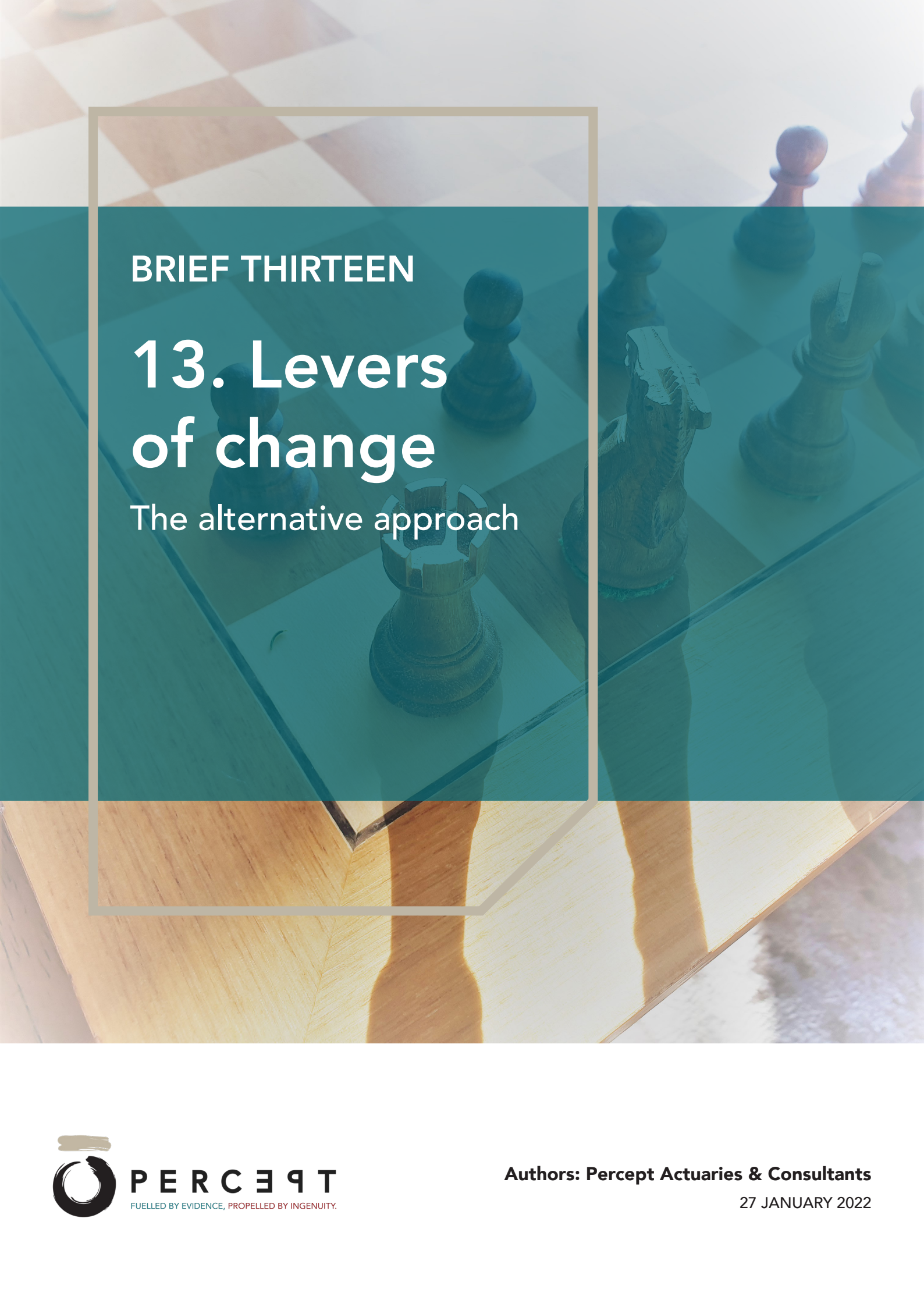




BRIEF THIRTEEN

13. Levers of change

The alternative approach



PERCEPT

FUELLED BY EVIDENCE, PROPELLED BY INGENUITY.

Authors: Percept Actuaries & Consultants

27 JANUARY 2022

Research briefs on non-communicable diseases in South Africa

Percept has developed a series of briefs aiming to explain, explore and quantify the burden of non-communicable diseases (NCDs) in South Africa. Throughout the briefs both existing quantitative data as well as emerging qualitative data are drawn together. The primary qualitative data - presented in the form of vignettes - has been collected by Dr. Beth Vale, through in-depth ethnographic research. Given the rising global burden of NCDs, particularly in low- and middle-income countries (LMICs) these briefs are incredibly relevant. Given South Africa's high prevalence of HIV, there's also recently been a focus on the link between HIV and NCDs, as the population living with HIV grows increasingly older with the successful uptake of antiretroviral treatment (ART). As we'll explain in the briefs, an ageing population is more at risk for NCDs. Moving towards universal health coverage (UHC), it's imperative to understand the current needs of our population - and how these may change going forward. We have produced fourteen briefs in this series.

Percept is grateful for the generous funding provided by the following three partners. The views presented are however the authors' own:

- + Actuarial Society of South Africa (ASSA): ASSA has an interest in being part of the development of high-quality evidence to support resource allocation and decision-making and the interplay between the supply and demand sides of the health system
- + RGA Reinsurance Company of South Africa Ltd (RGA): RGA has an interest in the ways in which life insurance can be responsive to the changing burden of disease and the ways in which we can use data to drive decision-making
- + Board of Healthcare Funders (BHF): BHF is a regional representative body of health funders, administrators, and managed-care organisations. It is committed to universal health coverage, value-based healthcare, and accountability for health. Addressing the NCD burden is an important element to achieve some of its objectives.

Take-home messages

- + A novel approach that incorporates patient-centred, community-orientated primary care is needed to address the burden of NCDs in South Africa.
- + Interventions that address the First Thousand Days of Life, including maternal health support from community healthcare workers, may limit the risk factors faced by children that lead to the development of NCDs. This has been shown to be cost-effective.
- + Incentive programmes are effective in increasing health-promotion activities in the private sector. While this can be used in the public healthcare system, interventions need to be altered to take the needs of the public-sector population into account.
- + Providing patients with support may enable self-management, which could lead to improved outcomes and the decongestion of the healthcare system.
- + The home delivery of medication and adherence support through community healthcare workers are community-level interventions that ensure secondary disease prevention.
- + Covid-19 has highlighted the ability of telemedicine to improve outcomes and access to healthcare. This could be leveraged to a greater extent.

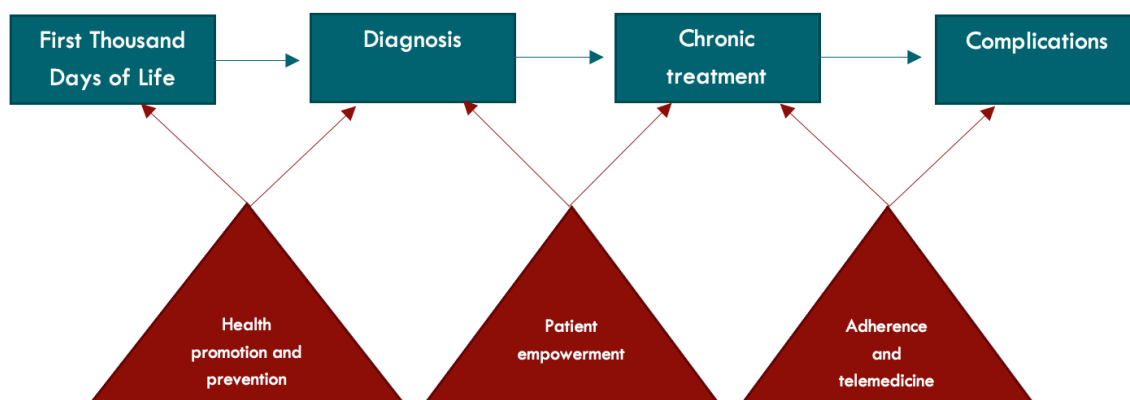
Introduction

his series of briefs about non-communicable diseases (NCDs) has provided a rich and layered picture of the multifaceted nature of the problem of NCDs in South Africa. The complexity of issues relating to their causes, as well as the multiple ways in which NCDs present in individuals, have been addressed from a range of perspectives.

This brief aims to paint a picture of hope and adaptability in response to the risk of NCDs and their consequences. As outlined in the previous briefs, NCDs are a reflection of our current human existence – the way we live, eat and work. There are generally two common threads running through the NCD narrative, often linking up with narratives relating to other chronic communicable conditions, such as HIV. The first is that these conditions are largely preventable, and the second is that the natural course of NCDs can most often be changed by reducing risks factors. Considering these factors, there's room to address the high burden of disease by shifting to a preventative approach to care. Innovative solutions are however needed to ensure that supply constraints are addressed. This will enable the health system to tackle the complex healthcare needs of NCD-related complications in the long term.

By reflecting on the life course of individuals, this brief will highlight how the patient journey can be altered using a community-based approach aimed at preventing disease in healthy individuals, and empowering those with chronic illness to manage their condition (Figure 1).

Figure 1: Potential levers of change throughout the life cycle



From womb to tomb

The previous briefs in this series highlighted that the healthcare system has the opportunity to prevent people from developing NCDs from as early as conception. This is the starting point for intervention, with a focus on the First Thousand Days (FTD) of Life.¹ During this period, nutrition isn't only linked to progress in childhood, but it also impacts on the lifelong risk of developing NCDs, with a return on investment (ROI) of 35USD for every dollar invested in maternal nutrition.² Additionally, this critical period will determine the child's ability to cope with the effects of adversity and stress, which were both described as contributing factors in previous briefs.

There is strong evidence to support the introduction of interventions during this period.³ In a 2017 review in *The Lancet*, a lack of maternal wellbeing in pregnancy – including suffering from depression and anxiety – was closely associated with a range of negative child outcomes, including poor infant growth, emotional and behavioural difficulties, and attachment issues.⁴ Additionally, recent evidence has shown that paternal mental health in pregnancy can also influence the socio-emotional and behavioural development of children.⁵

A systematic review of 13 trials of psychological interventions delivered by local community health workers (CHWs) to women with antenatal depression in LMICs showed a number of positive effects, including improved bonding, improved mental development and growth, reduced frequency of diarrhoea episodes, and increased immunisation rates.⁶ Therefore, the implementation of parenting programmes, cash transfers to incentivise antenatal care, and support during birth may have positive long-term child outcomes.⁷⁻¹⁰

There's been a shift in the National Integrated Early Childhood Development Policy (NIECDP-2015) towards the provision of holistic care during the FTDs, which is aimed at addressing nutrition, health, and psychological wellbeing.¹¹ To achieve this, it's been suggested that CHWs should be the mode of delivering care to expectant mothers and infants. However, there are limitations to CHWs' efficacy within the South African context, and the resources that will be required to implement these interventions need to be considered.

Wellbeing > health

There's been a substantial shift in the thinking and science relating to wellness in recent years, and it's primarily driven by the insurance industry as a means of increasing health promotion and disease prevention (brief 12). South Africa's largest private health insurer, Discovery Health Medical Scheme – which has more than 2.5 million beneficiaries – introduced its Vitality wellness programme in the late 1990s. It includes health-risk assessments, subsidised gym memberships, as well as plans to quit smoking and for weight loss. These are all incentivised through rewards, including cash backs on purchases of healthy foods, discounted movies, etc.³⁰ Studies on Vitality and other international programmes have demonstrated a significant relationship between wellness activities and lower healthcare spending, as well as improved preventative screening and access to care.^{31–34}

However, these studies have also demonstrated that more than two-thirds of members fail to use their gym benefits, suggesting that for most people, rewards are not enough to change behaviour. Enhanced communication methods targeted at high-risk patients and a wider variety of incentives are likely needed to improve health-promoting behaviour over time.

Despite promising evidence of improved wellbeing in the insured population (who are often from a higher socio-economic background), there's relatively little understanding of the potential role of incentives in an uninsured population whose healthcare costs are covered by the state. With food being highlighted as a critical factor that influences NCD development, preferential food pricing to encourage people to buy healthier food has been implemented in the public sector. The state has attempted to achieve this to some extent through zero-rating certain basic household items, but the policy hasn't been shown to help those who are most impoverished.³⁶ Studies however suggest that if food selection for tax exemption and more importantly, for state subsidisation, is based on the principles of equity, poverty alleviation, and maximising health benefits, this strategy may have a positive impact on the prevalence of chronic NCDs.³⁷ Once a basic system is in place for all citizens, it would be both rational and feasible to include additional incentive-driven discounts to encourage individuals to engage with the healthcare system for prevention and health promotion activities.

In Vignette 1, one of the co-authors of this brief who is a family physician reflects on the way society has engaged with sugar, refusing to acknowledge its addictive properties. They suggest that the choice of a biomedical lens to treat diabetes, which is intimately linked with the consumption of sugar, has gravely and negatively impacted the health system's efficacy in its fight against diabetes.

Vignette 1: Reflections on Type 2 diabetes by a family physician working in the public health system

A great deal of reflection has led me to the conclusion that most of what we believe about Type 2 diabetes (T2D) is probably a delusion. We frame it as a disease and categorise it with other NCDs – which is in a way a lot more enlightened than when I was a medical student – and we’ve also identified the connections that are fuelling its development. However, it is still regarded as a disease in the traditional sense of the word: a chronic medical condition characterised by insulin resistance and relative insulin deficiency, resulting in raised glucose levels. The disease is also viewed in relation to poor dietary habits, which is a bit like saying alcoholism is a chronic neurological condition caused by the progressive degeneration of the brain, which is related to excessive alcohol intake. While this is true, the narrative is incomplete if we fail to include an understanding of addiction. It’s known that alcoholism is caused by a chronic compulsion to consume an addictive substance. Whatever further damage occurs is as a result of that addiction, and whatever we do in relation to alcoholism is based on that central understanding. We also know that a very small proportion of alcoholics are curable, and even those who have been in prolonged remission are subject to relapses.

It’s very difficult for us to see the sugar addiction at the heart of T2D in the same light because we are culturally conditioned to delude ourselves. Addiction, we assume, is something that happens when things go badly wrong. People fall prey to addiction when circumstances and anguish collide, and the substance does the rest. Is it fair, to conventional addicts and diabetics alike, to draw parallels between the horrors of substance addiction and the homely lives we live with and our moms and dads, grandmas and grandpas, uncles and aunts as we develop T2D? It depends on your perspective. The first thing to consider is whether you see sugar as food or as a drug.

The first question to consider is whether sugar has any nutritional value. The short answer is that it doesn’t. This doesn’t mean that it has no value. After all, we don’t question whether coffee or hot chocolate have any nutritional value. Nor do we require that the salt, pepper, herbs and spices used to flavour meals have nutritional value. We use these items to experience pleasure and they can be used safely by almost all people without them developing an insatiable desire to consume more. Unfortunately, that’s not the case with sugar. It’s as addictive as heroin and if we use it, as we all do to some extent, to experience pleasure and improve our quality of life, we need to be very careful that we don’t get hooked.

If there are any doubts about the nature of sugar, just look at its history. Once the preserve of a technologically advanced Ottoman Empire, it drove Western European powers mad with desire. They desperately needed land in the tropics to cultivate the crop and slave labour to harvest it. Christopher Columbus colluded with financial backers in Spain, and a particularly cruel mistress who was the Governor of the Canary Islands, to replicate a slave labour model that had been implemented to grow sugar cane on the land she ruled over on behalf of

the Spanish Crown. They just needed more land to cultivate, and found it on the other side of the Atlantic. The plants that were taken over from the Canaries in Columbus' caravels in 1492 found fertile soil in the Caribbean Islands and within 50 years, the West's growing addiction was being fed by sugar extracted from their brutal plantations. The more they made, the more they needed. The desire overwhelmed everything in its path. It drove the subjugation of millions of people in West Africa and the capture and transportation of slave labour across the middle passage. It stained the consciousness of humanity with myths about racial superiority that allowed the slave trade and the genocide of indigenous populations to continue. It entrenched predatory capitalism as a legitimate human pursuit. There's nothing comparable in the history of the world. Not even the cocaine trade in South America or the heroin trade in Afghanistan has had anything close to the negative impact that sugar had in the New World over 500 years. There are however parallels to other drug industries, but sugar is the drug that started it all.

In *Candide*, the French philosopher Voltaire describes a world of hardship and horror that the protagonist and his companions encounter in their travels. In the New World, they learn of slavery. An escaped slave, missing both a hand and a leg, explains his mutilation: "When we work in the sugar mills and we catch our finger in the millstone, they cut off our hand; when we try to run away, they cut off our leg; both things have happened to me. It is at this price that you eat sugar in Europe." Also in the 1700s, with amputations being emblematic of the cane fields, a Quaker leader was quoted as saying that "For every pound of sugar, we may be considered as consuming two ounces of human flesh." Not to put too fine a point on it, but the undeniable reality that amputation has become emblematic of the global diabetes epidemic 300 years later, strikes me as a deeply ironic karmic twist in the tale of this cursed substance!

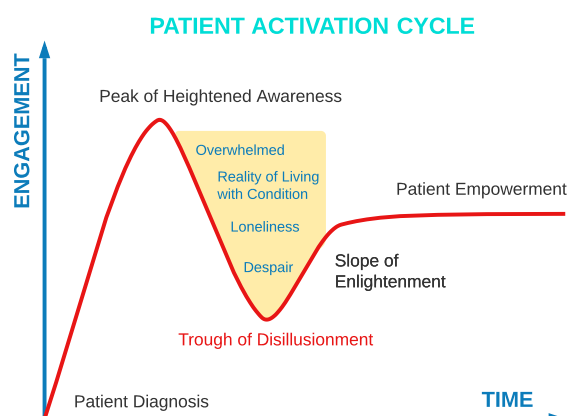
One reason for writing about this topic is a focus on the diabetic care pathway (specifically T2D) that I was recently engaged with. We tell a story of patients who are struggling with addiction. They need to be empowered to control their condition. At every point in the care pathway, there is a common theme – the health system is powerless against diabetes unless patients are empowered with the skills they need to confront their addiction and to modify the diet and the life experience that fuels it. This is a life experience that has its structural roots in the complex history of the modern world; in which much of the global population is compelled by a combination of macro-economic factors, corporate greed, and addiction, to consume cheap calories in the form of sugar, and to pay a heavy price with diabetes-ridden bodies and premature death. This is a life experience that may also be characterised by other forms of compulsive behaviour, such as alcoholism, again rooted in the thick tar of modern life and human frailty, but it is purely social convention that allocates one form of addiction to rehab and a 12-step programme, and another to a chronic club.

Patient empowerment

Among individuals with chronic conditions, empowering individuals to be able to care for themselves has shown to improve health-related behaviours such as adherence, and ultimately, health outcomes.^{12,13} This form of empowerment is likely to impact every step of the patient journey, and its absence may result in a failure to engage effectively with the health system. It has been highlighted among diabetic individuals (as described in brief 8), and is seen as fundamental to providing patient care.¹⁴

The Gartner Hype Cycle is used to describe the process that follows the diagnosis of a patient with a chronic disease (Figure 1).¹⁵ The cycle tracks an inevitable period of disillusionment following the diagnosis of a lifelong condition, before a level of empowerment, also termed activation, is reached. To reach a level of empowerment, consistent patient support from healthcare providers is required.¹⁶ The need for support has also been highlighted in South African health research.¹⁷

Figure 2: The Gartner Hype Cycle



To prevent overburdening health facilities with this additional support role, a community-based approach is recommended. Peer support has been shown to be effective in this regard, particularly among marginalised communities.^{18–21} The Western Cape on Wellness programme (branded WoW!) advocates for the adoption of health-promoting behaviours and environments and aims to prevent, reduce and improve the management of NCDs. The broader goal of the programme is to improve wellness at a population level.²²

Evidence suggests that patient care can be enhanced through the integration of community-based programmes. This will support patient empowerment and reduce the burden of NCDs on the health system.

A pill a day keeps the doctor away

Adherence is central in the chronic management of all NCDs. However, non-adherence is widespread and results in at least 100,000 preventable deaths and 100 billion USD in preventable medical costs per year, globally.²³ Due to this, improving adherence has been emphasised as a target of several interventions in this series of briefs.

The reasons for non-adherence are often unclear and multifactorial, and are measured against an ideal level that would be required to achieve the best clinical outcomes. A recent Spanish study²⁴ indicated the complexity of dealing with non-adherence by showing that no single factor in the World Health Organization (WHO) framework for managing chronic conditions at a primary care level²⁵ can determine adherence. This includes social and economic, healthcare team and system-related, condition-related, therapy-related, and patient-related dimensions. Five factors were independently associated with improved adherence: (i) older age, (ii) use of a lower number of facilities to obtain medication, (iii) receiving complete information about treatment, (iv) having adequate knowledge about the medication regimen (and condition), and (v) having a self-perceived good quality of life. These factors indicate critical areas for action to improve adherence.

Several interventions can be utilised to achieve the goal of patient adherence in the community setting. This includes community pharmacists and the creation of a “home pharmacy” environment for all patients. Chronic medication services such as the Chronic Dispensing Unit (CDU) system in the Western Cape and the Centralised Chronic Medicine Dispensing and Distribution (CCMDD) systems in other provinces have attempted to achieve this, allowing people to receive their medication in their homes or in nearby pickup points instead of having to visit health facilities. There is also a large and growing body of evidence available that demonstrates the value of Community Health Workers (CHWs) in adherence support. A study published in October 2020 showed that CHWs in Mpumalanga improved adherence to anti-seizure medication in epileptic patients. It also demonstrated this type of intervention’s cost-effectiveness.²⁶

Leveraging technology

Telemedicine is defined as “the use of medical information exchanged from one site to another via electronic communications to improve a patient’s health status. Closely associated with telemedicine is the term ‘telehealth’ which is often used to encompass a broader definition of remote healthcare that does not always involve clinical services.”²⁷ Although many forms of this telemedicine have emerged over the past few decades, the utilisation of telehealth has been amplified by the Covid-19 pandemic, the impact of which has been described in several briefs in this series. The pandemic has led to limited in-person consultations in order to prevent exposure to the virus. In parallel with this development, regulations relating to the practical application of telehealth have been significantly relaxed, allowing for more widespread use of technology to provide and receive healthcare.²⁸

Telehealth can be used to improve access to care in a convenient way. However, it can also be used more proactively to prevent negative outcomes. A telemedicine initiative that arose during the first wave of the pandemic in the Western Cape, and is an ongoing initiative within the province, is evidence of this.²⁹ Through the use of telemedicine, high-risk diabetic patients who contracted Covid-19 were contacted daily to provide them with pre-emptive admission to hospital early on in the disease process. This proactive response to care prevented complications and reduced the number of deaths by 20% among high-risk individuals. Furthermore, this intervention was found to be cost-effective.

Conclusion

This brief provides an overview of several components of the health system that can be leveraged to effectively change the landscape in which NCDs have flourished in South Africa. This list of factors mentioned is by no means complete, and none of these components are self-contained. These interventions aim to build a health system in which every human life, from the moment of conception to its final passing, is afforded the knowledge and the opportunity to prevent NCDs, as well as the empowerment to manage them effectively if they develop. As technology becomes more accessible, it can be used to improve supply and demand for healthcare. Importantly, mobilising community-based resources, such as CHWs, may help to achieve community-based prevention and address the burden of NCDs by supporting patients throughout the life cycle, offering a more cost-effective approach to the prevention and management of NCDs.

References

1. FHI. FHI Solutions acquires 1,000 Days to strengthen a healthy start in life – 1,000 Days. Published 2020. Accessed June 24, 2021. thousanddays.org/updates/fhi-solutions-acquires-1000-days-to-strengthen-a-healthy-start-in-life/
2. The World Bank. Why nutrition is a smart development investment. Investing in Health. Published 2017. Accessed July 22, 2021. blogs.worldbank.org/health/why-nutrition-smart-development-investment
3. Sarah Cusick, Michael Georgieff. The first 1,000 days of life: The brain's window of opportunity. Published 2013. Accessed June 24, 2021. www.unicef-irc.org/article/958-the-first-1000-days-of-life-the-brains-window-of-opportunity.html
4. Britto PR, Lye SJ, Proulx K, et al. Nurturing care: promoting early childhood development. *Lancet*. 2017;389(10064):91-102. doi:10.1016/S0140-6736(16)31390-3
5. Kvalevaag AL, Ramchandani PG, Hove O, Assmus J, Eberhard-Gran M, Biringir E. Paternal mental health and socioemotional and behavioral development in their children. *Pediatrics*. 2013;131(2). doi:10.1542/peds.2012-0804
6. Rahman A, Fisher J, Bower P, et al. Interventions for common perinatal mental disorders in women in low- and middle-income countries: a systematic review and meta-analysis. *Bull World Health Organ*. 2013;91(8):593-601. doi:10.2471/BLT.12.109819
7. Singla DR, Kumbakumba E, Aboud FE. Effects of a parenting intervention to address maternal psychological wellbeing and child development and growth in rural Uganda: A community-based, cluster-randomised trial. *Lancet Glob Heal*. 2015;3(8):e458-e469. doi:10.1016/S2214-109X(15)00099-6
8. Aboud FE, Singla DR, Nahil MI, Borisova I. Effectiveness of a parenting program in Bangladesh to address early childhood health, growth and development. *Soc Sci Med*. 2013;97:250-258. doi:10.1016/j.socscimed.2013.06.020
9. Fernald LC, Gertler PJ, Neufeld LM. Role of cash in conditional cash transfer programmes for child health, growth, and development: an analysis of Mexico's Oportunidades. *Lancet*. 2008;371(9615):828-837. doi:10.1016/S0140-6736(08)60382-7
10. Hodnett ED, Gates S, Hofmeyr GJ, Sakala C. Continuous support for women during childbirth. *Cochrane Database Syst Rev*. 2013;2013(7). doi:10.1002/14651858.CD003766.pub5
11. Early Childhood Workforce Initiative. Community Health Workers and the Expansion of First 1000 Days Services in South Africa.; 2018. Accessed June 24, 2021. [https://www.socialserviceworkforce.org/system/files/resource/files/Community Health Workers and the Expansion of First 1000 Days Services in South Africa.pdf](https://www.socialserviceworkforce.org/system/files/resource/files/Community%20Health%20Workers%20and%20the%20Expansion%20of%20First%201000%20Days%20Services%20in%20South%20Africa.pdf)
12. Náfrádi L, Nakamoto K, Schulz PJ. Is patient empowerment the key to promote adherence? A systematic review of the relationship between self-efficacy, health locus of control and medication adherence. *PLoS One*. 2017;12(10). doi:10.1371/journal.pone.0186458
13. Rappaport J. Terms of empowerment/exemplars of prevention: Toward a theory for community psychology. *Am J Community Psychol*. 1987;15(2):121-148. doi:10.1007/BF00919275
14. Policy Research and Monitoring group (PRM) of the Council for Medical Schemes. Patient Experience Survey: Medical Schemes' Beneficiaries Living With Diabetes 2019/20.; 2021
15. Medisafe. Redesigning the Patient Activation Cycle

References

16. RL K, TC A. Convoys over the life course: attachment, roles, and social support. *Life-span Dev Behav.* 1980;3:253-286. Accessed June 24, 2021. <http://europepmc.org/article/AGR/IND87098315>
17. Murphy K, Chuma T, Mathews C, Steyn K, Levitt N. A qualitative study of the experiences of care and motivation for effective self-management among diabetic and hypertensive patients attending public sector primary health care services in South Africa. *BMC Health Serv Res.* 2015;15(1):1-9. doi:10.1186/s12913-015-0969-y
18. Presley C, Agne A, Shelton T, Oster R, Cherrington A. Mobile-Enhanced Peer Support for African Americans with Type 2 Diabetes: a Randomized Controlled Trial. *J Gen Intern Med.* 2020;35(10):2889-2896. doi:10.1007/s11606-020-06011-w
19. Kaunonen M, Hannula L, Tarkka MT. A systematic review of peer support interventions for breastfeeding. *J Clin Nurs.* 2012;21(13-14):1943-1954. doi:10.1111/j.1365-2702.2012.04071.x
20. Boardman G, Mccann T, Kerr D. A peer support programme for enhancing adherence to oral antipsychotic medication in consumers with schizophrenia. *J Adv Nurs.* 2014;70(10):2293-2302. doi:10.1111/jan.12382
21. Yin J, Wong R, Au S, et al. Effects of providing peer support on diabetes management in people with type 2 diabetes. *Ann Fam Med.* 2015;13(Suppl 1):S42-S49. doi:10.1370/afm.1853
22. Creating a Culture of Wellness Together! WesternCape on Wellness (WoW!); 2019
23. Kleinsinger F. The Unmet Challenge of Medication Nonadherence. *Perm J.* 2018;22. doi:10.7812/TPP/18-033
24. Fernandez-Lazaro CI, García-González JM, Adams DP, et al. Adherence to treatment and related factors among patients with chronic conditions in primary care: A cross-sectional study. *BMC Fam Pract.* 2019;20(1):1-12. doi:10.1186/s12875-019-1019-3
25. E Sabaté. *Adherence to Long-Term Therapy: Evidence for Action.*; 2003
26. Wagner RG, Norström F, Bertram MY, et al. Community health workers to improve adherence to anti-seizure medication in rural South Africa: Is it cost-effective? *Epilepsia.* 2021;62(1):98-106. doi:10.1111/epi.16756
27. Digital Healthcare Association. *Practice Guidelines for South African Telemedicine.*; 2020
28. Percept Actuaries and Consultants. *No More Waiting Room.*; 2020
29. David NJ, Brey Z, Ismail M. Telemedicine in the Western Cape Department of Health during the first peak of the COVID-19 pandemic: Leveraging data to save lives by activating a telemedicine response. *African J Prim Heal Care Fam Med.* 2021;13(1). doi:10.4102/phcfm.v13i1.2954
30. Lambert E V., Kolbe-Alexander TL. Innovative strategies targeting obesity and non-communicable diseases in South Africa: What can we learn from the private healthcare sector? *Obes Rev.* 2013;14(S2):141-149. doi:10.1111/obr.12094
31. Patel D, Lambert E V., Da Silva R, et al. Participation in fitness-related activities of an incentive-based health promotion program and hospital costs: A retrospective longitudinal study. *Am J Heal Promot.* 2011;25(5):341-348. doi:10.4278/ajhp.100603-QUAN-172
32. Yang YT, Nichols LM. Obesity and Health System Reform: Private vs. Public Responsibility. In: *Journal of Law, Medicine and Ethics.* Vol 39. J Law Med Ethics; 2011:380-386. doi:10.1111/j.1748-720X.2011.00607.x

References

33. Sturm R, Patel D. Preventing chronic disease: integrating health care and health promotion in South Africa. *Heal Aff*. Published online 2013.
34. Patel DN, Lambert E V, Da Silva R, et al. The association between medical costs and participation in the vitality health promotion program among 948,974 members of a South African health insurance company. *Am J Heal Promot*. 2010;24(3):199-204. doi:10.4278/090217-QUAN-68R2.1
35. Sturm R, An R, Segal D, Patel D. A cash-back rebate program for healthy food purchases in South Africa: Results from scanner data. *Am J Prev Med*. 2013;44(6):567-572. doi:10.1016/j.amepre.2013.02.011
36. Ada Jansen, Elizabeth Stolz, Derek Yu. Improving the Targeting of Zero-Rated Basic Foodstuffs under Value Added Tax (VAT) in South Africa – An Exploratory Analysis - Research on Socio-Economic Policy (RESEP).; 2017. Accessed June 24, 2021. <https://resep.sun.ac.za/improving-the-targeting-of-zero-rated-basic-foodstuffs-under-value-added-tax-vat-in-south-africa-an-exploratory-analysis/>
37. Basu S, Seligman H, Bhattacharya J. Nutritional policy changes in the supplemental nutrition assistance program: A microsimulation and cost-effectiveness analysis. *Med Decis Mak*. 2013;33(7):937-948. doi:10.1177/0272989X13493971
38. Eyles H, Ni Mhurchu C, Nghiem N, Blakely T. Food Pricing Strategies, Population Diets, and Non-Communicable Disease: A Systematic Review of Simulation Studies. *PLoS Med*. 2012;9(12):e1001353. doi:10.1371/journal.pmed.1001353