MINISTRY OF HEALTH
MATAGALUEGA O SOIFUA MALOLOINA

NCD MANAGEMENT PROTOCOL IN PRIMARY CARE SERVICES

Focusing on hypertension and diabetes mellitus screening, referral, and treatment

April 15, 2024,
MINISTRY OF HEALTH
SAMOA
Final v1.7

Contents

ACRONYMS AND ABBREVIATIONS

BMI	Body Mass Index
BP	Blood Pressure
CKD	Chronic Kidney Disease
CVD	Cardiovascular disease
DBP	Diastolic Blood Pressure
DH	District Hospital
FBS	Fasting Blood Sugar
FPG	Fasting Plasma Glucose
HbA1C	Glycosylated Hemoglobin A1C
HQ	Headquarters
HTN	Hypertension
IFG	Impaired Fasting Glycaemia
IGT	Impaired Glucose Tolerance
KAP	Knowledge, Attitude and Practice
M & E	Monitoring and Evaluation
MDT	Multidisciplinary Team
MESC	Ministry of Education, Sports, and Culture
MOH	Ministry of Health
MUAC	Mid Upper Arm Circumference
MWCSD	Ministry of Women, Community and Social Development
NCD	Non-Communicable Disease
NHN	National Health Number
OGTT	Oral Glucose Tolerance Test
P for R	Program for Results
PEN	Packing of Essential NCD
RPG	Random Plasma Glucose
SBP	Systolic Blood Pressure
SNAP	Smoking, Nutrition, Alcohol and Physical activity
SOP	Standard Operating Procedure
VHW	Village Health Worker
WC	Waist Circumference
WHO	World Health Organization

ACKNOWLEDGEMENT

Chapter 3 is an adaptation of an original work HEARTS Technical package for cardiovascular disease management in primary health care: healthy-lifestyle counselling; Geneva: World Health Organization; 2018 (WHO/NMH/NVI/18.1). Licence: CC BY-NC-SA 3.0 IGO.

Chapter 4 is an adaptation of HEARTS. Technical package for cardiovascular disease management in primary health care. Evidence-based treatment protocols. Geneva: World Health Organization (WHO); [2018]. Licence: CC BY-NC-SA 3.0 IGO".

Chapter 5 is an adaptation of HEARTS. Technical package for cardiovascular disease management in primary health care. Evidence-based treatment protocols. Geneva: World Health Organization (WHO); [2018]. Licence: CC BY-NC-SA 3.0 IGO" as well as of the original work "Diagnosis and management of type 2 diabetes (HEARTS-D). Geneva]: World Health Organization; 2020 (WHO/UCN/NCD/20.1). Licence: CC BY-NC-SA 3.0 IGO"

These adaptations were not created by WHO. "WHO is not responsible for the content or accuracy of these Samoan adaptations. The original edition shall be the binding and authentic edition".

Chapter 1: INTRODUCTION

In the context of non-communicable diseases (CDs), four of the most prevalent chronic diseases—cardiovascular disease, type 2 diabetes, chronic obstructive pulmonary disease, and cancer —account for 80% of the NCD mortality and are linked by shared, common, and preventable **biological risk factors** - high blood pressure, high blood cholesterol, and overweight, as well as by related major **behavioral risk factors**: unhealthy diet, physical inactivity, alcohol, and tobacco use. It is efficient and sustainable to prevent these major chronic diseases by controlling these risk factors using an integrated approach.

Integration of NCDs can ensure **equity** by improving access to cost-effective NCD services in limited resource settings. Integrating NCDs as a part of primary health care can assist in managing NCDs at an early stage and therefore is a better investment than diagnosing and managing them at a later stage when it can be expensive. In the long-term, investing in NCD prevention and control through evidence-based approaches can contribute to strengthening of the health system.

A review of pilot projects carried out by WHO showed that community-level health promotion, disease prevention, early diagnosis, and treatment and referral services for NCDs can be delivered through the PHC system. In Bhutan, it has resulted in capacity building of health workers and brought the diagnosis and management of NCDs closer to the community.

The Package of Essential Noncommunicable Disease Interventions or WHO PEN, which uses the primary health care (PHC) approach for NCD prevention and control, has been adapted in Samoa as '**PEN Fa'asamoa'**. WHO PEN provides clinical protocols for management of heart disease, stroke, cardiovascular risk, diabetes, cancer, asthma, and chronic obstructive pulmonary disease in primary health care, that are adapted for the local PHC setting. Additionally, the World Health Organization HEARTS protocols have been adapted for use in Samoa.

Increased emphasis, however, is also needed on health promotion leading to primary prevention and on building multisectoral and community consensus on the prevention and control of NCDs. However, there are many constraints to be overcome in shifting to a PHC approach: serious workforce shortages of those with basic skills and expertise in NCD prevention and control; lack of training on the management of other major chronic diseases (e.g., hypertension, diabetes, and bronchial asthma); lack of essential medicines to treat NCDs; lack of standards of health care for people with chronic diseases.

Purpose

Most cases of diabetes and hypertension can be managed at primary care level, provided that clinicians follow clear protocols for screening, diagnosis, treatment, and referral to next levels of care. The purpose of this Protocol is to ensure a standardised approach to prevention, screening, diagnosis, treatment, and referral across all levels of the Samoa PHC service.

The role of the additional workforce for the Rural District Hospitals, recruited under the P4R program and referred to as the Multidisciplinary Teams (MDTs) will be defined to ensure that there is clarity around roles and responsibilities.

This protocol will be distributed to all primary care health facilities and health workers will be trained on how to manage patients and refer more difficult patients to the next level. It will also help decentralise diabetes and hypertension etc. management to rural and remote areas and reduce referrals to tertiary hospitals to the more difficult to manage, serious and complicated cases only, thus avoiding overcrowding at tertiary hospital clinics, delays in diagnosis and treatment and costly transport for patients.

Target Users

This Protocol is primarily intended for the use of physician and non-physician health workers in primary health care facilities in Samoa: District Hospitals and Health Centres. **It is not a clinical protocol for the tertiary referral hospitals**.

Scope and Limitation

This protocol is based on global evidence, WHO's Package of Essential Non-communicable (PEN) Disease Interventions, updated in WHO HEARTS for Primary Health Care in Low Resource Settings. It focuses on the Integrated Management of Hypertension and Diabetes, as these diseases top the leading causes of morbidity and mortality in Samoa. In future, the integrated protocol will include COPD and cancers.

Health facilities and communities have complementary roles in successfully implementing NCD prevention and control interventions. Patient, family and community education on prevention and control is essential for reducing NCDs. Understanding risk factors and modifying lifestyle is fundamental, and all health workers need to be able to deliver SNAP interventions. Equally important is the creation and promotion of smoke free and healthy eating environments that encourage physical activity and low risk alcohol consumption through public policy.

Key Principles

It is crucial to use a primary health care approach to increase coverage and make an impact on delivering interventions at the ground level. Based on the primary health care philosophy, key principles for implementing NCD strategies and interventions should include:

1. Universal access that is affordable and convenient, equity, and social protection.
2. Comprehensive and integrated services for scaling up.
3. Use of technology that is affordable, appropriate, and accessible to poor and vulnerable populations
4. An intersectoral approach including community participation and engagement; and
5. Using existing infrastructure for NCD prevention and control rather than building new structures.

Minimum requirements

The minimum resource requirements in managing and operating NCD prevention and control at the facility level include skilled health staff, a working and functional screening and referral system, availability of basic drugs and medicines as well as equipment or devices needed and a functional patient management record system.

Chapter 2: SCREENING & REFERRAL

2.1 Community Screening (targeting village health workers)

Pre-training

1. The Ministry of Health's Coordination team through the Ministry of Women, Community and Social Development (MWCSD) liaise with the Sui Tamaitai of each village explaining the purpose, details and confirmed dates of the training program.
2. Details provided in an official letter and explained face to face or via the phone include:
    - Dates for the program
    - What the program is about
    - The nomination of young women representatives and/or youth (males and females to be trained. A minimum of 10 and a maximum of 15 people is the target.
    - Expectations that they will continue the screening for their village after the training is done.
    - Resources supplied by the village include the use of a fale tele (venue), tables and chairs.
    - Cater of breakfast and lunch for village participants and MOH resource people for the 3 days of training which would be re-imbursed by MOH.
    - The wear of comfortable clothing for physical activity (e.g., a Zumba session); and
    - Village participation during presentations and screening

3. A three-day training is carried out in selected villages, following the schedule below:

Schedule

Session Number	Day 1	Day 2	Day 3
1	Introduction followed by overview of PEN Fa'asamoa	Interactive recap of Day 1 activities	Interactive recap of Day 2 activities
2	Introduction to the Assessment Form followed by the Referral Form	Explanation of the Body Mass Index	Explanation of the CVD ISH Chart
3	Introduction to SNAP	Explanation of blood pressure target	Explanation of blood sugar target
4	Questions and Answers	Screening starts	Screening resumes
5	Tea break		
6	Interactive group work demonstration		
7	Lunch	Lunch	Lunch
8	Group work practical	Screening resumes	Last words and farewell
9	Zumba demonstration	Zumba	

Key Responsibilities

Responsible	Topic
District Nurse Manager	- Welcome and introduction of the MOH team. - Introduction to the Assessment Form followed by the Referral form. - Last words and farewell
Team Leader from MOH HQ	- Overview - Interactive recap of day 1 and day 2 activities - Overall technical support
Nutrition and Health Promotion representatives	- Introduction to SNAP - Zumba demonstration - Lead in SNAP counselling and KAP stations
MOH team	- Questions and Answers - Interactive group work demonstration - Groupwork practical - Supervises, identifies, trains village representatives on medical process/ examination during group work/ stations. - Screening - Zumba
District Nurses	- Explanation of Body Mass Index - Explanation of blood pressure target - Explanation of the CVD ISH Chart - Explanation of blood sugar target - Lead in blood pressure, blood sugar, BMI, and questionnaire station
F&P	- Logistics support

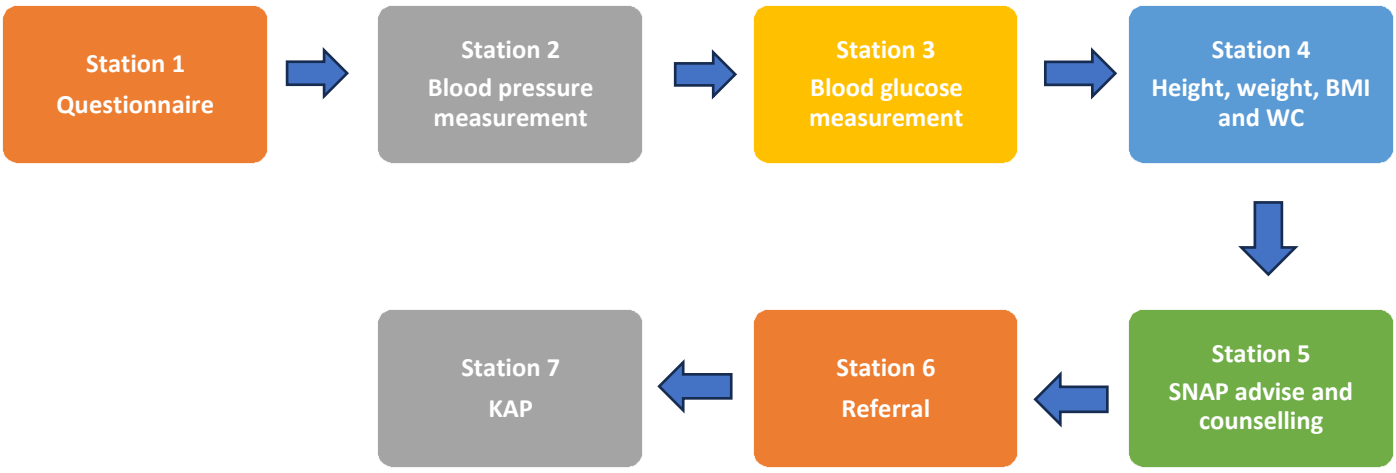
Group work setup

The goal is to make the session as interactive as possible, giving ample time for village representatives to ask questions from MOH staff. The staff should ensure that demonstration of medical procedures or examination is according to protocol utilizing the SOP for VHWs prepared (Annex 1).

There should be a MOH person in each of the stations and the order of stations be maintained for ease of workflow (Refer to responsibilities below)

Until such time MOH decides to give tablets to each village, we shall continue to teach health workers on paper-based forms (all MOH staff going out should be trained on Tamanu mobile).

Depending on the number of village representatives taught and how quickly they learn, each station should be allocated a minimum of 15 minutes each. Ideally 30 minutes maximum is allowed. (Range of 15-30 minutes per station) (105-210 minutes for group work demonstration and practical; almost 4 hours max).



Team Composition

To ensure the smooth flow of community work, it is crucial that staff from headquarters and those from the district hospitals work together. Even though the coordination and technical lead is based at HQs, the gateway to the community is through the District Nurse Manager and Medical officer. Thus, their involvement should be encouraged as much as possible. Communication should be properly and well established by team HQ before the roll out.

There should be a:

1. Team leader from HQ (technical support)
2. Health Promotion officer
3. Nutrition officer
4. Logistics support
5. Driver
6. Minimum of 3 nurses (ideal is 5 nurses from the DH)

Screening proper

This starts on day 2. The village representatives are split equally into 3 groups. The workflow remains, except that all representatives take turn in doing each examination. This ensures that everyone knows how to carry out the different tasks required of the program. Each team is supervised by the MOH staff; with each team consisting of a nurse.

During screening, MOH staff enters the screening form directly on Tamanu mobile in the field. The person's photo is taken using the Tamanu tablet and loaded onto the app. The KAP survey is also entered on Tamanu mobile at the time of screening.

It is imperative that MOH staff addresses any challenges that is noted during fieldwork. The assessment and referral forms loaded onto Tamanu mobile is similar to the manual version (Annex 1).

Referral

There are 11 criteria that villagers need to observe for person referral. Anyone meeting these should be advised according to Protocols provided and given a referral form to submit to the nearest district hospital. A referral is also generated on the Tamanu mobile.

REFERRAL CRITERIA

Previous experience of cardiovascular disease
Never assessed before
No recent visit or medications ran out

Symptoms
Heart attack warning signs
Stroke warning signs

Diabetic patient
Uncontrolled blood glucose (>15mmol/l) despite lifestyle change and medication
Foot infection or ulcer
Blurred eye vision or blindness

Others
High blood glucose >11.1 mmol/l
High blood pressure ≥140 systolic ≥90 diastolic
High WHO ISH Risk >20%
No antenatal checkup

Additional Referral

This is an additional referral criteria for high-risk non-communicable diseases (NCDs) in the population aged 20 to 39 years old, with normal blood sugar level and blood pressure. Those in this age group meeting these, should be advised according to Protocols provided and given a referral form to submit to the nearest district hospital. A referral is also generated on the Tamanu mobile.

Major Risk factors for NCDs/ cardiovascular disease:

Individuals who have one or more of these risk factors are at risk for NCDs/ CVDs.

1. **Smoking/Tobacco use**
2. **Harmful use of alcohol** – had 5 or more drinks on one occasion during the past 30 days.
3. **Unhealthy diet** – Eat processed food, sugary or fried foods, canned meat, or instant noodles > 2 days a week.
4. **Physical inactivity –** less than 30 minutes of moderate intense physical activity 5 days of the week
5. **Family History –** Individuals with a family history of NCDs such premature heart disease, stroke, diabetes, cancer and kidney disease.
6. **Obesity/ Overweight:** Obesity is a major risk factor for NCDs such as diabetes, heart disease, and hypertension.

   BMI <18.5 Underweight
   18.5-25 normal weight
   25-30 overweight
   30-35 obese class I
   35- 40 obese class II
   >40 obese class III

Table 1:1 Cardiovascular Risk stratification tool

Risk Factors	Village health worker's intervention.	District hospital intervention
No major risk factors	Low risk- no intervention	
1-2 major risk factors	Moderate risk- provide health education (refer to the table 1:2)	
3 major risk factors with no CVDs symptoms	Moderate- high risk-provide health education (refer to table 1:2) Need follow up by village health worker.	
>3 major risk factors with no CVD symptoms	High risk: provide health education (refer to table 1:2) Refer to district hospital	Refer to guideline of managing NCDs/CVDs
>3 major risk factors with CVDs symptoms	Urgent referral to district hospital	Refer to guideline of managing NCDs/CVDs

It is important for village health workers to identify these individuals and provide appropriate interventions to reduce their risk of developing NCDs/ CVDs. Early detection and prevention can lead to better health outcomes and improve overall quality of life.

1. **Provide Education**: Educate individuals on non-communicable diseases, their risk factors, and prevention strategies. Encourage healthy lifestyle habits such as regular exercise, a balanced diet, and stress management and use SNAP charts.

Table 1:2 General health educations and counselling

Weight control	All individuals who are overweight and obese should be encouraged to lose weight through a combination of healthy diet and physical activity.
Physical activity	All individuals should be encouraged to do at least 30 minutes of moderate exercise a day for at least 5 days a week.
Dietary changes	Reduced salt < 5 gram (one teaspoon) a day Limit processed/ fast food. Reduced sugar consumption Eat at least 5 servings of fruits/vegetables a day. Limit fatty food
Tobacco	All tobacco users should be strongly encouraged to quit
Alcohol intake	Advised to reduce alcohol intake to < 3 units of alcohol per day

2. **Refer to district hospital**: In some cases, referral to a specialist may be necessary for further evaluation and management of non-communicable diseases.
3. **Develop a Management Plan**: If a non-communicable disease is identified, healthcare professionals should develop a management plan that includes medication, lifestyle modifications, and regular follow-up visits.

Logistics

The following is the minimum checklist of team supplies that should be prepared before departure. There should be 3 sets of each for team Upolu and team Savaii. Additional containers should be prepared for every village visited and this is the one to be presented to the village on day 3, before the team departs using the same checklist for MOH teams. Furthermore, there should be supplies for district hospitals for replacement of village resources as well as for use during their screening. The supplies to the hospitals should be taken well in advance so they can start. All medical equipment used are standardized according to protocol.

PEN Fa'asamoa MOH Village Team Container Content

No.	Item	Quantity
1	Weighing scale	1
2	Tape measure	2
3	Glucometer	1
4	Glucose strips	200
5	Finger prick lancets	200
6	Lancing device (pen)	1
7	Alcohol swab or cotton swabs	1 box
8	Biohazard bags	1 bag
9	Sharp bin (EPI boxes)	10
10	Calculators	4
11	Electronic sphygmomanometer	1
12	Spare AA batteries	1 box
13	Spare AAA batteries	1 box
14	Box of clippers	1 box
15	Youth folders	30
16	Participant folders	80
17	SNAP flip chart	1
18	SNAP Guide Booklets	200
19	BMI chart	1
20	KAP survey	300
21	HP IEC materials	TBC
22	Stadiometer (separate)	1
23	Disposable gloves	1 box
24	Pens	30

	Folder content	
	Notebook	1
	SOP	1

District Hospital Container

No	Item	Quantity
1	Weighing scale	1
2	Tape measure	2
3	Glucometer	1
4	Glucose strips	200
5	Finger prick lancets	200
6	Lancing device (pen)	2
7	Alcohol swab or cotton swabs	200 or 1 roll
8	Electronic sphygmomanometer	1
9	Biohazard bags	2 bags
10	Sharps bin (EPI boxes)	20
11	Calculators	4
12	Box of AA batteries	1
13	Box of AAA batteries	1
14	Ball pens	5
15	Box of clippers	1
16	Village assessment forms	200
17	Village referral forms	100
18	Village screening guideline	30
19	SNAP Guide Booklet	30
20	SNAP Flip Chart	2
21	BMI Chart	2
22	KAP survey	TBC
23	Health Promotion IEC	TBC
24	Village register	1
25	Stadiometer (separate)	1
26	Inventory Register	1
27	NCD PEN Booklets	100
28	School Assessment Forms	200
29	School Referral Forms	200
30	School register	20
	Village Screening Guideline Content	**Page**
	Introduction to PEN Fa'asamoa	1
	Flowchart	4

Data entry and reporting

It is the responsibility of the MDT (or if there is no MDT onboard, district nurses) to communicate and collect the assessment forms from trained village workers/representatives on a regular basis. Data entry officer or MDT is responsible for immediately entering the data on Tamanu mobile. On that note, 2 tablets are given to each district hospital/HC for this purpose.

Follow up screening and trainings of village health workers

This is the task of the MDT hired by the P for R. The same process that was done in the initial training should be carried out by the MDTs in subsequent years. The goal is for DH teams to continue doing this every year by building the capacity of village women's committees/village health workers. As staff turnover is expected including the unavailability of trained village health workers, it is on the MDT to ensure new village representatives are trained on an annual basis.

Support for MDTs

It is the responsibility of the Coordination team that MDTs are provided refresher trainings and support every year, so they are up to date with recent development.

Trainings include the following:

1. SNAP counselling
2. Up to date screening, referral, and treatment protocol
3. Eye screening and care
4. Diabetic foot screening and care
5. Food safety
6. Sanitation and vector control
7. Other Environmental Health Officer activity
8. Tamanu mobile and desktop (for nurses and doctors)
9. M&E

Report from MDTs

Coordination should ensure regular reports from MDTs on their activities. Noting that once the new Ministry structure has been embedded, the reporting lines will be clarified, and the protocol will be updated to reflect this.

2.2 Health Facility Screening

Age, lead, and staff training

The nursing staff at the District hospitals led by the District nurse manager and public health nurse (as part of the MDT) should ensure that screening for adults above 18 years old presenting to the hospital is done. On that note, there should be ongoing training of district staff on the screening protocol.

Screening protocol, logistics, data entry and Tamanu use

The protocol is the same as that used for community screening. The only difference is that Tamanu mobile should be used directly to enter screening results and referral if necessary (to minimize reliance on manual forms). As previously mentioned, screening resources and consumables should be supplied by the Coordination team. Two tablets are supplied for each district hospital. Moreover, PCs are provided by the program and Tamanu desktop is installed for clinicians to use for NCD patients referred after screening. Clinicians are also encouraged to start entering all consultations for NCD patients already registered at the clinic regardless of if they were screened in the community or not.

Screening SOP for everyone > 20 years old

1. Everyone above 20 years old should be screened using the questionnaire
2. Greet and inform the person of the screening purpose
3. Ask and obtain general details about the person (village, matai title, full name, gender, date of birth, phone number or other contact details, chronic illness
4. Ask about cardiovascular disease symptoms - questions 12-14 of the questionnaire
5. Ask about behavior risk factors - questions 15-25 of the questionnaire
6. Start the checkup
   - **Check up includes**:
     - Measuring the blood pressure
     - Measuring the blood sugar level
     - Measuring the weight
     - Measuring the height
     - Measuring the circumference
     - Calculate the Body Mass Index (BMI)
     - Calculating the CVD Risk using WHO Risk Chart provided
     - Provide basic NCD councelling and referral

- Ask if he/she was diagnosed of diabetes or high blood pressure before – Q15.
- Ask about tobacco smoke – Q17.
- Ask about alcohol consumption – Q19.
- Ask about nutrition – Q21.
- Ask about physical activity – Q23.

IF "YES" TO ANY OF THE 3 QUESTIONS, THIS PERSON HAS CARDIOVASCULAR DISEASE

Ask the following:

1. Are you currently taking any medication and adhere to it?
2. When is your next appointment?
3. Are there any problems or challenges you are facing?

What the village health worker can do:

1. If the person is not taking any medications or has a current problem advise and refer
2. If the person has high blood sugar and blood pressure, or having problems breathing, he/she should be referred to the hospital
3. If there are no problems noted, advise the person to continue attending appointments

2.3 Primary School Screening

Age

All primary school students from year 1-8 are assessed for nutritional status using a standard questionnaire or assessment form which is attached in Annex 2. Children despite disabilities, age, gender or race are included in the assessment.

Pre-screening

A schedule of visit is prepared and shared ahead of time with the MESC and schools before implementation. For non-government schools, approval letters and schedule should be submitted to school boards well ahead of schedule. Official school rolls should be obtained by the MOH from either MESC or school boards.

Logistics

The list of equipment and supplies for field work include the following:

No	Item	Quantity
1	Weighing scale	1
2	Stadiometer	1
3	Tape measure	2
4	Calculator	1
5	Pens	10
6	School assessment form	
7	School referral form	
8	SOP	
9	Flipchart	
10	Batteries	
11	Simplified field tables of BMI for both girls and boys 15-19 years	
12	Consent forms	
13	Tablets	

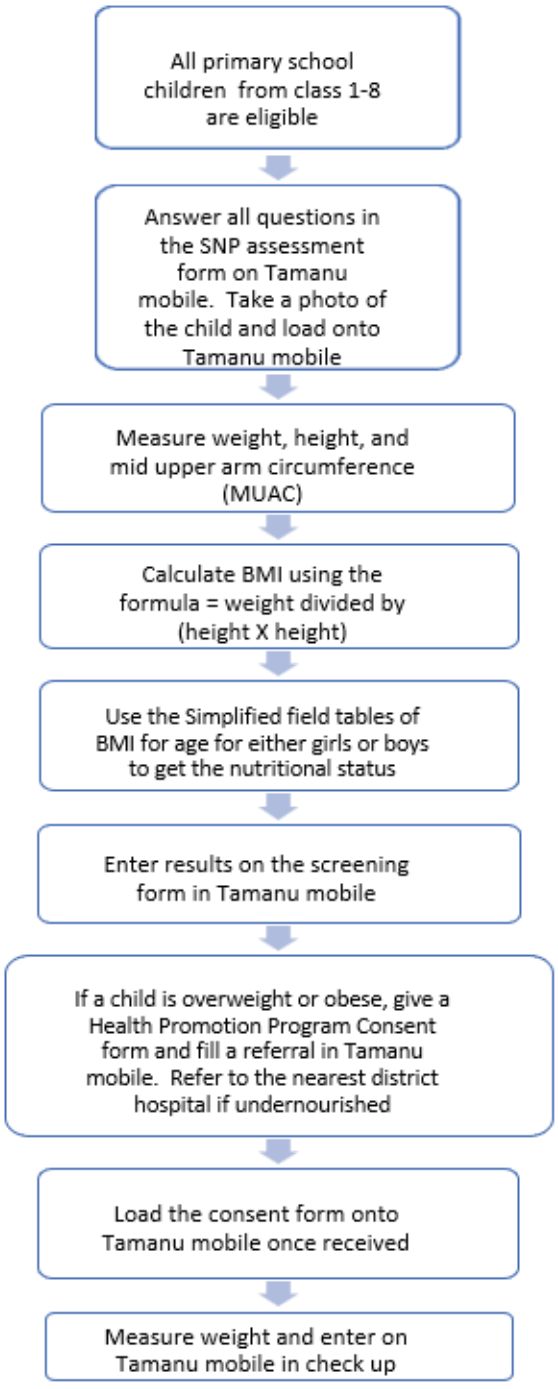
Data entry

The screening assessment is entered directly onto the Tamanu mobile using the School Nurse Assessment form and referral which were uploaded on Tamanu mobile. Each child's photo is taken and loaded onto the Tamanu platform.

Referral to a Health Promotion Program or Health Facility

Students who are identified as overweight or obese in the field using the World Health Organization's guidelines for children 5-19 years, are given a consent form for their parent's or caregiver's information to be enrolled in a health promotion program. The child's NHN should be documented on the consent form and entered onto Tamanu once they are returned to the MOH staff. MDTs should enter them onto Tamanu mobile upon receipt.

Screening SOP for all primary school children years 1-8



WHO Nutritional Classification for students aged 5-19 years.

BMI for age	Classification
More than + 2SD	Obese
More than +1SD	Overweight
More than -1SD to < 1SD	Normal weight
Less than -2SD	Thinness
Less than -3SD	

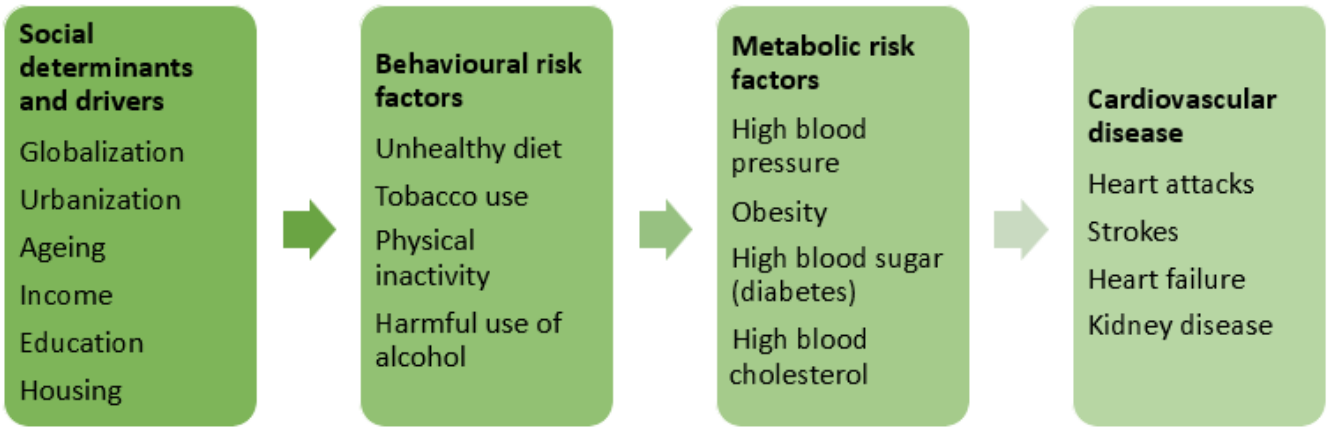
2.4 Ad hoc Screening

This refers to any screening requested from NGOs e.g., Church organizations or government ministries for wellness checkup. The same protocol used for community and health facility screening is utilized for this purpose, in addition to particular requests e.g., STI and HIV/AIDS screening and so forth. Similarly, Tamanu app is used to enter the data directly onto the Tablets.

Chapter 3: HEALTHY LIFESTYLE COUNSELING

Introduction

The risk factors for CVD include behavioural factors, such as tobacco use, an unhealthy diet, harmful use of alcohol and inadequate physical activity, and physiological (metabolic) factors, including high blood pressure (hypertension), high blood cholesterol and high blood sugar or glucose. Both kinds of factor s are linked to underlying social determinants and driver.



This chapter of the NCD protocol focuses on the behavioural risk factors and provides information on:

- tobacco use, unhealthy diet, insufficient physical activity, and harmful use of alcohol as important contributors to CVDs. It includes guidelines translated directly in the Samoan language for the target users to use for counselling
- behavioural change, brief interventions for counselling and key points for motivational interviewing
- the theory of the 5As for brief interventions, as well as sample brief interventions for each risk factor, using the 5As.

The four main behavioural risk factors for CVD

Unhealthy diet

The risk of CV i s increased by an unhealthy diet, characterized by a low intake of fruit and vegetables and high intakes of salt, fats, and sugars. An unhealthy diet contributes to obesity and overweight, which are also risk factors for CVD. Unhealthy eating habits can also result in a range of other conditions, including cancer, diabetes, and micronutrient deficiencies.

Insufficient physical activity

Insufficient physical activity is one of the leading risk factors for premature death worldwide. People who are insufficiently active are between 20% and 30% more likely to die prematurely than those who are sufficiently active. Insufficient physical activity is a key risk factor for CVD, cancer, and diabetes.

Tobacco use

Tobacco kills nearly half of its users and causes 6 million deaths every year. Ten per cent of these deaths are the result of inhaling second-hand smoke in homes, restaurants, offices, or other enclosed spaces.

What is tobacco use?

Tobacco can be smoked, sucked, chewed, or sniffed. Tobacco products can generally be divided into two types:

- smoked tobacco (in cigarettes, cigars, pipes, and water pipes)
- smokeless tobacco (in chewing tobacco and snuff).

All tobacco products contain the addictive substance nicotine that is absorbed into the bloodstream when a tobacco product is used.

Harmful use of alcohol

The harmful use of alcohol is a risk factor for CVD and has many negative health and social consequences. Harmful use of alcohol is a causal factor in more than 200 diseases and injuries. Beyond health consequences, the harmful use of alcohol brings significant social and economic losses to individuals and society at large. Like tobacco, alcohol can have a marked impact on the health of people other than the drinker.

3.1 Taumafa tatau

Taiala faalauaitele

1. Toaga e taumata fua o laau taumafa mata (vegetables) ma fualaau faisua (fruits)
2. Ia fa'aitiitia le taumafa i meaai e tele ai le suka, ga'o ma le masima
3. Fua fa'atatau o le taumafataga – ia afa le ipu i fualaau aina, tasi kuata o anogase o manu, i'a ma isi meaai faatuputino ma le tasi kuata o meaai masoa (silasila i vaega e tolu o i lalo)

4. E tolu (3) vaega o taumafa e pei ona taua ile ata oi lalo
   - Mea ai masoa/aano
   - Fualaauaina
   - Anogase o manu, ia ma isi meaai faatuputino

5. Ia faaitiitia le faamoemoe i meaai gaosi mai atunuu i fafo ae sui a'i i meaai o loo maua lava i tua maota ma laoa poo gataifale
6. Faalogo ile tino – tausami pea ua e lagona le fia-ai.

Taiala mo laau taumafa mata ma fualaau faisua

1. Ia lima (5) pe sili atu ‘aiga o fualaau aina i aso ta’itasi

2. Fa’aeseese fualaau aina i aso ta’itasi

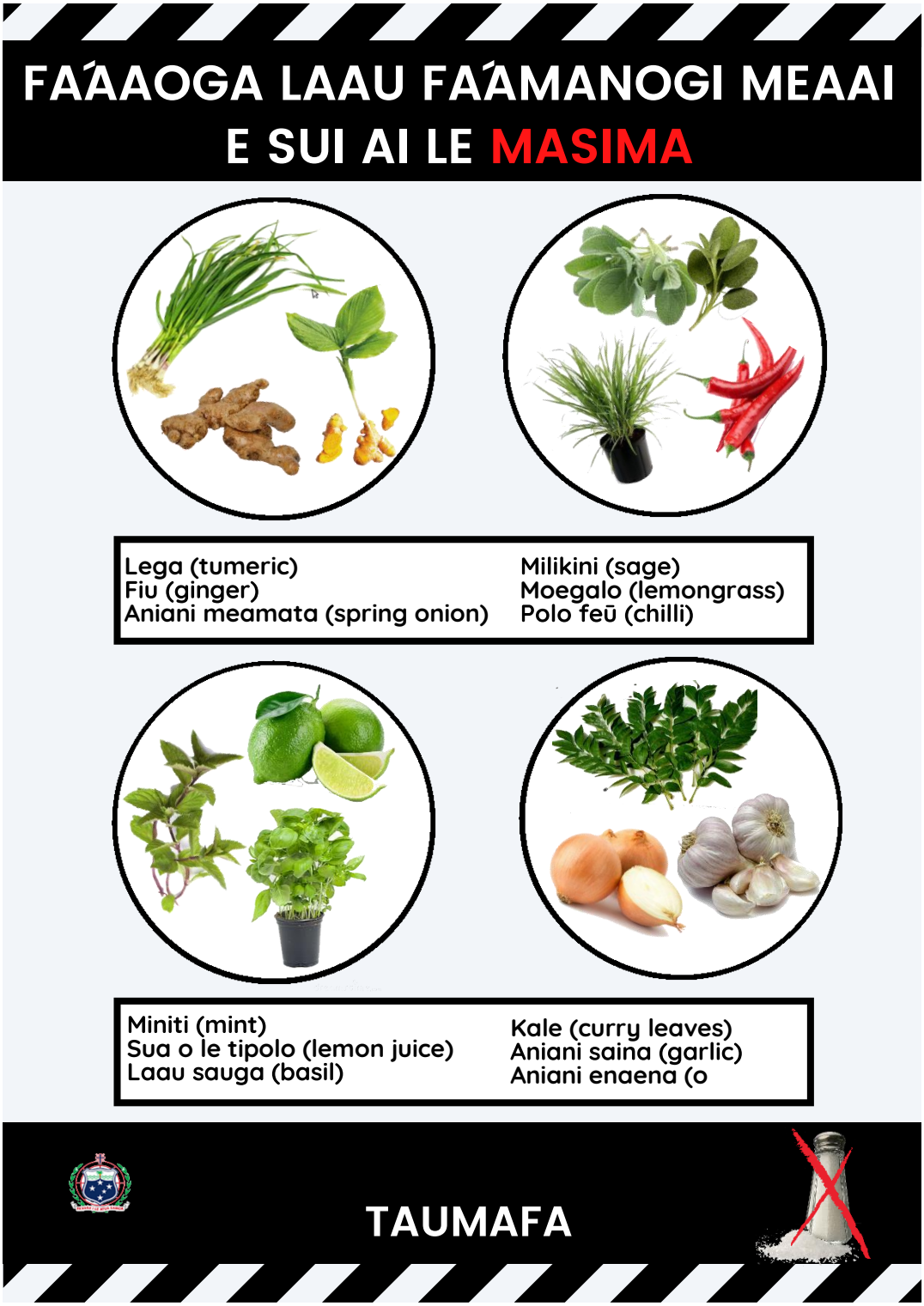
Taiala mo le suka

1. Ia lalo ifo ile 50 kalama po'o le 10 sipuni ti o le suka i le aso mai meaai mo tagata matutua
2. Ia lalo ifo ile 25 kalama mo tamaiti (ia lalo ifo mai le 5 siputi ile aso)
3. Tulimata'i le aofaiga o sipuni ti i meaai ma vai inu i aso taitasi, ia aua nei sili atu nai lo taiala ua taua i luga
4. O le ata ua faataatia atu i lalo o loo lisi atu ai meaai e fiafia iai tagata Samoa ma le aofaiga o sipuni ti suka i totonu o nei meaai ma vai inu. Taofi pe faaitiitia le taumafa i meaai nei.

5. A lagona e le tino le fia tausami i se meaai suamalie, sui a'e i fualaau faisua o loo maua i tatou o laufanua e pei o le esi, moli, vi, mago, fala, niu

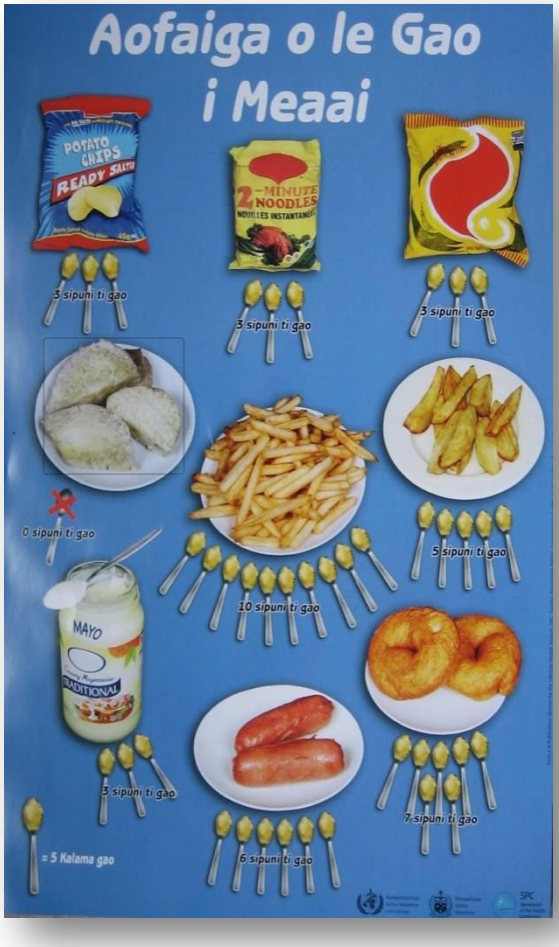
Taiala mo le masima

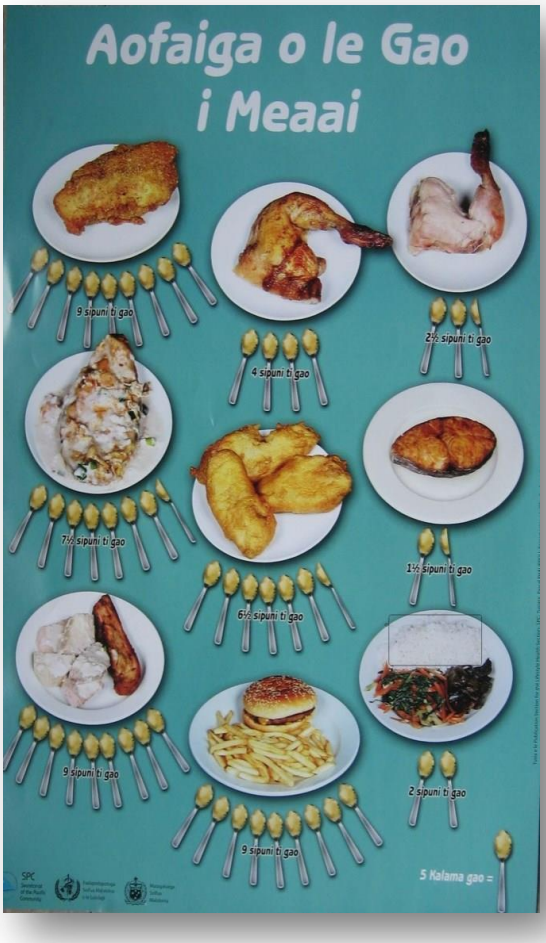
1. E tasi lava le sipuni ti masima e fa'aaogaina pe talafeagai mo le tino i le aso (la'ititi ifo ma le 5 kalama)
2. Ia suia'e le masima i meaai e pei ona faailoa atu ile ata oi lalo



Taiala mo le ga’o

1. Ia fa’aitiitia le ga’o i meaai
2. Filifili lelei auala e gaseseina ai meaai – faasupo pe tao, aveese pa’u o anogase o manu
3. Filifili meaai e la’ititi ai le ga’o i aso ta’itasi
4. E sili atu ga’o suau’u nai lo poloka ga’o
5. O ata faataatitia atu i lalo o loo lisi atu ai aofaiga o le ga’o i meaai e fiafia iai tagata Samoa e faitauina i sipuni ti





Taiala mo le faasusuina o le pepe

Taiala mo meaai talafeagai mo aoga

1. Ia fa’atele fualaau aina i meaai mo tamaiti aoga
2. Fa’aititia le suka ma le ga’o mai meaai a tamaiti
3. Fautuaina le taumafa ile 6 pe 8 ipu vai auli mama – e sili atu mo tamaiti i aso ta’itasi
4. Fa’ataua le meaai o le taeao ae e lei usu le tamaititi i le aoga

3.2 Faagaioi le tino

Taiala mo le fa'agaioiga o le tino

1. Ia 30 minute pe sili atu i aso uma mo tagata matutua i aso e 5 o le vaiaso pe sili at
2. Ia 60 minute pe sili atu mo tamaiti i aso uma

3. Fa'atinoga e talafeagai i lou matua ma le malosi
4. Nofoaga ma le taimi talafeagai e fa'atino ai gaioiga/fa'amalositino
5. Fa'atino nisi gaioiga e sili atu pe a fai ua maua le malosi ma lava le manava
6. Fai laei e talafeagai
7. O nisi nei o ituaiga faamalositino:
    - Faiga o feau masani o le aso
    - Savali
    - Siva fa'amalositino
    - Auai i ta'aloga
8. Filifili le ituaiga fa'amalositino e;
    - Mauagofie
    - Taugofie
    - Taliagofie
    - Faigofie
9. Fa'aitiitia le nofoa'i
10. Toaga e inu le vai a'o lei fa'amalositino pe a uma foi ona fa'amalositino

3.3 Taofi le taumafa tapaa

Taiala

1. E sili atu i le 4,000 vailaau o'ona e maua i totonu o le tapa'a
2. O le tolu ua taua i lalo e ogaoga ona aafiaga:
    - Kaponimonisete (carbon monoxide) - E poloka ai le fegasoloa'i o le toto i le tino
    - Nikotini (nicotine) - E fa'atosina oe, e fa'aosooso oe, e fa'atupu lagona ole fia ula

3. Ta (tar) - E to'a i mama o tagata ulaula ma a'afia ai mama i le kanesa 3.
   O isi a'afiaga e aofia ai:
   - Fa'aitiitia malosiaga fa'alenatura o le tino
   - E'ena ma mama'i ai nifo
   - E'ena ai tamatama'i lima
   - Manogi leaga le manava
   - Le lava ai le fa'asoa
   - E a'afia ai mata ma fa'aletonu ai le vaai
4. O le manavaina e tamaiti ma isi tagata o asu ma kasa o'ona mai le tapa'a e tele le avanoa e maua ai i le ma'i sela ma le niumonia

3.4 Faaitiitia le ava malosi

Ta'iala

1. Fautuaga:
   - Afai e te le'i inuina le ava malosi, aua le fa'ata'ita'ia
   - Afai e te inu ava malosi, taumafai e fa'aitiitia
   - Mafaufau i le tele o fa'afitauli e tutupu ona o le ava malosi
   - Ia e saoloto mai le ava malosi
2. Taiala mo tama'ita'i – Ia le silia le 1 i le aso le ava malosi (1 le fagu pia, pe 1 le ipu pia/uaina)
3. Taiala mo ali'i – ia le silia i le 2 i le aso le ava malosi (2 fagu pia, pe 2 ipu pia/uaina)

3.5 Behaviour change

Understanding behaviour change

Reducing health risks may require changes to be made in some behaviours. Behaviour change is a complex issue and is not a one-off event but rather a set of different stages through which a person moves.

Behaviour change takes time, and different people go through the stages at various speeds. Some may remain indefinitely at one stage: for example, they may recognize and think they need to change but not be ready to make the change. Even though a person intends to start or maintain a new behaviour, for a range of reasons they may move back to an earlier stage. A relapse into an old behaviour can occur at any point and does not necessarily mean a failure

to change. Many people who eventually adopt a new behaviour make several attempts before it is maintained over the long term. A person may feel disappointed, frustrated, or tired, and relapse as a consequence.

Understanding behaviour change is important for primary health care providers as they usually provide the first point of contact for patients accessing the health system. It is therefore necessary for the primary health care worker to assess and understand the different stages of readiness of the patient to make the required change in behaviour. This allows for more contextual, relevant, and patient-centred counselling. Every visit or interaction with a healthcare provider is an opportunity for providing information and counselling on the risk factors, particularly for people with existing NCDs.

Counselling for behaviour change through brief interventions

Counselling can be described as professional guidance and support to help a person to solve a problem. Counselling for healthy lifestyles involves guiding and supporting patients toward making changes in certain behaviours to reduce the risk of heart attack, stroke, and other conditions (diabetes, lung disease and cancer). A brief intervention is a short interaction of between three and 20 minutes between health worker and patient. It aims to identify a real or potential problem, provide information about it and then motivate and assist the patient to do something about it. A brief intervention involves two important aspects: how and what.

"How"

Refers to the communication style that the health worker uses to interact with the patient during the brief intervention. Communications techniques (Box 1) and motivational interviewing (Box 2) can be used as approaches to deliver the brief interventions.

Box 1: Communication techniques - "OARS"

- Open - ended questions
- Affirm
- Reflective listening
- Summarize

Box 2: Key principles of motivational interviewing

- Don't tell the person what to do
- Listen and show empathy
- Help the patient see the gap between where they are and where they want to be
- Let the patient tell you they need to change
- Help the patient to feel confident about changing
- Roll with resistance

"What"

Refers to the structure of the counselling process and the content that should be covered during the brief intervention. An example of a brief intervention that can be used for healthy-lifestyle counselling is the 5As

Motivational interviewing

Motivational interviewing is a style of talking with a person that can help in motivating them to change. In motivational interviewing, the counsellor does not try to convince the person to change, but instead guides them to reach conclusions themselves, and draws out the internal motivations unique to the person.

A central idea in motivational interviewing is that most people experience some ambivalence or mixed feelings about change. They have some reasons to change and also some reasons for staying the same, and may remain caught in the middle, unable to change. Motivational interviewing encourages people to explore these mixed feelings so that they can move toward positive change.

3.6 Brief interventions to encourage behaviour change

General theory of the 5As brief interventions

Primary health care workers play an important role in helping patients to change their unhealthy behaviours and maintain healthy behaviours. Short interactions of between 3 and 20 minutes, called brief interventions, aim to identify a real or potential problem, provide information about it, and motivate and assist the patient to do something about it.

The 5As is a tool used for brief interventions. It summarizes what a health worker can do to help someone who is ready to change. This can be integrated into regular visits by health providers of any level, either at community or facility level. Risk-factor counselling should be integrated with existing programme delivery at all levels of care.

Table 1 provides a general theoretical framework and further details on the 5As and how to use this tool. This framework can be adapted for each CVD behaviour risk factor, and samples are provided in Tables 2 to 5. (The sample for unhealthy diet focuses on fruit and vegetables, but can be expanded to include salt, fats and oils and sugars.)

Table 1: The 5As: General theoretical framework for how to do it

<table>
<tr><th>5As</th><th>What to say/do and how to say/do it</th></tr>
<tr><td>Ask</td><td>Ask the patient about the relevant risk factor(s) at every visit.
Ask in a friendly way, without being judgmental.
Keep the questions simple.
Record the information in the patient's medical record/notes.</td></tr>
<tr><td>Advise</td><td>Health workers have special authority because of their training. Patients usually respect this expertise.
Provide information, key messages, and advice in a clear, simple, and personalized manner. Link the advice to something that is relevant for the person. For example:
• a person with hypertension may be interested in the benefits of reducing salt intake
• people with young children may be concerned about the effects of second-hand smoke.</td></tr>
<tr><td>Assess</td><td>Assess the patient's readiness to start making a change by asking two questions:
1. Are you ready to have a diet that includes more healthy options? Be more physically active? Be a non-smoker? Be a lower-risk drinker?
2. Do you think you will be able to make the change?
<table><tr><td>Question 1</td><td>Yes</td><td>Not sure</td><td>No</td></tr><tr><td>Question 2</td><td>Yes</td><td>Not sure</td><td>No</td></tr></table>Any answer in the shaded area indicates that the person is not yet ready to change. In this case, effort needs to be made to increase motivation for change
Answers in the white area suggest that you and the patient can move on to the next step.</td></tr>
<tr><td>Assist</td><td>Help the person to develop a plan that can increase the chance of success.
Provide practical counselling that focuses on:
• provision of basic information about the risk factor
• identification of situations that could trigger relapse
• ways of coping with trigger situations.
Provide social support including:
• providing encouragement
• communicating interest and concern
• encouraging the person to talk about the change process with family and friends.
Provide and ensure availability of health education materials and details about additional resources, such as support groups, quit lines, etc.</td></tr>
<tr><td>Arrange</td><td>Arrange a follow-up contact, by phone or in person. Discuss timing of follow-up with patients. At follow-up for all patients:
• identify problems already experienced as well as new ones that could arise
• remind them of the additional support that is available
• schedule next follow-up visit.
Refer to specialist services if needed and available.
For those who have made the planned changes:
• congratulate them on their success.
For those who have challenges:
• remind them to view this as a learning experience
• review their circumstances and motivate them to re-commit
• link to more intensive support, if available.</td></tr>
</table>

Table 2: 5As brief intervention for a healthy diet – example fruit and vegetables

<table>
<tr><th>5As</th><th>Fruit and vegetables</th></tr>
<tr><td>Ask</td><td>How many portions of fruit and vegetables do you eat each day?
1 portion = 1 orange, apple, mango, banana, or 3 tablespoons of cooked vegetables*.
Provide local examples and equivalent serving sizes.
*Potatoes, sweet potatoes, cassava or other starchy tubers or roots do not count as one of these portions.</td></tr>
<tr><td>Advise</td><td>Eat at least 5 portions of fruit and vegetables per day.
Eat a variety of fruits, vegetables, legumes (lentils, beans), nuts and whole grains (unprocessed maize, millet, oats, wheat, brown rice), starchy tubers or roots (potato, yam, taro or cassava) and foods from animal sources (meat, fish, eggs and milk). Provide local examples.
Advantages:
• Eating a variety of these foods every day helps you to take in the right amounts of essential nutrients. • Eating enough healthy food helps to avoid unhealthy foods that can lead to overweight and obesity, and diseases such as hypertension, diabetes, heart attack and stroke.</td></tr>
<tr><td>Assess</td><td>1. Are you ready to make some changes to your diet in order to include more healthy food options?
2. Do you think you will succeed in making the changes?
<table><tr><td>Question 1</td><td>Yes</td><td>Not sure</td><td>No</td></tr><tr><td>Question 2</td><td>Yes</td><td>Not sure</td><td>No</td></tr></table>Any answer in the shaded area indicates that the person is not yet ready to change. In this case, effort needs to be made to increase motivation for change.
Answers in the white area suggest that you and the patient can move on to the next step.</td></tr>
<tr><td>Assist</td><td>Help the patient to set goals and make a plan to start introducing some changes to their eating habits.
Provide practical counselling about unhealthy foods and healthier choices. For example:
• Avoid deep fried foods.
• Eat fresh vegetables and fruit that are in season. Have fresh fruit available and in plain sight.
Engage the patient in the conversation and allow time for them to share ideas:
• Can you think of ways to increase the amount of fruit and vegetable you eat every day?
• Can you think of healthier types of food that you enjoy and that you could eat instead of the less-healthy option?
Provide social support:
• Invite the patient to bring family members to the next visit in order to discuss healthier diet options for the whole family.
• Provide health and nutrition education materials.</td></tr>
<tr><td>Arrange</td><td>Refer to specialist support services (dietician, nutritionist) if needed and available
Follow-up: decide the timeline and method and schedule the next appointment.
Ask about successes and challenges.
For those of have made the planned changes to their eating habits:
• Congratulate them on their success.
For those experiencing challenges:
• Remind them to view the process as a learning experience and that it takes time to establish new habits
• Review circumstances, discuss ways to address challenges and encourage recommitment to their plan.
Link with more intensive support, if available. Remind all patients of any additional support and resources that are available.</td></tr>
</table>

Table 3: 5As brief intervention to increase physical activity

<table>
<tr><th>5As</th><th>Physical activity</th></tr>
<tr><td>Ask</td><td>In the past week, on how many days have you been physically active for a total of 30 minutes or more? For example: walking, cycling, cleaning, gardening, climbing stairs, dancing, or playing sport.
Adapt examples to local context.</td></tr>
<tr><td>Advise</td><td>All adults should do at least 2½ hours (150 minutes) of physical activity per week.
This can be spread over short sessions throughout the day and week, starting from as little as 10 minutes per session.
Being more active can start in small ways which are part of daily life. This can include going for a walk, playing with children, gardening, and domestic chores. Adapt examples to local context.
Advantages of physical activity:
• Reduces the risk of heart attack and stroke or of developing hypertension, diabetes, and cancer
• Can help to control blood pressure, cholesterol, and diabetes
• Helps with weight loss and weight control
• Helps to prevent and manage depression.
• Some physical activity is better than none.</td></tr>
<tr><td>Assess</td><td>1. Are you ready to start being more physically active?
2. Do you think you will be able to succeed in increasing your activity levels?
<table><tr><td>Question 1</td><td>Yes</td><td>Not sure</td><td>No</td></tr><tr><td>Question 2</td><td>Yes</td><td>Not sure</td><td>No</td></tr></table>Any answer in the shaded area indicates that the person is not yet ready to change. In this case, effort needs to be made to increase motivation for change.
Answers in the white area suggest that you and the patient can move on to the next step.</td></tr>
<tr><td>Assist</td><td>Help the patient to develop a plan to start increasing physical activity.
Provide practical counselling.
• Help the patient to identify areas of their daily life where they could start to increase their activity levels.
• Help to identify activities that they would enjoy doing.
• Help to identify possible challenges and suggest how to overcome them. •
Provide social support.
• Encourage the patient to talk with family, friends, and work colleagues about their efforts to increase activity levels.
• Provide health education materials and information on additional resources.
• These could include contact details for organizations such as walking groups and activity clubs
Adapt to local context.
Provide (if available) or advise on devices to help motivate or monitor activity e.g., a pedometer.</td></tr>
<tr><td>Arrange</td><td>Refer to specialist support services if needed and available.
Follow-up: decide the timeline and method and schedule the next appointment.
Ask about successes and challenges.
For those who have become more physically active:
• Congratulate them on their success.
For those experiencing challenges:
• Remind them to view the process as a learning experience and that it takes time to establish new habits.
• Review circumstances, discuss ways to address challenges and encourage recommitment to their plan.
• Link with more intensive support if available.
Remind all patients of any additional support and resources that are available.</td></tr>
</table>

19

Table 4: 5As brief intervention to quit tobacco

5As	Tobacco
Ask	Have you smoked or used any other tobacco product in the past 12 months? (for example, cigarettes (including home-made), cigars, pipe, water-pipe, chewing tobacco, snuff): Yes No Do you currently smoke or use any other tobacco product? Yes No Does anyone smoke around you at home or at work, or do you often go to places where there is a lot of smoke such as restaurants or bars? Yes No If No to all these questions: • Advise not to start tobacco use smoke and to avoid second-hand exposure If Yes to any questions: • Advise on risks of exposure to second-hand
Advise	Quitting tobacco is the most important thing you can do to protect your health now and, in the future, Advantages • Tobacco use is a major cause of heart attack and stroke, of serious lung problems and certain cancers. • Tobacco can damage every part of the body. • Second-hand smoke damages the health of your family and others around you.
Assess	1. Are you interested in quitting tobacco use? 2. Do you think you will succeed in quitting? Question 1 | Yes | Not sure | No Question 2 | Yes | Not sure | No Any answer in the shaded area indicates that the person is not yet ready to change. In this case, effort needs to be made to increase motivation for change. Answers in the white area suggest that you and the patient can move on to the next step.
Assist	Help the patient to develop a quit plan using the STAR method: **S**et a quit date, ideally within 2 weeks. **T**ell family and friends about quitting and ask for support. **A**nticipate challenges in the quit attempt. **R**emove tobacco products from personal environment and make home smoke-free. Provide practical counselling: • Provide basic information about tobacco use and quitting. • Help the patient to identify situations (e.g., feelings, places, activities) that could increase the risk of smoking or relapse. • Help to identify and practise ways of coping with these situations. Provide social support. • Provide encouragement in the quit attempt by showing care and concern. • Encourage the patient to talk about the quitting process. Provide health education materials and information on additional resources, e.g., support groups, quit lines. Recommend the use of medications if indicated and available, e.g., nicotine replacement therapy.
5As	**Tobacco**
Arrange	Refer to specialist support services if needed and available. Follow-up: • Decide the timeline and method and schedule the next appointment. • Ask about successes and challenges. For those who have quit: • Congratulate them on their success. For those who have used tobacco again: • Remind them to view any failures as a learning experience. • Review circumstances and encourage them to recommit quitting • Link with more intensive support if available. For all patients: • Identify problems and discuss ways to address them. • Remind them of additional support and resources that are available. • Assess use of medications and any problems experienced.

Table 5: 5As brief intervention to screen for harmful use of alcohol

5As	Alcohol
Ask	Do you ever drink alcohol? Yes No If Yes: • How often do you have an alcoholic drink? • How many alcoholic drinks do you have on a usual day when you are drinking?
Advise	For people drinking fewer than 2 units (according to local drink strengths and commonly available sizes) per day and Drinking on 5 or fewer days per week, inform them of the following: • Use of alcohol can increase the risk of having a heart attack or stroke. • It also increases the risks of getting certain cancers and can cause damage to other parts of the body. • Overall, the best way to avoid the health risks of alcohol use is to abstain. • If you do drink alcohol, keep in mind that "less is better." • Avoid having more than two units on any single day and do not drink any alcohol at least two days per week. • Do not drink alcohol for "health" reasons. • Do not use alcohol when you are: o Driving; operating machinery; pregnant or breast feeding; taking medications that interact with alcohol: living with medical conditions that are made worse by alcohol; having difficulties controlling how much you drink.
Assess	For people who drink two or more units per day, who drink on more than five days per week and/or have any indication. that alcohol could potentially be a problem, say: • "Your drinking habits could be harmful to your health. May I ask you ask you a few more questions to have a better idea of the possible risks?" Yes No
Assist and Arrange	If No: • Give advice. End the discussion positively by saying, "This can be a difficult issue to discuss but I am here to help you." • Provide health education materials and information about additional resources such as help lines, counselling, support Groups. • At the next visit, repeat the brief intervention If Yes: • Give brief advice and refer for further counselling and tests (for which further training, tools and resources are Required). See AUDIT test (link below). The score will determine next steps.

Please also refer to the WHO publication *Strengthening health systems for treating tobacco dependence in primary care. Part III: Training for primary care providers: Brief tobacco interventions*, listed in Selected further reading.

Chapter 4 HYPERTENSION PROTOCOL

4.1 Background

Hypertension, also known as high or raised blood pressure, is a condition in which the blood vessels have persistently and collectively raised intravascular pressure

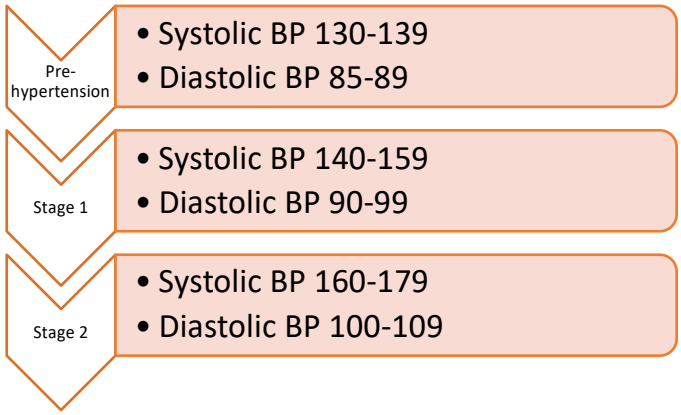
- Hypertension or elevated blood pressure is a serious medical condition that significantly increases the risks of heart, brain, kidney, and other diseases
- An estimate of 1.13 billion people worldwide has hypertension, most (two thirds) living in low- and middle-income countries
- In 2015, 1 in 4 men and 1 in 5 women had hypertension
- Fewer than 1 in 5 people with hypertension have the disease under controlled
- It is a major cause of premature death worldwide
- One of the global targets for noncommunicable disease is to reduce the prevalence of hypertension by 25% by 2025 (baseline 2010)

In Samoa:

- The Samoa STEPS survey in 2014 indicated a prevalence of 24.5% (1 in 5 adults) in adults aged 18-64 years (24.5%)
- Of those found to have high blood pressure, a significant 66% have not received medications
- In the age group 18-64 years, 71.7% had never visited any health care worker or doctor to have their BP checked

4.2 Definition and staging

Hypertension is a medical condition that is common and one of the leading causes of cardiovascular events such as stroke and ischemic heart attacks. It is also one of the common causes of chronic kidney disease in Samoa.



4.3 Other types and definitions

Malignant hypertension is elevated high blood pressure with end organ damage/multiple organ failure e.g. visual impairment, kidney failure, heart failure etc.

Resistant hypertension is high blood pressure which requires three and/or more anti-hypertensive medications for control.

White-coat hypertension is defined as a *difference* of more than 20(systolic)/10(diastolic) mmHg between clinic and daytime out of clinic blood pressure measurements. Occurs in *9-16%* of the general population, approximately *55%* of people with mild hypertension and *10%* of severe hypertension.

Masked Hypertension is the opposite of "white coat", when readings out of clinic are higher than the measurements in the clinic. Affects *10-17%* of the general population.

Aetiology of hypertension

Hypertension is divided into Primary and Secondary based on its causes. Primary hypertension is the most common type and account for 90-95% of cases.

Primary or essential hypertension

Although its etiology is poorly understood but is most likely the result of numerous genetic and environmental factors that have multiple compounding effects on cardiovascular and renal structure and function. These risk factors includes:

- Obesity and weight gain
- Excessive alcohol intake
- Physical inactivity
- Stress
- High sodium intake
    - Excess sodium intake >3g/day increases the risk of hypertension
- Aging
    - Advancing age is associated with increased blood pressure, particularly systolic blood pressure
- Family history
    - Twice as common in subjects who have one/two hypertensive parents

Secondary hypertension

A number of common and uncommon medical conditions may increase blood pressure and lead to secondary hypertension. In many cases, these causes may coexist with risk factors for primary hypertension and are significant barriers to achieving adequate blood pressure control.

Major causes include:

- Obstructive Sleep Apnea
    - Independent risk factor for systemic hypertension
- Primary renal disease
    - Both acute and chronic kidney disease can lead to hypertension
- Medications – prescription or over the counter
    - NSAIDs (non-steroidal anti-inflammatory) – chronic use
    - Corticosteroids including both glucocorticoids and mineralocorticoids
    - Oral Contraceptives particularly those containing higher doses of estrogens
- Antidepressants including tricyclic antidepressants, selective serotonin reuptake inhibitors and monoamine oxidase inhibitors
- Cyclosporine
- Stimulants including methylphenidate and amphetamines
- Atypical antipsychotics including clozapine and olanzapine
- Erythropoietin

- Cigarette Smoking
- Hyperthyroidism/Hypothyroidism and hyperparathyroidism
- Renal artery stenosis
- Cushing syndrome
- Conn syndrome
- Pheochromocytoma
- Coarctation of the aorta

4.4 Complications of hypertension

Hypertension is associated with a significant increase in risk of adverse cardiovascular and renal outcomes. Each of the following complications is closely associated with the presence of hypertension.

- Left ventricular hypertrophy
- Heart failure
- Ischemic stroke
- Intracerebral hemorrhage
- Chronic kidney disease and end stage renal disease

Qualitatively, hypertension is the most common modifiable risk factor for premature cardiovascular disease, being more common than cigarette smoking, dyslipidemia or diabetes which are major risk factors.

4.5 When to measure blood pressure

Measuring blood pressure is the only way to diagnose hypertension, as most people with raised blood pressure have no symptoms.

Blood pressure measurements should be conducted on adults ≥ 18 years old during routine visits to primary health care facilities. Every patient with elevated blood pressure readings requires follow-up, according to intervals in this protocol (Refer to the Screening chapter)

Blood pressure measurement and control is particularly important in adults who:

- have had a prior heart attack or stroke
- have diabetes
- have chronic kidney disease (CKD)
- are obese
- use tobacco
- have a family history of heart attack or stroke

4.6 When to investigate

As documented, most patients have primary hypertension as compared to secondary. There are special cases and circumstances where hypertension patients' need to be investigated for secondary causes and these include:

- Age < 40 years
- Patient has resistant hypertension or requiring more than three anti-hypertensive medications with suboptimal control
- Patient has a palpable mass in the abdomen or flank
- Patient has as an abdominal bruit/thrill

- Patient has a palpable or auscultated neck thrill/bruit

Baseline investigations

People who are diagnosed with hypertension require thorough assessment for evidence of end organ damage and should have their cardiovascular risk calculated. These investigations can include:

- Electrocardiogram – look for LVH/Arrhythmia or evidence of ischemia
- Baseline bloods
    - Full blood count
    - Renal function tests (Urea, creatinine) + electrolytes
    - Lipid profile
    - Liver function tests
    - Uric acid
    - Hba1c (if possible)
- Chest x-ray – Asses the heart size
- Urinalysis – quantification of urinary protein, either ACR or PCR
- Ultrasound scan (KUB) – Assess kidney sizes, renal masses
- Ophthalmoscope examination of the fundus – Copper and silver wiring, AV nipping, retinal hemorrhages and pappiloedema

4.7 Diagnosis

Treatment of hypertension often involves lifelong exposure to multiple medicines and their potential adverse effects. It is therefore essential that hypertension is accurately diagnosed in primary care.

Confirming a diagnosis of hypertension

The diagnosis of hypertension should be confirmed at an additional patient visit, usually 1 to 4 weeks after the first measurement. In general, hypertension is diagnosed if, on two visits on different days:

- systolic blood pressure on both days is ≥140 mmHg and/or diastolic blood pressure on both days is ≥90 mmHg

How to measure blood pressure

Effective treatment algorithms for hypertension are dependent on accurate blood pressure measurement. All those measuring blood pressure should have taken the adapted BP measurement course and passed the evaluation within the last year i.e., Samoa-PAHO WHL course (Please enquire with MOH headquarters details for access). The following advice should be followed for measuring blood pressure:

- Cuff size: use the appropriate cuff size, noting the lines on the cuff to ensure that it is positioned correctly on the arm. (If the arm circumference is >32 cm, use large cuff)
- Site: although at the initial evaluation it is preferable to measure blood pressure in both arms and use the arm with the higher reading thereafter, this may not be practical in a busy primary care environment.
- Position: the patient should be sitting with back supported, legs uncrossed, empty bladder, relaxed for 5 minutes and not talking.
- Frequency: for persons who are getting their blood pressure measured to assess for hypertension, it is

preferable to take at least two readings and to use the average reading (30 mins if busy, 1 hour if not busy, duration apart)

- Type of Sphygmomanometer: blood pressure should be routinely measured by a validated automated electronic device (Please see examples of validated machines below). The electronic device, if available, is preferred because it provides more reproducible results and is 'less' influenced by variations in technique or by the bias of the observers.

4.8 Management

The treatment of hypertension can be divided into pharmacological and non-pharmacological interventions.

Non – pharmacological

Lifestyle counselling is a critical component of good hypertension management and is often recommended as a first step for patients with blood pressure of SBP 130–139 mmHg and/or DBP 80–89 mmHg who do not have other CVD risk factors.

However, in settings where people do not regularly visit the doctor, people who are recommended only lifestyle modification may not return for re-evaluation and needed treatment, resulting in uncontrolled hypertension and associated complications.

Refer to the healthy lifestyle counselling section of the protocol

Pharmacological

Medications

1. ACE inhibitors
2. ARB
3. CCB
4. Diuretic (Not recommended for use in BP management alone)
5. Aldosterone antagonist
6. Beta Blocker

First Line:

It is now prefered to use an ACE inhibitor/ARB or a CCB with an option of a thiazide diuretic if CCB is:

- Not tolerated by the patient
- Person has edema or heart failure
- High risk of heart failure

Second Line:

ACEI/ARB or CCB for most patients

Third Line:

Diuretic remains as the third line with the preference of a thiazide like drugs.

Fourth line:

This is mainly for resistant hypertension and is considered to use an aldosterone antagonist, i.e. A spironolactone in patient with a *Potassium < 4.5 mmol/L*. For those where the *Potassium is > 4.5 mmol/l*, it is prefered to use a higher dose of a "thiazide like diuretic".

N.B: Care must be taken with spironolactone if the patient becomes dehydrated; it is good to advice patients to temporarily stop the drug if they develop diarrhea and vomiting or if their fluid intake is restricted.

Beta blockers:

These medications are only used for treatment of hypertension if the patients have had an ischemic heart disease and atrial fibrillation.

SAMOA HYPERTENSION PROTOCOL FOR PRIMARY CARE SETTINGS

Step 1	Screen all adults ≥ 18 years old
Step 2	If SBP ≥ 140 or DBP ≥ 90 Prescribe Enalapril 5mg tab 1/2 tab + Bendrofluazide 2.5mg tab 1/2 tab per day
Step 3 After one month	If still SBP ≥ 140 or DBP ≥ 90 Increase both Enalapril and Bendrofluazide to 1 tab per day
Step 4 After one month	If still SBP ≥ 140 or DBP ≥ 90 Add Amlodipine 5mg 1 tab per day
Step 5 After one month	If still SBP ≥ 140 or DBP ≥ 90 Increase Amlodipine to 10mg per day
Step 6 After one month	If still SBP ≥ 140 or SBP ≥ 90 Increase Enalapril to 20mg tab 1/2 tab per day
Step 7 After one month	If still SBP ≥ 140 or DBP ≥ 90 Check that patient has been taking drugs regularly and correctly - if this is the case REFER or DISCUSS with the medical team

PROVISION FOR SPECIFIC PATIENTS

- This protocol is contraindicated for women who are or could become pregnant. Refer to hypertension in pregnancy protocol
- Manage diabetes according to the diabetes protocol
- Aim for BP <130/80 for people at high risk, such as individuals with diabetes, CAD, stroke, or CKD

LIFESTYLE MANAGEMENT ADVISE FOR ALL PATIENTS

- Stop all tobacco use, avoid second hand tobacco smoke
- Drink no more than 2 units of alcohol per day for men and 1 for females on at least 2 days of the week
- Increase physical activity to at least 30 minutes per day for 5 days
- Lose weight (if overweight)
- Eat a healthy diet:
  - Low salt
  - >5 servings of fruits and vegetables per day
  - Avoid added sugar from cakes, cookies, sweets, fizzy drinks, juice
  - Watch your food portion
  - Eat local food instead of imported food
  - Drink water and coconut

Notes:

- Before starting enalapril and Bendrofluazide and after several weeks consider checking serum creatinine and potassium. Dose titrate at least every 4 weeks until controlled. Once controlled on 2 consecutive visits, follow up at least ≤ 3 months
- ACE inhibitors cause chronic cough in approximately 10% of patients. Neither ACE-I nor ARBs should be given to pregnant women
- Consider statin use
- Consider starting treatment if SBP >160 or DBP >100 on the same day. If SBP 140-159 or DBP 90-100, check on a different day and if still elevated start treatment

4.9 Treatment targets

For most patients, blood pressure is considered controlled when SBP <140 mmHg and DBP <90 mmHg. However, for patients with diabetes use a target of: SBP <130 mmHg and DBP <80 mmHg.

Other treatment considerations

- If there is a prior heart attack or stroke, or the person has CVD risk of >30%, start a statin at the same time as starting antihypertensive medication. (Statins should not be used in women who are or who may become pregnant.)
- If there is a prior heart attack or ischemic stroke, start low-dose aspirin (i.e., 100 mg aspirin)
- The hypertension protocol included in this module serve well for initiation and maintenance of successful treatment. If there are serious adverse events, lack of control of blood pressure, or if a major medical event intervenes, then referral to medical specialists to get advice on alternative treatment is recommended
- If the patient is already on another medication regimen, blood pressure is controlled to the target level, and the medications the patient is taking are accessible and affordable, there is no reason to change the regimen.
- If the patient feels faint on standing, check blood pressure while standing. If the systolic blood pressure is consistently less than 110 mm Hg in a patient on medical treatment, consider reducing the dosage or number of medications used.

Treatment adherence

Adherence to treatment is critical for blood pressure control. If antihypertensive medication is being prescribed, the following are critical to ensuring adherence:

- Teach the patient how to take the medications at home.
- Explain the difference between medicines for long-term control (for example, of blood pressure) and medicines for quick relief (such as for headaches).
- Explain the reason for prescribing the medicine(s).
    - Explain the diagnosis of hypertension.
    - Discuss the asymptomatic nature of hypertension and explain that medications must be taken even if there are no symptoms.
    - Inform patient of the complications of untreated hypertension, including stroke, heart attack, kidney failure.
    - Explain the disability and economic and family burden these preventable complications cause.
- Show the patient the appropriate dose.
- Explain how many times a day the patient should take the medication and at what time, and adopt the following simple steps to help them to adhere to the guidelines:
    - Label and package the tablets.
    - Check the patient's understanding before the patient leaves the health centre.
    - Wherever possible, use once-daily dosages of all medications, to be given at the same time each day.
- Explain how important it is for the patient to:
    - Keep an adequate supply of medications safely at home.
    - Take the medicines regularly as advised, even if there are no symptoms.
- Explain potential adverse effects of the medications and what to do if the patient experiences them.
- Encourage the patient to have a family member to accompany them on next visits and show them how to assist with adherence

Chapter 5 DIABETES MELLITUS PROTOCOL

5.1 Background

Classification

Type 1 diabetes

Previously known as insulin-dependent, juvenile or childhood-onset is characterized by deficient insulin production and requires daily administration of insulin. Neither the cause of Type 1 diabetes nor the means to prevent it are known. Symptoms include excessive excretion of urine (polyuria), thirst (polydipsia), constant hunger, weight loss, vision changes, and fatigue. These symptoms may occur suddenly.

Type 2 diabetes

Formerly called non-insulin-dependent, or adult-onset results from the body's ineffective use of insulin. The majority of people with diabetes have type 2 diabetes. This type of diabetes is largely the result of excess body weight and physical inactivity. Symptoms may be similar to those of type 1 diabetes but are often less marked. As a result, the disease may be diagnosed several years after onset, after complications have already arisen. Until recently, this type of diabetes was seen only in adults, but it is now also occurring increasingly frequently in children.

Gestational diabetes

is hyperglycaemia with blood glucose values above normal but below those diagnostics of diabetes. Gestational diabetes occurs during pregnancy. Women with gestational diabetes are at an increased risk of complications during pregnancy and at delivery. These women and possibly their children are also at increased risk of Type 2 Diabetes in the future. Gestational diabetes is diagnosed through prenatal screening, rather than through reported symptoms.

Impaired glucose tolerance and impaired fasting glycaemia

Impaired glucose tolerance (IGT) and impaired fasting glycaemia (IFG) are intermediate conditions in the transition between normality and diabetes (pre-Diabetes). People with IGT or IFG are at high risk of progressing to Type 2 Diabetes, although this is not inevitable.

Key statistics

- The number of people with diabetes rose from 108 million in 1980 to 422 million in 2014.
- The global prevalence of diabetes* among adults over 18 years of age rose from 4.7% in 1980 to 8.5% in 2014 .
- Between 2000 and 2016, there was a 5% increase in premature mortality from diabetes.
- Diabetes prevalence has been rising more rapidly in low- and middle-income countries than in high-income countries.
- Diabetes is a major cause of blindness, kidney failure, heart attacks, stroke, and lower limb amputation.
- In 2016, an estimated 1.6 million deaths were directly caused by diabetes. Another 2.2 million deaths were attributable to high blood glucose in 2012.
- Almost half of all deaths attributable to high blood glucose occur before the age of 70 years. WHO estimates that diabetes was the seventh leading cause of death in 2016.

New Zealand Data

In 2013, the highest rate of diabetes in New Zealand was in the Indian ethnic group (11 percent), followed by Pacific peoples (9.6 percent)

- Type 2 diabetes is increasingly occurring in Māori and Pacific children under the age of 15 years
- Māori are three times as likely to have type 2 diabetes as non-Māori, and are more likely to develop complications
- One in three Pacific adults aged 45 years or over has diabetes
- Pacific peoples develop diabetes earlier and experience more complications than New Zealand Europeans with the condition
- Adults living in the most socioeconomically deprived areas are over three times more likely to report that they have been diagnosed with diabetes than adults living in the least deprived areas
- People with a history of long-term mental illness have significantly higher rates of diabetes

Samoa Data (STEPS SURVEY)

- 1 in 5 adults aged 18-64 years, (25.8%) suffer from impaired fasting glycaemia and almost half of adults(45.8%) was found to have raised blood glucose or had been previously diagnosed as diabetic.
- In the age group 18-64 years, 74.6% had never had their blood sugar measured by a doctor or health worker.
- Among those diagnosed by doctor or health worker with raised blood sugar or diabetes, 11.6% are taking insulin and 26.3 % are taking oral drugs.
- Among those diagnosed by doctor or health worker with diabetes, 69% have been prescribed special diet, only 33.6% were recommended to lose weight, 30.8% to stop smoking and 83.3% to do more exercise.
- Among those diagnosed with diabetes, 1.6% sought advice from traditional healer and 1.8% was currently taking herbal or traditional treatment for diabetes.

5.2 Diabetes risk factors and symptoms

Risk factors for type 2 diabetes include:

- overweight/obesity
- physical inactivity
- having a first-degree relative with diabetes
- history of gestational diabetes, or preeclampsia
- history of CVD, HTN, dyslipidaemia, or polycystic ovary syndrome.

On average, people have type 2 diabetes (with or without symptoms) for between five and seven years before it is diagnosed. Symptoms of diabetes include:

- polyuria (excessive passing of urine)
- polydipsia (excessive thirst)
- unexplained weight loss
- polyphagia (excessive hunger)
- vision changes
- fatigue.

5.3 Diagnostic testing for diabetes

Test adults who are over 18 years old regardless of weight.

Fasting plasma glucose (FPG) is the most practical test for low-resource settings, given its low cost*. HbA1c can also be used, but it is considerably more costly.

Plasma glucose two hours after a 75 g oral glucose load (OGTT) can also be used to screen for and diagnose diabetes but is less practical and more costly.

If a patient is not fasting and has symptoms, a random plasma glucose (RPG) test can also be performed. It is the least accurate of the diagnostic tests. It is useful to confirm the diagnosis in person with symptoms; however, a negative test does not rule out the diagnosis of diabetes.

* Point of care devices can be used in diagnosing diabetes if laboratory services are not available.

Diagnostic Values

Test	mmol/l	mg/dl
Fasting blood sugar (FBS)*	≥7	≥126
Random plasma glucose (RPG)	≥11.1	≥200
Plasma glucose two hours after a 75 g oral glucose load-OGTT	≥11.1	≥200
	mmol/mol	**%**
Haemoglobin A1c	≥48	≥6.5%

5.4 Drug therapy

Control of blood glucose

Metformin is recommended as the first-line drug in the treatment of diabetes. Sulfonylurea is recommended as the second-line treatment, and human insulin as the third-line treatment.

Patients may require two or three drugs. Although there are other drug classes usually used as second- and third-line treatment, including thiazolidinediones (TZDs), DPP-4 inhibitors, SGLT2 inhibitors, and GLP-1 receptor agonists, these medicines tend to be more costly than metformin, sulfonylurea, and insulin, with currently limited evidence of superior effectiveness. They may, however, be considered in the rare cases when treatment with metformin, sulfonylurea, and insulin is not possible. Insulin treatment should be introduced and monitored according to protocols.

Control of blood pressure and blood lipids

Hypertension treatment is indicated when SBP ≥130 and/or DBP ≥80). Statins are recommended for all people with type 2 diabetes older than 40 years, but only if this does not negatively impact access to glucose-lowering and blood pressure lowering medication.

5.5 Monitoring glycaemic control

If diabetes is diagnosed, monitor glycaemic control every three months until diabetes is controlled, then every six months after that.

HbA1c is the most accurate measurement of long-term glycaemic control and represents the average blood glucose over the previous two to three months. HbA1c < 7% is generally considered to be adequate glycaemic control. In people with frequent severe hypoglycaemia, severe complications and low life-expectancy, the goal for HbA1c could be relaxed, eg to <8%.

Fasting plasma glucose (FPG) can also be used to monitor control.

Goal for glycaemic control	Plasma glucose
Fasting	≤7.0 mmol/l (126mg/dl)

* Fasting: no food and only water for 8–14 hours or more before the test.

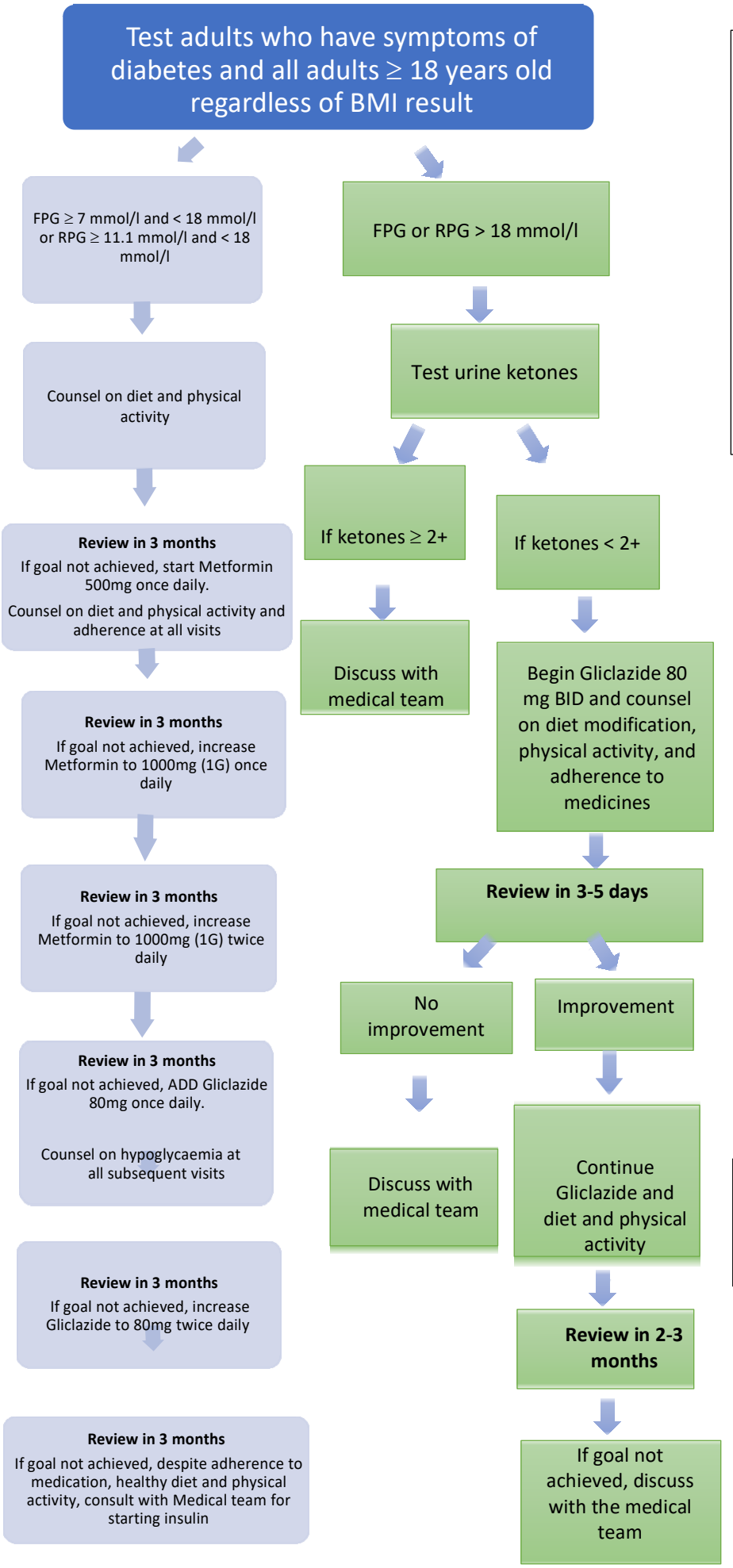
5.6 Clinical practice recommendations

Provide counselling around lifestyle change, including diet, physical activity and smoking cessation (see Healthy-lifestyle counselling).

- Initiate diabetes self-management education to reinforce treatment goals.
- Prescribe aspirin for patients with CVD.
- Measure blood pressure at every visit. Treat as per hypertension protocol if ≥130/80 mmHg. Note: if 130/80 mmHg is chosen as target, then treatment should start if over 130/80 mmHg.
- Measure weight and calculate BMI at every visit.
- Take A1c measurements every three to six months; every six months if stable on unchanging treatment.
- Arrange fasting lipid panel annually if available.
- Conduct foot exam for amputation risk annually, or every visit if high-risk (Refer to diabetic neuropathy protocol)
- Conduct annual urine protein dipstick (microalbuminuria dipstick if available to calculate albumin to creatinine ratio) and serum creatinine measurement (GFR calculation) for CKD screening. CKD is defined by GFR<60 ml/min/1.73 m2 OR the presence of moderate or severe albuminuria (albumin-creatinine ratio ≥30 mg/mmol).
- Conduct dilated pupils' retinal exam at first diabetes diagnosis and annually thereafter (Refer to diabetic retinopathy protocol)

5.7 Treatment adherence

- Explain the diagnosis of diabetes.
- Inform patient of the complications of untreated diabetes.
- Discuss the possible symptoms of diabetes.
- Show the patient the appropriate dose.
- Prescribe once-daily medications, less expensive generics, and longer-lasting supplies of medicine whenever possible.
- Explain potential adverse effects of the medications and what to do if the patient experiences them.
- Explain how many times a day the patient should take the medication and at what time, and adopt the following simple steps to help them adhere to the guidelines:
    - Label and package the tablets.
    - Check the patient's understanding before the patient leaves the health centre.
- Explain to patient how import it is to:
    - Keep an adequate supply of medications safely at home.
    - Take the medicines regularly as advised, even if there are no symptoms.
- Provide tools such as pill boxes and medication logs to help patients remember to take their medications.
- Assess adherence and discuss barriers at every visit.
- Reconcile clinician's medication list with patient's list, adjust dose, and eliminate unneeded medications



SCREENING FOR CHRONIC COMPLICATIONS

- Measure BP at every scheduled visit, review medication as per hypertension protocol
- Refer for dilated pupil retinal exam upon diagnosis. Refer to retinopathy protocol
- Examine feet for ulcers at every visit. Refer to TTM hospital or MTII hospital if ulcer is present. Refer to neuropathy protocol
- Test for CKD (Serum creatinine, electrolytes, UACR)

MANAGEMENT OF ACUTE COMPLICATIONS

Severe hypoglycaemia (plasma glucose <2.8 mmol/l) or signs:

- If conscious, give a sugar-sweetened drink
- If unconscious, give 20-50 ml of 50% glucose (Dextrose) IV over 1-3 minutes

Severe hyperglycaemia (plasma glucose >18 mmol/l and urine ketones 2+) or signs and symptoms of severe hyperglycaemia:

- Set up IV drip 0.9% normal saline 1 litre in 2 hours; continue at 1 litre every 4 hours, ADMIT OR REFER

GOAL FOR GLYCAEMIC CONTROL

- Fasting ≤ 7mmol/l
- HbA1c 7% (if available)

TEST TO DIAGNOSE DM TYPE 2

- FBS ≥ 7 mmol/l
- RBS ≥ 11.1 mmol/l
- OGTT 2 hours 75g plasma glucose ≥ 11.1 mmol/l
- HbA1c ≥ 6.5%

5.8 Identifying emergencies and need for referral

A primary care visit may also be for an emergency condition, or evolve to an emergency, and the provider can be equipped to identify and refer such patients to the nearest facility with the required capacity.

Morbidity from acute exacerbations of cardiovascular disease (including but not limited to hypertensive crisis, heart attack, stroke, and diabetic ketoacidosis) can be very time-dependent. Early recognition, resuscitation, and referral of patients with acute cardiovascular emergencies is essential.

All providers delivering primary care for cardiovascular conditions should:

1. Know the nearest appropriate higher-level facilities for referral of acute cardiovascular emergencies.
2. Understand how to approach the person with acute difficulty in breathing, shock, or altered mental status (such as that taught in the WHO Basic Emergency Care course).
3. Screen each patient for danger signs that would suggest the need for immediate referral. (This screening may take 2–3 minutes in patients without acute symptoms. A simple list of danger signs is provided below, but facilities may want to use existing referral protocols).

Urgent referral criteria

- New chest pain, chest pain at time of assessment or change in severity or frequency of chest pain
- Symptoms/signs of transient ischemic attack (TIA) or stroke
- Symptoms/signs of heart failure (shortness of breath, difficulty breathing, leg swelling) or heaving cardiac apex
- Severe leg pain with symptoms of claudication
- Blood pressure >180/110 mmHg with severe headache, chest pain, shortness of breath, blurred vision, mental status changes, reduced urine output, nausea, vomiting, lethargy, seizures, papilloedema, focal neurologic signs or signs of heart failure
- Blood pressure >200/>120 mmHg
- Plasma glucose >18mmol/l (325mg/dl) and urine ketones 2+ or signs and symptoms
- Hypoglycaemia unresolved by intravenous glucose
- Suspected type 1 diabetes in a newly diagnosed patient
- Any severe infection or infected ulcer
- Recent deterioration of vision
- Anuria
- Symptomatic tachycardia.

Other referral criteria (non-emergency)

- Known prior heart disease, stroke, TIA, diabetes, kidney disease (if the patient has not had an initial assessment),
- cardiac murmurs
- Irregular pulse
- Aged under 40 years with BP ≥140/90 mmHg (to exclude secondary causes of hypertension)
- Persistent blood pressure ≥140/90 (in diabetes ≥130/80 mmHg) while on treatment with two or three anti-hypertensives
- Newly diagnosed diabetes with urine ketones 2+ or in lean persons of <30 years
- Diabetes with poor control despite maximal metformin dosing with or without sulphonylurea

- Diabetes with recent deterioration of vision or no eye examination in past two years
- Pregnant women with diabetes or hypertension
- Total cholesterol > 8 mmol/l (310 mg/dl)
- Any protein in the urine (proteinuria), or elevated creatinine
- Symptoms/signs of kidney problems
- Signs of peripheral vascular disease

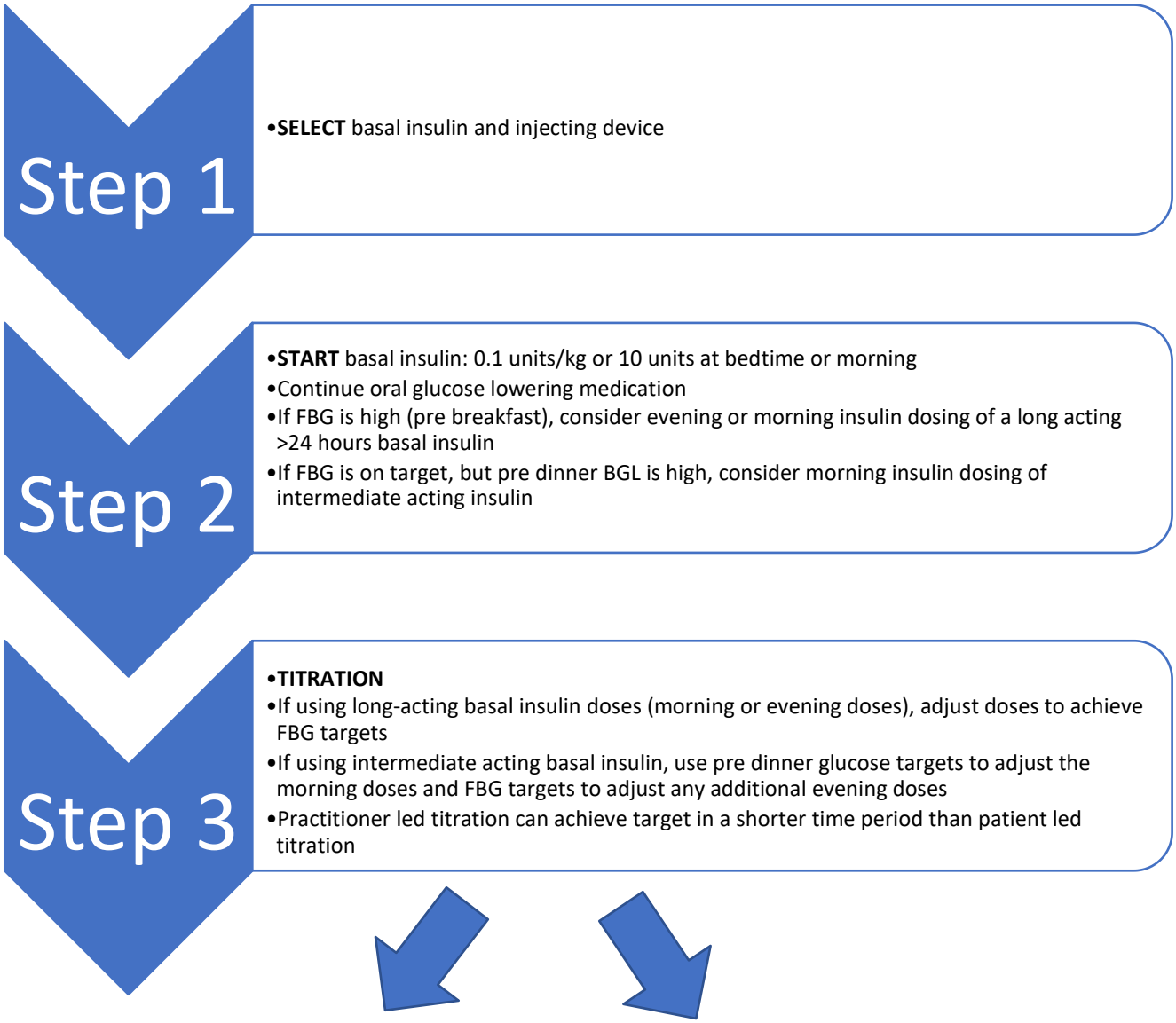
Samoa Essential Medicines for Diabetes

INSULINS AND OTHER ANTI-DIABETIC AGENTS	
Glibenclamide	**Tabs** 5mg
Gliclazide	**Tabs** 80mg
Glipizide	**Tabs** 5mg
insulin biphasic neutral/isophane	**Injection** 100IU/ml, 10ml vial
insulin isophane	**Injection** 100IU/ml, 10ml vial
insulin neutral	**Injection** 100IU/ml, 10ml vial
Metformin	**Tabs** 500mg

5.9 Guide to insulin initiation and titration

The following figures provide guidelines for insulin initiation and titration.

Starting and adjusting basal insulin



PRACTITIONER LED TITRATION	
Adjust insulin dose twice weekly as shown, until FBG target is achieved	
Mean FBG over previous two days (mmol/L)	**Insulin dose adjustment**
≥ 10.0	Increase by 4 units
8.0 – 9.9	Increase by 2-4 units
7.0 – 7.9	No change or increase by 2 units
6.0 – 6.9	No change
4.0 – 5.9	No change or decrease by 2 units
< 4.0	Decrease by 2-4 units.

PATIENT LED TITRATION	
Adjust insulin dose every three days. Increase by 2 units until FBG target is achieved	
Mean FBG over previous three days (mmol/L)	**Insulin dose adjustment**
≥ 6.0 but ≤ 8.0	No change
4.0 – 6.0	Decrease insulin dose by 2 units
< 4.0	Decrease insulin dose by 4 units
Do not increase insulin dose if FBG < 4.0 mmol/L at any time in the preceding week	

Starting and adjusting pre-mixed (biphasic) and co-formulated insulin

Step 1

- **SELECT** premixed or co-formulated insulin and injecting device
- Insulin naive patients

Step 2

- **START** premixed or co-formulated insulin 10 units immediately before or soon after the largest meal (usually evening meal)
- Continue metformin if indicated; consider tapering sulfonylureas (e.g., Daonil, glipizide, gliclazide) as glycaemic control improves

Step 3

- **TITRATION**
- Adjust the evening pre-mixed insulin dose once or twice a week according to the schedule below to FBG

Lowest BGL reading (mmol/L) of the previous three day: fasting or preprandial	**Insulin dosage adjustment**
≥ 10.0	Increase by 6 units
8.0 – 9.9	Increase by 4 units
6.0 – 7.9	Increase by 2 units
4.0 – 5.9	No change
< 4.0	Decrease by 2 unit

- If a morning insulin dose is given, adjust the insulin dose according to evening preprandial BGL according to the same titration recommendations
- Hypoglycaemia should prompt a review of other oral therapy. Which insulin is adjusted depends on regimen and target glucose

Step 4

- **INTENSIFICATION:** Once daily insulin to twice daily premixed insulin

- **WHEN?**
- With FBG at target, if evening preprandial BGL > FBG, or if evening preprandial BGL is high, or
- After 3 months if HbA1c > target, despite FBG and evening preprandial BGL at night

- **HOW?**
- Calculate any increased total daily insulin dose and divide this into 2 doses, considering the continued need to maintain FBG and postprandial targets
- Give the increased dose adjustment as twice daily injections (pre breakfast and pre dinner). This may not be a 50/50 split, as prandial targets may require a higher proportion to be given at the largest meal of the day e.g., 60/40
- Monitor pre dinner BGL and FBG against targets
- Once a week, adjust both insulin doses independently (according to protocol above in step 3); pre-breakfast insulin is adjusted according to pre-dinner BGL, and pre-dinner insulin is adjusted according to FBG

Guide to basal plus insulin intensification schedules

Step 1

- **SELECT** rapid acting (prandial) insulin and injecting device to be added in addition to basal insulin

Step 2

- **START** rapid-acting insulin (4 units) to be given before the meal with the largest carbohydrate content
- Continue metformin, consider tapering sulfonylureas (e.g., Daonil, glipizide, gliclazide) as glycaemic control improves
- Monitor two-hour postprandial BGL.
- Continue to assess FBG and preprandial glucose levels - GOAL is 4.0 - 7.0 mmol/L

Step 3

- **TITRATION**
- Increase rapid acting (prandial) insulin dose by 2 units every three days to achieve target

Two-hour postprandial BGL (mmol/L)	Rapid acting (prandial) insulin dosage adjustment
≥ 8.0 (for three consecutive days)	No change or increase y 2 units
6.0 – 7.9	No change
4.0 – 5.9	No change or decrease by 2 units
< 4.0 on any day	Decrease by 2-4 units

Step 4

- **Basal plus titration to basal bolus – intensification**

- **WHEN?**
- If HbA1c is not at target after three months, add a further prandial insulin dose to another meal (e.g., basal plus 2 to basal bolus)

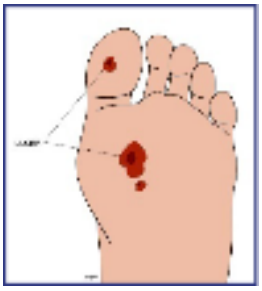
- **HOW?**
- Keep the current prandial and basal insulin doses unchanged
- Add a new rapid-acting (prandial) insulin to the next largest meal of the day (starting at 10% of the basal insulin dose or 4 units)
- Increase new prandial insulin dose by 2 units every three days until postprandial target is achieved as per Step 3 above

5.10 Diabetic neuropathy

What are diabetic foot problems?

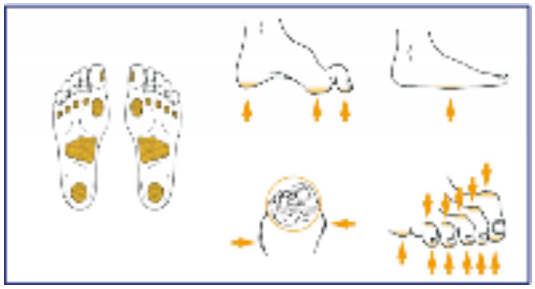
Diabetic foot problems are amongst the most common, costly and severe complications of diabetes. The term "diabetic foot complications" encompasses the conditions of diabetic foot *ulcer* (i.e., a full-thickness epithelial defect below/distal to the ankle) and diabetic foot *infections* (i.e., any soft-tissue or bone infection occurring in the diabetic foot, including osteomyelitis).

A diabetic foot ulcer is a localised injury to the skin and/or underlying tissue below the ankle. Disruption of protective skin allows for colonization of subcutaneous tissues by microbes and in many cases the wound becomes clinically infected, requiring antimicrobial treatment and often some form of surgical intervention.
Diabetic foot ulcers frequently result from a person with diabetes simultaneously having two or more risk factors, with diabetic peripheral neuropathy and peripheral artery disease usually playing a central role.



Examples of foot ulcers

The *neuropathy* leads to an insensitive and sometimes deformed foot, often causing abnormal loading of the foot. In people with neuropathy, minor trauma (e.g., from ill-fitting shoes, or an acute mechanical or thermal injury) can precipitate ulceration of the foot. Loss of protective sensation, foot deformities, and limited joint mobility can result in abnormal biomechanical loading of the foot. This produces high mechanical stress in some areas, the response to which is usually thickened skin (callus). The callus then leads to a further increase in the loading of the foot, often with subcutaneous haemorrhage and eventually skin ulceration. Whatever the primary cause of ulceration, continued walking on the insensitive foot impairs healing of the ulcer.



Areas of foot at highest risk for ulceration

Peripheral artery disease (PAD), generally caused by atherosclerosis, is present in up to 50% of patients with a diabetic foot ulcer. PAD is an important risk factor for impaired wound healing and lower extremity amputation. A small percentage of foot ulcers in patients with severe PAD are purely ischaemic; these are usually painful and may follow minor trauma.

Common risk factors for the development of foot ulcers in people with diabetes

- peripheral vascular disease
- neuropathy

- poor glycaemic control
- cigarette smoking
- diabetic nephropathy
- previous foot ulcerations/amputations

Symptoms

Patients can present with symptoms of peripheral neuropathy and or peripheral artery occlusion, such as:

- pain in the legs or cramping in the thighs or calves during physical activity.
- tingling, burning, or pain in the feet.
- loss of sense of touch or ability to feel heat or cold very well.
- a change in the shape of feet over time
- dry, cracked skin on the feet.
- a change in the colour and temperature of the feet
- thickened, yellow toenails.
- fungal infections between the toes
- a blister, sore, ulcer, infected corn, or ingrown toenail.

However, the absence of symptoms does not exclude diabetic foot problems.

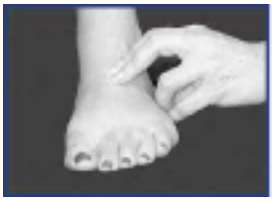
Assessment and management of diabetic foot problems

Examination of the feet

Remove the patient's shoes, socks, dressings, and bandages and carry out the following examination procedures:

Palpation of arteries

Dorsal pedis: Feel in the middle of the dorsum of the foot just lateral to the tendon of extensor halluces longus (extensor tendon of the great toe).



Dorsal pedis palpation

Posterior tibial artery: Feel midway between medial malleolus and tendon calcaneus.

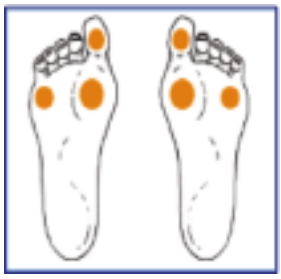
Posterior tibial artery palpation

Assessing loss of protective sensation (LOPS)

Assessment of LOPS is done with one of the following techniques:

a) Pressure perception: Semmes-Weinstein 10 g monofilament (if monofilament is not available, see "method c" below). Sensory examination should be carried out in a quiet and relaxed setting.

- First, apply the monofilament on the patient's hands (or elbow or forehead) so that she or he knows what to expect. The patient must not be able to see whether or where the examiner applies the filament.
- Conduct the test on three sites on both feet.



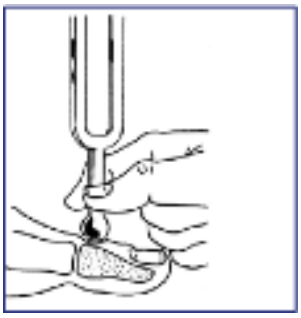
Sites to be tested for loss of protective sensation.

Pressure perception test using Semmes-Weinstein 10 g monofilament.

- The total duration – skin contact and removal of the filament should be approximately 2 secs.
- Apply the filament along the perimeter of, not on, an ulcer site callus or necrotic tissue.
- Do not allow the filament to slide across the skin or make repetitive contact at the test site.
- Apply the monofilament perpendicular to the skin surface. Apply sufficient force to cause the filament to bend or buckle.
- Press the filament to the skin and ask the patient whether they feel the pressure applied (Yes/No).
- Next, ask where they feel the pressure (right foot/left foot).
- Repeat this application twice at the same site but alternate this with one "mock" application in which no filament is applied.

b)Vibration perception: 128 Hz tuning fork. The proper method for using a 128 Hz tuning fork to check for vibratory sensation is as follows:

- First, apply the tuning fork on the patient's wrist (or elbow or clavicle) to demonstrate what the sensation feels like.
- Ensure the patient cannot see whether or where the examiner applies the tuning fork.
- Apply the tuning fork to a bony part on the dorsal side of the distal phalanx of the first toe (or another toe if the hallux is absent).
- Apply the tuning fork perpendicularly, with constant pressure. Repeat this application twice but alternate this with at least one "mock" application in which the tuning fork is not vibrating.



Application of tuning fork in vibration perception test

- The test is positive if the patient correctly answers at least two out of three applications, and negative if two out of three answers are incorrect.
- If the patient is unable to sense the vibrations on the toe, repeat the test more proximally (e.g., malleolus, tibial tuberosity).

c) When monofilament or tuning fork are not available, test tactile sensation with the light touch test. This simple test (also called the Ipswich Touch Test) can be used to screen for loss of protective sensation (LOPS), when the 10 g monofilament or 128 HZ tuning fork is not available. The test has reasonable agreement with these tests to determine LOPS, but its accuracy in predicting foot ulcers has not been established.

- Instruct the subject to close their eyes and to say "yes" when they feel the touch.
- The examiner lightly sequentially touches with the tip of her/his index finger the tips of the first, third, and fifth toes of both feet for 1–2 seconds. When touching, do not push, tap, or poke.
- LOPS is likely when light touch is not sensed in ≥2 sites.

Stratification and management of risk

Risk level	Low risk	Moderate risk	High risk	Active foot problem
Features	No risk factor except callus alone	Any of: • Deformity • Neuropathy • non-critical limb ischaemia	Any of: • previous ulcer • previous amputation • neuropathy with non-critical limb ischaemia • neuropathy with callus and/or deformity • non-critical limb ischaemia with callus and/or deformity	Any of: • ulcer • spreading infections • critical limb iscaemia • gangrene • suspicion of acute Charcot arthropathy • unexplained red swollen foot
Action	Assess annually	Assess every 3–6 months	Assess every 1–3 months	Urgent referral

Stratification of level of risk of developing diabetic foot problems or the need for an amputation

Patients with diabetes should receive counselling on avoidance of foot complications (see below).

- Patients at low risk can be assessed annually, those at moderate risk every 3–6 months, and those at high risk every 1–3 months.
- Pre-ulcerative lesions need to be treated by a trained professional by:
- removal of callus
- protection or draining of blisters.

- treatment of ingrown and thickened nails
- antifungal treatment for fungal infections.

Management of active diabetic foot problems

Active foot problems require referral to a higher level of care. Best results in prevention of amputations have been achieved in settings where multidisciplinary facilities are available.

When to refer

Patients with a foot ulcer should be referred to a more specialized level for further evaluation if management by a trained professional and the necessary equipment and consumables are not available at the primary care level. Patients with gross foot deformities and/or absent peripheral pulses, and patients with suspected lower limb ischaemia will need to be referred to a higher level of care.

Urgent referral to acute services is recommended for patients with any of the following:

- infected ulcer
- spreading infection
- critical limb ischaemia
- gangrene
- suspicion of acute Charcot arthropathy
- unexplained red swollen foot.

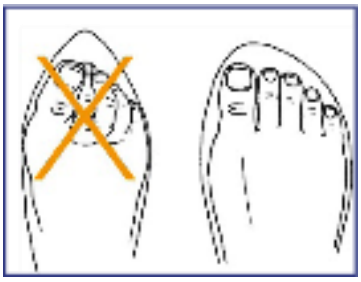
Counselling patients on foot care

To avoid serious foot problems that could result in losing a toe, foot or leg:

- Inspect your feet daily. Check for cuts, blisters, redness, swelling, or nail problems. Use a magnifying hand mirror to look at the bottom of your feet.
- Bathe feet in lukewarm, never hot, water. Keep your feet clean by washing them daily. Use only lukewarm water – the temperature you would use on a newborn baby.
- Be gentle when bathing your feet. Wash them using a soft washcloth or sponge. Dry by blotting or patting, and dry carefully between the toes.
- Moisturize your feet but not between your toes. Use a moisturizer daily to keep dry skin from itching or cracking. But don't moisturize between the toes – that could encourage a fungal infection.
- Cut nails carefully. Cut them straight across and file the edges. Don't cut nails too short, as this could lead to ingrown toenails. If you have concerns about your nails, consult your doctor.

The proper way to cut toenails.

- Never treat corns or calluses yourself. No "bathroom surgery" or medicated pads. Visit your doctor for appropriate treatment.
- Shake out your shoes and feel the inside before wearing. Remember, your feet may not be able to feel a pebble or other foreign object, so always inspect your shoes before putting them on.
- Wear socks and appropriate footwear. The inside length of the shoe should be 1–2 cm longer than your foot and should be neither too tight nor too loose.



Appropriate shoe shape and size

- Keep your feet warm and dry.
- Never walk barefoot, not even at home. Always wear shoes or slippers. You could step on something and get a scratch or cut.
- Take care of your diabetes. Keep your blood glucose levels under control.
- Do not smoke. Smoking restricts blood flow in your feet.
- Get your feet examined regularly.

5.11 Diabetic kidney disease

Diabetic kidney disease is a microvascular complication of diabetes, with a characteristic histopathology. If untreated, it is characterized by a relentless decline in glomerular filtration rate (GFR), raised arterial blood pressure, and high risk of CVD and death. If left untreated, once the stage of proteinuria is reached it often ends in renal failure in about 5 to 7 years.

Diabetic kidney disease is defined by albuminuria and/or a decreased estimated glomerular filtration rate (eGFR).

Risk factors for diabetic kidney disease

- poor glycaemic control
- elevated blood pressure
- genetic susceptibility

Diagnosis of diabetic kidney disease

Symptoms and signs of diabetic kidney disease:

- The earliest clinical signs are elevated blood pressure and moderately increased urine albumin excretion.
- Peripheral oedema occurs at a very late stage.
- The first symptoms are those of uraemia (nausea, itching, anorexia).

The diagnosis of diabetic kidney disease is made in patients diagnosed with diabetes upon:

- Estimated glomerular filtration rate (eGFR)[1] of <60 mL/min per 1.73 m^2 on at least two occasions, 1 to 3 months apart, and/or
- Presence of albuminuria in at least two urine samples, 1 to 3 months apart.

eGFR is calculated from serum creatinine, using an equation that has been validated for that population. Otherwise, the most commonly used equation, developed by the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI). It is based on serum creatinine, age, sex and race.

Urinary albumin excretion can be estimated in a spot urine sample using several tests (from most preferred to least preferred):

- urine albumin-to-creatinine ratio (ACR)
- urine protein-to-creatinine ratio (PCR)
- reagent strip (“dipstick”) urine analysis for albumin or total protein with automated reading
- reagent strip (“dipstick”) urine analysis for albumin or total protein with manual reading.

Category	mg/g	mg/mmol	dipstick
normal to mildly increased	<30	<3	–
moderately increased	30–300	3–30	Trace/1+
severely increased	>300	>30	1+/2+

Categories of albuminuria (measured by ACR)

Screening for and management of diabetic kidney disease

People with type 2 diabetes should be screened once a year with either the albumin/creatinine ratio in a spot urine sample or with eGFR using serum creatinine (preferably both tests, for better prognostic ability).

Patients with moderately and severely increased albuminuria and those with GFR <60 ml/min/1.73 m2 if combined with albuminuria should be referred for specialist assessment.

To delay onset and slow the progression of diabetic kidney disease:

- Aim for good glycaemic control but adjust for hypoglycaemia risk.
- Maintain blood pressure levels at <130/80 mmHg with an angiotensin-converting enzyme (ACE) inhibitor and add thiazide diuretic if required.
- Modify other major CVD risk factors (dyslipidaemia, smoking).

5.12 Diabetic Retinopathy

All persons with diabetes mellitus need regular eye checkup for early detection and timely treatment of diabetic retinopathy to prevent blindness.

- Diabetic retinopathy (DR) is a major micro-vascular complication of diabetes and is a significant cause of irreversible blindness in Samoa. As much as 20% of people with Type 2 diabetes have retinopathy at the time of first diagnosis of diabetes. Diabetic retinopathy can remain asymptomatic until the disease progresses to advanced stages. Therefore, people with diabetes need to have regular eye examinations to monitor progression of the disease, to identify and treat vision threatening DR.
- With good management, visual impairment can be avoided in the majority of patients. Treatment, particularly with laser, when applied appropriately and in a timely manner, reduces the risk of vision loss.
- Diabetic retinopathy is divided into a number of different grades based on the severity of the disease and the presence of particular clinical features.
    - Mild non-proliferative diabetic retinopathy (NPDR), characterized by increased vascular permeability ○ Moderate to severe non proliferative diabetic retinopathy, characterized by vascular closure ○ Proliferative diabetic retinopathy (PDR), characterized by presence of new blood vessels.
    - Macular edema, characterized by retinal thickening from leaky blood vessels, can develop at all stages of retinopathy.
- Untreated PDR and macular edema can lead to visual impairment and blindness.
- Cataract is also common in people with diabetes.

Risk factors

- Duration of diabetes is a strong predictor for development and progression of retinopathy with the prevalence of DR at 5 years being 25%, 60% at 10 years and 80% at 15 years.
- Major modifiable risk factors are glycemic and blood pressure control.
- Other risk factors include hyperlipidemia, pregnancy, and nephropathy.

Screening recommendations

- Screening services are available at TTM and MTII Hospital Eye Clinics, and District Health facilities via mobile outreach services.

- Retina exam is performed using either a fundus camera, indirect or direct ophthalmoscopy by trained screeners.
- People with Type 1 diabetes: ○ Initial screening done 5 years after first diagnosis of diabetes, or at puberty, whichever is earlier.
- People with Type 2 diabetes:
    - ○ Initial screening done at first diagnosis of diabetes.
- Pregnant women who have diabetes: ○ Screening done early in the first trimester of pregnancy or at booking, regardless of previous history of screening

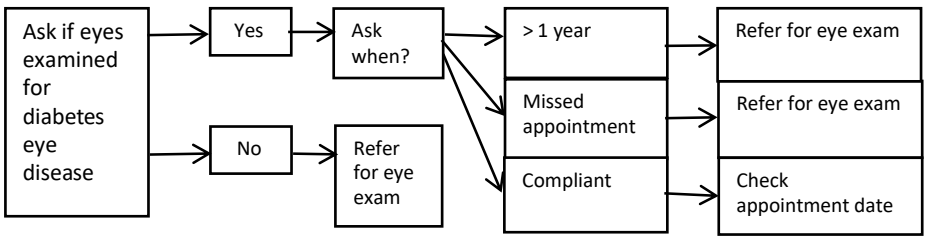
Follow up

- On-going screening is conducted every 1 – 2 years if no DR is detected. The frequency of eye examination is increased depending on the grade or the severity of DR and the risk factors for progression to vision-threatening disease.

Eye assessment

- Take a history focused on diabetes and its modifiers.
- Assessment of visual acuity – unaided or aided. Check with pinhole if visual acuity is 6/12 or worse.
- Identification and grading of diabetic retinopathy
    - Routine retinal photography should be performed without mydriasis. However, if the retinal image produced does not meet the "quality of image" criteria (specified in (Pacific Eye Institute, 2010), then dilate the pupil and repeat retinal photograph. If image is still not satisfactory, then slit lamp biomicroscope examination is required.
    - Dilate pupils with tropicamide 1% eye drop. Add phenylephrine 2.5% eye drop for rapid onset and more complete dilation (only one drop in each eye for patients with hypertension).

Diabetic retinopathy care assessment



Management of Diabetic Retinopathy

- Patients with any level of macular edema, severe NPDR, or any PDR require prompt referral to ophthalmologist.
- Laser photocoagulation for DR is effective at slowing the progression of retinopathy and reducing visual loss. Because this treatment does not usually restore lost vision, early detection before symptoms develop is imperative.

5.13 Diabetes in Pregnancy

Purpose of guideline

1. This guideline aims to establish the detection, diagnosis, and management of diabetes in pregnancy in Samoa.
2. To create referral pathways for women with diabetes when pregnant and women who develop gestational diabetes.

Optimal outcomes

1. Maintenance of maternal normoglycaemia during pregnancy
2. Prevention of adverse pregnancy outcomes in women with gestational diabetes
3. Timely referral of women with diabetes

Responsibility

Doctors, nurses, midwives, all maternal health care providers (Private and Public)

Diagnosis

Gestational diabetes – abnormal glucose tolerance that is detected in Pregnancy (i.e.) after 20 weeks and or 6 weeks postpartum.

OGTT values (MOH New Zealand 2014)

- Fasting ≥ 5.5 mmols/L OR
- 2hr glucose level ≥ 9.0 mmols/L
- HbA1c 50mmols/L (6.7%) during pregnancy is referred to as Probable Chronic Diabetic

Background

Due to the increase in estrogen, progesterone, and cortisol as well as the presence of the human placental lactogen, pregnancy induces and imbalance in glucose homeostasis leading to a state of insulin resistance. Therefore, the pathogenesis of gestational diabetes is similar to type 2 diabetes; and as evidence has shown; many of the women are at increased risk of developing Type 2 Diabetes.

Local Data

There are no local data regarding the rates of GDM in Samoa

WOMEN AT RISK

- Maternal Obesity (BMI >35)
- Pre-existing Medical co-morbidities (Hypertension, Hyperlipidaemia)
- High Carbohydrate and Glucose in Diet · Positive Family History of Diabetes · Other risk factors include:
    - Maternal Age >35 years
    - Family History of Diabetes (parents or siblings)
    - Past personal History of abnormal glucose tolerance
    - Previous very large babies > 4.5kg Bwt
    - Polycystic Ovarian syndrome
    - Persistent glycosuria
    - Previous unexplained Intrauterine Demise
    - Current use of Glucocorticoids
- Prev. large babies > 4kgs
- Past history of Recurrent miscarriages (>3)

Management

Pre-pregnancy Control of Diabetes

It is important to aim for good diabetes control prior to becoming pregnant. This is to prevent the risk of:

1. Congenital anomalies

The background rate of anomalies in the general population is 2-3%; with every 11mmol/mol increase in HBa1C level above the normal range, this risk increases linearly by 2%. Congenital anomalies subsequently are responsible for approximately half of pregnancy losses in diabetic women. HbA1C has largely taken over as the screening tool at booking for Diabetes in Pregnancy. The green light for pregnancy is generally given with levels around 50mmol/mol (6.7% whereabouts).

2. Early Pregnancy losses

Women with poorly controlled diabetes have an increased risk of spontaneous miscarriages.

3. Developing other associated comorbidities and/or complications. Pertinent ones include:

a. Nephropathy

Pregnant women with nephropathy (>0.3mg/24 hours), impaired Renal Function Tests and Hypertension) are at increased risk of:

i. Gestational Hypertension and Pre-eclampsia
ii. Fetal Growth Restrictions
iii. Prematurity
iv. Increased Perinatal Mortality

The risks of complications are directly proportional to the degree of renal impairment at the onset of pregnancy, though this can further rise with the addition of hypertension and proteinuria. A pre-pregnancy Creatinine level of 200mg/dl or more, careful counselling regarding adverse pregnancy outcomes should be employed.

v. Optimizing Medications – Women with nephropathy are usually on an ACE-I to slow the progression of their renal pathology and to treat hypertension. This however is generally contraindicated in pregnancy quoted as first trimester – congenital anomalies (renal, CNS, cardiac), second trimester – skull and later pregnancy – fetal kidneys side effects.

Therefore, discussion around safe medications should take place.

b. Ischemic Heart Disease

Women with diabetes who have a myocardial infarct in pregnancy have a high mortality rate, which has been reported to be as high as 50% in the past.

c. Pregnancy Maternal Complications

i. Birth Injuries and Post-Partum Hemorrhage (PPH) and Anemia – Owing to the delivery of a macrosomic baby, women are prone to developing extensive vaginal and perineal lacerations. As further consequence, blood losses during delivery can be expected to be excessive.
ii. Anemia as a consequence of PPH
iii. This further exposes women to more risks via the introduction of Blood products through transfusions
iv. Post-Partum Sepsis
v. Post-Partum Depression

4. Neonatal complications

i. Hypoglycemia is a consequence of suboptimal maternal glycemic control and secondary fetal hyperinsulinemia that takes some time to adapt to external glucose delivery postpartum. Another contributing factor is poor glycemic control during labour. The premature or growth restricted a fetus is, the worse the drop in glucose levels when born.

ii. Respiratory Distress Syndrome – Surfactant synthesis is restricted due to Insulin action in addition to its usual interference with glucocorticoid mediated lung maturation.

iii. Polycythemia – Secondary to fetal hypoxia leading to hyperbilirubinemia

iv. Birth Trauma and Shoulder Dystocia – As a consequence of hyperglycemia exposure and hyperinsulinemia, adipose tissue cellularity is increased therefore resulting in macrosomia. This poses problems such as these during delivery and childbirth.

v. Fetal Demise

vi. Increase risk of developing Diabetes in Children

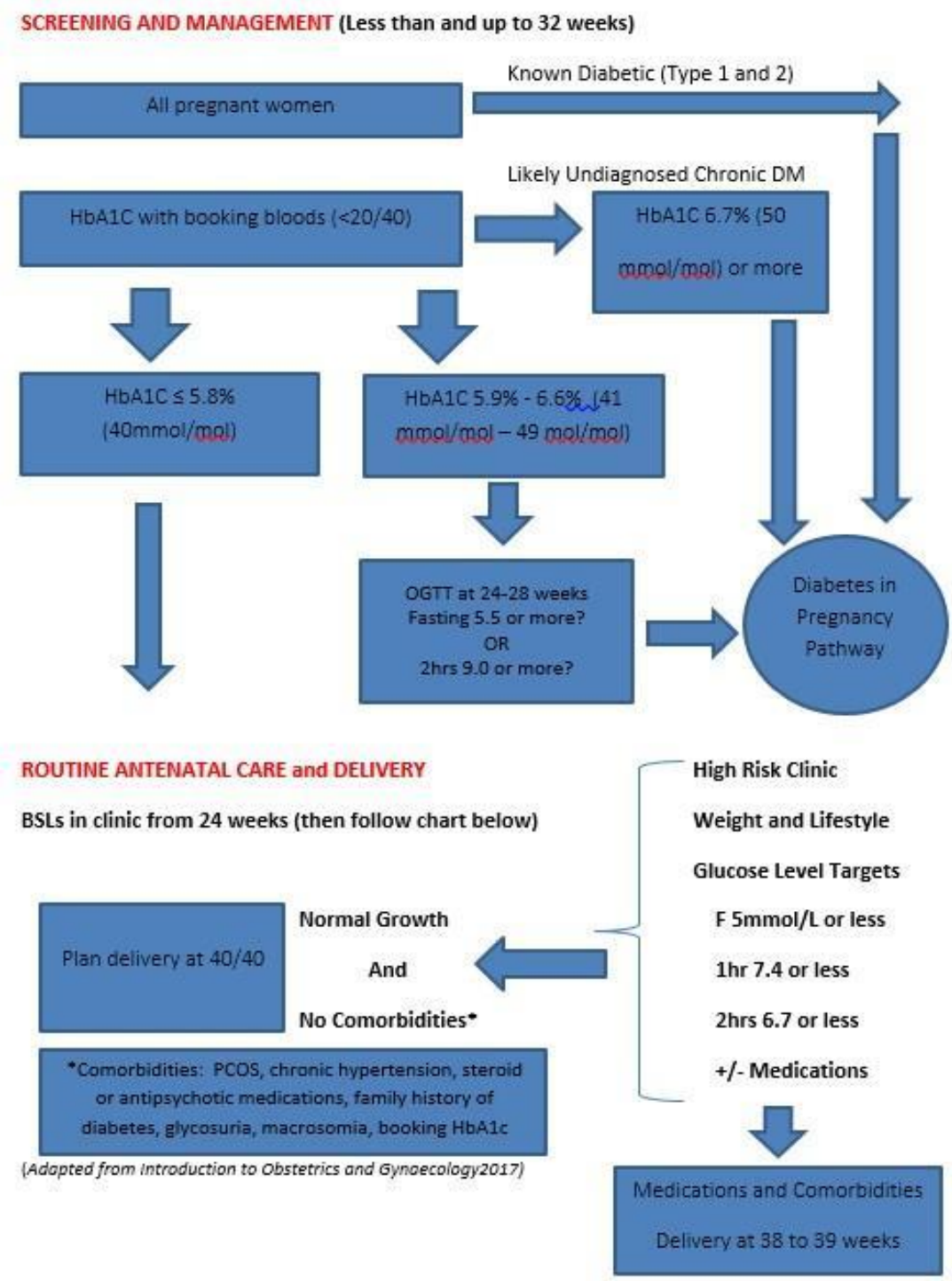
Antenatal Screening and Management

Note: Owing to the lack of local data particular to Diabetes in Pregnancy, the development of the latest version of the Antenatal Guideline (in progress) involved examining data from various acclaimed Colleges of Obstetrics and Gynecology in the world (RANZCOG, RCOG and NICE and AOG and WHO). Because of the similarity of the characteristics of the local population of women to New Zealand and Australia, this guideline is therefore based on these values.

Primary Health Care Level Management

Below is the Latest Local Antenatal Care Pathway (in progress) adapted from the World Health Organization 2016. Integrated within this Algorithm is the Pathway for Diabetes in Pregnancy. For ease of use and to avoid differences in management between Primary Health Care and Clinical Level, we therefore recommend its use.

ANTENATAL CARE FOR NORMAL PREGNANCY (Pregnancy with no Identified Risk Factors)



Alternative Pathway for Women that Book Late; and Late Pregnancy

80% of pregnant women are either Late Bookers or Unbooked (Fidow 2015: Research paper on Rates of IUDs in Samoa 2014-2015). This makes screening for Gestational Diabetes very difficult. The following is the World Health Organization Criteria for Gestational Diabetes (2006) and should be deemed useful in managing this group of women. Data used were based on the HAPO (Hyperglycaemia and Adverse Pregnancy Outcome) Trial which is a landmark study is looking at adverse pregnancy outcomes with different levels of maternal hyperglycaemia.

The diagnosis of gestational diabetes mellitus at any time during pregnancy should be based on any one of the following values:

- *Fasting plasma glucose = 5.1-6.9 mmol/l (92 -125 mg/dl)*
- *1-h post 75g oral glucose load >=10.0 mmol/l (180 mg/dl)**
- *2-h post 75g oral glucose load 8.5 – 11.0 mmol/l (153-199 mg/dl)*

**There are no established criteria for the diagnosis of diabetes based on the 1-hour post load value*
Quality of evidence: very low
Strength of recommendation: weak
Diagnostic Criteria and Classification of Hyperglycema first detected in pregnancy (WHO 2013): page 5.

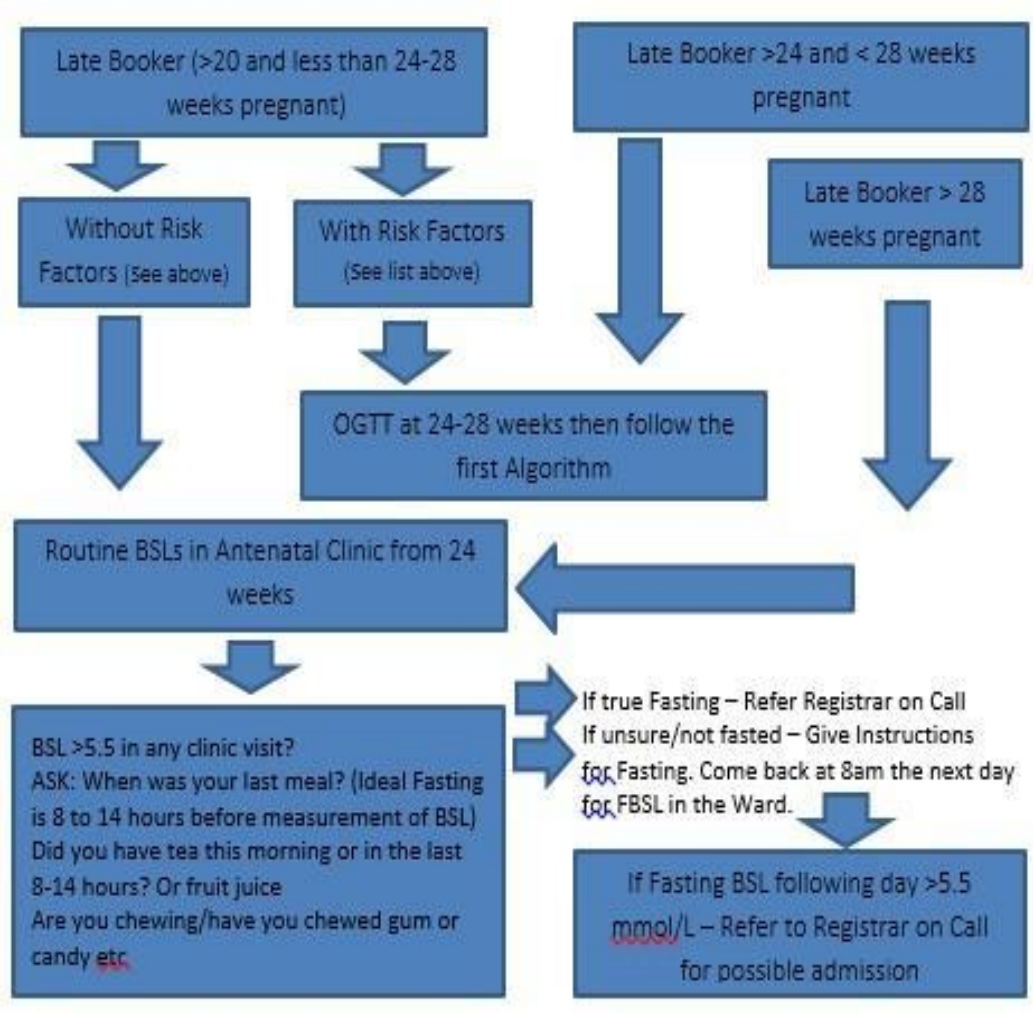
Note

1. Because of the lack of resources in the local setting: limited number of ward beds for all Unit patients and limited number of manpower, there are discussions against using 5.1 mmol/L as cutoff for referral and therefore admissions as this would mean a large number of women admitted everyday exceeding capacity.

2. According to the World Health Organisation, a cutoff of 7mmol/l is also largely too high a number that we may miss Women with Diabetes thereby making room for Adverse Pregnancy Outcomes. This is identified by various Institutions worldwide who have therefore endorsed the use of Fasting Plasma Glucose around 5mmols/l. The lowest is 5.5 mmols/L recommended by Australasia.

3. To synchronise local dilemma and experience with established Guidelines (see above) we recommend (and have been practicing) the use of 5.5mmol/l as cut off for fasting plasma glucose in Antenatal Clinics in Samoa (refer below)

ALTERNATIVE PATHWAY FOR LATE BOOKERS



Medications

1. Metformin – Start at 500mg TDS and titrate to a maximum of 3g/24 hours depending on BSLs
2. Insulin – Add if sugars still uncontrolled with maximum dose of Metformin.

Follow-up

1. After delivery, all women with Diabetes in Pregnancy will be discharged to their General Practitioner or District Hospital or Private Clinic midwife with:
2. Discharge Summary (Appendix 1)
    a. Follow up Plan for the ensuing 6 weeks post-delivery which includes: Women on Medications – Weekly visits (for 6 weeks) to clinic where BSL (use non pregnant values) should be checked and medications titrated down depending on levels.
    b. Women without Medications – Review 1 week after discharge then in 6 weeks with OGTT

REFERENCES

1. Alexander S, Barinov A, Dyck P.J, ...Ziegler D. The Sensory Symptoms of Diabetic Polyneuropathy Are Improved With – Lipoic Acid. *Diabetes Care* 2003; 26: 770-6.
2. Basile, J. and Bloch, M., 2020. *Up to date*. [online] Uptodate.com Available at: <https://www.uptodate.com/contents/overview-of-hypertension-in-adults> [Accessed 10 December 2020].
3. Boulton AJ. The diabetic foot: a global view. Diabetes/Metabolism Research and Reviews. 2000 Sep 1;16 (S1):S2-5.
4. Bpac.org.nz. 2018. *Best Practice Advocacy Centre New Zealand*. [online] Available at: <https://bpac.org.nz/2018/bp.aspx> [Accessed 7 December 2020].
5. Bpac.org.nz. 2020. *Hypertension in Adults: The Silent Killer - BPJ Issue 54*. [online] Available at: <https://bpac.org.nz/bpj/2013/august/hypertension.aspx> [Accessed 11 December 2020].
6. Diabetes in Pregnancy (2012). www.nationalwomenshealth.adhb.govt.nz
7. Diabetes in Pregnancy (2014). Quick Reference Guide for Health Professionals on the Screening Diagnosis and Treatment of Gestational Diabetes in New Zealand. Ministry of Health New Zealand
8. Diagnosis and management of type 2 diabetes (HEARTS-D). Geneva]: World Health Organization; 2020 (WHO/UCN/NCD/20.1). Licence: CC BY-NC-SA 3.0 IGO.
9. Diagnostic Criteria and Classification of Hyperglycaemia first Detected in Pregnancy (2013) World Health Organization
10. Donald S Fong, L. A. (2003). Diabetic Retinopathy. *Diabetes Care*, 99-102.
11. Farquhar C. Roberts H (2017) Introduction to Obstetrics and Gynaecology: Medical Disorders (123-125)
12. Gestational Diabetes: Risk Assessment Testing Diagnosis and Management (2020). National Institute for Health and Care Excellence
13. HEARTS Technical package for cardiovascular disease management in primary health care: healthy-lifestyle counselling; Geneva: World Health Organization; 2018 (WHO/NMH/NVI/18.1). Licence: CC BY-NC-SA 3.0 IGO.
14. HEARTS technical package for cardiovascular disease management in primary health care: risk based CVD management. Geneva: World Health Organization; 2020. Licence: CC BY-NC-SA 3.0 IGO.
15. HEARTS Technical package for cardiovascular disease management in primary health care: evidence-based treatment protocols. Geneva: World Health Organization; 2018 (WHO/NMH/NVI/18.2). Licence: CC BY-NC-SA 3.0 IGO.
16. https://nationalwomenshealth.adhb.govt.nz/assets/Womens-health/Documents/Referrals-andinfo/Diabetes/Diabetes-in-Pregnancy-background-paper.pdf
17. IDF Clinical Practice Recommendations on the Diabetic Foot, 2017.
18. Jeganathan, V. S. (2017). Screening for Diabetic Eye Disease among Samoan Adults: A Pilot Study. *Ophthalmology Therapy*, 187-194.
19. Ministry of Health Government of Fiji. (2012). *Diabetes Management Guidelines, third edition.* Suva: Ministry of Health,
Fiji.
20. Nice.org.uk. 2019. *Recommendations | Hypertension In Adults: Diagnosis And Management | Guidance | NICE*. [online] Available at: <https://www.nice.org.uk/guidance/ng136/chapter/recommendations> [Accessed 10 December 2020].
21. Pacific Eye Institute. (2010). *Diabetes Retinal Screening, Grading and Management Guidelines for Use In Pacific Island Nations 2010.* Suva: PacEYES.
22. Portenoy R. Development and testing of a neuropathic pain screening questionnaire: ID Pain. *Curr Med Res Opin*, 2006, 22: 1555–1565
23. Samoa STEPS Report 2014
24. Unger, T., Borghi, C., Charchar, F., Khan, N., Poulter, N., & Prabhakaran, D. et al. (2020). 2020 International Society of Hypertension Global Hypertension Practice Guidelines.*Hypertension*,*75*(6),1334-1357.doi: 10.1161/hypertensionaha.120.15026

25. WHO package of essential noncommunicable (PEN) disease interventions for primary health care. Geneva: World Health Organization; 2020. Licence: CC BY-NC-SA 3.0 IGO.
26. WHO package of essential noncommunicable (PEN) disease interventions for primary health care. Geneva: World Health Organization; 2020. Licence: CC BY-NC-SA 3.0 IGO.
27. Who.int.2020.Hypertension.[online]Availableat:<https://www.who.int/health-topics/hypertension/#tab=tab_1> [Accessed 9 December 2020].

Annex 1: SOP for village screening (training for village workers)

TAIALA MO NUU MA AFIOAGA MO LE FAATINOINA O LE POLOKALAME O LE PEN FA'ASAMOA

Taiala e faaaogaina e i latou e le o iai ni tomai faasoifua maloloina mo le faatinoina o siaki faasoifua maloloina i nuu ma afioaga

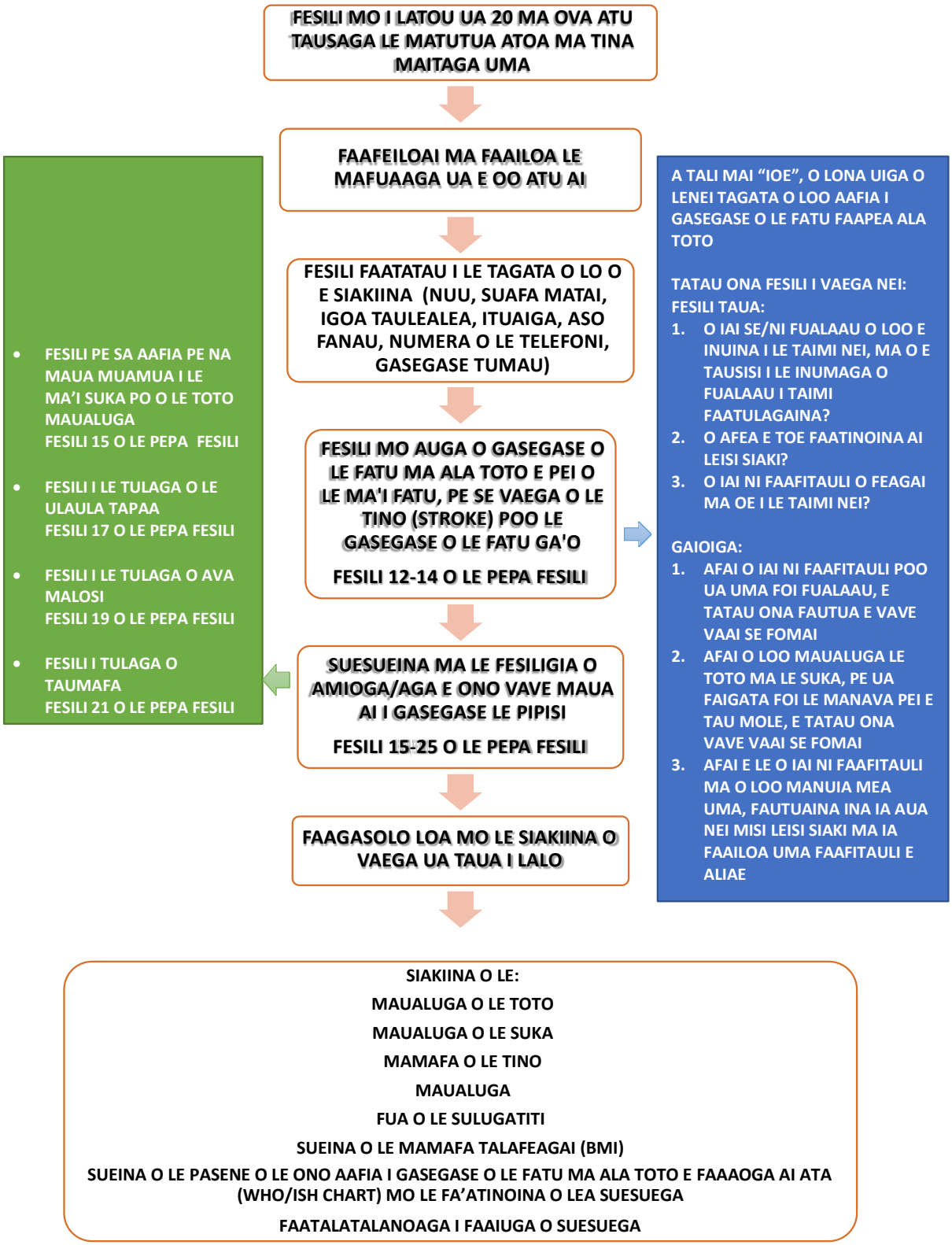
MINISTRY OF HEALTH
MATAGALUEGA O SOIFUA MALOLOINA

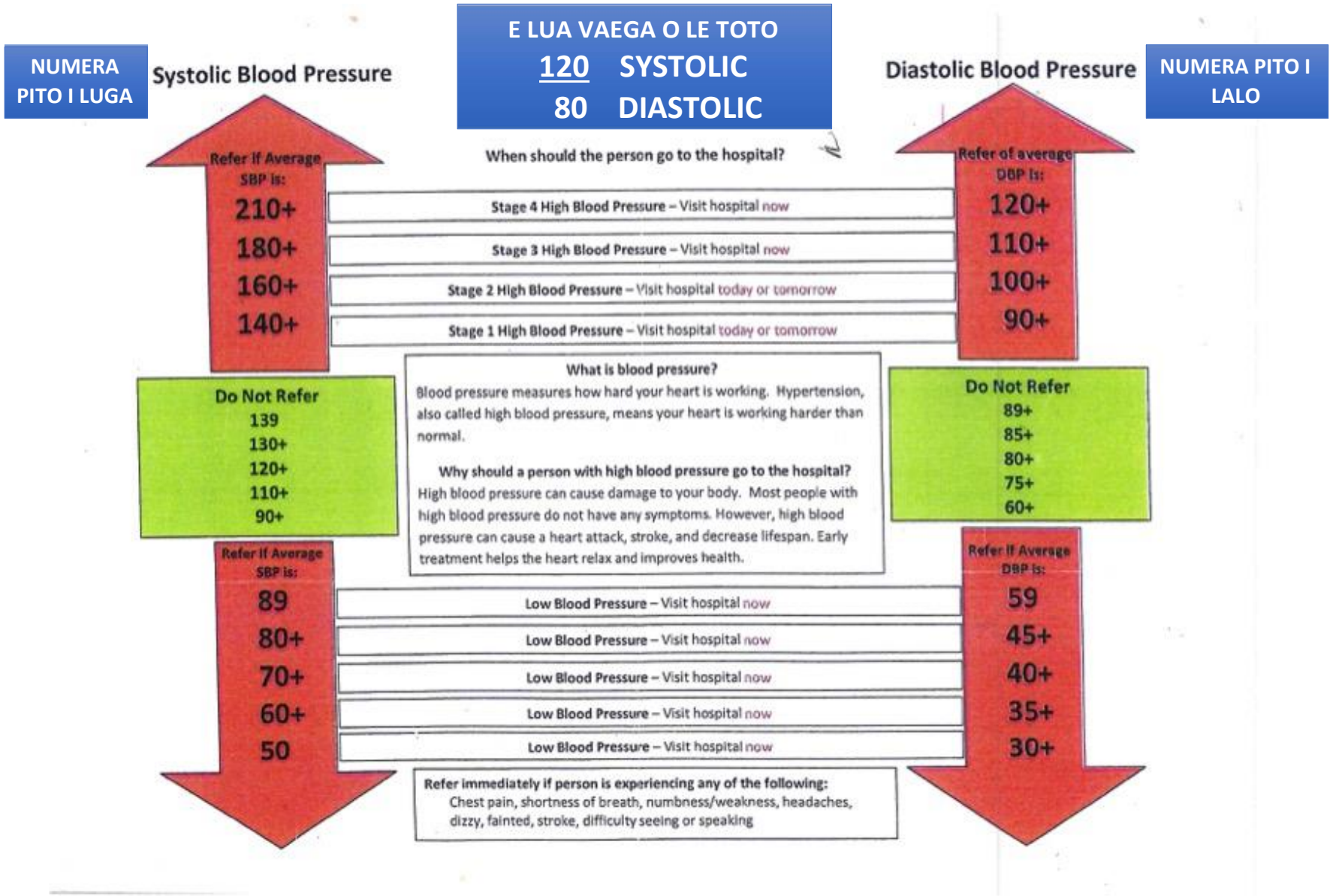
WORLD BANK GROUP

NCD PEN

Ofisa o le Soifua Maloloina
Me 2022

FAASOLOGA O LE GALUEGA




NUMERA PITO I LUGA
Systolic Blood Pressure
E LUA VAEGA O LE TOTO
120 SYSTOLIC
80 DIASTOLIC
Diastolic Blood Pressure
NUMERA PITO I LALO
When should the person go to the hospital?
Refer if Average SBP is:
210+
180+
160+
140+
Refer of average DBP is:
120+
110+
100+
90+
Stage 4 High Blood Pressure – Visit hospital now
Stage 3 High Blood Pressure – Visit hospital now
Stage 2 High Blood Pressure – Visit hospital today or tomorrow
Stage 1 High Blood Pressure – Visit hospital today or tomorrow
What is blood pressure?
Blood pressure measures how hard your heart is working. Hypertension, also called high blood pressure, means your heart is working harder than normal.
Why should a person with high blood pressure go to the hospital?
High blood pressure can cause damage to your body. Most people with high blood pressure do not have any symptoms. However, high blood pressure can cause a heart attack, stroke, and decrease lifespan. Early treatment helps the heart relax and improves health.
Do Not Refer
139
130+
120+
110+
90+
Do Not Refer
89+
85+
80+
75+
60+
Refer if Average SBP is:
89
80+
70+
60+
50
Refer if Average DBP is:
59
45+
40+
35+
30+
Low Blood Pressure – Visit hospital now
Low Blood Pressure – Visit hospital now
Low Blood Pressure – Visit hospital now
Low Blood Pressure – Visit hospital now
Low Blood Pressure – Visit hospital now
Refer immediately if person is experiencing any of the following:
Chest pain, shortness of breath, numbness/weakness, headaches, dizzy, fainted, stroke, difficulty seeing or speaking

FUAINA O LE SUKA

< 2.9 MMOL/L	2.9 - 11 MMOL/L	> 11 MMOL/L
• MAUALALO	• SUKA TALAFEAGAI	• MAUALUGA LE SUKA

MAMAFA TALAFEAGAI E FUAFUA I LE MAUALUGA (POO LE BMI)

= MAMAFA VAEVAE I LE (MAUALUGA FAATELE I LE MAUALUGA)

< 18%	18-25%	25-30%	>30%
• PAEE TELE	• MAMAFA TALAFEAGAI	• TINO PUTA	• TINO PUTA TELE

BMI CHART

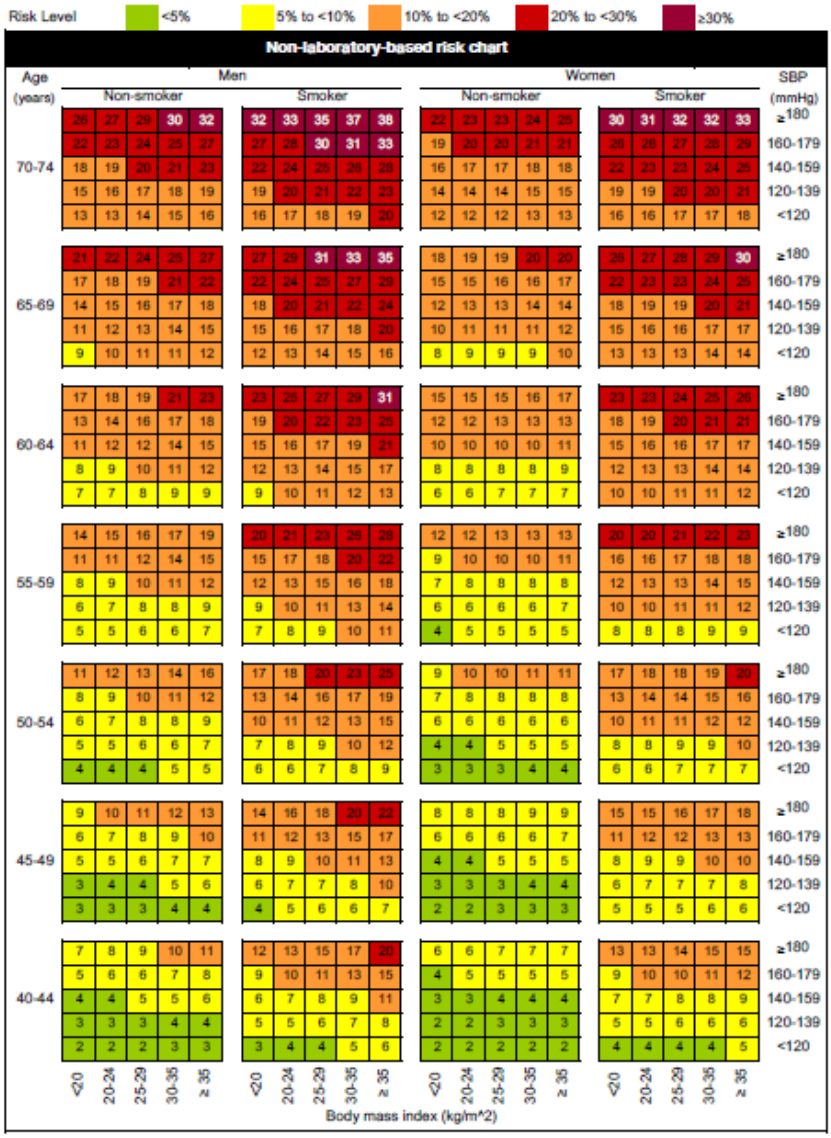
FAAAOGA LE ATA LEA MO LE MAMAFA TALAFEAGAI E FUA I LE MAUALUGA

WEIGHT lbs	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215
kgs	45.5	47.7	50.0	52.3	54.5	56.8	59.1	61.4	63.6	65.9	68.2	70.5	72.7	75.0	77.3	79.5	81.8	84.1	86.4	88.6	90.9	93.2	95.5	97.7
HEIGHT in/cm	Underweight					Healthy						Overweight				Obese				Extremely obese				
5'0" - 152.4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
5'1" - 154.9	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	36	37	38	39	40
5'2" - 157.4	18	19	20	21	22	22	23	24	25	26	27	28	29	30	31	32	33	33	34	35	36	37	38	39
5'3" - 160.0	17	18	19	20	21	22	23	24	24	25	26	27	28	29	30	31	32	32	33	34	35	36	37	38
5'4" - 162.5	17	18	18	19	20	21	22	23	24	24	25	26	27	28	29	30	31	31	32	33	34	35	36	37
5'5" - 165.1	16	17	18	19	20	20	21	22	23	24	25	25	26	27	28	29	30	30	31	32	33	34	35	35
5'6" - 167.6	16	17	17	18	19	20	21	21	22	23	24	25	25	26	27	28	29	29	30	31	32	33	34	34
5'7" - 170.1	15	16	17	18	18	19	20	21	22	22	23	24	25	25	26	27	28	29	29	30	31	32	33	33
5'8" - 172.7	15	16	16	17	18	19	19	20	21	22	22	23	24	25	25	26	27	28	28	29	30	31	32	32
5'9" - 175.2	14	15	16	17	17	18	19	20	20	21	22	22	23	24	25	25	26	27	28	28	29	30	31	31
5'10" - 177.8	14	15	15	16	17	18	18	19	20	20	21	22	23	23	24	25	25	26	27	28	28	29	30	30
5'11" - 180.3	14	14	15	16	16	17	18	18	19	20	21	21	22	23	23	24	25	25	26	27	28	28	29	30
6'0" - 182.8	13	14	14	15	16	17	17	18	19	19	20	21	21	22	23	23	24	25	25	26	27	27	28	29
6'1" - 185.4	13	13	14	15	15	16	17	17	18	19	19	20	21	21	22	23	23	24	25	25	26	27	27	28
6'2" - 187.9	12	13	14	14	15	16	16	17	18	18	19	19	20	21	21	22	23	23	24	25	25	26	27	27
6'3" - 190.5	12	13	13	14	15	15	16	16	17	18	18	19	20	20	21	21	22	23	23	24	25	25	26	26
6'4" - 193.0	12	12	13	14	14	15	15	16	17	17	18	18	19	20	20	21	22	22	23	23	24	25	25	26

WHO cardiovascular disease risk non-laboratory-based charts

Oceania

Fiji, Kiribati, Marshall Islands, Micronesia (Federated States of), Papua New Guinea, Samoa, Solomon Islands, Tonga, Vanuatu



Oceania

SUESUEGA O LE PASENE O FAAMAI O LE FATU:

1. **FILIFILI LE POLOKA TALAFEAGAI E FUA ILE ITUAIGA, TAMAITAI POO LE ALII**
2. **SILASILA PE TAUMAFA TAPAA PE LEAI LE TAGATA. FILIFILI LE POLOKA TALAFEAGAI**
3. **SILASILA POO FEA LE VAEGA O LOO IAI TAUSAGA A LE TAGATA O LOO SIAKI. FILIFILI LE POLOKA TALAFEAGAI**
4. **SILASILA I LE NUMERA O LE TOTO PITO I LUGA. FILIFILI LE VAEGA O LE POLOKA TALAFEAGAI**
5. **FILIFILI LE NUMERA O LE BMI (MAMAFA TALAFEAGAI E FUAFUA I LE MAUALUGA)**
6. **TUSI LE NUMERA O LE PASENE TALAFEAGAI I LUGA O LE PEPA FESILI**

	Ministry of Health Matagaluega o le Soifua Maloloina		Screen everyone 18 years and over and all pregnant mothers Faatumu mo tagata uma 18 tausaga i luga ma tina to (maitaga) uma Please fill in completely and neatly. Tali uma fesili ma ia manino le tusitusi		
A	**GENERAL DATA**				
1.0	**Date (Aso) Day/Month/Year (Aso/Masina/Tausaga) :**				
2.0	**Village (Nuu):**				
3.0	**Matai titles (Suafa matai):**				
4.0	**First Name (Igoa muamua):**				
5.0	**Last Name (Faaiu):**				
6.0	**Sex (Ituaiga)**	Male **(Alii)**	Female**(Tamaitai)**		
7.0	**National Health Number (Tamanu) (Numera Falemai):**				
8.0	**Date of birth (Aso Fanau) (Day/Month/Year) (Aso/Masina/Tausaga):**				
9.0	**Completed age (Tausaga ua ausia):**				
10.0	**Contact Number (Telefoni):**				
11.0	**Known diseases (E iai ni gasegase tumau ua taua)**	**Mark with an X or (Faailoga ile X poo le)**		**Yes (Ioe)**	**No (Leai)**
		11.1	**Hypertension (Toto maualuga)**		
		11.2	**Diabetes (Mai suka)**		
		11.3	**Cardiac (Mai fatu)**		
		11.4	**Pregnant (Tina maitaga/to)**		
		11.5	**Others (Specify) (Lisi ma nisi mai o maua ai)**		
B	**SYMPTOMS (Auga o lo'o faalogoina i le taimi nei)**				
	Mark with an X or (Faailoga ile X poo le)			**Yes (Ioe)**	**No (Leai)**
12.0	**Chest pain, tightness, and/or breathlessness, likely to be worsen by exercise. (E tiga le fatafata ma fufusi, tau le au, pe puni pe faigata ona manava ma e faateteleina pe a savali pe faamalositino foi) (Auga nei o le ma'i fatu)**				
13.0	**~~Left or right-sided weakness of limbs or face, difficulties speaking, permanent or~~ transient periods of resolving blindness (E gagase ma pe lima ma vae; tau le mafai pe faigata ona tautala pe fai ma tau po le vaai) (Auga nei o le stroke)**				
14.0	**~~Constant thirst, drinking, passing urine; frequent bacterial infection (UTI, chest~~ infection, skin infections), tiredness, blurred vision. Foot ulcers. (E lagona le fia inu i taimi uma, pe tulai soo mo feau lata (vai)? E te aafia gofie i faamai e afua mai i siama pei o le tulita, niumonia, faamai o le pa'u ma isi? E te lelava gofie pe nenefu le vaai?. O iai ni manu'a i vae faigata na faape) (Auga o le ma'i suka)**				
C	**SCREEN FOR BEHAVIOURAL RISK FACTORS AND OTHER CONDITIONS (Suesueina o mafuaaga ma aafiaga o tagata afua mai suiga o le olaga)**				
	Mark with an X or (Faailoga ile X poo le)			**Yes (Ioe)**	**No (Leai)**
15.0	**Have you ever been diagnosed as having hypertension and/or diabetes mellitus? (Na maua muamua oe i le mai suka poo le toto maualuga?) If the answer is Yes, go to Q16. If the answer is No, skip Q16 and go to Q17 (A tali mai i le "Ioe", faaauau i le fesili No 16. A tali mai i le "leai" faaauau i le No 17 ae faamisi le fesili No 16)**				
16.0	**Are you taking any medications for hypertension or diabetes? (O e inuina ni ~~fualaau mo le mai suka poo le toto maualuga?)~~**				
17.0	**Did you use tobacco during the last 12 months? (Sa e ulaula tapaa i totonu o le 12 masina ua tuanai?) If the answer is Yes, go to Q18. If the answer is No, skip Q18 and go to Q19 (A tali mai i le "Ioe", faaauau i le fesili No 18. A tali mai i le "leai" ~~faaauau i le No 19 ae faamisi le fesili No 18)~~**				
18.0	**Are you going to quit or are you interested in smoking cessation education and/or regular group session? (O e fuafua e taofi le ulaula tapaa pe e te fia auai i ni ~~aoaoga ma faatalatalanoaga mo le tuuina o le ulaula tapaa?)~~**				

19.0	Have you ever consumed an alcoholic drink such as beer, wine, spirits or home brew within the last 30 days? (Sa e inuina se ava malosi i totonu o le 30 aso ua te'a?) If the answer is Yes, go to Q20. If the answer is No, skip Q20 and go to Q21 (A tali mai i le "Ioe", faaauau i le fesili No 20. A tali mai i le "leai" faaauau i le No 21 ae faamisi le fesili No 20)			
20.0	Have you had 5 or more drinks in one occasion during the past 30 days? (Sa e inuina ni ava malosi e ova atu ma le 5 fagu laiti, pe sa e inu ava malosi i aso uma o le vaiaso?)			
	How many different types of fruits and vegetables did you eat yesterday? (E fia ni ituaiga fualaauaina eseese na e taumafaina ananafi?) Circle / Li'o le tali talafeagai	0, 1, 2, 3, 4, 5, 6+		
21.0	How many days do you eat processed, sugary food or fried foods, canned meat or instant noodles during the week? (E faafia ni aso o le vaiaso e te taumafaina ai meaai falai, gaoa, suamalie, apa pisupo, maligi poo le saimigi?) Circle / Li'o le tali talafeagai	0, 1, 2, 3, 4, 5, 6, 7		
~~22.0~~ 23.0	Do you do at least 30 minutes of moderate intense physical activity 5 days of the week? (O e faia ni faamalositino mo le 5 aso o le vaiaso e atoa le 30 minute i le aso, e lagona ai sou sela pe afu foi?)			
~~24.0~~	How much time do you spend walking per day? (E fia minute o le aso e te savali ai?)	_____ Minutes (minute)		
25.0	Do you have a parent or sister or brother who was diagnosed with premature heart disease, stroke, diabetes, cancer or kidney disease? (Sa maua seisi o ou matua, uso, tuagane, tuafafine i le mai fatu, stroke, kanesa poo mai o ala toto?)			
D	FINDINGS (Suesuega faatino)			
26.0	Height (Maualuga) cm:			
27.0	Weight (Mamafa) kg:			
28.0	BMI (Mamafa talafeagai fua i le maualuga) Formula: Weight / (Height multiply by Height) Fomulale: (Mamafa / (Maualuga X Maualuga)			
~~29.0~~	~~Waist circumference (Pui manava) cm:~~			
30.0	Random blood glucose (Fua ole suka) mmol/l	30.1 30.2	1 2	
31.0	Blood Pressure (Maualuga ole toto) mmH_g	31.10 31.20	Systolic 1 Diastolic 1	
	Average Systolic = (Systolic 1 + Systolic 2) divided by 2	31.30 31.40	Systolic 2 Diastolic 2	
	Average Diastolic = (Diastolic 1 + Diastolic 2) divided by 2	31.50 31.60	Average Systolic Average Diastolic	
~~32.0~~	~~Pulse rate (Tata ole fatu):~~			
~~33.0~~	~~WHO ISH RISK CHART (Mark with an X or) (Faailoga ile X poo le)~~			

< 5%	
5% - < 10%	
10% - < 20%	
20% - < 30%	
> 30%	

Faamolemole, ia faatinoina le suesuega lea ae le'i maea le siaki

E	Additional questions for pregnant women (Fesili faaopoopo mo tina to)		
34.0	How many months pregnant are you? (Ua fia nei masina o lou to?) _____ masina	Yes (Ioe)	No (Leai)
35.0	Have you had any antenatal check up for this pregnancy? (Ua siaki lau to e se fomai poo se tausi soifua?)		
~~36.0~~	~~Do you have a problem with night blindness? (O iai se faaletonu o lau vaai pea pogisa?)~~		
~~37.0~~	~~Do you have Acanthosis Nigricans? (O iai ni vaega o lou tino e uliuli ese lava, talu na e to?)~~		
~~38.0~~	~~Are you taking an iron supplement? (O e inuina ni fualaau faatupu toto?)~~		
39.0	Have you taken any drug for intestinal worms in the last 6 months? (Na e inuina ni fualaau poo se vai anufe i le 6 masina talu ai?)		
40.0	Does this person need to be referred? (E moomia na asia le falemai?) Please fill the referral form if you replied Yes (Faatumu le pepa mo le falemai pe a e tali mai "IOE")		
~~41.0~~	~~Name of person filling the form (Suafa o le na faatumuina le pepa fesili)~~		

PEN Fa'aSamoa NCD Community Assessment

Referral Form Version 3.0

	Ministry of Health Matagaluega o le Soifua Maloloina		Copy directly from the PEN Fa'aSamoa NCD Community Assessment Form (Si'i sa'o mai i le pepa o suesuega) Please write clearly and neatly (Faaminono le tusitusi)
A	**GENERAL DATA**		
1.0	Date (Aso) Day/Month/Year (Aso/Masina/Tausaga) :		
2.0	Village (Nuu):		
3.0	Matai titles (Suafa matai):		
4.0	First Name (Igoa muamua):		
5.0	Last Name (Faaiu):		
6.0	Sex (Ituaiga)	Male (Alii)	Female(Tamaitai)
7.0	National Health Number (Tamanu) (Numera Falemai):		
8.0	Date of birth (Aso Fanau) (Day/Month/Year) (Aso/Masina/Tausaga):		
9.0	Completed age (Tausaga ua ausia):		
10.0	Contact Number (Telefoni):		

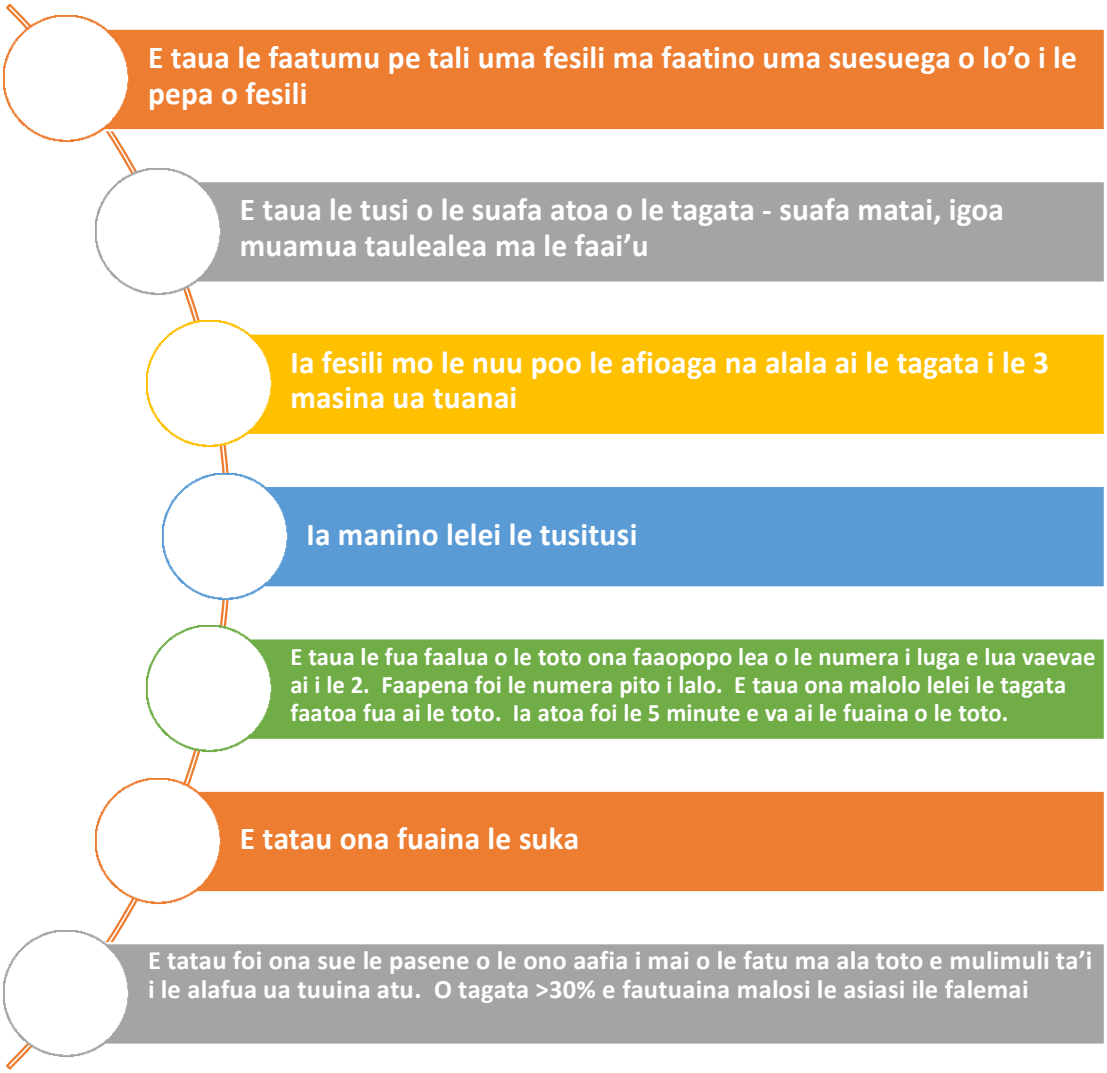
11.0	Known diseases (E iai ni gasegase tumau ua taua)	Mark with an X or (Faailoga ile X poo le)	Yes (Ioe)	No (Leai)
		11.1 Hypertension (Toto maualuga)		
		11.2 Diabetes (Mai suka)		
		11.3 Cardiac (Mai fatu)		
		11.4 Pregnant (Tina maitaga/to)		
		11.5 Others (Specify) (Lisi ma nisi mai o maua ai)		

B	**FINDINGS (Suesuega faatino)**			
12.0	Height (Maualuga)			
13.0	Weight (Mamafa)			
14.0	BMI (Mamafa talafeagai fua ile maualuga)			
15.0	Waist circumference (Pui manava)			
16.0	Random blood glucose (Fua ole suka)	16.1	1	
		16.2	2	
17.0	Blood Pressure (Maualuga ole toto)	17.10	Systolic 1	
		17.20	Diastolic 1	
		17.30	Systolic 2	
		17.40	Diastolic 2	
		17.50	Average Systolic	
		17.60	Average Diastolic	
18.0	Pulse rate (Tata ole fatu)			
19.0	WHO ISH RISK CHART (Mark with an X or) (Faailoga ile X poo le)			

5%	
5% - <10%	
10% - <20%	
20% - <30%	
>30%	

20.0	**REFERRAL CRITERIA (Mafuaaga e tatau ai ona alu i le falemai). (Faailoga ile X poo le)**	
	Previous experience of cardiovascular disease	
	Never assessed before (Gasegase e lei vaaia muamua e se fomai poo se tausi soifua)	
	No recent visit or medications ran out (Gasegase ua leva ona le toe asia se falemai poo ua leai ni fualaau)	
	Symptoms (Auga)	
	Heart attack warning signs (Auga o le mai fatu)	
	Stroke warning signs (Auga ole stroke)	
	Diabetes patient (Mai suka)	
	Uncontrolled blood glucose (>15mmol/l) despite lifestyle change and medication (Maualuga le suka >15mmol/l e ui ina inu fualaau)	
	Foot infection or ulcer (Manu'a i vae)	
	Blurred eye vision or blindness (Nenefu pe po le vaai)	
	Others (Isi mafuaaga)	
	High blood glucose (Maualuga le suka) >11mmol/l	
	High blood pressure (Maualuga le toto) >140 systolic >90 diastolic	
	High WHO ISH Risk (Maualuga le avanoa e ono maua ai i le mai fatu ma isi >20%)	
	No antenatal checkup (E le'i faia lava se siaki o le mai to lenei i se fomai poo se tausi soifua)	
	Others (Isi mafuaaga e le'o taua i luga):	
21.0	Name of person filling the form (Suafa o le na faatumuina le pepa fesili)	

FAUTUAGA LAUTELE



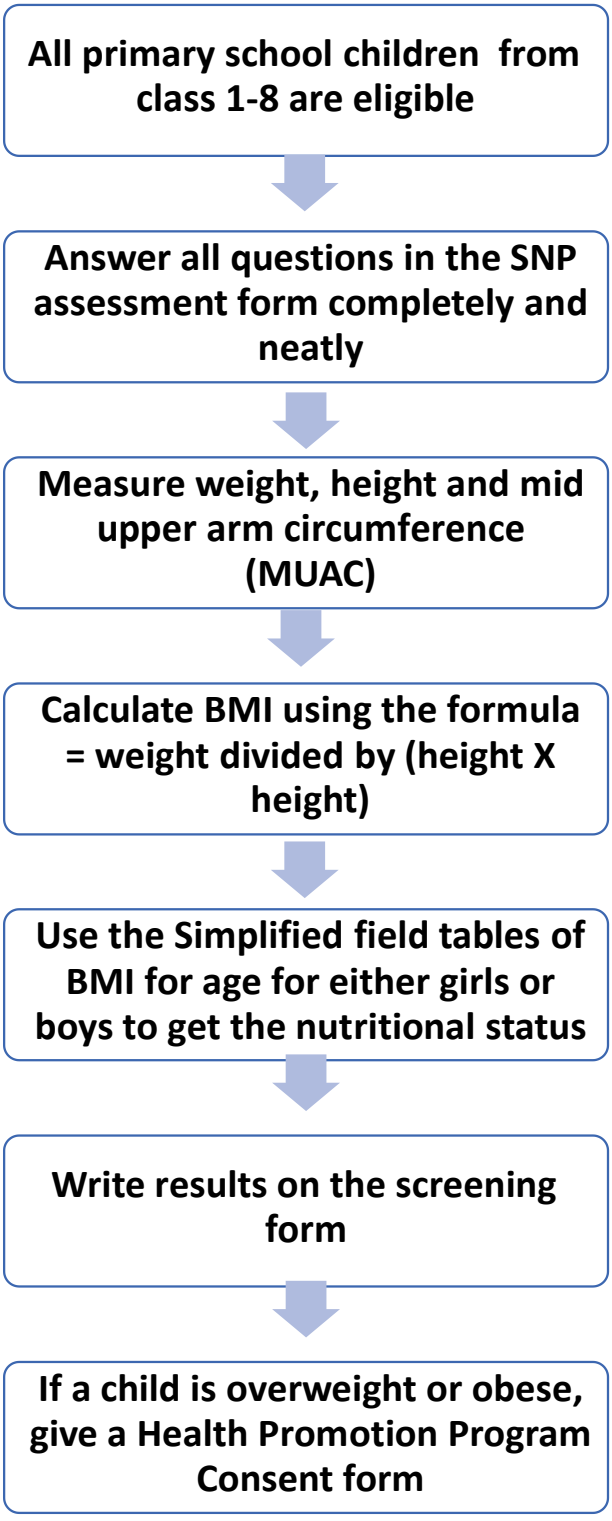
Ia mata'itu mafuaaga e manaomia ai ona fautuaina tagata e asia le falemai ma tuu iai le pepa e ave i le falemai

Annex 2: SCHOOL NURSE PROGRAM SOP

SCHOOL NURSE PROGRAM SOP

PEN FA'ASAMOA

MINISTRY OF HEALTH May 2021


All primary school children from class 1-8 are eligible
Answer all questions in the SNP assessment form completely and neatly
Measure weight, height and mid upper arm circumference (MUAC)
Calculate BMI using the formula = weight divided by (height X height)
Use the Simplified field tables of BMI for age for either girls or boys to get the nutritional status
Write results on the screening form
If a child is overweight or obese, give a Health Promotion Program Consent form

SOP for Nutritional Assessment

1. The Public Health Nurse in each District Hospital or Health Centre should ensure that staff conducting the assessment are well trained on the procedures before field work
2. The Public Health Nurse together with F&P should ensure that all equipment and supplies specified have been procured, functioning, sufficient and packed before field work
3. It is imperative that height, weight, and mid upper arm circumference measurements are done following WHO protocols specified.
4. To calculate the body mass index, the formula to use is: Weight in kilograms divided by (height multiply by height in meters). It is important that height is converted to meters before the formula is used.
5. To arrive at the final nutritional status, the WHO Simplified Field Table inserted here should be used. The following WHO criteria is used:

WHO Nutritional Classification for students aged 5-19 years.

BMI FOR AGE	CLASSIFICATION
MORE THAN + 2 SD	OBESE
MORE THAN + 1 SD	OVERWEIGHT
MORE THAN – 1SD TO < 1 SD	NORMAL WEIGHT
LESS THAN – 2SD	THINNESS
LESS THAN – 3 SD	SEVERE THINNESS

How to use Simplified field tables:

1. Using a student's DOB, estimate the age in years and months by calculating from the DOB to the screening date
2. Using the relevant table for either girls or boys, select the right age in years and months and find the BMI value in the columns
3. If the value falls between -1SD and Normal, the student has normal weight
4. If the value is > than 1SD, the student is overweight
5. If the value is >2SD, the student is deemed obese

Procedures for measuring height:

Follow the steps below to measure the height of a participant:

Step	Action
1	Ask the participant to remove their: • Footwear (shoes, slippers, sandals etc.) • Head gear (hat, cap, hair bows, comb, ribbons, etc). Note: If it would be insensitive to seek removal of a scarf or veil, the measurement may be taken over light fabric.
2	Ask the participant to stand on the board facing you.
3	Ask the participant to stand with: • Feet together • Heels against the back board • Knees straight
4	Ask the participant to look straight ahead and not look up.
5	Make sure eyes are the same level as the ears.
6	Move the measure arm gently down onto the head of the participant and ask the participant to breathe in and stand tall.
7	Read the height in centimetres at the exact point.
8	Ask the participant to step away from the measuring board.
9	Record the height measurement in centimetres in the student's form.

Procedures for measuring weight:

Electronic scales

Follow the steps below to measure the weight of a participant:

Step	Action
1	Put the scale on a firm, flat surface
2	Ask the participant to remove their footwear (shoes, slippers, sandals etc) and socks.
3	Ask the participant to step onto scale with one foot on each side of the scale.
4	Ask the participant to: • Stand still • Face forward • Place arms on the side and • Wait until asked to step off
5	Record the weight in kilograms on the participant's form

Measuring waist circumference

This measurement should be taken:

- At the end of a normal expiration
- With the arms relaxed at the sides
- Under the midline of the participant's armpit, at the midpoint between the lower part of the last rib and the top of the hip.

Procedure

Follow the steps below to measure the waist circumference of a participant:

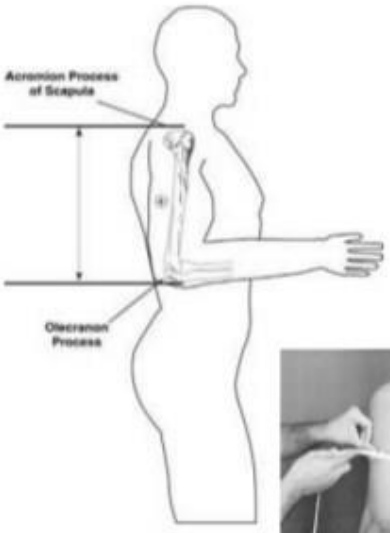
Step	Action
1	Standing to the side of the participant, locate and mark the inferior margin (lowest point) of the last rib and the crest of the ilium (top of the hip bone) with a fine pen.
2	With a tape measure, find the midpoint and mark the point.
3	Apply the tension tape over the marked midpoint and ask the participant to wrap it round themselves. Note: Check that the tape is horizontal across the back and front of the participant.
4	Ask the participant to: • stand with their feet together, • place their arms at their side with the palms of their hands facing inwards, and • breathe out gently.
5	Measure waist circumference and read the measurement at the level of the tape to the nearest 0.1 cm.
6	Record the measurement on the participant's Instrument. Note: Measure only once and record.

Measuring Mid upper arm circumference

MID-ARM CIRCUMFERENCE (MAC)

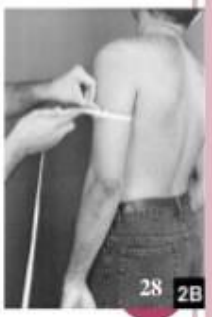
Locate the midpoint of the arm.

- Non-dominant arm elbow flexed at 90deg with palm facing upwards
- Measurer stands **behind** the subject & locates the **lateral tip of the acromion** and the most **distal point on the olecranon** process
- Place a tape measure so that it passes between these 2 landmarks and mark the midpoint



Measure the midarm circumference

- The subject stands erect with arms hanging freely at the sides and the palms facing the thighs
- Place the tape measure perpendicular to the long axis of the arm at the **marked midpoint** & measure the **circumference to the nearest mm**. (e.g. 18.1 cm)
- Provide the actual MAC in cm.



MINISTRY OF HEALTH
Matagaluga o le Soifua Maloloina
PEN FA'ASAMOA SCHOOL NURSE PROGRAM ASSESSMENT FORM

For screening of all Year 1 - 8 students (Primary School Level)
Please fill in completely and neatly

A	**GENERAL DATA**			
1.0	Screening Date (Today's date) (DD/MM/YYYY)			
2.0	Name of School			
3.0	Class/Grade			
4.0	First name			
5.0	Surname			
6.0	National Health Number (Tamanu)			
7.0	Sex (Mark with an ✘ or ✓)	Male ☐	Female ☐	(Mark with an ✘ or ✓)
8.0	Date of Birth (DD/MM/YYYY). If not provided, please calculate Q8 and 9			8.1 Not Provided ☐
9.0	Age (Completed Years)			
10.0	Age (Completed Months)			
11.0	Village (where student resided in the last 3 months)			11.1 Not Provided ☐
12.0	Mother or father's name			12.1 Not Provided ☐
13.0	Guardian's name			13.1 Not Provided ☐
14.0	Working Phone Numbers			14.1 Not Provided ☐

B	**MEASUREMENTS (Please ensure that this section is completely filled before continuing)**		
15.0	Weight (kg)		
16.0	Height (cm)		
17.0	BMI (Formula: weight divided by (height multiply by height). Remember to divide Height above (Q16) by 100 to convert cm to meter, only then you		
18.0	calculate using this formula Nutrition Classification (Please use the WHO Field tables provided to		
19.0	calculate this. Responses are -3SD, -2SD, -1SD, Median, 1SD, 2SD, 3SD) Final nutritional classification (Responses are: Severely thin, Thin, Normal,		
	overweight, obese)		
20.0	Mid upper arm circumference (MUAC) (mm)		
21.0	Waist Circumference (WC) (cm)		

C	**REFERRAL CRITERIA**	Yes (Ioe)	No (Leai)
22.0	Overweight or Obese (Mamafa tele pe tino puta)	☐	☐
23.0	Severely thin or thin		
24.0	✘ ✓ Was this person referred? (Mark with an or) Na moomia ona asia le falemai?	Yes (Ioe) ☐	No (Leai) ☐

	Please complete the REFERRAL FORM if you ticked "YES" to Q22, Q23, Q24	
25.0	Full name of person completing this form	
26.0	Designation	

Please keep the filled form safely for collection. Thank you for your patience

MINISTRY OF HEALTH
Matagaluga o le Soifua Maloloina
PEN FA'ASAMOA SCHOOL NURSE PROGRAM REFERRAL FORM
COPY ALL INFORMATION NEEDED FROM THE ASSESSMENT FORM AND GIVE THE FORM TO THE CAREGIVER/TEACHER

A	**GENERAL DATA**			
1.0	Screening Date (Today's date) (DD/MM/YYYY)			
2.0	Name of School			
3.0	Class/Grade			
4.0	First name			
5.0	Surname			
6.0	National Health Number (Tamanu)			
7.0	Sex (Mark with an ✘ or ✓)	Male ☐	Female ☐	**Mark with an ✘ or ✓**
8.0	Date of Birth (DD/MM/YYYY). If not provided, please calculate Q8 and 9			8.1 Not Provided ☐
9.0	Age (Completed Years)			
10.0	Age (Completed Months)			
11.0	Village (where student resided in the last 3 months)			11.1 Not Provided ☐
12.0	Mother or father's name			12.1 Not Provided ☐
13.0	Guardian's name			13.1 Not Provided ☐
14.0	Working Phone Numbers			14.1 Not Provided ☐
B	**FINDINGS**			
15.0	Weight (kg)			
16.0	Height (cm)			
17.0	BMI			
18.0	Nutrition Classification			
19.0	Final nutritional classification			
20.0	Mid upper arm circumference (MUAC) (mm)			
21.0	Waist Circumference (WC) (cm)			
C	**REASON FOR REFERRAL**	**Mark with an ✘ or ✓**		**Refer to:**
		Yes	**No**	
22.0	Overweight or Obese (Mamafa tele pe tino puta)	☐	☐	Health Promotion Program
23.0	Severely thin or thin (Mama tele le tino)	☐	☐	Community nutritionist
	Please give a consent form to the student if referred to a health promotion program			
D	**FORM COMPLETED BY**			
24.0	Full name			
25.0	Designation (RN, EN, Dr etc)			

Simplified Field Tables for Boys:

BMI-for-age BOYS
5 to 19 years (z-scores)

World Health Organization

Year: Month	Months	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
5: 1	61	12.1	13.0	14.1	15.3	16.6	18.3	20.2
5: 2	62	12.1	13.0	14.1	15.3	16.6	18.3	20.2
5: 3	63	12.1	13.0	14.1	15.3	16.7	18.3	20.2
5: 4	64	12.1	13.0	14.1	15.3	16.7	18.3	20.3
5: 5	65	12.1	13.0	14.1	15.3	16.7	18.3	20.3
5: 6	66	12.1	13.0	14.1	15.3	16.7	18.4	20.4
5: 7	67	12.1	13.0	14.1	15.3	16.7	18.4	20.4
5: 8	68	12.1	13.0	14.1	15.3	16.7	18.4	20.5
5: 9	69	12.1	13.0	14.1	15.3	16.7	18.4	20.5
5: 10	70	12.1	13.0	14.1	15.3	16.7	18.5	20.6
5: 11	71	12.1	13.0	14.1	15.3	16.7	18.5	20.6
6: 0	72	12.1	13.0	14.1	15.3	16.8	18.5	20.7
6: 1	73	12.1	13.0	14.1	15.3	16.8	18.6	20.8
6: 2	74	12.2	13.1	14.1	15.3	16.8	18.6	20.8
6: 3	75	12.2	13.1	14.1	15.3	16.8	18.6	20.9
6: 4	76	12.2	13.1	14.1	15.4	16.8	18.7	21.0
6: 5	77	12.2	13.1	14.1	15.4	16.9	18.7	21.0
6: 6	78	12.2	13.1	14.1	15.4	16.9	18.7	21.1
6: 7	79	12.2	13.1	14.1	15.4	16.9	18.8	21.2
6: 8	80	12.2	13.1	14.2	15.4	16.9	18.8	21.3
6: 9	81	12.2	13.1	14.2	15.4	17.0	18.9	21.3
6: 10	82	12.2	13.1	14.2	15.4	17.0	18.9	21.4
6: 11	83	12.2	13.1	14.2	15.5	17.0	19.0	21.5
7: 0	84	12.3	13.1	14.2	15.5	17.0	19.0	21.6
7: 1	85	12.3	13.2	14.2	15.5	17.1	19.1	21.7
7: 2	86	12.3	13.2	14.2	15.5	17.1	19.1	21.8
7: 3	87	12.3	13.2	14.3	15.5	17.1	19.2	21.9
7: 4	88	12.3	13.2	14.3	15.6	17.2	19.2	22.0
7: 5	89	12.3	13.2	14.3	15.6	17.2	19.3	22.0
7: 6	90	12.3	13.2	14.3	15.6	17.2	19.3	22.1

BMI-for-age BOYS
5 to 19 years (z-scores)

World Health Organization

Year: Month	Months	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
7: 7	91	12.3	13.2	14.3	15.6	17.3	19.4	22.2
7: 8	92	12.3	13.2	14.3	15.6	17.3	19.4	22.4
7: 9	93	12.4	13.3	14.3	15.7	17.3	19.5	22.5
7: 10	94	12.4	13.3	14.4	15.7	17.4	19.6	22.6
7: 11	95	12.4	13.3	14.4	15.7	17.4	19.6	22.7
8: 0	96	12.4	13.3	14.4	15.7	17.4	19.7	22.8
8: 1	97	12.4	13.3	14.4	15.8	17.5	19.7	22.9
8: 2	98	12.4	13.3	14.4	15.8	17.5	19.8	23.0
8: 3	99	12.4	13.3	14.4	15.8	17.5	19.9	23.1
8: 4	100	12.4	13.4	14.5	15.8	17.6	19.9	23.3
8: 5	101	12.5	13.4	14.5	15.9	17.6	20.0	23.4
8: 6	102	12.5	13.4	14.5	15.9	17.7	20.1	23.5
8: 7	103	12.5	13.4	14.5	15.9	17.7	20.1	23.6
8: 8	104	12.5	13.4	14.5	15.9	17.7	20.2	23.8
8: 9	105	12.5	13.4	14.6	16.0	17.8	20.3	23.9
8: 10	106	12.5	13.5	14.6	16.0	17.8	20.3	24.0
8: 11	107	12.5	13.5	14.6	16.0	17.9	20.4	24.2
9: 0	108	12.6	13.5	14.6	16.0	17.9	20.5	24.3
9: 1	109	12.6	13.5	14.6	16.1	18.0	20.5	24.4
9: 2	110	12.6	13.5	14.7	16.1	18.0	20.6	24.6
9: 3	111	12.6	13.5	14.7	16.1	18.0	20.7	24.7
9: 4	112	12.6	13.6	14.7	16.2	18.1	20.8	24.9
9: 5	113	12.6	13.6	14.7	16.2	18.1	20.8	25.0
9: 6	114	12.7	13.6	14.8	16.2	18.2	20.9	25.1
9: 7	115	12.7	13.6	14.8	16.3	18.2	21.0	25.3
9: 8	116	12.7	13.6	14.8	16.3	18.3	21.1	25.5
9: 9	117	12.7	13.7	14.8	16.3	18.3	21.2	25.6
9: 10	118	12.7	13.7	14.9	16.4	18.4	21.2	25.8
9: 11	119	12.8	13.7	14.9	16.4	18.4	21.3	25.9
10: 0	120	12.8	13.7	14.9	16.4	18.5	21.4	26.1

BMI-for-age BOYS
5 to 19 years (z-scores)

World Health Organization

Year: Month	Months	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
10: 1	121	12.8	13.8	15.0	16.5	18.5	21.5	26.2
10: 2	122	12.8	13.8	15.0	16.5	18.6	21.6	26.4
10: 3	123	12.8	13.8	15.0	16.6	18.6	21.7	26.6
10: 4	124	12.9	13.8	15.0	16.6	18.7	21.7	26.7
10: 5	125	12.9	13.9	15.1	16.6	18.8	21.8	26.9
10: 6	126	12.9	13.9	15.1	16.7	18.8	21.9	27.0
10: 7	127	12.9	13.9	15.1	16.7	18.9	22.0	27.2
10: 8	128	13.0	13.9	15.2	16.8	18.9	22.1	27.4
10: 9	129	13.0	14.0	15.2	16.8	19.0	22.2	27.5
10: 10	130	13.0	14.0	15.2	16.9	19.0	22.3	27.7
10: 11	131	13.0	14.0	15.3	16.9	19.1	22.4	27.9
11: 0	132	13.1	14.1	15.3	16.9	19.2	22.5	28.0
11: 1	133	13.1	14.1	15.3	17.0	19.2	22.5	28.2
11: 2	134	13.1	14.1	15.4	17.0	19.3	22.6	28.4
11: 3	135	13.1	14.1	15.4	17.1	19.3	22.7	28.5
11: 4	136	13.2	14.2	15.5	17.1	19.4	22.8	28.7
11: 5	137	13.2	14.2	15.5	17.2	19.5	22.9	28.8
11: 6	138	13.2	14.2	15.5	17.2	19.5	23.0	29.0
11: 7	139	13.2	14.3	15.6	17.3	19.6	23.1	29.2
11: 8	140	13.3	14.3	15.6	17.3	19.7	23.2	29.3
11: 9	141	13.3	14.3	15.7	17.4	19.7	23.3	29.5
11: 10	142	13.3	14.4	15.7	17.4	19.8	23.4	29.6
11: 11	143	13.4	14.4	15.7	17.5	19.9	23.5	29.8
12: 0	144	13.4	14.5	15.8	17.5	19.9	23.6	30.0
12: 1	145	13.4	14.5	15.8	17.6	20.0	23.7	30.1
12: 2	146	13.5	14.5	15.9	17.6	20.1	23.8	30.3
12: 3	147	13.5	14.6	15.9	17.7	20.2	23.9	30.4
12: 4	148	13.5	14.6	16.0	17.8	20.2	24.0	30.6
12: 5	149	13.6	14.6	16.0	17.8	20.3	24.1	30.7
12: 6	150	13.6	14.7	16.1	17.9	20.4	24.2	30.9

BMI-for-age BOYS
5 to 19 years (z-scores)

World Health Organization

Year: Month	Months	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
12: 7	151	13.6	14.7	16.1	17.9	20.4	24.3	31.0
12: 8	152	13.7	14.8	16.2	18.0	20.5	24.4	31.1
12: 9	153	13.7	14.8	16.2	18.0	20.6	24.5	31.3
12: 10	154	13.7	14.8	16.3	18.1	20.7	24.6	31.4
12: 11	155	13.8	14.9	16.3	18.2	20.8	24.7	31.6
13: 0	156	13.8	14.9	16.4	18.2	20.8	24.8	31.7
13: 1	157	13.8	15.0	16.4	18.3	20.9	24.9	31.8
13: 2	158	13.9	15.0	16.5	18.4	21.0	25.0	31.9
13: 3	159	13.9	15.1	16.5	18.4	21.1	25.1	32.1
13: 4	160	14.0	15.1	16.6	18.5	21.1	25.2	32.2
13: 5	161	14.0	15.2	16.6	18.6	21.2	25.2	32.3
13: 6	162	14.0	15.2	16.7	18.6	21.3	25.3	32.4
13: 7	163	14.1	15.2	16.7	18.7	21.4	25.4	32.6
13: 8	164	14.1	15.3	16.8	18.7	21.5	25.5	32.7
13: 9	165	14.1	15.3	16.8	18.8	21.5	25.6	32.8
13: 10	166	14.2	15.4	16.9	18.9	21.6	25.7	32.9
13: 11	167	14.2	15.4	17.0	18.9	21.7	25.8	33.0
14: 0	168	14.3	15.5	17.0	19.0	21.8	25.9	33.1
14: 1	169	14.3	15.5	17.1	19.1	21.8	26.0	33.2
14: 2	170	14.3	15.6	17.1	19.1	21.9	26.1	33.3
14: 3	171	14.4	15.6	17.2	19.2	22.0	26.2	33.4
14: 4	172	14.4	15.7	17.2	19.3	22.1	26.3	33.5
14: 5	173	14.5	15.7	17.3	19.3	22.2	26.4	33.5
14: 6	174	14.5	15.7	17.3	19.4	22.2	26.5	33.6
14: 7	175	14.5	15.8	17.4	19.5	22.3	26.5	33.7
14: 8	176	14.6	15.8	17.4	19.5	22.4	26.6	33.8
14: 9	177	14.6	15.9	17.5	19.6	22.5	26.7	33.9
14: 10	178	14.6	15.9	17.5	19.6	22.5	26.8	33.9
14: 11	179	14.7	16.0	17.6	19.7	22.6	26.9	34.0
15: 0	180	14.7	16.0	17.6	19.8	22.7	27.0	34.1

BMI-for-age BOYS
5 to 19 years (z-scores)

World Health Organization

Year: Month	Months	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
15: 1	181	14.7	16.1	17.7	19.8	22.8	27.1	34.1
15: 2	182	14.8	16.1	17.8	19.9	22.8	27.1	34.2
15: 3	183	14.8	16.1	17.8	20.0	22.9	27.2	34.3
15: 4	184	14.8	16.2	17.9	20.0	23.0	27.3	34.3
15: 5	185	14.9	16.2	17.9	20.1	23.0	27.4	34.4
15: 6	186	14.9	16.3	18.0	20.1	23.1	27.4	34.5
15: 7	187	15.0	16.3	18.0	20.2	23.2	27.5	34.5
15: 8	188	15.0	16.3	18.1	20.3	23.3	27.6	34.6
15: 9	189	15.0	16.4	18.1	20.3	23.3	27.7	34.6
15: 10	190	15.0	16.4	18.2	20.4	23.4	27.7	34.7
15: 11	191	15.1	16.5	18.2	20.4	23.5	27.8	34.7
16: 0	192	15.1	16.5	18.2	20.5	23.5	27.9	34.8
16: 1	193	15.1	16.5	18.3	20.6	23.6	27.9	34.8
16: 2	194	15.2	16.6	18.3	20.6	23.7	28.0	34.8
16: 3	195	15.2	16.6	18.4	20.7	23.7	28.1	34.9
16: 4	196	15.2	16.7	18.4	20.7	23.8	28.1	34.9
16: 5	197	15.3	16.7	18.5	20.8	23.8	28.2	35.0
16: 6	198	15.3	16.7	18.5	20.8	23.9	28.3	35.0
16: 7	199	15.3	16.8	18.6	20.9	24.0	28.3	35.0
16: 8	200	15.3	16.8	18.6	20.9	24.0	28.4	35.1
16: 9	201	15.4	16.8	18.7	21.0	24.1	28.5	35.1
16: 10	202	15.4	16.9	18.7	21.0	24.2	28.5	35.1
16: 11	203	15.4	16.9	18.7	21.1	24.2	28.6	35.2
17: 0	204	15.4	16.9	18.8	21.1	24.3	28.6	35.2
17: 1	205	15.5	17.0	18.8	21.2	24.3	28.7	35.2
17: 2	206	15.5	17.0	18.9	21.2	24.4	28.7	35.2
17: 3	207	15.5	17.0	18.9	21.3	24.4	28.8	35.3
17: 4	208	15.5	17.1	18.9	21.3	24.5	28.9	35.3
17: 5	209	15.6	17.1	19.0	21.4	24.5	28.9	35.3
17: 6	210	15.6	17.1	19.0	21.4	24.6	29.0	35.3

BMI-for-age BOYS
5 to 19 years (z-scores)

World Health Organization

Year: Month	Months	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
17: 7	211	15.6	17.1	19.1	21.5	24.7	29.0	35.4
17: 8	212	15.6	17.2	19.1	21.5	24.7	29.1	35.4
17: 9	213	15.6	17.2	19.1	21.6	24.8	29.1	35.4
17: 10	214	15.7	17.2	19.2	21.6	24.8	29.2	35.4
17: 11	215	15.7	17.3	19.2	21.7	24.9	29.2	35.4
18: 0	216	15.7	17.3	19.2	21.7	24.9	29.2	35.4
18: 1	217	15.7	17.3	19.3	21.8	25.0	29.3	35.4
18: 2	218	15.7	17.3	19.3	21.8	25.0	29.3	35.5
18: 3	219	15.7	17.4	19.3	21.8	25.1	29.4	35.5
18: 4	220	15.8	17.4	19.4	21.9	25.1	29.4	35.5
18: 5	221	15.8	17.4	19.4	21.9	25.1	29.5	35.5
18: 6	222	15.8	17.4	19.4	22.0	25.2	29.5	35.5
18: 7	223	15.8	17.5	19.5	22.0	25.2	29.5	35.5
18: 8	224	15.8	17.5	19.5	22.0	25.3	29.6	35.5
18: 9	225	15.8	17.5	19.5	22.1	25.3	29.6	35.5
18: 10	226	15.8	17.5	19.6	22.1	25.4	29.6	35.5
18: 11	227	15.8	17.5	19.6	22.2	25.4	29.7	35.5
19: 0	228	15.9	17.6	19.6	22.2	25.4	29.7	35.5

2007 WHO Reference

Simplified Field Tables for Girls:

BMI-for-age GIRLS
5 to 19 years (z-scores)

World Health Organization

Year: Month	Months	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
5: 1	61	11.8	12.7	13.9	15.2	16.9	18.9	21.3
5: 2	62	11.8	12.7	13.9	15.2	16.9	18.9	21.4
5: 3	63	11.8	12.7	13.9	15.2	16.9	18.9	21.5
5: 4	64	11.8	12.7	13.9	15.2	16.9	18.9	21.5
5: 5	65	11.7	12.7	13.9	15.2	16.9	19.0	21.6
5: 6	66	11.7	12.7	13.9	15.2	16.9	19.0	21.7
5: 7	67	11.7	12.7	13.9	15.2	16.9	19.0	21.7
5: 8	68	11.7	12.7	13.9	15.3	17.0	19.1	21.8
5: 9	69	11.7	12.7	13.9	15.3	17.0	19.1	21.9
5: 10	70	11.7	12.7	13.9	15.3	17.0	19.1	22.0
5: 11	71	11.7	12.7	13.9	15.3	17.0	19.2	22.1
6: 0	72	11.7	12.7	13.9	15.3	17.0	19.2	22.1
6: 1	73	11.7	12.7	13.9	15.3	17.0	19.3	22.2
6: 2	74	11.7	12.7	13.9	15.3	17.0	19.3	22.3
6: 3	75	11.7	12.7	13.9	15.3	17.1	19.3	22.4
6: 4	76	11.7	12.7	13.9	15.3	17.1	19.4	22.5
6: 5	77	11.7	12.7	13.9	15.3	17.1	19.4	22.6
6: 6	78	11.7	12.7	13.9	15.3	17.1	19.5	22.7
6: 7	79	11.7	12.7	13.9	15.3	17.2	19.5	22.8
6: 8	80	11.7	12.7	13.9	15.3	17.2	19.6	22.9
6: 9	81	11.7	12.7	13.9	15.4	17.2	19.6	23.0
6: 10	82	11.7	12.7	13.9	15.4	17.2	19.7	23.1
6: 11	83	11.7	12.7	13.9	15.4	17.3	19.7	23.2
7: 0	84	11.8	12.7	13.9	15.4	17.3	19.8	23.3
7: 1	85	11.8	12.7	13.9	15.4	17.3	19.8	23.4
7: 2	86	11.8	12.8	14.0	15.4	17.4	19.9	23.5
7: 3	87	11.8	12.8	14.0	15.5	17.4	20.0	23.6
7: 4	88	11.8	12.8	14.0	15.5	17.4	20.0	23.7
7: 5	89	11.8	12.8	14.0	15.5	17.5	20.1	23.9
7: 6	90	11.8	12.8	14.0	15.5	17.5	20.1	24.0

BMI-for-age GIRLS
5 to 19 years (z-scores)

World Health Organization

Year: Month	Months	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
7: 7	91	11.8	12.8	14.0	15.5	17.5	20.2	24.1
7: 8	92	11.8	12.8	14.0	15.6	17.6	20.3	24.2
7: 9	93	11.8	12.8	14.1	15.6	17.6	20.3	24.4
7: 10	94	11.9	12.9	14.1	15.6	17.6	20.4	24.5
7: 11	95	11.9	12.9	14.1	15.7	17.7	20.5	24.6
8: 0	96	11.9	12.9	14.1	15.7	17.7	20.6	24.8
8: 1	97	11.9	12.9	14.1	15.7	17.8	20.6	24.9
8: 2	98	11.9	12.9	14.2	15.7	17.8	20.7	25.1
8: 3	99	11.9	12.9	14.2	15.8	17.9	20.8	25.2
8: 4	100	11.9	13.0	14.2	15.8	17.9	20.9	25.3
8: 5	101	12.0	13.0	14.2	15.8	18.0	20.9	25.5
8: 6	102	12.0	13.0	14.3	15.9	18.0	21.0	25.6
8: 7	103	12.0	13.0	14.3	15.9	18.1	21.1	25.8
8: 8	104	12.0	13.0	14.3	15.9	18.1	21.2	25.9
8: 9	105	12.0	13.1	14.3	16.0	18.2	21.3	26.1
8: 10	106	12.1	13.1	14.4	16.0	18.2	21.3	26.2
8: 11	107	12.1	13.1	14.4	16.1	18.3	21.4	26.4
9: 0	108	12.1	13.1	14.4	16.1	18.3	21.5	26.5
9: 1	109	12.1	13.2	14.5	16.1	18.4	21.6	26.7
9: 2	110	12.1	13.2	14.5	16.2	18.4	21.7	26.8
9: 3	111	12.2	13.2	14.5	16.2	18.5	21.8	27.0
9: 4	112	12.2	13.2	14.6	16.3	18.6	21.9	27.2
9: 5	113	12.2	13.3	14.6	16.3	18.6	21.9	27.3
9: 6	114	12.2	13.3	14.6	16.3	18.7	22.0	27.5
9: 7	115	12.3	13.3	14.7	16.4	18.7	22.1	27.6
9: 8	116	12.3	13.4	14.7	16.4	18.8	22.2	27.8
9: 9	117	12.3	13.4	14.7	16.5	18.8	22.3	27.9
9: 10	118	12.3	13.4	14.8	16.5	18.9	22.4	28.1
9: 11	119	12.4	13.4	14.8	16.6	19.0	22.5	28.2
10: 0	120	12.4	13.5	14.8	16.6	19.0	22.6	28.4

BMI-for-age GIRLS
5 to 19 years (z-scores)

World Health Organization

Year: Month	Months	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
10: 1	121	12.4	13.5	14.9	16.7	19.1	22.7	28.5
10: 2	122	12.4	13.5	14.9	16.7	19.2	22.8	28.7
10: 3	123	12.5	13.6	15.0	16.8	19.2	22.8	28.8
10: 4	124	12.5	13.6	15.0	16.8	19.3	22.9	29.0
10: 5	125	12.5	13.6	15.0	16.9	19.4	23.0	29.1
10: 6	126	12.5	13.7	15.1	16.9	19.4	23.1	29.3
10: 7	127	12.6	13.7	15.1	17.0	19.5	23.2	29.4
10: 8	128	12.6	13.7	15.2	17.0	19.6	23.3	29.6
10: 9	129	12.6	13.8	15.2	17.1	19.6	23.4	29.7
10: 10	130	12.7	13.8	15.3	17.1	19.7	23.5	29.9
10: 11	131	12.7	13.8	15.3	17.2	19.8	23.6	30.0
11: 0	132	12.7	13.9	15.3	17.2	19.9	23.7	30.2
11: 1	133	12.8	13.9	15.4	17.3	19.9	23.8	30.3
11: 2	134	12.8	14.0	15.4	17.4	20.0	23.9	30.5
11: 3	135	12.8	14.0	15.5	17.4	20.1	24.0	30.6
11: 4	136	12.9	14.0	15.5	17.5	20.2	24.1	30.8
11: 5	137	12.9	14.1	15.6	17.5	20.2	24.2	30.9
11: 6	138	12.9	14.1	15.6	17.6	20.3	24.3	31.1
11: 7	139	13.0	14.2	15.7	17.7	20.4	24.4	31.2
11: 8	140	13.0	14.2	15.7	17.7	20.5	24.5	31.4
11: 9	141	13.0	14.3	15.8	17.8	20.6	24.7	31.5
11: 10	142	13.1	14.3	15.8	17.9	20.6	24.8	31.6
11: 11	143	13.1	14.3	15.9	17.9	20.7	24.9	31.8
12: 0	144	13.2	14.4	16.0	18.0	20.8	25.0	31.9
12: 1	145	13.2	14.4	16.0	18.1	20.9	25.1	32.0
12: 2	146	13.2	14.5	16.1	18.1	21.0	25.2	32.2
12: 3	147	13.3	14.5	16.1	18.2	21.1	25.3	32.3
12: 4	148	13.3	14.6	16.2	18.3	21.1	25.4	32.4
12: 5	149	13.3	14.6	16.2	18.3	21.2	25.5	32.6
12: 6	150	13.4	14.7	16.3	18.4	21.3	25.6	32.7

BMI-for-age GIRLS
5 to 19 years (z-scores)

World Health Organization

Year: Month	Months	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
12: 7	151	13.4	14.7	16.3	18.5	21.4	25.7	32.8
12: 8	152	13.5	14.8	16.4	18.5	21.5	25.8	33.0
12: 9	153	13.5	14.8	16.4	18.6	21.6	25.9	33.1
12: 10	154	13.5	14.8	16.5	18.7	21.6	26.0	33.2
12: 11	155	13.6	14.9	16.6	18.7	21.7	26.1	33.3
13: 0	156	13.6	14.9	16.6	18.8	21.8	26.2	33.4
13: 1	157	13.6	15.0	16.7	18.9	21.9	26.3	33.6
13: 2	158	13.7	15.0	16.7	18.9	22.0	26.4	33.7
13: 3	159	13.7	15.1	16.8	19.0	22.0	26.5	33.8
13: 4	160	13.8	15.1	16.8	19.1	22.1	26.6	33.9
13: 5	161	13.8	15.2	16.9	19.1	22.2	26.7	34.0
13: 6	162	13.8	15.2	16.9	19.2	22.3	26.8	34.1
13: 7	163	13.9	15.2	17.0	19.3	22.4	26.9	34.2
13: 8	164	13.9	15.3	17.0	19.3	22.4	27.0	34.3
13: 9	165	13.9	15.3	17.1	19.4	22.5	27.1	34.4
13: 10	166	14.0	15.4	17.1	19.4	22.6	27.1	34.5
13: 11	167	14.0	15.4	17.2	19.5	22.7	27.2	34.6
14: 0	168	14.0	15.4	17.2	19.6	22.7	27.3	34.7
14: 1	169	14.1	15.5	17.3	19.6	22.8	27.4	34.7
14: 2	170	14.1	15.5	17.3	19.7	22.9	27.5	34.8
14: 3	171	14.1	15.6	17.4	19.7	22.9	27.6	34.9
14: 4	172	14.1	15.6	17.4	19.8	23.0	27.7	35.0
14: 5	173	14.2	15.6	17.5	19.9	23.1	27.7	35.1
14: 6	174	14.2	15.7	17.5	19.9	23.1	27.8	35.1
14: 7	175	14.2	15.7	17.6	20.0	23.2	27.9	35.2
14: 8	176	14.3	15.7	17.6	20.0	23.3	28.0	35.3
14: 9	177	14.3	15.8	17.6	20.1	23.3	28.0	35.4
14: 10	178	14.3	15.8	17.7	20.1	23.4	28.1	35.4
14: 11	179	14.3	15.8	17.7	20.2	23.5	28.2	35.5
15: 0	180	14.4	15.9	17.8	20.2	23.5	28.2	35.5

BMI-for-age GIRLS
5 to 19 years (z-scores)

World Health Organization

Year: Month	Months	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
15: 1	181	14.4	15.9	17.8	20.3	23.6	28.3	35.6
15: 2	182	14.4	15.9	17.8	20.3	23.6	28.4	35.7
15: 3	183	14.4	16.0	17.9	20.4	23.7	28.4	35.7
15: 4	184	14.5	16.0	17.9	20.4	23.7	28.5	35.8
15: 5	185	14.5	16.0	17.9	20.4	23.8	28.5	35.8
15: 6	186	14.5	16.0	18.0	20.5	23.8	28.6	35.8
15: 7	187	14.5	16.1	18.0	20.5	23.9	28.6	35.9
15: 8	188	14.5	16.1	18.0	20.6	23.9	28.7	35.9
15: 9	189	14.5	16.1	18.1	20.6	24.0	28.7	36.0
15: 10	190	14.6	16.1	18.1	20.6	24.0	28.8	36.0
15: 11	191	14.6	16.2	18.1	20.7	24.1	28.8	36.0
16: 0	192	14.6	16.2	18.2	20.7	24.1	28.9	36.1
16: 1	193	14.6	16.2	18.2	20.7	24.1	28.9	36.1
16: 2	194	14.6	16.2	18.2	20.8	24.2	29.0	36.1
16: 3	195	14.6	16.2	18.2	20.8	24.2	29.0	36.1
16: 4	196	14.6	16.2	18.3	20.8	24.3	29.0	36.2
16: 5	197	14.6	16.3	18.3	20.9	24.3	29.1	36.2
16: 6	198	14.7	16.3	18.3	20.9	24.3	29.1	36.2
16: 7	199	14.7	16.3	18.3	20.9	24.4	29.1	36.2
16: 8	200	14.7	16.3	18.3	20.9	24.4	29.2	36.2
16: 9	201	14.7	16.3	18.4	21.0	24.4	29.2	36.3
16: 10	202	14.7	16.3	18.4	21.0	24.4	29.2	36.3
16: 11	203	14.7	16.3	18.4	21.0	24.5	29.3	36.3
17: 0	204	14.7	16.4	18.4	21.0	24.5	29.3	36.3
17: 1	205	14.7	16.4	18.4	21.1	24.5	29.3	36.3
17: 2	206	14.7	16.4	18.4	21.1	24.6	29.3	36.3
17: 3	207	14.7	16.4	18.5	21.1	24.6	29.4	36.3
17: 4	208	14.7	16.4	18.5	21.1	24.6	29.4	36.3
17: 5	209	14.7	16.4	18.5	21.1	24.6	29.4	36.3
17: 6	210	14.7	16.4	18.5	21.2	24.6	29.4	36.3

BMI-for-age GIRLS
5 to 19 years (z-scores)

World Health Organization

Year: Month	Months	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
17: 7	211	14.7	16.4	18.5	21.2	24.7	29.4	36.3
17: 8	212	14.7	16.4	18.5	21.2	24.7	29.5	36.3
17: 9	213	14.7	16.4	18.5	21.2	24.7	29.5	36.3
17: 10	214	14.7	16.4	18.5	21.2	24.7	29.5	36.3
17: 11	215	14.7	16.4	18.6	21.2	24.8	29.5	36.3
18: 0	216	14.7	16.4	18.6	21.3	24.8	29.5	36.3
18: 1	217	14.7	16.5	18.6	21.3	24.8	29.5	36.3
18: 2	218	14.7	16.5	18.6	21.3	24.8	29.6	36.3
18: 3	219	14.7	16.5	18.6	21.3	24.8	29.6	36.3
18: 4	220	14.7	16.5	18.6	21.3	24.8	29.6	36.3
18: 5	221	14.7	16.5	18.6	21.3	24.9	29.6	36.2
18: 6	222	14.7	16.5	18.6	21.3	24.9	29.6	36.2
18: 7	223	14.7	16.5	18.6	21.4	24.9	29.6	36.2
18: 8	224	14.7	16.5	18.6	21.4	24.9	29.6	36.2
18: 9	225	14.7	16.5	18.7	21.4	24.9	29.6	36.2
18: 10	226	14.7	16.5	18.7	21.4	24.9	29.6	36.2
18: 11	227	14.7	16.5	18.7	21.4	25.0	29.7	36.2
19: 0	228	14.7	16.5	18.7	21.4	25.0	29.7	36.2

2007 WHO Reference

BACKPAGE