

Advancing the agenda on non-communicable diseases: prevention and management at community level

Authors:

Thandi Rose Puoaneⁱ

Bonaventure Amandi Egbujieⁱ

David Sandersⁱ

Lungiswa Primrose Tsolekileⁱ

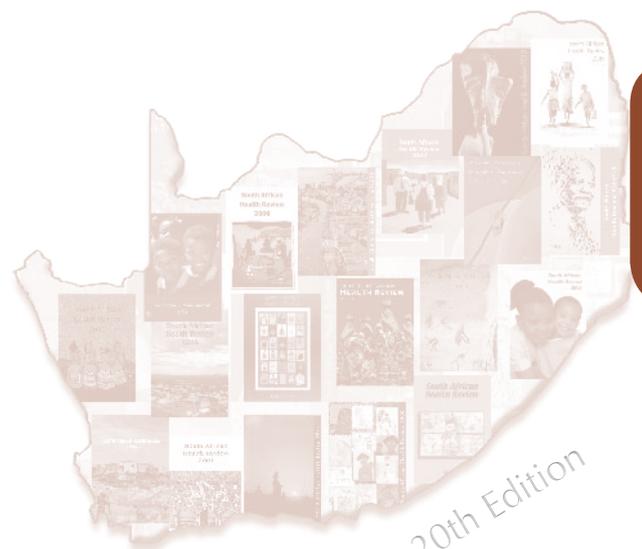
Marc Lewyⁱ

South Africa is experiencing an increase in the prevalence of non-communicable diseases (NCDs), which imposes a heavy burden on healthcare services. The South African government has made great strides towards management and control of NCDs, including the development of management guidelines, health-promotion and prevention policies intended to assist healthcare workers, facilities and communities in NCD care. However, it appears that the facility-based component of NCD management and control efforts has received more attention than the community-level components.

The national strategic plan for NCDs highlights the importance of community-level interventions in chronic NCD care. Thus there is a need for community-based strategies for NCD prevention, control and management to complement facility-based health services.

This chapter explores the advancement of the NCD agenda in South Africa through an emphasis on community-level prevention and management. It describes interventions that used community actors such as community health workers in NCD care. The chapter discusses some of the challenges of these interventions, and ends with possible suggestions for South Africa.

The national strategic plan for non-communicable diseases emphasises the need for community-based strategies for prevention, control and management to complement facility-based health services.



SAHR 20th Edition

Introduction

Non-communicable diseases (NCDs) such as cardiovascular diseases (CVDs), cancers, chronic respiratory disease and diabetes are the leading cause of mortality and disability globally. Eighty per cent of NCD deaths reportedly occur in low- and middle-income countries (including South Africa), affecting disproportionately more individuals younger than 60 years than in high-income countries. In South Africa, the probability of dying between 30 and 70 years of age from CVDs, cancers, chronic respiratory disease or diabetes is about 27%.^{1,2} These death and disease burdens are largely driven by preventable risk factors.

The risk factors for NCDs are well known and include tobacco use, harmful consumption of alcohol, unhealthy diet, obesity and physical inactivity.^{3–5} Dietary factors and physical inactivity remain two of the most significant risk factors for NCDs in South Africa, with the former influenced by the food environment.⁶ Many of these risk factors can be reduced through existing preventive interventions, as well as through early detection of individuals at risk and those who have undiagnosed conditions.³ Prevention and early detection measures are therefore crucial for the control and management of NCDs, and failure to implement such interventions can be costly.

Globally, there have been efforts to reduce the burden associated with NCDs. This is evident in the formulation of NCD-related policies and the inclusion of a specific Sustainable Development Goal (SDG) targeted at reducing premature NCD mortality by one-third by 2030.⁷ Furthermore, the World Health Organization (WHO) Global Action Plan for the Prevention and Control of NCDs 2013–2020 recommends that each country commit to setting targets and strategies to reduce NCD morbidity and mortality.⁸ The development of NCD-related policies and the use of population-based approaches for tackling NCDs highlight the importance of dealing with these conditions.

However, policy development alone will not translate into NCD control. Policies must be translated into action at various levels of society, including community level. An improved response to NCDs at community level calls for new thinking that engages available resources to deliver care, especially in low-resource settings.

Current NCD policy and implementation

The South African National Department of Health (NDoH) has taken various steps to improve NCD management, including the establishment of units specifically responsible for NCD prevention and control. Also, NCD control-related policies have been designed and implemented over the years. In a landmark development, the 2011 summit on NCDs set the stage for a new multisectoral NCD response, which ended with stakeholders agreeing to new national NCD management and control targets contained in the South African NCD Declaration.⁹ The Declaration paved the way for the 'Strategic plan for the prevention and control of non-communicable diseases 2013–17',¹⁰ which detailed arrangements for NCD prevention and control in South Africa. Notably, the strategic plan focuses on preventing NCDs and promoting health; strengthening health systems for NCDs; and monitoring progress.¹⁰

Preventing NCDs and promoting health subsequently became a central focus of policies developed for NCD management. One

such policy is the National Health Promotion Strategy and Policy 2015–2019,¹¹ which provides a framework for general disease prevention in South Africa. This aligns closely with the 2011 Declaration on NCDs¹² and also conforms to the overall WHO Global Action Plan for the Prevention and Control of NCDs.⁸ Other policies targeting NCD risk factors include the Liquor Act of 2003¹³ and the Tobacco Product Control Act of 1993 (amended in 1999, 2007, 2008 and 2016),¹⁴ designed for alcohol and tobacco consumption control respectively. Policies and strategies are being designed that improve dietary intake and counter the overwhelming influence of 'Big Food' and its impact on NCDs.⁶ The Strategy to Prevent and Control Obesity 2015–2020¹⁵ and the National Food and Nutrition Security Policy¹⁶ are some of the policies targeting the food environment and NCDs. As part of the strategy to reduce obesity by 10% by 2020, the South African Treasury plans to increase the price of sugar-sweetened beverages by means of a 20% fiscal tax.¹⁷ The NDoH passed new Regulations on the Foodstuffs, Cosmetics and Disinfectants Act (54 of 1972)¹⁸ to reduce salt intake from processed food in the country,¹⁹ with implementation commencing in 2016.

While empirical evidence shows reduction in tobacco consumption in South Africa after the introduction of tobacco control, the impact of other NCD control policies remains to be seen. This suggests a gap between plans and implementation.²⁰

In order to address apparent gaps between macro-level planning and micro-level implementation, the NDoH introduced the Primary Health Care (PHC) Re-engineering policy to facilitate integration of NCD prevention and control into general health management. The expectation is that health-facility teams working with Ward-based Outreach Teams (WBOTs), comprising nurses and community health workers (CHWs)²¹ are able to deliver integrated NCD services to individuals in their households and communities. Although the PHC Re-engineering Strategy has its challenges,^{22,23} notionally it provides a good platform for improved community-level prevention and management of NCDs. In designing this policy, health policymakers recognised the critical importance of community-level efforts in the fight against NCDs. The NDoH's Ideal Clinic initiative and the Integrated Clinical Services Model (ICSM) offer opportunities for NCD management and integration between facility and community levels. However, there is a need for 'consistency of purpose' connecting the macro (policy) and the micro (community) environments of NCD prevention and control.

While NCD policies and strategies exist in South Africa, their impact in reducing the NCD burden in the country will depend on the capacity and readiness of the health system to implement and monitor proposed strategies successfully.

Health-system readiness

The WHO defines the role of health systems in the prevention and control of NCDs as including universal coverage; protecting people from the burden of ill-health associated with NCDs through people-centered PHC; making resources available for the care of people with NCDs; as well as preventing complications and reducing mortality. The health system is also expected to build the capacity of communities to take responsibility for their health through actions

such as advocating for reduced exposure to modifiable NCD risk factors, and making healthy choices in their living and work environments.⁸ At the very minimum, the South African health system should be able to perform these functions in combatting NCDs.

One of the main targets of the National Strategic Plan for NCDs is strengthening of national capacity and reorientation of the health system to address NCDs.^{10,24} The PHC Re-engineering Strategy stipulates the use of WBOTs, District Clinical Specialist Teams (DCSTs), and School Health Teams to provide screening and disease-detection services in schools and communities. Availability and readiness of these cadres of healthcare workers (HCWs) remain a challenge.^{22,23} Community-health systems for NCD prevention and control appear to lag behind facility systems. There is heavy reliance on facilities for NCD management. However, as discussed next, it is evident that the facility system is not adequately equipped to deal with the NCD challenge.

Availability and capacity of health providers in NCD management

Evidence suggests that between 1997 and 2006, little progress was made in improving the availability of HCWs in South Africa's public-health sector.^{25,26} However, improvements have been made more recently. Between 2004 and 2010, the overall number of workers in the public-health sector increased quite considerably, from 153 383 to 210 511, mainly in the nursing sector.²⁷ However, this increase is not necessarily adequate to cater for the increasing burden of NCDs and other diseases.^{28,29} Most of the documented increase in the number of HCWs has been in the number of facility-based staff, with little or no mention of community care workers.²⁷ The capacity of available HCWs to implement policies and strategies is equally important, but is not adequate at present.

Studies assessing the management of patients with diabetes and hypertension at PHC facilities have reported suboptimal management and poor compliance.³⁰ In one study in Soweto, Brand and colleagues found that both hypertensive and diabetes patients were poorly managed and were not screened for CVD risk factors.³¹ Staff shortages, resulting in reduced time to counsel patients with NCDs and poor communication between patients and health workers, are some of the factors reported as barriers to management and control of NCDs globally.³²

There have been initiatives to improve the capacity of HCWs to deliver NCD care in South Africa. Nurses are the major care providers for NCD patients in PHC facilities in South Africa, and as such they have been trained in evidence-based management guidelines, known as 'Primary Care 101'.³³ An evaluation of the impact of the Primary Care 101 training found that diabetes and hypertension management skills improved among nurses, but the management of asthma and other chronic obstructive pulmonary diseases did not. This was attributed in part to the fact that diabetes and hypertension were common conditions in the studied population, which exposed the nurses to experiential learning.³⁴ There is a need to explore the utilisation of other cadres of health workers, including CHWs, to manage NCDs.

One of the strategies recommended for circumventing these health system-related challenges is 'task-shifting',³⁵ whereby a task normally performed by a physician is shifted to a health professional with a different or lower level of education and training, or to a specifically

trained person who performs a limited task only, without having formal health education.^{35,36}

The PHC Re-engineering Strategy encourages the shift of disease-management tasks from physicians in health facilities to nurses and CHWs in communities and other primary care settings. Implementation of the PHC Re-engineering Strategy and other strategies (e.g. the Ideal Clinic initiative) has led to an increase in the number of PHC facilities with functional clinic committees and WBOTs, thus increasing access to community-based PHC services.³⁷ There is a need to strengthen these strategies and enhance community capacity for NCD management.

Although the prevention of NCDs should be part of PHC services, these services are still weak in many places in South Africa. Patients still access health care at inappropriate levels,²¹ and community-based hospice and palliative care is mainly provided by non-governmental organisations (NGOs) and not by government.

Medicine supply and management remains an ongoing challenge as medications are sometimes not available, especially in rural areas of South Africa,³⁸ and although Chronic Dispensing Units (CDUs) have been rolled out in some areas to ensure that patients receive medicines conveniently,³⁹ it is too early to comment on the effectiveness of this system. The new national adherence guideline stipulates three options of Repeat Prescription Collection Service (RPCS) for stable chronic-disease clients, namely; Adherence club, Central Chronic Medicines Dispensing and Distribution (CCMDD) and Spaced & Fast Lane Appointment (SFLA) (including those with certain NCDs such as diabetes and hypertension).⁴⁰ Community pick-up points for medications under the CCMDD system is one of the strategies approved, and community dispensing of chronic medication is encouraged and should be sustained and improved.

Health financing

The importance of health financing for management and control of NCDs at community level cannot be overemphasised. South Africa included NCDs in the National Development Plan (NDP) and has a target of 28% reduction of incidence by 2030. Funding for NCDs forms less than 0.1% of the national health budget; it is not clear how much of this funding is dedicated to community NCD services. There is evidence of increasing budgetary allocation to PHC care.⁴¹ Table 1 shows the increased spending budget for services that provide PHC, with the highest annual growth observed in district management and community health clinics. Despite increasing budgetary allocations to PHC and community services, there is insufficient information on how much is dedicated to the community care system itself.

Table 1: Primary health care spending by budget programme, South Africa, 2007/08–2013/14

	Rand million							Average growth pa %
	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	
2.1 District Management	1 420	1 878	2 044	2 570	2 892	3 070	3 122	14.0
2.2 Community Health Clinics	5 104	6 625	7 846	8 924	9 951	10 522	11 179	14.0
2.3 Community Health Centres	2 833	3 405	3 877	4 326	4 998	5 360	5 785	12.6
2.4 Community-based Services	1 139	1 237	1 591	1 734	1 940	2 213	2 409	13.3
2.5 Other Community Services	688	719	882	1 158	1 144	1 145	1 199	9.7
2.7 Nutrition	209	177	246	298	311	336	354	9.2
6.4 Primary Health Care Training	266	323	316	405	390	411	431	8.4
8.1 Community Health Facilities	788	880	1 253	1 623	1 335	1 465	1 587	12.4
Total	12 447	15 244	18 054	21 039	22 961	24 525	26 066	13.1
Rand per capita uninsured	305	372	438	504	546	579	610	
PHC as % of total	19.9%	20.3%	20.4%	20.9%	20.9%	20.7%	20.6%	

Source: Naledi et al., 2011.²¹

Advocacy for community-level NCD management

The South African health system includes several policies and strategies for NCD management^{9,11,42} However, it is not very clear how the community system has been strengthened and leveraged in the fight for disease control. Examples of where the community system has been successful include management of HIV and AIDS and tuberculosis. To strengthen the case for improved community-level NCD prevention and management, we present a few examples of how community resources have been utilised to improve disease management. Central to these community resources are CHWs.

Effectiveness of community-level NCD prevention and control interventions

Table 2 presents a summary of selected NCD interventions using community-based strategies, mainly utilising CHWs. Interventions described focus on NCDs such as hypertension, diabetes, cancer and CVDs.

Table 2: Community-based NCD interventions utilising community health workers in South Africa, 2006–2015

Author and year	Aim and setting	Intervention	Training, duration of training & retraining	Impact/outcome
Puoane et al. (2006) ⁴³	To describe the development of an intervention programme for primary prevention of NCDs in general and CVD. Western Province	CHWs (intervention group) received training on lifestyle modification focusing on healthy eating and physical activity. Interventions included: healthy eating, group walks, developing and staging drama to disseminate messages on NCDs, and formation of a health club.	Training focused on primary prevention of NCDs (including anthropometric measurements and blood-pressure measurement). Weekly lectures for a period of three hours over one year. No information on retraining.	The initiative created awareness among community members of the importance of primary prevention of diabetes. CHWs initiated the process of behavioural change among themselves.
Bradley and Puoane (2007) ⁴⁴	To identify factors that contribute to hypertension and diabetes, and to design and implement appropriate local interventions to prevent these NCDs and promote healthy lifestyles. Western Province	CHWs held community health clubs weekly. Activities conducted included: exercise sessions, discussions on various health topics including healthy eating and physical activity, and cooking demonstrations. On a monthly basis, CHWs measured blood pressure and, when necessary, referred members to the primary care clinic.	Interactive training programme developed in co-operation with CHWs. Focus was on improving the knowledge of CHWs in hypertension and diabetes, promotion of healthy lifestyles, and developing their skills in communication and advocacy. Weekly sessions for three hours over five months. No information on retraining.	No outcomes specified.
Puoane et al. (2012) ⁴⁵	To describe experiences in developing and implementing health clubs to reduce hypertension risk. Western Province	CHWs initiated a health club, where anthropometric and blood-pressure measurements were taken. Various topics related to hypertension were discussed in these health clubs.	Training of CHWs was in primary prevention of CVDs. Training included education on risk factors as well as facilitation skills. Training was conducted over a period of six months.	There was a decrease in obesity, while the proportion of people who were of normal weight or overweight decreased over a two-year period. Diastolic pressure remained the same, while systolic pressure increased.

Author and year	Aim and setting	Intervention	Training, duration of training & retraining	Impact/outcome
Ndou et al. (2013) ⁴⁶	To examine the outcomes of a pilot CHW programme to improve the management of hypertension and diabetes. Gauteng Province	CHWs provided social support and counselling to improve patient literacy and adherence, and to encourage appropriate visits to the PHC clinic. A monthly supply of medication was delivered to named patients.	The course focused primarily on home-based care and provided skills in adherence, counselling and health promotion, with a particular focus on chronic illnesses, including hypertension and diabetes. Training duration was 14 weeks.	Hypertension control improved with CHW home visits compared with usual clinic care. However, the inverse was found for diabetes control. When both conditions were considered, hypertension control was higher in the intervention group than with usual clinic care.
Gaziano et al. (2014) ⁴⁷	To determine whether training CHWs on hypertension in order to improve adherence to medications is a cost-effective intervention among community members in South Africa.	In this simulated intervention, six CHWs measured blood pressure using an automated blood-pressure cuff. Each CHW was given a list of hypertensive patients registered at a nearby clinic and it was estimated that she could make six home visits per day.	In this simulated intervention, six CHWs were trained to measure blood pressure using an automated blood-pressure cuff. Training was also given on the aetiology and prevention of hypertension and CVD. Training duration was two days.	The CHW intervention was found to be cost-effective and led to an incremental cost-effectiveness ratio of \$320/ Disability-Adjusted Life Year averted.
Tum et al. (2013) ⁴⁸	To develop and pilot-test an intervention to address low cervical screening uptake as well as a potentially low breast-screening uptake. Tshwane	Community members were trained to become CHWs. However, one member was specifically trained to work in cancer prevention. The assessed outcomes for this study were: screening uptake; awareness; and value of the CHW. The study utilised a post-intervention design.	CHWs were trained and tasked to raise awareness of cervical and breast cancer and to motivate women to take up screening. Training was conducted over a period of three months.	Intervention showed that CHWs were valued but uptake of cervical screening and awareness remained low.
Gaziano et al. (2015) ⁴⁹	To investigate whether CHWs could do community-based screenings to predict CVD risk as effectively as physicians or nurses, with a simple, non-invasive risk-prediction indicator in low- and middle-income countries. South Africa, Bangladesh, Guatemala, Mexico	Observational study CHWs who successfully completed the training screened community residents to predict CVD risk.	Trained to calculate an absolute CVD risk score with a previously validated simple, non-invasive screening indicator. Duration of the training was 1–2 weeks and included both practical and didactic components. No information on retraining.	Mean level of agreement between the CHW and health professional scores was 96.8% for the overall study and 97% for South Africa.

Key findings and lessons learnt

Key findings from the studies described in Table 2 include the following:

- CHWs are effective when used in the delivery of clinical outcomes for NCDs;
- there are differences in training strategies;
- community-based interventions differ according to the targeted outcome; and
- NCD interventions are suitable for resource-poor settings, which is the case in many areas in South Africa.

In addition, several lessons can be learnt from the research studies presented in Table 2. The studies show that the scope of CHW practice ranges from NCD prevention to control. The study by Gaziano and colleagues clearly demonstrates that CHWs have the ability to screen community members for CVD risk; furthermore, the accuracy of CHWs was found to be similar to that of professional health staff.⁴⁹ However, despite CHWs' ability in executing NCD-related tasks, their effectiveness in improving NCD-related health outcomes is not well documented. Evaluation of health outcomes will strengthen the case advocating for the use of CHWs at community

level, especially in resource-limited settings and areas where there is a lack of nurses and doctors.

The breadth of work undertaken by CHWs was found to vary widely, based on intended health outcomes. Their tasks included measurement of height and weight, monitoring of blood pressure and blood-glucose level,^{35,37,39} as well as screening and health education.³⁸ These tasks are usually performed in formal health facilities; as such, the studies provide evidence that CHWs have the ability to extend services beyond health facilities when trained appropriately.

Training of CHWs is crucial in capacity-building, with the cited studies showing varied training duration. In a country where the educational attainment of CHWs varies, duration of training is critical. Furthermore, duration of training can have an impact on follow-up training. It has been shown that follow-up training is necessary for retaining knowledge,^{50–52} this is even more the case for this cadre of workers who lack continuous education opportunities.

Despite the usefulness of these interventions, several issues should be borne in mind when considering them, especially in terms of

scale-up. High-performing CHW subsystems should be integrated into the PHC system, and there must be investment in supervision that extends into health facilities.⁵³ As CHW models become more formalised and integrated into the formal healthcare system, training must be better structured. Apart from training, it is equally important to ensure that CHWs have the appropriate materials in order to fulfil their tasks.⁵⁴

In the interventions cited in Table 2, researchers had the necessary resources for the execution of tasks. Other studies have reported that in resource-poor settings, CHWs often lack the resources and supplies needed to perform their daily tasks,⁵⁵ thus lack of supplies can hinder performance. In addition, the scope of practice for CHWs may have implications for the number of workers needed to deliver services to communities.⁵³ Failure to increase the number of CHWs will mean that they either offer fewer services or reach fewer households. These are some of the elements that must be in place for CHW programmes to be successful and effective.

Potential gains

Gains in community-level NCD prevention and control, especially when CHWs are utilised, can be measured at three major levels, namely patient, care-provider and national-resource levels.

For the individual, gains include disease prevention due to health-promotion messages and services delivered early and closer to home in the community. There is also reduced transport and other associated costs for individuals already affected with NCDs if they receive services at home from a CHW.

For the care providers, gains include reduced facility visits with less overcrowding as fewer people develop NCDs and attendant complications.

For the country, gains include fewer resources spent on NCD management, with disease averted by health promotion and complications delayed or totally averted by early detection.

Based on the evidence presented in this chapter, we have formulated our recommendations focusing on three areas, namely the CHW programme, health information and financing.

These recommendations are formulated to improve the utilisation of CHWs in the prevention and control of NCDs at community level.

The CHW Programme

- **Community and facility interaction:** Successful interaction between the Ideal Clinic and the WBOT stream of PHC re-engineering is crucial. Community health workers are well positioned to be the fulcrum of a successful interaction. If properly co-ordinated, this can ensure smooth integration between community (promotive and preventive) and facility (curative and rehabilitative) NCD services.
- **CHW training and retraining:** There should be a standardised curriculum for NCDs. In addition, training should focus on core tasks, based on evidence, which will result in a more focused training programme. Retraining is crucial, thus dedicated trainers should be identified, as should appropriate intervals for retraining.

- **Supportive supervision:** Constant supervision that is non-judgmental can assist in improving the confidence of CHWs in executing their tasks. In addition, supervision has the potential to provide a non-threatening space that facilitates interactive learning.
- **CHW scope of work:** The CHW scope of work must be clearly defined, so that workers are able to provide a comprehensive service to communities. In resource-limited settings where CHWs are required to provide a plethora of services, defining their NCD-related tasks will ensure that they offer realistic service, without compromising on the quality of service.

Health information

As with HIV and AIDS, translating NCD policy into action will require a carefully designed monitoring system. Currently, indicators set for NCD monitoring appear inadequate and inappropriate for providing information for effective NCD control. Because of the greater emphasis on promotive and preventive health action, the South African health-information system should be improved to highlight progress in NCD prevention. Importantly, as most promotive and preventive health actions occur in the community, the health-information system should be strengthened for adequate information collection and reciprocal use at community level. Capacity for useful and relevant data collection must be enhanced. Healthcare workers providing community-level NCD activities are a useful resource that should be capacitated to form part of the health-information system for NCD. Process, outcome and impact indicators for NCD monitoring and management are needed, and several of these will be crucial at community level.

Financing

There is a need to pursue alternative funding for CHWs. Donor agencies should be leveraged to finance community involvement in NCD management, as has been the case with other chronic conditions such as HIV and AIDS. Furthermore, there is a need to look at the cost-effectiveness of utilising CHWs in a setting such as South Africa, as a cost-effective approach will strengthen the importance of community-based interventions for NCDs.

Conclusion

Evidence shows that there are flaws in the management of NCDs in the formal healthcare system, suggesting the need to provide services that extend beyond health facilities to communities in order to advance the NCD agenda. Community-level prevention and control of NCDs in resource-limited settings is crucial for continuity of care. Community health workers have provided health care within communities for decades; therefore, they can potentially provide NCD care while also connecting individuals to the formal healthcare system. Numerous systems, such as funding, training and retraining, and supportive supervision, should be put in place to enable CHWs to provide adequate services. Furthermore, they require support from other parts of the formal healthcare system, especially at the primary level of care. A strong community-based focus and a functional formal healthcare system have the potential to avert the burden of NCDs.

References

- 1 World Health Organization. Global Status Report on Noncommunicable Diseases 2014. Geneva: World Health Organization; 2014.
- 2 World Health Organization. Global Health Estimates 2013: deaths by cause, age and sex; estimates for 2000–2012. [Internet]. Geneva; 2014 [cited 13 Feb 2017]. URL: http://www.who.int/healthinfo/%0Aglobal_burden_disease/en/
- 3 Caleyachetty R, Echouffo-Tcheugui JB, Tait CA, Schilsky S, Forrester T, Kengne AP. Prevalence of behavioural risk factors for cardiovascular disease in adolescents in low-income and middle-income countries: an individual participant data meta-analysis. *Lancet Diabetes Endocrinol* [Internet]. 1 Jul 2015 [cited 2017 Feb 13];3(7):535–44. URL: <http://www.thelancet.com/article/S2213858715000765/fulltext>
- 4 Libman K, Freudenberg N, Sanders D, Puoane T, Tsolekile L. The role of urban food policy in preventing diet-related non-communicable diseases in CapeTown and New York. *Public Health*. 2015;129(4).
- 5 World Health Organization. Fact sheet: Cardiovascular diseases (CVDs). 2016. URL: <http://www.who.int/mediacentre/factsheets/fs317/en/>
- 6 Igumbor EU, Sanders D, Puoane TR, Tsolekile L, Schwarz C, Purdy C, et al. "Big food," the consumer food environment, health, and the policy response in South Africa. *PLoS Med*. 2012;9(7).
- 7 Sachs JD. From millennium development goals to sustainable development goals. *Lancet*. [Internet]. 9 Jun 2012 [cited 28 Aug 2016];379(9832):2206–11. URL: <http://www.thelancet.com/article/S0140673612606850/fulltext>
- 8 World Health Organization. Global action plan for the prevention and control of noncommunicable diseases : 2013–2020. Geneva: World Health Organization; 2013.
- 9 South African National Department of Health. South African Declaration on the Prevention and Control of Non-communicable Diseases. National Department of Health, Pretoria: NDoH; 2011 [cited 14 Feb 2017]. URL: http://www.cdia.uct.ac.za/usr/health/research/groupings/cdia/downloads/SA_NCD_Declaration.pdf
- 10 South African National Department of Health. Strategic Plan for the prevention and control of non-communicable diseases 2013–17 [Internet]. 2013 [cited 13 Feb 2017]. URL: <https://www.health-e.org.za/wp-content/uploads/2013/09/NCDs-STRAT-PLAN-CONTENT-8-april-proof.pdf>
- 11 South African National Department of Health. The National Health Promotion Policy and Strategy 2015–19 [Internet]. Pretoria: NDoH; 2014 [cited 14 Feb 2017]. URL: <https://www.sancda.org.za/south-african-health-promotion-policy-strategy-2015-19-new/>
- 12 United Nations. Political Declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases. In New York: United Nations; 2012 [cited 14 Feb 2017]. URL: http://www.who.int/nmh/events/un_ncd_summit2011/political_declaration_en.pdf
- 13 Department of Trade and Industry. National Liquor Policy [Internet]. 2015 p. Notice 446 of 2015. URL: http://www.gov.za/sites/www.gov.za/files/38808_gen446.pdf
- 14 Republic of South Africa Government Gazette. Tobacco Products Control Act 183 of 1993. URL: <http://www.gov.za/sites/www.gov.za/files/Act83of1993.pdf>
- 15 South African National Department of Health. Strategy for the Prevention and Control of Obesity in South Africa 2015–2020 [Internet]. 2015 [cited 24 Apr 2017]. URL: <https://www.health-e.org.za/wp-content/uploads/2015/12/National-Strategy-for-prevention-and-Control-of-Obesity-4-August-latest.pdf>
- 16 South African National Department of Agriculture and Fisheries. The national policy on food and nutrition security for the Republic of South Africa [Internet]. 2014. URL: http://www.gov.za/sites/www.gov.za/files/37915_gon637.pdf
- 17 National Treasury: Republic of South Africa. Taxation of sugar sweetened beverages [Internet]. 2016. URL: http://www.treasury.gov.za/public_comments/Sugar_sweetened_beverages/policy_paper_and_proposals_on_the_taxation_of_sugar_sweetened_beverages-8_july_2016.pdf
- 18 South African National Department of Health. Foodstuffs, Cosmetics and Disinfectants Act, 1972 (54 of 1972). 1972 [cited 24 Apr 2017];54. URL: http://www.gov.za/sites/www.gov.za/files/38975_rg10465_gon591.pdf
- 19 Hofman KJ. Intersectoral case study: Successful sodium regulation in South Africa. [Internet]. 2013 [cited 10 Apr 2017]. URL: <http://www.afro.who.int/en/clusters-a-programmes/4085-successful-sodium-regulation-in-south-africa.html>
- 20 Netshitenzhe M, Makaepea C. Final National Liquor Policy: National Liquor Review. Cape Town: Department of Trade and Industry; 2016 [cited 14 Feb 2017]. URL: http://www.dti.gov.za/parliament/2016/Liquor_Policy_30122016.pdf
- 21 Naledi T, Barron P, Schneider H. Primary Health Care in South Africa since 1994 and implications of the new vision for PHC re-engineering. In: Padarath A, English R, editors. *South African Health Review 2011*. Durban: Health Systems Trust. 2011.
- 22 Nxumalo, Nonhlanhla, Choonara S. A Rapid Assessment of Ward-based PHC outreach teams in Gauteng Sedibeng District – Emfuleni sub-district [Internet]. 2014 [cited 13 Feb 2017]. URL: <http://citeweb.info/20142827119>
- 23 Schneider H, Schaay N, Dudley L, Goliath C, Qukula T. The challenges of reshaping disease specific and care oriented community based services towards comprehensive goals: a situation appraisal in the Western Cape Province, South Africa. *BMC Health Serv Res* [Internet]. 2015;15(1):436. URL: <http://www.biomedcentral.com/1472-6963/15/436>
- 24 Beaglehole R, Bonita R, Ezzati M, Alleyne G, Dain K, Kishore SP, et al. NCD Countdown 2025: accountability for the 25 x 25 NCD mortality reduction target. *Lancet* [Internet]. 2014 Jul 12 [cited 4 Nov 2016];384(9938):105–7. URL: <http://www.thelancet.com/article/S0140673614610916/fulltext>
- 25 South African National Department of Health. Human Resources for Health South Africa: HRH strategy for the health sector 2012/13 – 2016/17 [Internet]. 2011 [cited 24 Apr 2017]. URL: http://www.gov.za/sites/www.gov.za/files/hrh_strategy_0.pdf

- 26 Dambisya Y. A review of non-financial incentives for health worker retention in east and southern Africa. *Heal Syst Res Group, Dep* [Internet]. 2007 [cited 24 Apr 2017]. URL: [http://www.chwcentral.org/sites/default/files/A review of non-financial incentives for health worker retention in east and southern Africa.pdf](http://www.chwcentral.org/sites/default/files/A%20review%20of%20non-financial%20incentives%20for%20health%20worker%20retention%20in%20east%20and%20southern%20Africa.pdf)
- 27 Blecher M, Kollipara A, Zulu N, De Jager P. Health financing. In: Padarath A, English R, editors. *South African Health Review 2011*. Durban: Health Systems Trust; 2011.
- 28 Lehmann U. Strengthening human resources for Primary Health Care: Primary Health Care: systems support. In: Barron P, editor. *South African Health Review 2008*. Durban: Health Systems Trust; 2008.
- 29 Matsoso M, Strachan B. Human Resources for Health for South Africa: HRH Strategy for the Health Sector 2012/13–2016/17. In: Padarath A, English R, editors. *South African Health Review 2011*. Durban: Health Systems Trust; 2011.
- 30 Igbojiaku OJ, Ross A, Harbor OC. Compliance with diabetes guidelines at a regional hospital in KwaZulu-Natal, South Africa : original research [Internet]. Vol. 5, *Afr J Prim Health Care Fam Med*. AOSIS; 2013 [cited 14 Feb 2017]. URL: <https://journals.co.za/content/phcfm/5/1/EJC134584>
- 31 Brand M, Woodiwiss AJ, Michel F, Booysen HL, Majane OHI, Maseko MJ, et al. Chronic diseases are not being managed effectively in either high-risk or low-risk populations in South Africa. *S Afr Med J* [Internet]. [cited 14 Feb 2017];103(12):938–41. URL: http://www.scielo.org.za/scielo.php?script=sci_arttext&pid=S0256-95742013001200028&lng=en&nrm=iso&tlng=en
- 32 Khatib R, Schwalm J-D, Yusuf S, Haynes RB, McKee M, Khan M, et al. Patient and Healthcare Provider Barriers to Hypertension Awareness, Treatment and Follow Up: A Systematic Review and Meta-Analysis of Qualitative and Quantitative Studies. Barengo NC, editor. *PLoS One* [Internet]. 2014 Jan 15 [cited 14 Feb 2017];9(1):e84238. URL: <http://dx.plos.org/10.1371/journal.pone.0084238>
- 33 Fairall LR, Zwarenstein M, Bateman ED, Bachmann M, Lombard C, Majara BP, et al. Effect of educational outreach to nurses on tuberculosis case detection and primary care of respiratory illness: pragmatic cluster randomised controlled trial. *BMJ* [Internet]. 2005 [cited 24 Apr 2017];331(7519). URL: <http://www.bmj.com/content/331/7519/750>
- 34 Naidoo S, Mahomed OH, Asmall S, Taylor M. Nurses' knowledge of chronic disease management. *Heal SA Gesondheid* [Internet]. 2014 Mar 3 [cited 14 Feb 2017];19(1):1–8. URL: http://www.scielo.org.za/scielo.php?script=sci_arttext&pid=S2071-97362014000100031&lng=en&nrm=iso&tlng=en
- 35 Joshi R, Alim M, Kengne AP, Jan S, Maulik PK, Peiris D, et al. Task Shifting for Non-Communicable Disease Management in Low and Middle Income Countries – A Systematic Review. Moormann AM, editor. *PLoS One* [Internet]. 2014 Aug 14 [cited 14 Feb 2017];9(8):e103754. URL: <http://dx.plos.org/10.1371/journal.pone.0103754>
- 36 Lekoubou A, Awah P, Fezeu L, Sobngwi E, Kengne AP. Hypertension, Diabetes Mellitus and Task Shifting in Their Management in Sub-Saharan Africa. *Int J Environ Res Public Health* [Internet]. 2010 Jan 27 [cited 14 Feb 2017];7(2):353–63. URL: <http://www.mdpi.com/1660-4601/7/2/353/>
- 37 South African National Department of Health. Department of Health Annual Report 2015/2016 [Internet]. Pretoria: NDoH; 2016. [cited 13 Feb 2017]. URL: <http://www.gov.za/documents/department-health-annual-report-20152016-22-nov-2016-0000>
- 38 Magadzire BP, Budden A, Ward K, Jeffery R, Sanders D. Frontline health workers as brokers: provider perceptions, experiences and mitigating strategies to improve access to essential medicines in South Africa. *BMC Health Serv Res* [Internet]. 2014 Dec 5 [cited 22 Feb 2017];14(1):520. URL: <http://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-014-0520-6>
- 39 Magadzire BP, Marchal B, Ward K. Improving access to medicines through centralised dispensing in the public sector: a case study of the Chronic Dispensing Unit in the Western Cape Province, South Africa. *BMC Health Serv Res* [Internet]. 2015 Jun 17 [cited 22 Feb 2017];15(1):513. URL: <http://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-015-1164-x>
- 40 South African National Department of Health. Adherence Guidelines for HIV, TB and NCDs: Policy and service delivery guidelines for linkage to care, adherence to treatment and retention in care [Internet]. 2016 [cited 24 Apr 2017]. URL: <https://www.nacosa.org.za/wp-content/uploads/2016/11/Integrated-Adherence-Guidelines-NDOH.pdf>
- 41 National Planning Commission. National Development Plan 2030: Our future – make it work. South African Government [Internet]. Pretoria. 2010 [cited 13 Feb 2017]. URL: <http://www.gov.za/documents/national-development-plan-2030-our-future-make-it-work>
- 42 South African National Department of Health. South African Declaration on the Prevention and Control of Non-communicable Diseases. Pretoria: NDoH; 2011 [cited 14 Feb 2017]. URL: http://www.cdia.uct.ac.za/usr/health/research/groupings/cdia/downloads/SA_NCD_Declaration.pdf
- 43 Puoane T, Bradley H, Hughes G. Community intervention for the emerging epidemic of non-communicable diseases. *South African J Clin* [Internet]. 2006 [cited 13 Feb 2017]. URL: <http://www.tandfonline.com/doi/abs/10.1080/16070658.2006.11734094>
- 44 Bradley HA, Puoane T. Prevention of hypertension and diabetes in an urban setting in South Africa: participatory action research with community health workers. *Ethn Dis* [Internet]. 2007 [cited 13 Feb 2017];17(1):49–54. URL: <http://www.ncbi.nlm.nih.gov/pubmed/17274209>
- 45 Puoane TR, Tsolekile L, Igumbor EU, Fourie JM. Experiences in developing and implementing health clubs to reduce hypertension risk among adults in a South African population in transition. *Int J Hypertens*. 2012.
- 46 Ndou T, van Zyl G, Hlahane S, Goudge J. A rapid assessment of a community health worker pilot programme to improve the management of hypertension and diabetes in Emfuleni sub-district of Gauteng Province, South Africa. *Glob Health Action* [Internet]. 2013 Jan 19 [cited 13 Feb 2017];6(1):19228. URL: <https://www.tandfonline.com/doi/full/10.3402/gha.v6i0.19228>
- 47 Gaziano TA, Bertram M, Tollman SM, Hofman KJ. Hypertension education and adherence in South Africa: a cost-effectiveness analysis of community health workers. *BMC Public Health* [Internet]. 2014 Mar 10 [cited 13 Feb 2017];14(1):240. URL: <http://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-14-240>
- 48 Tum SJ, Maree JE, Clarke M. Creating awareness and facilitating cervical and breast cancer screening uptake through the use of a Community Health Worker: a pilot intervention study. *Eur J Cancer Care (Engl)* [Internet]. 2013 Jan [cited 13 Feb 2017];22(1):107–16. URL: <http://doi.wiley.com/10.1111/ecc.12005>

- 49 Gaziano TA, Abrahams-Gessel S, Denman CA, Montano CM, Khanam M, Puoane T, et al. An assessment of community health workers' ability to screen for cardiovascular disease risk with a simple, non-invasive risk assessment instrument in Bangladesh, Guatemala, Mexico, and South Africa: an observational study. *Lancet Glob Heal* [Internet]. 2015 Sep [cited 21 Mar 2017];3(9):e556–63.
URL: <http://linkinghub.elsevier.com/retrieve/pii/S2214109X15001436>
- 50 Abrahams-Gessel S, Denman C, Montano C. Training and supervision of community health workers conducting population-based, noninvasive screening for CVD in LMIC: implications for scaling up. *Glob Heart* [Internet]. 2015 [cited 21 Mar 2017].
URL: <http://www.sciencedirect.com/science/article/pii/S2211816014027367>
- 51 Li VC, Goethals PR, Dorfman S. A Global Review of Training of Community Health Workers. *Int Q Community Health Educ* [Internet]. 2007 Oct [cited 22 Feb 2017];27(3):181–218.
URL: <http://journals.sagepub.com/doi/10.2190/IQ.27.3.b>
- 52 O'Brien MJ, Squires AP, Bixby RA, Larson SC. Role Development of Community Health Workers: An Examination of Selection and Training Processes in the Intervention Literature. *Am J Prev Med*. 2009;37(6):S262–9.
- 53 Singh P, Sachs JD. 1 million community health workers in sub-Saharan Africa by 2015. Vol. 382, *Lancet*. 2013. p. 363–5.
- 54 The Earth Institute Columbia University. One Million Community Health Workers: Technical Task Force Report [Internet]. *Community Health*. 2011 [cited 22 Feb 2017].
URL: http://www.millenniumvillages.org/uploads/ReportPaper/1mCHW_TechnicalTaskForceReport.pdf
- 55 Tsolekile LP, Puoane T, Schneider H, Levitt NS, Steyn K. The roles of community health workers in management of non-communicable diseases in an urban township. *Afr J Prim Heal Care Fam Med* [Internet]. 2014;6(1):1–8.
URL: <http://www.phcfm.org/index.php/phcfm/article/view/693>