerial performance by employing indicators related to structure, process and outcome. The tool is modelled on the Standard Treatment Guidelines, Essential Medicines List and the PACK guideline. The integrated audit was first conducted in 2009 at 29 primary health care facilities; the number of facilities participating in 2015 has increased to 187. The broad purpose of the annual audit is to improve clinical management and ultimately optimise patient outcomes.

In a paper looking at the effect of the audit on quality of care, the authors found that while there were only small to moderate improvements in clinical processes between 2009 and 2012, districts where audits were being done for a longer period demonstrated marked improvements compared to districts that had recently begun doing audits.⁴⁰

Chronic disease clubs

A number of facilities in the Western Cape offer chronic disease clubs as an adherence support measure. These clubs provide an opportunity for stable patients with NCDs to benefit from health screening, alternative distribution of medication, health promotion, education and socialisation. The clubs have developed organically, with some facility-based and others

community-based, following an adherence club model that has similarities with the model utilised for patients on ART⁴¹. As such the chronic club model for NCDs was not subject to specified targets or a roll-out process neither was a pre-defined monitoring and evaluation strategy outlined. The challenge now is to engineer an adherence club model that integrates communicable and non-communicable disease management.

Diabetes Lifestyle Education Collaboration and Action (D-LECA)

Diabetes Lifestyle Education Collaboration and Action (D-LECA) is a structured educational teaching package for newly diagnosed diabetic patients. The education programme is provided by a multidisciplinary team of health workers at the facility and the emphasis is on self-management and behaviour modification, encouraging the patient to be a partner in the chronic disease management process. This type of intervention was recommended by the cardiovascular workgroup in 2007 as an example of an intervention associated with cost-effective outcomes. However, findings from an evaluation of D-LECA (which has been piloted at three Community Health Centres (CHCs) in the Cape Town Metro district) showed little change in biomarker data, though there was positive feedback for the programme from the participants. A phased rollout of D-LECA to all facilities is planned and it is envisioned that future scale-up of the programme will also include other chronic conditions.

Chronic Disease Management Highway Project

The Chronic Disease Management (CDM) Highway project was developed at Mitchells Plain CHC as a means of enhancing service delivery in a community challenged by rapid population growth and a high burden of NCDs. The project is borne of the idea that acute and chronic diseases are fundamentally different and therefore require different approaches from service providers. In particular, rather than a reliance on expertise and system capacity, the CDM system should provide an environment where the chronic condition can be self-managed.

The vision of the CDM Highway is a rapid transit system where delays in service delivery are minimised and efficiency is maximised. Components of the project at Mitchells Plain CHC are designed to address bottlenecks specific to the facility and include a reorganisation of the reception and folder storage areas, an appointment system with patient folders drawn prior to the appointment slot, pre-packed medication, back to back prescribing which aligns clinic visits with the date of the last issue of the repeat prescription and a mobile network for SMS-based communication with patients. Initial findings from the project show a reduction in waiting times, increase in CDU membership and overall reduction in expenditure on medication. The project was awarded first runner-up in the category "Innovative

Enhancements of Internal Systems of Government" at the Centre for Public Service Innovation (CPSI) awards held in October 2016.

RESEARCH

In this section of the report, we present the findings of select locally conducted interventions pertaining to the prevention or management of NCDs.

HealthKick

HealthKick⁴² is a randomised controlled trial testing the impact of a nutrition intervention to improve the quality of children's diets from two low-income school districts in the Western Cape. The intervention comprised a number of activities related to promoting healthy eating, including both nutrition education and improving the availability of healthier food choices. Dietary diversity score (DDS) was assessed in both intervention and control groups prior to and after the intervention. The study did not find a significant improvement in dietary diversity score and there was no significant improvement in unhealthy snacking as a result of the intervention.

The study authors attributed these findings to the nature of the intervention, identifying that the model may not have been the best fit for low-income settings where poverty rather than dietary knowledge is the primary factor influencing food choices. This mirrors the finding by the SANHANES-1 study that for the majority of individuals, nutrition knowledge did not translate into healthy food choices. Again, the overwhelming finding is the importance of addressing upstream factors, such as poverty, in order to have an impact on the burden of NCDs.

M-health interventions for NCDs

Interventions making use of mobile health (m-health) technology can potentially impact on adherence and clinical outcomes. Two recent studies conducted in the Western Cape looked at the application of m-health interventions in hypertensive patients, indicating that there may be a role for m-health in NCD management.

SMS-text Adherence Support (StAR) trial

This randomised controlled trial was conducted in a primary care clinic in Cape Town and studied the effect of a short message service (SMS) adherence support intervention on blood pressure control and adherence to medication⁴³. Participants were hypertensives attending an outpatient chronic disease clinic and were randomised to one of three arms: information-only, interactive SMS-messaging or usual care. The study found a small reduction (-2.2 mmHg,

95% CI -4.4 to -0.04) in systolic blood pressure control in the information-only arm compared to the standard of care however there was no evidence of an increased effect with interactive SMS messaging. Adherence, measured by the proxy PDC (proportion of days of medication covered) was significantly higher in both intervention arms compared with standard of care (information only $p < 0.00$, interactive messaging $p = 0.002$). Participants viewed the intervention as acceptable and relevant.

Hypertension Health Promotion via Text Messaging

This study evaluated whether health information delivered via SMS messaging resulted in improvements in knowledge and self-reported health behaviour.⁴⁴ Participants were individuals in a hypertension outpatient support club at a community health centre in Cape Town. All participants completed a baseline questionnaire and were randomly assigned to either receive the intervention or not. The study found no statistically significant changes in knowledge between the intervention and control groups, however sampling from a chronic club support group may have reduced the potential for impact in this study. A focus group conducted with participants in the intervention group indicated that the intervention was well-received, reiterated health promotion messages from other interactions with the health service and served as a reminder to change.

Proposed research

It is evident both from locally conducted research and the evaluations of current interventions that we do not have clear evidence indicating which interventions are most effective and should therefore be prioritised. This has an impact on the planning of prevention and management strategies for NCDs. A preliminary search for systematic reviews on NCD interventions internationally (Annexure A) does not provide much guidance either. This limitation has been acknowledged and the Centre for Evidence Based Health Care (Stellenbosch University) and the Chronic Diseases Initiative for Africa (CDIA) together with counterparts across a number of institutions in other African countries have begun planning a project to address this knowledge gap. The project, which is due to get underway in January 2017, will look at research packages including systematic reviews focusing on hypertension and diabetes. Evidence-informed policies and practices on screening approaches and population-level prevention for the two conditions will be examined.

RECOMMENDATIONS

It is evident from the information presented in this report that there is a paucity of evidence on which to base recommendations, making it difficult to identify priority interventions that the WCG:H should focus on going forward. The following recommendations relate to improving the knowledge on disease burden, increasing data utilisation for service delivery planning, improving monitoring and evaluation and supporting innovation.

1. Non-communicable disease surveillance

There is a clear absence of reliable estimates of the case-load of NCDs in the Western Cape. As a result, despite multiple sources estimating the prevalence of NCDs in the province, it is difficult to determine the proportion diagnosed and accessing care within the public health system. There is therefore a need for robust indicators on the routine primary health and hospital data platform, relating to both incidence and prevalence of NCDs in the province. To allow for improved data quality and trend analysis of these indicators over time, standardised definitions and protocols for screening and reporting need to be put in place. Additionally, there is a need for the identification of appropriate denominators for this data. The use of population based denominators rather than PHC headcounts will allow for quantification of the unmet need in the province.

Triangulation of data from pharmacy (JAC, CDU), laboratory (NHLS) and health information systems (Clinicom) from the recently established Provincial Health Data Centre can also be used to estimate disease prevalence. The integration of data from these systems will allow for a greater yield and potentially a more accurate estimate of caseload than utilising a single proxy marker.

2. Data utilisation

The utilisation of routinely collected data at a facility level must be promoted in the context of service delivery planning. Managers need to be capacitated to use their health information for improving efficiencies at the facility, for example in terms of patient flow, and to inform decisions pertaining to resource allocation.

In order to enable effective utilisation of health data, there must be clear acknowledgement of where the responsibility for data quality lies and an understanding that the responsibility may be different at different levels of service. Managers should present data regularly at management meetings and engagement with the data at a facility-level should be done as a team, drawing on knowledge and experience from all staff. Skill gaps in terms of the ability to work with the data must be identified and form part of individual professional development plans. This can be addressed by drawing on available resources within WCG: H

and by specific training programmes. Over time, increased utilisation and interrogation of routine data will result in better quality data.

3. Monitoring and evaluation

A number of interventions included in this report lacked a clearly defined monitoring and evaluation strategy, making it difficult to objectively measure their effectiveness and impact. Monitoring and evaluation must be made a priority in the planning phase and should be budgeted for accordingly. Decisions regarding roll-out or scale-up of pilot interventions should be reserved pending the results of an evaluation. Further, interventions should be subject to economic evaluation allowing policy makers to include the question of financial feasibility and cost effectiveness into the decision-making process.

The absence of clear evidence supporting one type of intervention above the other is perhaps more of an indication that efforts to prevent and manage NCDs must be multi-faceted. Additionally, it cannot be ignored that NCDs occur in the context of social determinants of health which are the conditions in which people are born, grow, work, live and age. These conditions are determined by social, economic and political forces. Addressing the prevention and control of NCDs is therefore a complex initiative.

An evaluation methodology which may be useful in the context of NCDs is the Theory of Change.⁴⁵ This method is utilised for the design and eventual evaluation of complex initiatives and refers to the thinking behind how an intervention will produce results. In comparison to the commonly used, simplistic logic model method which begins with inputs and activities and works towards outcomes and impact, the Theory of Change process begins with identifying the long term outcome for the programme and working backwards to determine what pre-conditions are necessary for the achievement of the goal. In this way a pathway of change is determined with a clear articulation of underlying assumptions at each step with measurable outcomes. Activities are the last part of the Theory of Change and should be based on current evidence or experience. Evidence from systematic reviews, local and international research should form part of this process. It is recommended that a Theory of Change be identified as a planning activity for addressing and prioritising non-communicable disease initiatives in the province.

4. Innovation support

As can be seen from the description of interventions in this report, efforts are being made by health care workers at the coal face to improve patient experience at a facility-level. Such innovation, like the CDM Highway Project, should be encouraged and supported. Additionally, Lean and Quality Improvement methods⁴⁶, which advocate for small but

continuous change have worked well in other healthcare settings and can be implemented and have impact in the management of non-communicable diseases.

ACKNOWLEDGEMENTS

Elma de Vries, Neal David, Frederick Marais, Maureen McCrea, Elizabeth Pegram, Michael Phillips, Unita van Vuuren

REFERENCES

1. Global Status Report on noncommunicable diseases. 2014.
2. Western Cape Burden of Disease Reduction Project. 2007.
3. Nojilana B, Bradshaw D, Wyk VP, Msemburi W, Laubscher R, Somdyala NIM, et al. Emerging trends in non-communicable disease mortality in South Africa , 1997 - 2010. 2016;106(5):477–84.
4. Morden E, Groenewald P, Zinyakatira N, Neetling I, Msemburi W, Daniels J, et al. Western Cape Mortality Profile. 2013.
5. Bradshaw D, Groenewald P, Laubscher R, Nannan N, Nojilana B, Norman R, et al. Initial burden of disease estimates for South Africa, 2000. S Afr Med J. 2003;93:682–8.
6. Bradshaw D, Nannan N, Laubscher R, Groenewald P, Joubert J, Nojilana B, et al. South African National Burden of Disease Study. Estimates of Provincial Mortality Western Cape Province 2000.
7. Msemburi W, Pillay-van Wyk V, Dorrington R, Neethling I, Nannan N, Groenewald P, et al. Second National Burden of Disease Study for South Africa: Cause of death profile for Western Cape, 1997-2012. 2016.
8. WHO Health Statistics and Information Systems. Metrics: Disability-Adjusted Life Year (DALY) [Internet]. [cited 2016 Jun 1]. Available from: http://www.who.int/healthinfo/global_burden_disease/metrics_daly/en/
9. Kassebaum NJ, Arora M, Barber RM, Bhutta Z a, Brown J, Carter A, et al. Global, regional, and national disability-adjusted life-years (DALYs) for 315 diseases and injuries and healthy life expectancy (HALE), 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet. 2016;388(10053):1603–58.
10. Kengne AP, Mchiza ZJ-R, Amoah AGB, Mbanya J-C. Cardiovascular Diseases and Diabetes as Economic and Developmental Challenges in Africa. Prog Cardiovasc Dis. 2013;56(3):302–13.
11. Nikolic IA, Stanciole AE, Zaydman M. Chronic Emergency : Why NCDs Matter - Health Nutrition and Population (HPN) Discussion Paper. Washington; 2011.

12. Abegunde DO, Mathers CD, Adam T, Ortegón M, Strong K. The burden and costs of chronic diseases in low-income and middle-income countries. *Lancet*. 2007;370:1929–38.
13. Isaacs A, Manga N, Le Grange C, Hellenberg D, Titus V, Sayed R. A snapshot of noncommunicable disease profiles and their prescription costs at ten primary healthcare facilities in the in the western half of the Cape Town Metropole. *S Afr Fam Pr*. 2014;56(1):43–9.
14. Shisana O, Labadarios D, Rehle T, Simbayi L, Zuma K, Dhansay A, et al. South African National Health and Nutrition Examination Survey (SANHANES-1). Cape Town; 2014.
15. General Household Survey 2015. Statistics South Africa. 2016.
16. South Africa Demographic and Health Survey 2003. Pretoria; 2007.
17. Peer N, Steyn K, Lombard C, Gwebushe N, Levitt N. A High Burden of Hypertension in the Urban Black Population of Cape Town : The Cardiovascular Risk in Black South Africans (CRIBSA) Study. *PLoS One*. 2013;8(11):1–8.
18. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet*. 2016;388:1659–724.
19. Combrink A, Irwin N, Laudin K, Plagerson S, Mathee A. High prevalence of hookah smoking among secondary school students in a disadvantaged community in Johannesburg. *SAMJ*. 2010;100(5):297–9.
20. Merwe N Van Der, Banoobhai T, Gqweta A, Gwala A, Masiea T, Misra M, et al. Hookah pipe smoking among health sciences students. *SAMJ*. 2013;103(11):847–9.
21. Daniels KE, Roman N V. A descriptive study of the perceptions and behaviors of waterpipe use by university students in the Western Cape, South Africa. *Tob Induc Dis*. 2013;11(4):1–5.
22. Senkubuge F, Ayo-Yusuf O, Louwagie G, Okuyemi K. Water Pipe and Smokeless Tobacco Use Among Medical Students in South Africa. *Nicotine Tob Res*. 2012;14(6):755–60.
23. Global Status Report on Alcohol and Health. 2014.
24. Harker N, Kader R, Myers B, Fakier N, Parry C, Fischer A, et al. Substance Abuse Trends in the Western Cape. A review of studies conducted since 2000.
25. Lalkhen H, Mash R. Multimorbidity in non-communicable diseases in South African primary healthcare. *SAMJ*. 2015;105(2):134–8.
26. Folb N, Timmerman V, Levitt NS, Steyn K, Bachmann MO, Lund C, et al. Multimorbidity, control and treatment of non-communicable diseases among primary healthcare attenders in the Western Cape, South Africa. *SAMJ*. 2015;105(8):642–7.
27. Mayosi BM, Flisher AJ, Lalloo UG, Sitas F, Tollman SM, Bradshaw D. The burden of non-communicable diseases in South Africa. *Lancet*. 2009;374:934–47.

28. Venkat Narayan KM, Miotti PG, Anand NP, Kline LM, Harmston C, Gulakowski R, et al. HIV and Noncommunicable Disease Comorbidities in the Era of Antiretroviral Therapy : A Vital Agenda for Research in Low- and Middle-Income Country Settings. *J Acquir Immune Defic Syndr*. 2014;67:S2–7.
29. Oni T, Youngblood E, Boulle A, Mcgrath N, Wilkinson RJ, Levitt NS. Patterns of HIV , TB , and non-communicable disease multi-morbidity in peri-urban South Africa- a cross sectional study. *BMC Infect Dis*. 2015;15(20):1–8.
30. Oni T, Unwin N. Why the communicable / non-communicable disease dichotomy is problematic for public health control strategies : implications of multimorbidity for health systems in an era of health transition. *Int Health*. 2015;7(June):390–9.
31. Strategic Plan for the Prevention and Control of Non-Communicable Diseases 2013-17. 2013.
32. Bertram MY, Steyn K, Wentzel-Viljoen E, Tollman S, Hofman KJ. Reducing the sodium content of high-salt foods : Effect on cardiovascular disease in South Africa. *SAMJ*. 2012;102(9):743–5.
33. Cecchini M, Sassi F, Lauer JA, Lee YY, Guajardo-Barron V, Chisholm D. Chronic Diseases : Chronic Diseases and Development 3. Tackling of unhealthy diets , physical inactivity , and obesity : health effects and cost-effectiveness. *Lancet*. 2010;376:1775–84.
34. Manyema M, Veerman JL, Chola L, Tugendhaft A, Labadarios D, Hofman K. Decreasing the burden of type 2 diabetes in South Africa: The impact of taxing sugar-sweetened beverages. *PLoS One*. 2015;10(11):1–17.
35. Manyema M, Veerman LJ, Tugendhaft A, Labadarios D, Hofman KJ. Modelling the potential impact of a sugar-sweetened beverage tax on stroke mortality, costs and health-adjusted life years in South Africa. *BMC Public Health*. 2016;16:405.
36. Shemilt I, Hollands GJ, Marteau TM, Nakamura R, Jebb S a., Kelly MP, et al. Economic Instruments for Population Diet and Physical Activity Behaviour Change: A Systematic Scoping Review. *PLoS One*. 2013;8(9):1–11.
37. Cranney L, Phongsavan P, Kariuki M, Stride V, Scott A, Hua M, et al. Impact of an outdoor gym on park users' physical activity: A natural experiment. *Heal Place*. 2016;37:26–34.
38. Practical Approach to Care Kit Adult, Knowledge Translation Unit, University of Cape Town Lung Institute [Internet]. [cited 2016 Jul 1]. Available from: <http://knowledgetranslation.co.za/programmes/pack-adult-wc-sa/>
39. Naina McCann. An Evaluation of the Current Effectiveness of the PACK Programme. 2015.
40. Essel V, van Vuuren U, De Sa A, Govender S, Murie K, Schlemmer A, et al. Auditing chronic disease care : Does it make a difference ? *Afr J Prm Heal Care Fam Med*. 2015;7(1):1–7.
41. Wilkinson L, Harley B, Sharp J, Solomon S, Jacobs S, Cragg C, et al. Expansion of the Adherence Club model for stable antiretroviral therapy patients in the Cape Metro , South Africa 2011 – 2015. 2016;21(6):743–9.

42. Steyn NP, Villiers A De, Gwebushe N, Draper CE, Hill J, Waal M De, et al. Did HealthKick, a randomised controlled trial primary school nutrition intervention improve dietary quality of children in low-income settings in South Africa ? BMC Public Health. 2015;1–11.
43. Bobrow K, Farmer AJ, Springer D, Shayinde M, Yu L, Brennan T, et al. Mobile Phone Text Messages to Support Treatment Adherence in Adults With High Blood Pressure (StAR): A Single-Blind , Randomized Trial. Circulation. 2016;133(6):592–600.
44. Hacking D, Haricharan HJ, Brittain K, Lau YK, Cassidy T, Heap M. Hypertension Health Promotion via Text Messaging at a Community Health Center in South Africa: A Mixed Methods Study. JMIR Mhealth Uhealth. 2016;4(1).
45. Centre for Theory of Change [Internet]. [cited 2016 Nov 23]. Available from: www.theoryofchange.org
46. Scoville R, Little K. Comparing Lean and Quality Improvement: IHI White Paper. 2014.

ANNEXURE A: SUMMARY OF FINDINGS FROM SYSTEMATIC REVIEWS ON INTERVENTIONS FOR THE PREVENTION AND MANAGEMENT OF NON-COMMUNICABLE DISEASE

Review title	Types of interventions	Main findings
Interventions for improving outcomes in patients with multimorbidity in primary care and community setting(1)	The majority of interventions involved changes to the organisation of care delivery.	No clear improvement in clinical outcomes, health service use, medication adherence, patient-related health behaviours, health professional behaviours or costs.
Interventions to enhance adherence to dietary advice for preventing and managing chronic diseases in adults (2)	Interventions were grouped into the following categories: Education, Persuasion, Incentivisation, Coercion, Training, Restriction, Environmental restructuring, Modelling, Enablement and Multiple interventions	Education interventions (telephone follow-up, video, Incentive interventions (contract), Training (feedback), Modelling (nutritional tools) and multiple interventions were shown to improve at least one diet adherence outcome. However, interventions with positive outcomes in the short term were largely not sustained in the long-term.
School-based physical activity programs for promoting physical activity and fitness in children and adolescents aged 6 to 18 (3)	Education, health promotion, counselling and management strategies for the promotion of physical activity and fitness	School-based physical activity interventions led to an improvement in physical activity rates and participants spent less time watching television and had improved VO ₂ max (low quality evidence)
Mobile phone messaging for facilitating self-management of long-term illnesses (4)	Interventions for diabetics, hypertensives, asthma patients	Diabetes: No significant difference in HbA1c, diabetic complications or body weight (moderate quality evidence) 2 studies Hypertension: No significant

		<p>difference in mean blood pressure, mean body weight and the proportion of patients achieving blood pressure control (moderate quality evidence) 1 study</p> <p>Asthma: Improvements in peak expiratory flow variability and pooled symptom score but no significant difference in forced vital capacity or forced expiratory flow in 1 second. (moderate quality evidence) 1 study</p>
Interventions for preventing obesity in children (5)	Educational, behavioural and health promotion interventions involving diet and nutrition, exercise and physical activity, lifestyle and social support	Meta-analysis demonstrated a statistically significant reduction in adiposity measured by BMI. Not possible to distinguish which components of the interventions had the largest contribution to the effects.
Individual patient education for people with type 2 diabetes mellitus (6)	Individual face-to-face patient education addressing a range of self-management issues aiming to impact on clinical outcomes	<p>Individual education versus usual care: No significant impact on HbA1c at 6-9 months or 12-18 months. No significant impact on BMI, blood pressure or total cholesterol</p> <p>Individual education versus group education: Statistically significant Improvement in glycaemic control at 6-9 months, not sustained at 12-18 months. No significant difference in BMI and blood pressure.</p>

REFERENCES FOR ANNEXURE A

1. Smith S, Wallace E, Dowd OT, Fortin M. Interventions for improving outcomes in patients with multimorbidity in primary care and community settings (Review). *Cochrane Collab.* 2016;(3).
2. Desroches S, Lapointe A, Ratté S, Gravel K, Légaré F, Turcotte S. Interventions to enhance adherence to dietary advice for preventing and managing chronic diseases in adults. *Cochrane Database Syst Rev.* 2013;2(2).
3. Dobbins M, Husson H, Decorby K, Riddle L. School-based physical activity programs for promoting physical activity and fitness in children and adolescents aged 6 to 18 (Review). *Cochrane Database Syst Rev.* 2013;18(2):Art. No.: CD007651.
4. de Jongh T, Gurol-Urganci I, Vodopivec-Jamsek V, Car, J, Atun R. Mobile phone messaging for facilitating self-management of long-term illnesses. *Cochrane Database Syst Rev.* 2012;(12): Art.No.: CD007459
5. Waters E, de Silva-Sanigorski A, Hall BJ, Brown T, Campbell KJ, Gao Y, et al. Interventions for preventing obesity in children. *Cochrane database Syst Rev.* 2011;(12):CD001871.
6. Duke S, Colagiuri S, Colagiuri R. Individual patient education for people with type 2 diabetes mellitus. *Cochrane Database Syst Rev.* 2009;(1).