Obesity, healthy eating and physical activity health trends in Tonga and the implications for the prevention and control of NCDs

Dr Toakase Fakakovikaetau, Saia Faletau, Seini Filiai, Sara Gloede, Sione Hufanga, Dr Veisinia Matoto, Elisiva Naati, Dr Reynold 'Ofanoa, Dr Taniela Palu, Dr 'Ofa Tukia

TongaHealth

MINISTRY OF HEALTH
TONGA

Executive Summary

This report is a review by local health experts on relevant epidemiological data and reports (for example NCD screening data and economic analysis) in relation to health eating and physical activity in Tonga. The report aims to build a shared understanding amongst NCD stakeholders about health trends in Tonga, and the implications of these trends for the new NCD Strategy design. The report recommends priority groups and behaviours to maximise the health impact of the new NCD strategy.

The report recommends the following goals and targets for the 5-year strategy period:

Goal 1: Reduce the level of obesity and overweight amongst women who are entering, or are in, their child bearing years
- **Target 1:** Halt the number of pregnant women 34 and under with gestational diabetes
- **Target 2:** Halt the number of pregnant women with gestational diabetes who develop type 2 diabetes within 5 years of delivery
- **Target 3**: Halt the prevalence of overweight and obesity amongst females ages 16-25

Goal 2: Reduce the prevalence of overweight and obesity in children and adolescents
- **Target 1:** Increase by 5% mothers exclusively breastfeeding until 6 months and improve awareness and attitudes towards breastfeeding along with complementary feeding until age 2
- **Target 2:** Halt the prevalence of overweight and obesity amongst school-aged children

Goal 3: Reduce the prevalence of NCD related premature death
- **Target 1:** Halt the number of 25-64 year olds at high or medium risk of NCD as defined by the WHO STEPS survey criteria
- **Target 2:** Improve by 10% the number of patients who are engaged in appropriate management of their blood sugar, blood pressure and/or blood lipids
- **Target 3**: Reduce by 5% the weight of at least 10% of adults who are non-diabetic, over 30, overweight or obese and have a family history (parent or sibling) with diabetes
- **Target 4:** Strengthen early detection of NCD related cancers

Goal 4: Undertake intensive legislative, regulatory and policy action to make healthy lifestyle behaviours easy, accessible and attractive
- **Target 1:** 80% of recommendations of the Health in All Policy Review successfully implemented

The recommendations in this report have sought to identify targets that can be measured using existing data collection. This will reduce monitoring and evaluation costs and build shared ownership over progress. It is recommended that the Ministry of Health (MoH) incorporate the NCD Strategy indicators relating to health data into the MoH Corporate Strategy.

There is a need to strengthen the way in which data is collected and reported in Tonga to inform NCD policy making. In particular, there is limited evidence about the health status of young adults

and about eating patterns and behaviours. Clearer reporting of the underlying causes of mortality would also be helpful to effective policy making.

The NCD Strategy should carefully consider the co-morbidity that exists between NCDs and disability, in particular preventative disabilities such as diabetic amputation. There are also strong linkages between mental disorders and major NCDs such as heart disease and diabetes. Mental health should be considered as a stand-alone NCD issues as well as a cross cutting issue in relation to the prevention and control of diabetes and heart disease.

To be effective, it is critical that the strategy seek to make change through the judicious use of a range of levers, including:

- Evidence based policy, regulatory and legislative action
- Carefully designed and planned health education and community mobilisation actions that seek to specifically address known barriers and facilitators to behaviour change for priority target groups in Tonga, this includes building on existing strengths

An ongoing financial commitment to funding prevention and maintaining the engagement and political commitment of multi-sectoral stakeholders will be paramount to achieving change through the NCD Strategy.

Finally, achieving population level change takes time and it is important to ensure multi-year investment and commitment to preventative strategic priorities.

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1. Background

In February 2015, TongaHealth was appointed to the role of secretariat to the National Non-Communicable Disease Committee and, as a result, is responsible for the co-ordination of the design of the National NCD Strategy to Control and Prevent NCDs 2015-2020.

TongaHealth has adopted a best-practice, evidence-based design approach for undertaking this design (annex a), the first step of which is to undertake a detailed situational analysis that uses international and local evidence to, with full consideration of the Tongan context, make recommendations on the target groups, target behaviours and intervention modalities that the National NCD strategy design should target in order to maximise reductions in NCDs in Tonga.

The situational analysis process is the 'foundation piece' of the National NCD Strategy 2015-2020.

To ensure that the situational analysis recommendations are based on sound evidence and technical input, a set of technical documents, including this report, were developed to support the panel to make evidence-based recommendations.

This report is a review by local experts on the Kingdom of Tonga NCD Risk Factor STEPS Report and other relevant epidemiological data and reports (for example NCD screening data and economic analysis) and is designed to support the situational analysis group to clearly understand clinical and epidemiological trends in Tonga, and the implications of these trends for the NCD Strategy design.

In addition, a mid-term review of the Hala Fononga: National NCD Strategy to Prevent and Control NCDs 2010-2015 recommended that there was a need to strengthen the integration of multi-sectoral and clinical actions for primary and secondary prevention, and the recommendations of this paper seek to consider this need for integration.

Finally, it is important that the new NCD Strategy seek to understand and build on the work of the Hala Fononga 2015-2020, and an end of term review scheduled for July 2015 will support this.

2. Purpose

The purpose of this review is to produce a 4-10 page report that is in lay terms, draws on relevant health data and the experience of the panel to summarise Tonga's health profile and trends in order to make recommendations about priority:

- target groups and interventions
- areas for additional research
- opportunities for linkage and co-ordination between the NCD strategy and the primary health setting to maximise NCD prevention and control
- recommendations for strengthening of data collection and synthesis in Tonga to assist policy decision making

3. Method

The review team consisted of medical experts from both public health and clinical settings; an economist, a statistician and a nutritionist. This group was supported by an NCD/Health Promotion advisor who acted as secretariat to the group and who collated the final report.

The group met over a series of meetings. The first meeting focused on finalising a list of documentation and relevant clinical data based on the knowledge of the group and taking into account relevant documents identified through a recently completed systematic review of obesity literature relating to Tonga.1

Prior to the second meeting, a matrix was developed that summarised and categorized the recommendations and findings of the selected documents.

This matrix supported the team to, during a second meeting, identify broad target groups. There was consensus amongst the groups for:

- Young women
- Children and adolescents
- Those at a high risk of premature death

Following these preliminary meetings, the group secretariat met with and corresponded with small groups or individuals to tease out how to further break down target groups within these broad groupings, potential interventions, indicators aligned to existing data collection, linkages between prevention and primary health along with recommendations for strengthening of data collection and synthesis in Tonga to assist policy decision making.

Findings were collated into a draft report that was circulated amongst group members for feedback and revision prior to completion of the first draft. The first draft was sent for peer review and feedback was provided by Dr. Wendy Snowden from the WHO Western Pacific Office and Dr. Philayrath Phongsavan from the University of Sydney's Preventative Research Collaboration. This feedback was considered and consolidated by the authors prior to creation of a final version of this document.

This report makes general comments and recommendations in relation to indicators and interventions, but notes that both indicators and interventions should be driven through a design process that will allow the formulation of accurate short, medium and long term indicators of progress towards targets. The design process should also ensure alignment of the indicators to the Tonga Strategic Development Framework, Ministry of Health Corporate Strategy and relevant international and regional NCD monitoring frameworks.

4. Recommendation 1

*Reduce the level of obesity and overweight amongst women who
are entering, or are in, their child bearing years*

4.1 Overarching Rationale

There is strong evidence to support targeting reductions in women's overweight and obesity before and during their childbearing years, including:

- Adverse maternal health, including under-nutrition, obesity, and diabetes can program chronic disease into developing foetus *in-utero*, transferring NCD risk to the next generation.[2]
- Whilst not collated and reported, Diabetic health specialists in Tonga suggest that clinical data shows strong family clusters of diabetic prevalence and correlations between the very early onset of diabetes (teenage onset) and having been the child of a mother with gestational diabetes mellitus.
- 2015 screening of approximately 25% of pregnant mothers showed that 22% had gestational diabetes and that 87% of first trimester mothers were overweight or obese[3]
- Research findings from a Finnish Diabetes Prevention Study found that whilst dietary composition and physical activity are important in diabetes prevention, their effect on diabetes risk is in large part, although not entirely, mediated through resulting weight reduction.[4]
- Decisions about food and nutrition are often made by women, meaning that positively influencing food purchasing and preparation habits of women will impact the whole family.
- Interventions in early life often offer the best chance for primary prevention and should start with maternal health.[5]
- Data from the Ma'alahi Youth Project shows that by 17 years of age, 68.2% of girls are overweight or obese (compared to 42.8% of boys).[13]
- Over 30% of women have low levels of physical activity, compared to 15.1% of men.[6]
- 77% of women are obese compared to 57.2% of men.[6]
- Of those who are obese, women are more severely obese than men.[7]
- At all ages, women have higher levels of diabetes than men.[5]
- Assessed against the WHO STEPS Survey combined risk factor metric, women are more likely to be at high risk (meaning they have 3-5 risk factors) of developing NCDs than men[6]. This is despite the much lower levels of smoking amongst women and may be reflective of the higher levels of overweight/obesity and physical inactivity amongst women.
- The STEPS risk factor finding is reflected in screening data which indicates that 51% of women have a severe to very severe risk of NCD due to obesity compared to 28% of men[6]
- The Tonga Demographic Health Survey reports that "*a healthy, varied and low-fat diet is especially important to women who are pregnant and breastfeeding. Around 70% of women in the highest wealth quintile, living in urban Tonga reported eating high-fat foods. This contrasts with less than 50% of women in rural areas and the lowest wealth quintile.*"[8]

4.2 Outcome targets 1 and 2:

Target 1: Halt the number of pregnant women 34 and under with gestational diabetes

Target 2: Halt the number of pregnant women with gestational diabetes who develop type 2 diabetes within 5 years of delivery

4.2.1 Outcome Rationale:

The mean age of for a Tongan woman to give birth to her first child is 24.9 years[8] and in 2013 85% of all births were to mothers 34 or younger. 24.7% of women aged 25-44 have impaired fasting glycaemia.

Preliminary analysis of data from gestational mothers screening that is currently underway (approximately 25% of pregnant mothers have been screened so far) shows that approximately 22% have gestational diabetes and that 87% of first trimester mothers are overweight or obese[9]. Once complete, this data will serve as a highly valid baseline for the NCD Strategy.

Children born to women with gestational diabetes are at increased risk of developing NCDs in later life, gestational diabetes also increased the chances of birth complications. Women who develop GDM are at an increased risk of later developing Type 2 diabetes[10].

Diabetes prevention studies have demonstrated success through intensive lifestyle interventions in reducing or delaying the onset of diabetes mellitus amongst those with impaired fasting glycaemia[4].

The intensive nature of these lifestyle interventions make them relatively high cost, however cost effectiveness analysis of interventions for prevention and control for diabetes ranked 'intensive lifestyle interventions to prevent type 2 diabetes amongst persons with impaired glucose tolerance compared to standard lifestyle recommendations' as 'very cost effective'[11]. Because adverse maternal outcomes transfer NCD risk to the next generation, reducing the prevalence of diabetes in women of child-bearing age will have increased cost effectiveness through the health benefits for the women themselves and their children over their life-course.

4.2.2 Intervention options:

Intensive lifestyle intervention for women under 34 with, or at high risk of, impaired glycaemia should be considered. These interventions should draw on demonstrated successes, such as the Finnish and the American Diabetes Prevention Studies that provided individually tailored physical activity plans and multiple counselling sessions with nutritionist. Importantly, these interventions should also be carefully adapted to the Tongan context and address women with, and at risk of developing, impaired glycaemia. Research suggests that preventative actions may be more successful in avoiding the onset of diabetes if they are targeted at all high-risk individuals, rather than focusing on those with impaired glycaemia. [11]

75% of mothers report having had at least 4 antenatal care visits for their last birth and 99.9% of mothers receive post-partum care[12]. This demonstrates a strong engagement between gestational mothers and the health system, and any lifestyle interventions targeting gestational mothers should be integrated appropriately to existing health programs.

In 2015 the Ministry of Health has collected gestational diabetes screening data across Tonga and comprehensive reproductive health data is collected annually, the monitoring of this target groups should be linked to existing screening and data collection activities.

4.3 Outcome target 3:

Halt the prevalence of overweight and obesity amongst females ages 16-25

4.3.1 Outcome target Rationale:

Increasing the number of women entering their child bearing years at a healthy weight will require reducing the level of overweight and obesity from adolescence, with Ma'alahi data showing that over 68% of girls being overweight or obese by 17 years of age[13]. This suggests that to reduce overweight and obesity amongst women of childbearing age requires addressing weight gain in girls from childhood into early adulthood.

4.3.2 Intervention options:

Interventions for addressing overweight and obesity amongst children and adolescents are discussed in section 5 of this paper, however it is recommended that investment into weight management amongst children and adolescents be weighted towards girls, given the increased prevalence of overweight and obesity amongst girls and the corresponding risk for both mothers and babies if girls transition into their childbearing years overweight or obese.

Interventions that target women and girls 16-25 should:

- Be carefully designed to retain engagement by girls with physical activity as they transition into adulthood by building upon existing research and lessons learnt from physical activity promotion programs that have targeted this group. [19,20]
- Seek to build the target group knowledge attitude and behaviours in relation to eating a healthy diet that is protective against overweight, obesity and other NCDs such as cardio-vascular disease. This would include reductions in salt, saturated fat, trans fat and free sugar. Improving young women's healthy eating skills and behaviours is important because women are often responsible for food decisions (purchase and preparation) that impact the whole family. Research may be required to better understand the food purchasing and consumption patterns of the group, to ensure interventions are appropriately targeted.
- Address the socio-cultural norms and environmental barriers to achieving positive change, as discussed in section 7 of this report.

5. Recommendation 2

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Reduce the prevalence of overweight and obesity amongst children and adolescents

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5.1 Overarching Rationale

Interventions in early life often offer the best chance for primary prevention of NCDs.[14]

5.2 Outcome target 1

Increase by 5% mothers exclusively breastfeeding until 6 months and improve awareness and attitudes about breastfeeding along with complementary feeding until age 2.

5.2.1 Outcome target Rationale:

- Adults who were breastfed as babies are less likely to be overweight/obese. Breastfeeding also contributes to the health and well-being of mothers; it reduces the risk of ovarian and breast cancer, helps space pregnancies and helps women return to their pre-pregnancy weight faster[15], [16].
- The Tongan Demographic Health Survey[8] found that "Health improvements could be achieved by promoting longer and exclusive breast-feeding. Apart from contributing to better long-term child health outcomes, longer periods of exclusive breastfeeding (more women feeding until 6 months) also saves on household income (reduced expenditure on expensive formula), and has shown tangible secondary impacts on future eating habits, with non-breastfed children more likely to eat sugary foods (52%) and foods made with oil, fat and butter (46%), than breastfed children (28% and 25% respectively)."
- The WHO Global Action Plan which recommends that NCD strategies "promote and support exclusive breastfeeding for the first six months of life, continued breastfeeding until two years old and beyond with adequate and timely complementary feeding".
- Breast milk helps protect infants from common childhood illnesses such as diarrhea and pneumonia, the two primary causes of child mortality worldwide[16].
- Reproductive Health Data for 2013[12] shows that 61% of Tonga women are breastfeeding exclusively until 6 moths, but does not provide data on the number of women breastfeeding until infants are aged 2.

5.2.2 Intervention options

Intervention design must support and be integrated with existing programs, such as the work of reproductive nursing, and be adequately contextualised to Tonga through appropriate research. Evidence based interventions to strengthen exclusive breast feeding include[17]:

- Strengthening intra-partum and post-partum maternal care
- Policy and legislative action
- Peer support from mothers who are currently breastfeeding or who have breast fed in the past
- Improving maternal and community knowledge, skills and attitudes towards breastfeeding and healthy complementary feeding
- Provision of professional support to overcome breastfeeding problems
- Marketing initiatives include promotions and advertising that support or encourage breastfeeding

5.3 Outcome target 2
Halt the prevalence of overweight and obesity amongst school-aged children.

5.3.1 Outcome target Rationale:
- The Ma'alahi Youth Project showed that 55% of girls and 36% of boys are overweight or obese by their early teens, overweight or obesity with the same cohort rose to 68.2% for girls and 42.8% amongst boys within three years showing that adolescent weight gain is of significant concern.[13]
- Almost one in five children under 5 years of age are overweight or obese for their height. [13]
- Nearly 6 out of 10 students report daily consumption of carbonated beverages (soft-drink).[18]
- Only one in four students meet recommended guidelines for physical activity.[18]
- Nearly two out of 3 students do not meet guidelines for consumption of vegetables.[18]

5.3.2 Intervention options
It is important that addressing the prevalence of overweight and obesity amongst school age children draw on lessons learnt from the Ma'alahi Youth Project. Evaluations of the MYP found that:

- Effective programs require good leadership, comprehensive planning, widespread community engagement, multiple approaches, multiple partnerships, extensive capacity building, adequate intervention dose and most importantly, community-based initiatives designed, implemented and monitored in a culturally context perspective.[19]
- A strong emphasis is needed on addressing socio-cultural barriers to healthy behaviours and implementing more policy, as well as regulatory approaches at the national and local levels.[19]
- The MYP program comprised a wide range of activities conducted in multiple settings, touched a broad spectrum of the population (wider than the target group), but the dose and frequency of activities were generally insufficient and not sustained.[19]

Drawing on these lessons, it is critical that interventions for addressing overweight and obesity amongst children are intensive, multi-year, well planned and seek to address social, cultural and environmental influences. Interventions should include, but not be limited to:

- Implementation of the WHO's recommendations on the marketing of foods and non-alcoholic beverages to children
- Evidence informed public campaigns and community engagement
- Intensive policy and regulatory actions (discussed in more detail in section 7)
- Creation of health and nutrition promoting environments in schools, child care centres etc
- It is recommended that innovative, technology based solutions be explored. Research into women's physical activity in Tonga has shown that being time poor and lacking someone to exercise with are barriers to women being more active[20]. VicHealth identified similar barriers to participation amongst Victorian women and part of their solution was a mobile app that allows women to link with other women in their areas looking for physical activity partners or organisations offering activities[21]. This type of technology based solution can be fairly low cost, can facilitate communities and individuals leading change and is likely to be popular amongst a younger, highly tech savvy demographic.

6. Recommendation 3

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Reduce NCD related premature death

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6.1 Overarching Rationale

- Based on STEPS 2012 data, 99% of the adult population is at moderate to high risk of developing NCDs, with 57% of the adult population at high risk and a further 42% is at moderate risk.
- A 2012 revision of life expectancy in Tonga, estimated life expectancy at 60.4 to 64.2 years for males and 65.4 to 69.0 for females, well below previously published estimates. The authors attributed the high level of premature adult mortality to the "profound limiting effect of NCDs on the health status in Tonga"[22].
- Age-standardized rates for cardiovascular diseases, neoplasms, and diabetes increased significantly between 2001 to 2004 and 2005 to 2008.
- World Bank economic analysis of NCDs in the Pacific regions suggests that high risk, *premature* deaths, would appear to be a priority because of widespread prevalence of multiple risk factors, and the relatively high level of premature NCD deaths[2]
- The World Bank report further recommends prioritising primary prevention noting the cost to government of diseases like Type 2 diabetes e.g. every person in Vanuatu who changes their lifestyle through primary prevention and avoids becoming a newly diagnosed Type 2 diabetes patient saves the government a minimum of $347 per year
- Lifestyle interventions are highly cost effective, measures against QALY (quality of life year), they cost $US60 per QALY, as opposed to $US1810 for maintaining optimal glycemic control and $US3330 for cholesterol control[11]
- Tonga has been very successful in screening the adult population. To prevent premature death and disability, an important follow up to screening is the management of hi-risk individuals through clinical management and lifestyle counseling[23] [11,7]
- Because the Ministry of Health is under pressure to meet the clinical needs of the very large at risk cohort, there is an opportunity for the NCD Strategy to strengthen the lifestyle and counselling components of primary care protocols.

6.2 Outcome target 1

Halt the number of 25-64 year olds at high or medium risk of NCD as defined by the WHO STEPS Survey

6.2.1 Outcome target Rationale:

In 2008, 23% of deaths amongst women and 28% of death amongst men aged 15-64 were from diseases of the circulatory system, namely ischemic heart disease and cerebrovascular disease (stroke). Hypertension (raised blood pressure) is a leading cause of both heart disease and stroke. 18% of death amongst women and 19% amongst men aged 15-64 were due to diabetes[24]. This suggests that the program design should consider a focus on reducing premature death from diseases of the circulatory system and diabetes. There is significant co-morbidity between the diseases.

Weight loss, healthier diet and increased exercise are critical for the prevention of premature death from both diseases of the circulatory system and diabetes. In particular, moving away from energy dense, processed foods towards higher fibre, nutrient rich foods that are lower in trans and saturated fats, salt and sugar and which contribute to weight management is critical, as is meeting physical activity guidelines.

6.2.2 Intervention options

Because 99% of Tongan adults are at medium to high risk of NCD it may be necessary to consider interventions that can increase physical activity and healthy diet at scale, as well as the intensive style of diabetes prevention interventions discussed above in relation to gestational mothers. Using mass media to promote awareness about healthy eating is considered by the WHO as a 'best buy' intervention[25]. However it is critical that mass media campaigns are imbedded into targeted, multi-pronged campaigns that use evidence to address the local determinants of health (including social and cultural values and norms). As figure 1 shows, mass media campaigns should be considered an enabling umbrella under which a range of actions drive behavior change. As the WHO notes in their "Interventions to address diet and physical activity: What Works" report[26], it is critical that mass media campaigns:

- Focus on "Consistent, coherent, simple and clear messages that are communicated through many channels and in forms appropriate to local culture, age and gender."
- Are underpinned by "community-based, supportive activities such as programs in schools and local communities and policies to address local environmental barriers to participation". For example community based action could include building the supply of local, low cost physical activity (such as walking groups, sporting activities for all ages) by training community based volunteers and at the same time creating a mechanism for health centers' to refer at risk patients to physical activities in their local area.
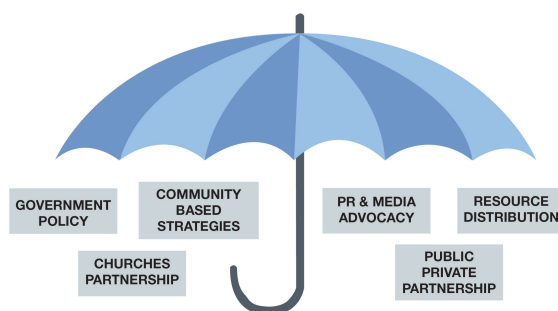

Figure 1

6.3 Outcome target 2

Improve by 10% the number of patients who are engaged in appropriate management of their blood sugar, blood pressure and/or blood lipids

6.3.1 Outcome target Rationale:

- The WHO states that "*many patients with chronic illnesses including hypertension and diabetes have difficulty adhering to their recommended medication regimens. This results in less than optimal management and control of the illness. Poor adherence is the primary reason for suboptimal clinical benefit (1,2). It causes medical and psychosocial complications of disease, reduces patients' quality of life, and wastes health care resources. Taken together, these direct consequences impair the ability of health care systems around the world to achieve population health goals.*"[27]
- Strengthening medication compliance is a highly cost effective way to reduce premature death and disability. For example, the WHO costings on USD$ per QALY (quality of life year) found that 76% of diabetes patients currently have a HbA1c of over 7%, suggesting poor compliance to diabetes management protocols[28]
- 33% of NCD register patients have more than a 10% chance of having a cardio-vascular event in the next ten years, again suggestive of poor compliance to lifestyle and medication recommendations
- Most admissions to the surgical ward for diabetic amputation are patients who have been 'defaulting' on attendance at the diabetes clinic[29]

6.3.2 Intervention options:
- Increased clinical engagement with diagnosed patients through strengthened universal coverage
- Improved provision of quality health promotion resources (pamphlets, posters etc) in relation to compliance specific to disease profiles (e.g. diet for hypertension etc)
- Improved qualitative and quantitative data collection on morbidity and mortality trends to inform evidence based designed health promotion and community mobilisation activities that increased compliance
- Increased participation of men in screening and clinic attendance

6.4 Outcome target 3

Reduce by 5% the bodyweight of at least 10% of adults who are non-diabetic, over 30, overweight or obese and have a family history (parent or sibling) with diabetes

6.3.1 Outcome target Rationale:
- Having a parent or sibling with diabetes is know to increase risk for developing type 2 diabetes[30], and National Diabetes Centre clinicians feel that there is significant clustering of diabetes amongst families in Tonga. This clustering can be due to both genetic factors and because families tend to have similar diet and physical activity
- Research shows that modest weight loss and regular physical activity can help prevent or delay type 2 diabetes by up to 58% in people with pre-diabetes. Modest weight loss means 5% to 7% of body weight[23]

6.3.2 Intervention options:

- Ensure 90% screening of all Tongans over 30 who have a parent or sibling with diabetes
- Deliver nutritional counselling and physical activity programs to those people who are not yet diabetic but are over 30, overweight or obese and have a family history (parent or sibling) with diabetes

6.5 Outcome target 4

Strengthen early detection of NCD related cancers

6.5.1 Outcome target rationale

- The MoH is currently working towards strengthening cancer management
- Cancer is the second leading cause of mortality in Tonga[31].
- 70% of all cancer is diagnosed in patients 69 years or younger[31]
- In 2014, 80% of cancer related deaths were people aged below 70, indicating that cancer is having a significant impact on rates of premature death in Tonga[31]
- Cancer patients are currently dying approximately 12 months after diagnosis, suggesting that cancer is not being detected early
- In 2014 67% of new cancer cases were female[31]
- Breast cancer is the leading cause of cancer incidence amongst women, representing 34% of all new incidence of cancer amongst women in 2014[31]
- Amongst men diagnosed with cancer in 2014, stomach/bowel cancer accounted for 12% of all diagnosis[31]

6.5.2 Intervention options:

- Strengthen early detection through population level cancer screening
- Improve population level cancer related health literacy

7. Reduce environmental barriers to healthy lifestyle behaviour

Undertake intensive legislative, regulatory and policy action to make healthy lifestyle behaviours easy, accessible and attractive

7.1 Overarching Rationale

- Environments that protect physical and mental health and promote healthy behaviour need to be created through multi-sectoral action, using incentives and disincentives, regulatory and fiscal measures, laws and other policy options[14]

- Effective NCD action requires health in all policies and whole-of-government approaches[14]

- Interventions that simply seek to educate or convince the Tongan population to make healthier choices **will not work without supportive policy action** that makes unhealthy choices less attractive (price, availability, amount of advertising) and healthy choices more attractive through being cheaper and easier to access[14,25,26].

7.2 Outcome target 1

80% of recommendations of the Health in All Policy Review successfully implemented

6.2.1 Outcome target Rationale:

Through its multi-sectoral NCD governance structure, Tonga has an existing commitment to multi-sectoral and whole-of-government action for the prevention and control of NCDs.

A Health in All Policy (HiAP) review is a way for partners to strengthen this existing commitment by collaboratively assess existing policy action and to identify priority policy action for delivery over the course of the NCD Strategy 2015-2020.

This review, being co-ordinated by TongaHealth, can and should draw on a 2009 research report "Policy Interventions to tackle NCDs and Obesity in Tonga: Findings from Local Research" that was a joint effort of the Ministry of Health, Fiji School of Medicine and key Tongan stakeholders.

The delivery of policy actions identified through the HiAP should be imbedded into the National Strategy, and the impact of policy action should seek to be captured through the strategies monitoring and evaluation processes.

8. General considerations when setting indicators

It is recommended that:

- Indicators are selected that can be monitored and reported on through existing screening and clinical data collection and reporting, or with feasible modifications to existing practice. Recommendations to this affect are made in Annex A

- When measuring indicators around reduction of overweight and obesity, that data collection methods capture reductions in the severity of obesity. The healthy BMI range is 18.5 – 24.9, with overweight being 25-29.9 and obese being a BMI of over 30. Obesity is further classified into Class 1, BMI of 30 – 34.9 (moderate risk of NCD), Class 2, BMI of 35 – 39.9 (severe risk of NCD) and Class 3, BMI of over 40 (very severe risk of NCD)32. Screening data indicates that 24% of women on Tongatapu have a BMI of over 40 and 27% have a BMI of 35 – 40, compared to 19 and 9% of men respectively. This means that if a shift from obesity to overweight is assessed without measuring reductions in obesity, reductions in the level of obesity amongst the 51% of women who are class 2 or class 3 obese would not be captured and the impact of the intervention may be under reported.

- Strong mid term indicators be developed through the design process, along with robust and regularly reported progress indicators.

9. Gender equity and social inclusion (GESI)

The following section is not intended to be a comprehensive (GESI) analysis but instead aims to touch on key topics that should be more fully considered through the NCD Strategy design process to ensure equity in Tonga's NCD prevention and control action.

NCD and Disability: there is significant co-morbidity between NCD and disability. Consideration should be given to the link between NCDs and preventable disability and how the strategy can contribute to reductions in preventable disability. A longitudinal study of a cohort of 4480 Tongan diabetic patients found that over the study period 6.1% required limb amputation, mostly of the lower leg, equating to 30 diabetes associated amputations per year[33]. The study also found vision impairment to be a significant concern, cataracts were recorded in 3.3% (149/4480) of patients and retinal abnormalities were present in 4.5%, or 203 patients (203/4480).

The strategy should ensure equitable access to health information and programs for people with a disability.

Mental Health: Mental disorders are a significant and underserviced NCD health issue in Tonga. There is co-morbidity between mental disorders and common NCDs such as heart disease. The Tenth Pacific Health Ministers meeting held in 2013 noted that:

- Mental disorders often affect and are affected by other diseases such as cancer, cardiovascular disease and diabetes. For example, there is evidence that depression predisposes people to myocardial infarction and diabetes, both of which conversely increase the likelihood of depression. Many risk factors, such as low socioeconomic status, alcohol use and stress, are common to both mental disorders and other NCDs.
- There are major information gaps for mental health service planning and delivery
- The growing prevalence of suicide amongst young males in several Pacific Countries, including Tonga
- Substantially more than 90% of people in PICs with mental disorders had received no care or

treatment in the previous 12 months

In addition, persons with serious mental illness, such as schizophrenia, bipolar disorder, and major depression, have premature mortality rates that are two to more than three times as high as the rate in the overall population and the primary cause of death in such persons is cardiovascular disease[34]. Hawaiian research found that "this may in part be because anti-psychotic medication are known to cause metabolic syndrome and other related conditions (overweight, dyslipidemia, diabetes mellitus) that increase the risk for heart disease[35]...and...calls attention to the importance of regular medical monitoring (i.e., lipids, glucose), encouraging healthy lifestyle, and psychoeducation to minimize the risk for these metabolic side effects[35]".

It is recommended that Tonga consider mental health as both a stand-alone aspect of the NCD strategy and also as a cross cutting issue when addressing NCD related morbidity and mortality.

Gender: It is important that intervention design be based on a sound understanding of the social-cultural and economic factors that impact on healthy behaviours. Evidence shows that gender is associated with differences in adherence to both healthy lifestyle and medication regime recommendations, for example a sample of patients with type 1 diabetes found men to be more physically active than the women but they also consumed more calories, ate more inappropriate foods[26].

Whilst this report does not make recommendations in relation to tobacco control, smoking is a major contributor to poor health outcomes, particularly amongst men and should be comprehensively addressed through the NCD strategy tobacco control component.

The lower engagement of men in NCD health screening is of a concern as it limits the Ministry of Health's ability to ensure early identification and management of NCDs. Activities that seek to improve men's screening should be considered.

Socio-economic status The association between socio-economic status and NCD is well established with the WHO stating that there are "links between chronic stress, which poverty can induce, restriction of healthy food choices and physical activity choices due to poverty; use of disposable income by the poor on commodities that contribute to NCDs, e.g. tobacco and alcohol; and illiteracy and lower education levels that often prevent health promotion from reaching the poor" [23].

Low socio-economic status combined with age can lead to other increased vulnerabilities, for example globally road users such as pedestrians or bicycle users account for most road fatalities with children and older people over-represented amongst this group due to their reliance non-motorised transport[36]. Active transport policy that increases separation of road users (e.g. through bike lanes) can help to address this issue whilst improving levels of physical activity.

Location: Disaggregation of surveys such as STEPS and the Reproductive Health Survey would support improved GESI sensitive policy formation.

It is known that location impacts on healthy lifestyle behaviours, for example pregnant mothers in urban areas more likely eat sugar/fat than their rural counterparts. Location may also impact access to NCD prevention and control programs and services. Equity of coverage for health services, including NCD prevention and control, is a high priority of the MoH as they move towards universal coverage of health care.

10. Strengthening evidence based policy-making

Timely, relevant reporting: There is a need to strengthen the way in which data is collected, collated and reported to track progress and to guide effective policy decision making in the future. The indicators designed to track the progress of the NCD Strategy 2015-2020 should be underpinned by regular, systematic data collection, collation and reporting.

Prioritisation of indicators: It is critical that staff understand the purpose and value of the data that they are collecting and are not asked to collect unreasonable amounts of data, or data that is not perceived as used or useful. Developing an Indicator framework may assist to identifying a limited set of priority indicators that will help ensure data collection and collation requirements are realistic and implementable.

Dissemination and use: Processes for reporting and sharing data with stakeholders and beneficiaries will help to ensure that the value of the data is understood, will assist data to drive program and policy decisions and allow transparent reporting of progress.

Improved disaggregation: Currently major reports such as STEPS and the Global School Health Survey do not disaggregate by location, socio-economic status or disability. The Demographic Health Survey partially disaggregates by location. Clinical screening data is collected by island, but there are not currently clear or systematic reporting modalities for this data.

The lack of disaggregated data makes gender, equity and social inclusion analysis difficult and strengthening the disaggregated reporting of survey and clinical data should be a priority for more informed policy decision making.

Reliance on self-report physical activity data Currently all data in relation to physical activity in Tonga is self-reported. Systematic reviews of the literature have found that "correlations between self-report and direct measures of physical activity are generally low-to-moderate and that self-report measures of physical activity were both higher and lower than directly measured levels of physical activity, which poses a problem for both reliance on self-report measures and for attempts to correct for self-report – direct measure difference"[37]. It is recommended that the NCD Strategy 2015-2020 conduct direct measurement validation studies amongst target groups samples at baseline at set evaluation points in order to validate self report data.

Healthy eating behavioural patterns As has been identified in both the Systematic Review of Obesity Literature in Tonga and the Healthy Eating Discussion Paper, more needs to be known about patterns of food purchasing and consumption, and the values and norms underpinning these patterns if healthy eating interventions are to be effective. The complexity of influences on food choice should be fully considered through the design process. Annex C provides an overview of these influences.

Tongan perspectives A common message in the literature is the need to adequately contextualise interventions according to the social, cultural and environmental factors that influence life in Tonga[1,5,19,26]. An important aspect of this is ensuring designs are based on the insight and perception of the target beneficiaries about barriers and opportunities to change and the use of recognised

models of behaviour change. This type of design approach has been found to be more effective in achieving behavioural outcomes[38].

Children, adolescents and young adults There is a gap in up-to-date, reliable data in relation to the heath of children and adolescents. The Global School Health Survey is now five years old, and the self report nature of the data should be treated with caution, as some finding were highly inconsistent with the direct measure data of the Ma'alahi Opic Project (although the Ma'alahi project was not nationally representative so comparisons should be treated with some caution). It is notable that because the Tonga STEPS currently measures from 25 years onwards and screening data focuses on age 30 and above, there is almost not data about older adolescents and young adults between school age and 25. The WHO recommends that STEPS be conducted from age 18-69, and Tonga should consider adopting this recommendation.

Men's screening: As is common elsewhere, it is challenge to attract men to screening in Tonga, resulting in less robust screening data relating to males 30 and above compared to women and reducing the chance of improved outcomes through early detection and management of NCDs. If this continues to be an issue, the Ministry of Health may wish to consider programs that specifically attract and engage men in screening.

Correlations between pregnancy frequency and female weight gain: Of the 1829 births in the year 2013 that were considered hi-risk, 59% were classified hi-risk due to being more than the fourth delivery for the mother, or being a birth less than two years from the mothers most recent birth.

If a correlation was found between women's weight and the frequency between births and the number of births, then targeting reductions in the number of children women birth and the number of births at less than 2 year intervals may not only reduce hi-risk births, but also women's overweight and obesity during their child-bearing years. However, further research to understand any potential correlations would be required.

Improved understanding of the underlying causes of morbidity and mortality: As has been identified by local research[22], there is a need to improve reporting of the underlying causes of mortality in Tonga, especially given the strong co-morbidity between diabetes, hypertension and heart disease[39]. Strengthening the reporting of underlying causes of mortality is important to support improved policy and program decision-making.

11. Conclusion

The findings of this report are drawn from Tongan epidemiological data but are also highly consistent with the recommendations of the WHO Global Action Plan to Prevent and Control NCDs which states that:

"supportive environments that protect physical and mental health and promote healthy behaviour need to be created through multisectoral action, using incentives and disincentives, regulatory and fiscal measures, laws and other policy options, and health education, as appropriate within the national context, with a special focus on maternal health (including preconception, antenatal and postnatal care, and maternal nutrition), children, adolescents and youth, including prevention of childhood obesity"

Given the breadth of NCD issues in Tonga, and the limited resources available to impact change, it is critical that Tonga invest in the most important areas and identify the most cost-efficient actions, which is why targeting preventative action early in the life-course is critical.

It is critical that the strategy seek to make change through the judicious use of a range of levers, including:

- Evidence based policy, regulatory and legislative action
- Carefully design and planned health education and community mobilisation actions that seek to specifically address known barriers and facilitators to behaviour change for priority target groups in Tonga, this includes building on existing strengths

An ongoing financial commitment to funding prevention and maintaining the engagement and political commitment of multi-sectoral stakeholders will be paramount to achieving change through the NCD Strategy.

Finally, achieving population level change takes time and it is important to ensure multi-year investment and commitment to preventative strategic priorities.

12. Recommendations

1. It is recommended that the National Strategy to Prevent and Control NCD address the following targets, with the targets listed in order of importance to support prioritisation of funding and resources:

   1. Reduce the prevalence of overweight and obesity amongst school aged children
   2. Reduce the level of obesity and overweight amongst women who are entering, or are in, their child bearing years
   3. Reduce NCD related premature death

Undertaking intensive legislative, regulatory and policy action to make healthy lifestyle behaviours easy, accessible and attractive should be seen as critical to achieving any and all of the above outcomes.

2. It is recommended that the strategy seek to ensure that a sufficient range and intensity of actions be undertaken for higher order targets and that other targets only be addressed if sufficient resources are available

3. Noting lessons learnt from interventions such as the Ma'alahi Youth Project, the Kau Mai Tonga project and from WHO guidelines, it is critical that actions to address change within any of the target groups be based on local evidence and encompass a range of intensive, integrated and multi-pronged actions including policy, regulation and wide-spread community mobilization to address the social, cultural, economic and individual determinants of health.

4. It is recommended that there be continued advocacy for maintenance and strengthening of funding for preventative action, in particular if Tonga increases revenue through further excise and taxation of unhealthy foods, drinks and tobacco consideration should be given to increase funding of preventative action

4. It is essential that the design process establishes clear, achievable and measurable targets and that monitoring and evaluation data is routinely collected and reported to assist continuous improvement and future policy decision-making. It is recommended that the Ministry of Health (MoH) incorporate the NCD Strategy indicators relating to health data into the MoH Corporate Strategy.

5. Change will not happen without strong, comprehensive and evidence based policy, legislative and regulatory action to reduce the economic, social and environmental barriers to healthy eating and physical activity. It is recommended that a Health in All Policy Review be undertaken in partnership with key stakeholders and that the resulting priority policy reform be imbedded into the NCD Strategy and its corresponding monitoring and evaluation frameworks.

6. It is recommended that Tonga consider mental health as both a stand-alone aspect of the NCD strategy and also as a cross cutting issue when addressing NCD related morbidity and mortality.

Annex A: table of goals, targets and indicators

Target	Indicators	How will it be measured?	Is there a valid existing baseline?	Comment	Babies and toddlers	Primary School Children	Adolescents	Young adults (18-25)	Adults 25-44
GOAL 1: Reduce the level of obesity and overweight amongst women who are entering, or are in, their child bearing years									
Target 1: Halt the number of pregnant women 34 and under with gestational diabetes Target 2: Halt the number of pregnant women with gestational diabetes who develop type 2 diabetes within 5 years of delivery	Trends in the % of pregnant women with gestational diabetes Trends in the % of GDM mothers who develop Type 2 diabetes within 5 years of delivery	Gestational Diabetes Intervention Taskforce national screening program at baseline, year 2 and year 5.	Yes. The 2015 GDIT screening data (some additional outer island data may be required).	Whilst interventions will target all women under 34, because healthy pregnancy is the goal, the outcome measure is via pregnant women	✓			✓	✓
Halt increase in the prevalence of overweight and obesity amongst females ages 16-25	% reduction in overweight and obesity amongst females aged 16-25	Reduction in overweight and obesity of Form 6 girls and pregnant mothers aged 25 and under at baseline, year 2 and year 5	GDIT screening data for pregnant mothers. There is no reliable baseline data for Form 6 girls.	Whilst a population level survey may be more ideal, the weight of pregnant women is data that is already collected. The mean age of birth in Tonga is 25.	✓		✓	✓	
Medium term targets relating to knowledge, attitudes and behaviours about the consumption of fruit and vegetables, salt, sugar, fat and physical activity to be determined through the design process									
GOAL 2: Reduce the prevalence of overweight and obesity in children and adolescents									
Increase by 5% mothers exclusively breastfeeding until 6 months and improve awareness and attitudes about breastfeeding along with complementary feeding until age 2.	% of mothers exclusively breastfeeding until 6 months, and breastfeeding along with complementary feeding until age 2	Reproductive health data, but the survey needs to be extended to include collection of data about breastfeeding at 2 years	Yes for exclusive breastfeeding until 6 months, no for feeding until 2 years, the reproductive health survey would need to be adjusted.		✓			✓	✓
Halt the prevalence of overweight and obesity amongst school-aged children	% reduction in the level of overweight and obesity amongst school aged children.	Reduction in overweight and obesity of primary and high school students at baseline, year 2 and year 5.	Rheumatic Heart Disease screening data for primary school.			✓	✓		
Medium term targets relating to knowledge, attitudes and behaviours about the consumption of fruit and vegetables, salt, sugar, fat and physical activity to be determined through the design process									

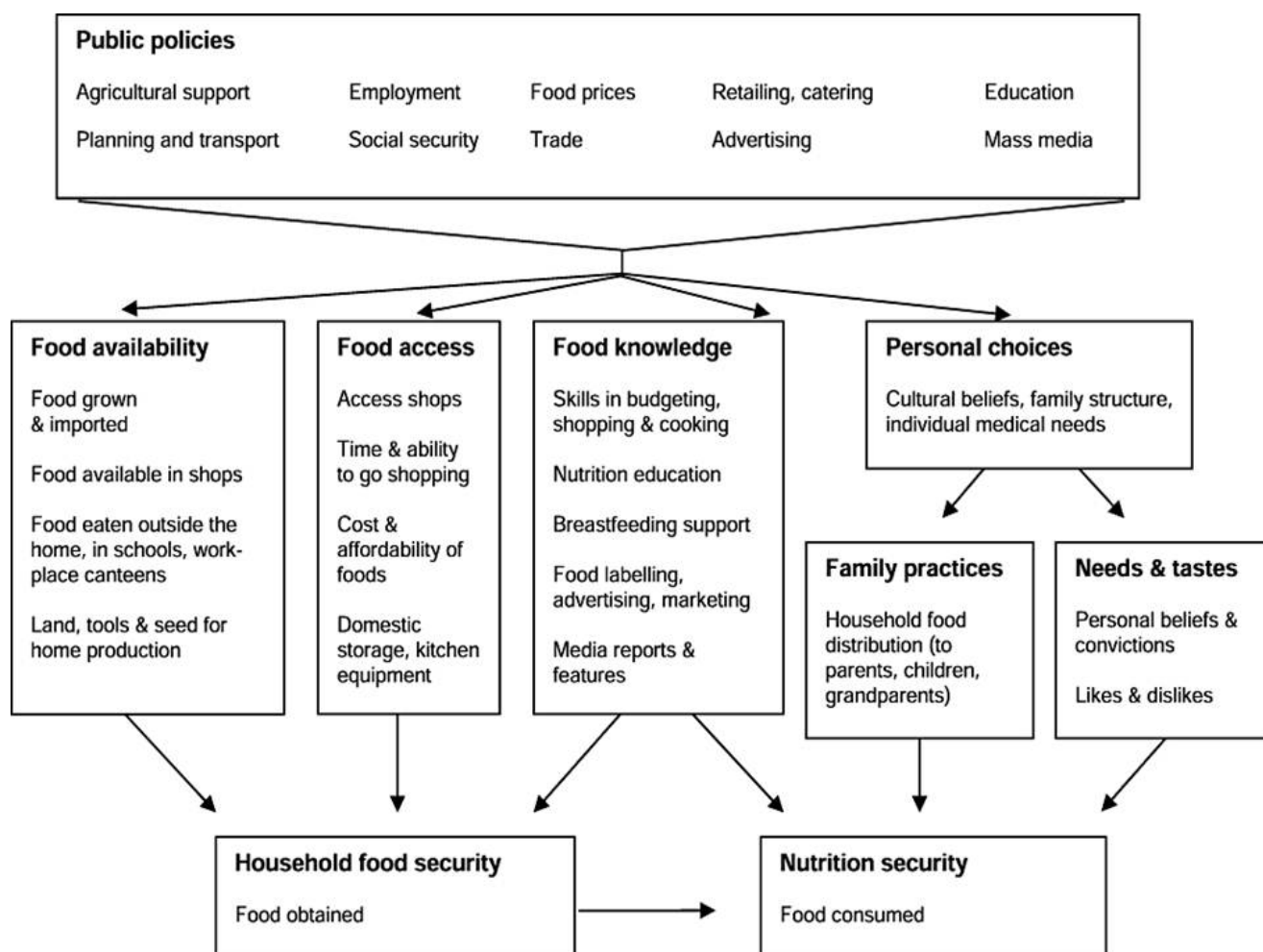| GOAL 3: Reduce NCD related premature death								
Halt the number of 25-64 year olds at high or medium risk of NCD as defined by the WHO STEPS survey criteria	% change in the number of 25-65 olds at high or medium risk of NCD	STEPS survey.	Yes, the STEPS survey	Because STEPS is every 5 years, NCD register data may also serve as a measure of this indicator. NCD Register data could be used for baseline given that STEPS was enumerated in 2012. This indicator will be affected by tobacco control action, in particular for men.			✓	✓
Reduce by 5% the bodyweight of at least 10% of adults who are non-diabetic, over 30, overweight or obese and have a family history (parent or sibling) with diabetes	% of adults who are non-diabetic, over 30, overweight or obese and have a family history (parent or sibling) with diabetes who have lost 5% or more of their bodyweight	NCD register and follow up data .	Yes	The screening of men would need to be improved for this data to be sufficient.				✓
Improve by 10% the number of patients who are engaged in appropriate management of their blood sugar, blood pressure and/or blood lipids	10% increase in the number of diabetics who are maintaining a H1ba1C of 7 or less	NCD register and follow up data	Yes				✓	✓
	5% reduction in the number of patients who have CVD risk score of more than 10%	NCD register and follow up data	Yes				✓	✓
	10% reductions in individual patient admissions to the surgical ward	NCD register and follow up data	Yes	Surgical ward data suggests that the majority of diabetic sepsis amputations are patients who have not been attending their diabetic clinic check ups. It is important to ensure that patients with multiple, progressive amputations are not measured more than once, hence the wording on 'individual patient'			✓	✓
Strengthen early detection of NCD related cancers	# of cancers detected early (early to be defined)	Cancer Registry	Yes, the Cancer Registry				✓	✓
Medium term targets relating to knowledge, attitudes and behaviours about the consumption of fruit and vegetables, salt, sugar, fat and physical activity to be determined through the design process								

GOAL 4: Undertake intensive legislative, regulatory and policy action to make healthy lifestyle behaviours easy, accessible and attractive									
80% of recommendations of the Health in All Policy Review successfully implemented	% of HiAP policy recommendations implemented	NCD Strategy work plan activity tracking data.	No.		✓	✓	✓	✓	✓

Annex B: Alignment of targets with national, international and donor targets

Target	Aligns to WHO Global Framework Targets	Aligns to TSDF Target	Aligns to DFAT THSSP 2 Targets
Halt the number of pregnant women 34 and under with gestational diabetes	Halt the rise in diabetes and obesity A 25% relative reduction in risk of premature mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases A 10% relative reduction in prevalence of insufficient physical activity	Reduce incidence and death rates associated with diabetes by 2% per year by 2025	Decrease in percentage of population at high risk of developing a NCD, for both males and females.
Halt the number of pregnant women with gestational diabetes who develop type 2 diabetes	Halt the rise in diabetes and obesity A 25% relative reduction in risk of premature mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases A 10% relative reduction in prevalence of insufficient physical activity	Reduce incidence and death rates associated with diabetes by 2% per year by 2025	Decrease in percentage of population at high risk of developing a NCD, for both males and females.
Halt increase in the prevalence of overweight and obesity amongst females ages 16-25	Halt the rise in diabetes and obesity A 10% relative reduction in prevalence of insufficient physical activity	Reduce incidence and death rates associated with diabetes by 2% per year by 2025	Decrease in percentage of population at high risk of developing a NCD, for both males and females.
Increase by 5% mothers exclusively breastfeeding until 6 months and improve awareness and attitudes about breastfeeding along with complementary feeding until age 2.	Halt the rise in diabetes and obesity		Decrease in percentage of population at high risk of developing a NCD, for both males and females.
Halt the prevalence of overweight and obesity amongst school-aged children	Halt the rise in diabetes and obesity A 10% relative reduction in prevalence of insufficient physical activity		Decrease in percentage of population at high risk of developing a NCD, for both males and females.

Halt the number of 25-64 year olds at high or medium risk of NCD as defined by the WHO STEPS Survey	Halt the rise in diabetes and obesity A 25% relative reduction in risk of premature mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases A 10% relative reduction in prevalence of insufficient physical activity A 30% relative reduction in mean population intake of salt/sodium	Reduce incidence and death rates associated with diabetes by 2% per year by 2025	Decrease in percentage of population at high risk of developing a NCD, for both males and females.
Reduce by 5% the bodyweight of at least 10% of adults who are non-diabetic, over 30, overweight or obese and have a family history (parent or sibling) with diabetes	Halt the rise in diabetes and obesity A 25% relative reduction in risk of premature mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases A 10% relative reduction in prevalence of insufficient physical activity	Reduce incidence and death rates associated with diabetes by 2% per year by 2025	Decrease in percentage of population at high risk of developing a NCD, for both males and females. Downward trend in the rates of premature deaths and preventable disability related to NCDs in men and in in women.
Improve by 10% the number of patients who are engaged in appropriate management of their blood sugar, blood pressure and/or blood lipids	A 25% relative reduction in risk of premature mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases At least 50% of eligible people receive drug therapy and counselling (including glycaemic control) to prevent heart attacks and strokes	Reduce incidence and death rates associated with diabetes by 2% per year by 2025	Downward trend in the rates of premature deaths and preventable disability related to NCDs in men and in in women.
80% of recommendations of the Health in All Policy Review successfully implemented	Halt the rise in diabetes and obesity A 30% relative reduction in mean population intake of salt/sodium		Decrease in percentage of population at high risk of developing a NCD, for both males and females.

Annex C: Influences on food behaviours

Public policies

Agricultural support	Employment	Food prices	Retailing, catering	Education
Planning and transport	Social security	Trade	Advertising	Mass media

Food availability

Food grown & imported

Food available in shops

Food eaten outside the home, in schools, work-place canteens

Land, tools & seed for home production

Food access

Access shops

Time & ability to go shopping

Cost & affordability of foods

Domestic storage, kitchen equipment

Food knowledge

Skills in budgeting, shopping & cooking

Nutrition education

Breastfeeding support

Food labelling, advertising, marketing

Media reports & features

Personal choices

Cultural beliefs, family structure, individual medical needs

Family practices

Household food distribution (to parents, children, grandparents)

Needs & tastes

Personal beliefs & convictions

Likes & dislikes

Household food security

Food obtained

Nutrition security

Food consumed

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