TOWARDS A COMPREHENSIVE NCD REPORTING FRAMEWORK FOR INDONESIA

Supported by The Australia-Indonesia Centre

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HEALTH RESEARCH CLUSTER

Executive Summary

This is a commissioned piece of research by the Australia-Indonesia Centre, a bilateral partnership to address common health challenges. Non-communicable diseases such as cardiovascular disease, diabetes and cancer are now the leading causes of death and disability in both settings. As such, the Australia-Indonesia Centre has identified non-communicable disease (NCD) as the health priority across both countries (http://Australiaindonesiacentre.org/clusters/health/).

Core to responding to NCDs is an understanding of their onset and the burden across populations. This represents the overarching aim of this project. We anticipate that this report will be useful to those working in epidemiology, public health policy, and those with an interest in NCDs.

In the first section of this report we define a framework for the key NCD outcomes, risks and determinants for all Indonesians. The purpose of this framework is to define **what** should be measured. Previous Indonesian frameworks and policies have largely focussed on cardiovascular disease, diabetes and cancer, somewhat neglecting other key NCDs such as mental disorders, dental condition and musculoskeletal conditions. We also explore for **whom** these NCDs should be reported. Previously, where NCDs have been reported, the focus has largely been on adults (despite NCDs being important causes of morbidity and mortality across the life course). The key output of this first section is a reporting framework detailing the NCDs that should be measured, and at what staged of the life-course, for females and males.

In the section two we examine data available against the proposed reporting framework. We interrogate Indonesia's RISKESDAS survey (given this is primarily designed to monitor health and wellbeing) and key administrative datasets. Key indicators harmonised with available data are proposed so as to be able to populate the proposed reporting framework. This section also identifies specific data gaps. Key data gaps related to NCDs such as mental disorder, sense organ disorders, skin and oral health conditions. Data were also very limited for children and adolescents overall.

In the third section, we populate key aspects of the reporting framework to illustrate the burden of these NCDs, their risks and determinants.

Key messages arising from this project:

1. NCDs extend beyond cardiovascular disease, diabetes, cancer and chronic respiratory disease (the traditional focus of policy). Any reporting of NCDs in Indonesia should include a focus on musculoskeletal disorders, poor mental health, cardiovascular disease, cancer, diabetes, chronic skin conditions, vision and hearing defects and chronic respiratory conditions given these all contribute to the burden of disease in Indonesia and all are preventable. The key to prevention is a measure of risk factors and determinants.

2. NCDs occur across the life-course and not just in adulthood. NCDs that emerge in childhood and adolescence provide a particularly important target for intervention as this can improve the health of young people now, their health as adults, and the health of the next generation.

3. Key NCDs vary sub-nationally in Indonesia. Geographic health inequity across the archipelago requires regular monitoring in order to take advantage of unique opportunities to elicit change.

4. Current data systems in Indonesia measure some, but not all NCDs that are relevant. Particular gaps exist around some key NCDs (such as mental disorder), with data for adolescents particularly lacking. There is a need to continue to invest in objective measures, and extend this across the life-course.

Acknowledgements

This project was funded by the Australia-Indonesia Centre.

We would like to acknowledge our stakeholders who have provided valuable support and feedback throughout the project.

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CONTENTS

TOWARDS A COMPREHENSIVE NCD REPORTING FRAMEWORK FOR INDONESIA 1

EXECUTIVE SUMMARY 2

Acknowledgements 3

INTRODUCTION 5

THE NEED TO FOCUS ON NCDS 5

THE NEED FOR WELL-DEFINED REPORTING FRAMEWORKS AND INDICATORS. 6

Strengths and limitations of current frameworks in Indonesia 7

THE CURRENT PROJECT 8

A REVISED NCD REPORTING FRAMEWORK FOR INDONESIA 9

METHOD: PRIORITISING NCD OUTCOMES, RISKS AND DETERMINANTS 9

Approach to defining key NCDs across the life-course 9

Burden of disease 10

Government policy and strategic priorities 12

Stakeholder Consultation 13

KEY FINDINGS: THE REPORTING FRAMEWORK 13

SECTION 1 DISCUSSION: A REVISED REPORTING FRAMEWORK FOR INDONESIA 22

DATA AND INDICATORS TO MEASURE NCDS IN INDONESIA 24

METHOD 24

KEY FINDINGS: DATA, AVAILABILITY AND PROPOSED INDICATORS. 26

SECTION 2 DISCUSSION: DATA AND INDICATORS TO MEASURE NCD IN INDONESIA 35

AN UPDATED NCD PROFILE FOR INDONESIA 37

METHOD 37

KEY FINDINGS: PROFILE OF NCD FOR INDONESIA 37

NCD OUTCOMES 37

Chronic respiratory diseases and Neoplasms 37

Cardiovascular diseases and Chronic Renal Failure. 39

Diabetes and Hyperthyroidism. 40

Mental Disorder, Disabilities and Musculoskeletal disorders 41

Blindness and Low Vision. 42

NCD RISK FACTORS 43

Smoking, Physical inactivity, and Lack of consumption of fruit and vegetables. 43

Overweight or Obesity and Hypertension. 46

SECTION 3 DISCUSSION: AN UPDATED NCD PROFILE FOR INDONESIA 47

DISCUSSION AND RECOMMENDATIONS 49

REFERENCES 51

APPENDIX 53

DATA TABLES - NCD OUTCOMES 53

DATA TABLES - NCD RISK FACTORS 60

Introduction

The need to focus on NCDs

Non-communicable diseases (NCDs) are now the leading cause of mortality globally, up to 60-70% of deaths are caused by largely preventable diseases [1, 2]. For over a decade the World Health Organization (WHO), the World Bank and the United Nations Development Programme (UNDP) have been actively working to increase action on NCDs, in response to the increasing worldwide prevalence [3]. Governments have begun to enact policies relating to NCD; and public health & medical experts continue to publish research and evidence on NCD, the risk factors and associated social determinants.

Defining Non-Communicable Disease

Defining NCDs is not easy. The UN High Level Meeting defined NCDs as primarily four conditions (cardiovascular disease, cancer, diabetes and chronic respiratory disorders) caused by four behavioural risk factors (diet, physical activity, smoking and alcohol)[3]. This definition is commonly adopted, however as recognised by the UNHLM itself, it fails to include other important NCDs such as mental and substance use disorders, musculoskeletal conditions and neurological diseases.

It remains unclear how best to define NCDs [4]. For the purpose of this project we considered NCD to be a medical condition or disease that is non-infectious or transmissible. We included those conditions defined as 'NCD' in the Global burden of disease (GBD) study and in NCD policy frameworks. We included those which may have transmissible underlying cause (such as Cirrhosis, having an underlying cause of Hepatitis C, among other causes). Injuries were excluded (despite many common risks and determinants) with the exception of suicide and self-harm due to their alignment with mental health conditions.

NCD is the leading cause of death and disability in Indonesia

Much like the rest of the world, NCDs have emerged as the leading causes of death and ill-health in Indonesia. Despite several infectious diseases continuing to be major health challenges for Indonesia, the health loss from non-communicable diseases has dramatically increased. These increases have been contributed by poor diet, high blood pressure, lack of physical activity, and tobacco use – which is now the top risk factors among adult males in Indonesia

NCDs are largely preventable through modification of risk behaviours and exposures in early life (for example, poor diet, tobacco smoking), and early detection and treatment of health risks (such as hypertension, overweight and obesity). Many of these risk factors have their origins in childhood and adolescence, and these life stages are crucial to prevention efforts- for the benefit of the individual now, into adult life, and into the next generation [5].

According to WHO comprehensive public health approaches that target the life course are required for NCDs prevention and control. Such interventions should target people in infancy, childhood, adolescence and adulthood. For instance, exclusive breast feeding during infancy, promote physical activity, safe and healthy foods during adolescent and implement tobacco and alcohol controls, and tobacco prevention and cessation programmes during adult period [6].

The disability and death associated with NCD places a huge cost and financial burden on individuals, their families and the broader health system. The loss of the main income earner to premature death or disability and sickness, and hospital bills and medications can have catastrophic impacts on low

income earners [7, 8]. In addition to the cost to individuals, and their families, NCDs are amongst the most expensive diseases in terms of health-care expenditure. The burden of NCDs in Indonesia is reported to account for 8% of the nation's out of pocket healthcare expenditure and due to rising disease prevalence and changing demographics, this figure is expected to rise to 12% by 2020 without an adequate strategic intervention [9]. The increase of NCDs impacts significantly on the economic development and growth of a nation also, with a 10% rise in NCD mortality said to reduce the economic growth for that year by 0.5% [10].

Socioeconomic disadvantage is associated with an excess burden of NCD risk and outcome. Low and middle income countries are experiencing up to 80% of the world's NCD-related mortality [11]. Considering the social determinants of health aids to evaluate and examine the root causes in the level and distribution of NCDs. While NCDs are well known to be determined by biological and behavioural risk factors they are influenced by social position, which can directly impact disease incidence and outcomes [12]. However, the determinants of NCD extend well beyond socioeconomic disadvantage. For example, In Indonesia, lower risk of CVDs was significantly associated with increasing level of education [13]. Also, research using World Health Survey Data from low and middle income countries (LMICs) showed both wealth and education inequalities were strongly associated with increased prevalence of many NCDs [14].

The need for well-defined reporting frameworks and indicators.

It is well recognized in Indonesia that there is a need for high quality data to identify priorities and ensure accountability. One of the barriers to accurate prevention measures is the availability of good quality data, which allows us to identify priorities, inform intervention and to track progress [15].

A reporting framework is generally defined as a group of indicators brought together to describe the status of a given population. Reporting frameworks typically align with policies and conceptual models of social development and well-being. Indicators are a measure which summarises a facet of health, wellbeing, their determinants or services response. Indicators help to identify and quantify a problem, but to contribute to accountability around NCDs they must also be measured, reported on, and used to monitor and track progress for goals [16].

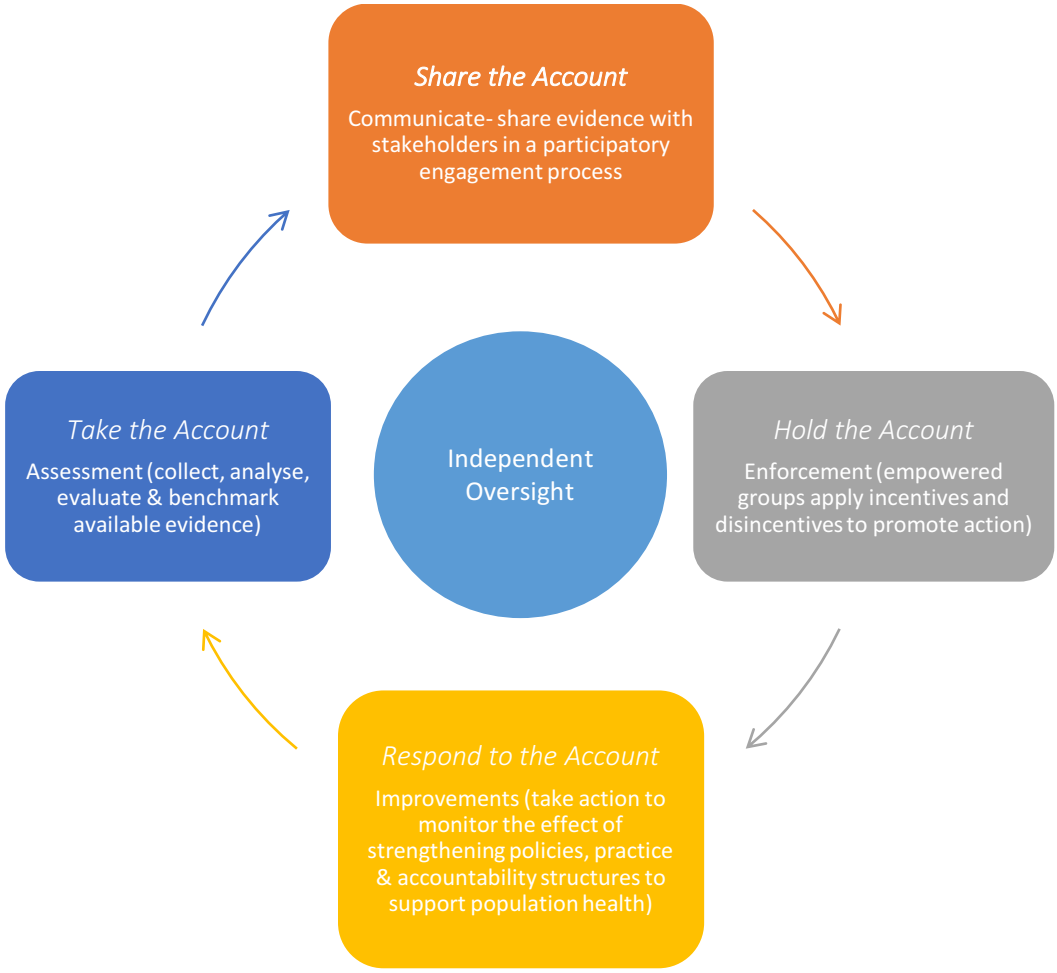
There are two key frameworks in Indonesia of specific importance to NCD reduction, the Ministry of Health's (MoH) Strategic Plan (2015-2019) (RENSTRA), and the Indonesian Action Plan for NCD (developed by the MoH's Dept. of NCD). Both of these documents set out strategic priorities, first for Indonesia's health overall in RENSTRA and specifically around NCD in the NCD action plan. In the NCD action plan (adopted from the WHO South East Asia action plan), four major NCD are prioritised, those which contribute to 60% mortality in Indonesia: cardiovascular diseases, cancer, diabetes and chronic lung disease.

Given the breadth and complexity of NCD as a disease group, a comprehensive reporting framework which covers NCD outcomes, risks and determinants will provide a clear structure with which to set priorities (formally define indicators; assess data availability, quality and gaps), inform intervention and track progress.

A strong reporting framework accompanied by well-defined indicators provides the basis of *accountability* for NCD in Indonesia. Kraak & colleagues (2014) 'accountability framework' describes a four-stage process for achieving accountability within a strategy for health promotion, see figure A [17]. Kraak's accountability framework was developed to promote healthy food environments with independent body oversight, the framework has also been modified and recommended in public

health context for effective accountability and oversight in the area of Adolescent health and wellbeing [5]. Tolhurst and colleagues (2015) have also already recognized the potential for application of a modified version of this accountability framework to chronic disease and health conditions [18].

Figure A. Accountability framework [17]



Strengths and limitations of current frameworks in Indonesia

The Indonesian government's commitment to reducing NCDs is reflected in both the formation of the Department of Non-Communicable Disease under the Ministry of Health; and the preparation and dissemination of the Indonesian Action Plan for NCD (the 'action plan') which identifies and reports on important NCD outcomes such as cerebrovascular disease, cardiovascular disease, diabetes mellitus, hypertension and chronic lung disease. However, the NCD action plan is heavily influenced by the WHO global action plan and is quite narrow in the definition of NCD. This results in many outcomes which cause significant burden in the Indonesian population not being included in the action plan, such as mental disorder, neurological, and musculoskeletal conditions.
The focus on common adult NCD outcomes and their risk factors also results in a lack of priority or strategic plan for child and adolescent NCD. Important chronic diseases which have lasting impact across the life-course, such as asthma, anxiety, and depressive disorders have their origin in these neglected periods of life.

The action plan for NCD describes the magnitude of some NCDs in Indonesia, the impact on the health of the nation and the socio-economic burden for communities and government; and considers prevention strategies and controls which could be implemented. The action plan for NCD fills a noticeable gap in RENSTRA, the MoH's strategic plan, which only has 1 strategic target and a few indicators that linked specifically to an NCD outcome or risk factor.

Posbindu PTM is an integrated health post for the screening and prevention of NCD risk factors in Indonesia. The goal of the Posbindu is to increase early detection and education around NCDs, using both trained health workers and community volunteers. To make the program more accessible there are various settings used, including: schools, workplaces and homes. The Posbindu's strength is the use of direct measurements to screen for NCD (BMI, blood pressure, cholesterol, blood glucose, and physical activity), however the screening is focused on age 15 and up, missing children and younger adolescents. This reflects the narrow focus in the action plan on common adult NCD's. Furthermore, raw data reported from the Posdindu program appears to show much greater uptake in screening in the older age groups, further compounding the 'adult focus' [19].

The Current Project

The overarching aim of this project is to define a comprehensive reporting framework for NCDs in Indonesia that builds on those currently in use.
The specific objectives are to:

- Define a reporting framework for NCD outcomes, risks and determinants that is of specific public health and policy relevance to Indonesia;
- Map data, assess the quality of currently collected data, and define clear indicators to apply to the reporting framework;
- Analyse the available data to describe a profile of NCD and its risks for Indonesia; and

This report is presented as three sections, each addressing a specific objective outlined above, plus final recommendations.

Section 1

A revised NCD reporting framework for Indonesia

This section of the report defines a comprehensive reporting framework for NCDs in Indonesia. Specifically, it defines what NCDs should be reported, and at what stages of the life-course, in Indonesia.

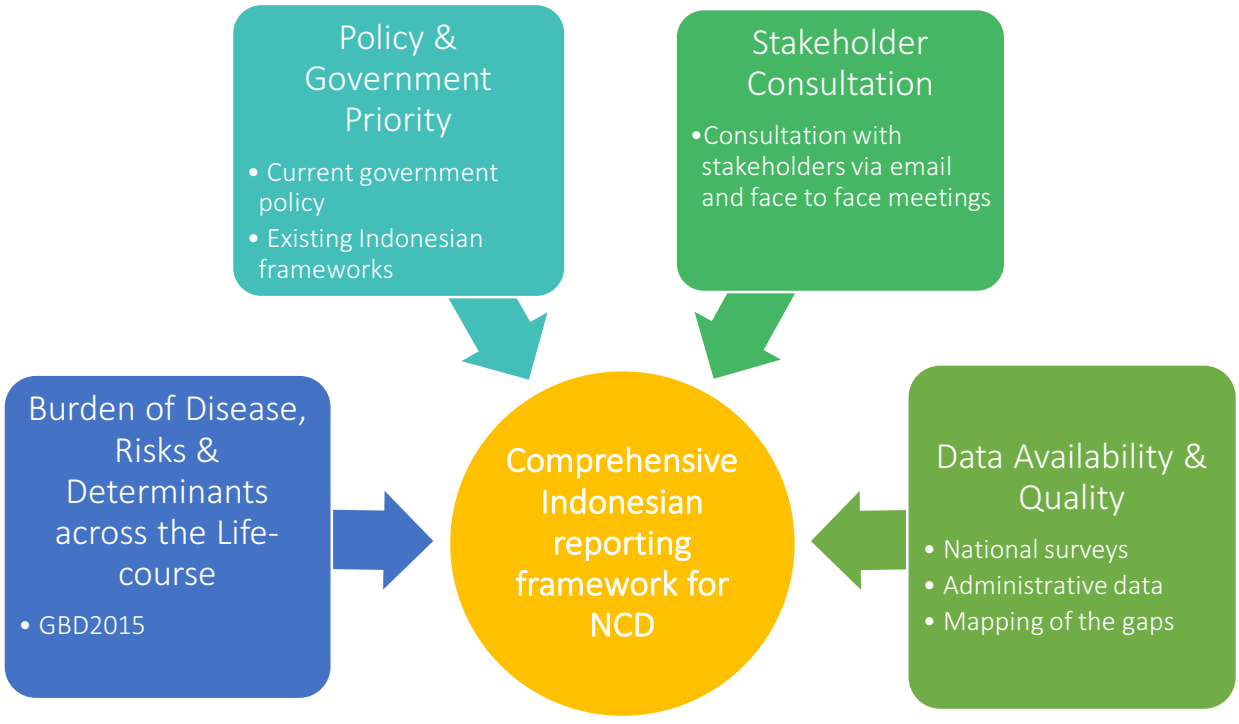
Method: Prioritising NCD outcomes, risks and determinants

The reporting framework was defined using a modified priority setting approach [2]. For key age-groups across the life course (defined below), we defined the **key NCD outcomes** by considering public health relevance (contribution to modelled burden of disease) and policy relevance (review of national and international policy frameworks). We additionally consulted a broad range of stakeholders and reviewed current data collection systems (on the assumption that data are collected for conditions previously defined as important). This approach is summarised in Figure 1.0. We undertook a similar approach for **NCD risks,** defined initially by the top risk factors attributed to the burden of NCDs (again using modelled burden of disease data), policy relevance (again, by reviewing national and international policy frameworks) and stakeholder recommendations. For **NCD determinants** we used the Commission on Social Determinants of Health (Closing the Gap in a generation) as a starting point for considering key determinants [20]. While reviewing policy frameworks we aimed to incorporate any further key determinants as they were identified, however the social determinant framework outlined in the commission on social determinants was exhaustive.

This approach is detailed further below.

Approach to defining key NCDs across the life-course

Figure 1.0. Conceptual framework for the project:



Burden of disease

We used the 2015 Global Burden of Disease study (GBD2015) data to identify key NCD causes in Indonesia. We examined the leading causes of death and disability across the life-course attributable to NCD.

GBD2015 research gathers and analyses data on premature death and disability from 249 diseases (including 164 NCDs) and injuries in 195 countries, by sex and age. The outcomes included in GBD2015 are grouped into four levels. For example, Major Depressive Disorder: Level 1- Non-communicable diseases, Level 2- Mental and substance use disorders, Level 3- Depressive disorders, Level 4- Major Depressive disorder. For this project, we examined Level 3 data with some exceptions. The GBD2015 study measures the burden of disease in Disability-adjusted Life Years (DALYs). DALYs are described as the sum of years lost due to premature death (YLLs) and years lived with disability (YLDs). DALYs are also defined as 'years of healthy life lost'.

GBD2015 has age-specific data available in several age groupings; to elicit the most detail from the data we examined the following groups: 0-6 days; 7-27 days; 28-364 days; 1-4 years; 5-9 years; 10-14 years; 15-19 years; 20-24 years; 25-29 years; 30-34 years; 35-39 years; 40-44 years; 45-49 years; 50-54 years; 55-59 years; 60-64 years; 65-69 years; 70-74 years; 75-79 years; 80+ years.

Ranking the data

For each sex and age grouping we ranked the NCD causes by DALY rate. We initially examined the DALY rate for those outcomes classified in GBD2015 as Non-communicable disease. The exception to this rule is Intentional self-harm. In the GBD2015 study intentional self-harm is grouped under the level 1 category of 'Injury'. For the purpose of this reporting framework we grouped intentional self-harm under mental disorders. Globally, self-harm and suicide comprises a significant proportion of the burden of disease, specifically for 15-39 year-olds [21]. In Indonesia, for both genders; self-harm, falls and road injuries are the only three causes classified as Injury which fall into the top twenty for 15-49 year olds. Given the strong link between self-harm, suicide, mental ill-health and poor psycho-social outcomes we have chosen to include it in our framework under mental disorders [22, 23].

Those causes with the highest rate within the group were ranked 1. For example, for Indonesian males aged 5-9years the NCD cause with the highest observed DALY rate is Skin diseases with 705.13 DALYs per 100,000. At this point we also calculated, for each sex and age grouping, the proportion of total DALYs attributed to each cause from the total number of DALYs attributable to non-communicable diseases.

We then examined the proportion of NCD burden (by age and sex) that the top ten causes accounted for. Table 1.0 shows that those causes that we have included in our framework account for over 50% of the NCD burden across age and sex.

Table 1.0. Proportion of NCD burden accounted for in the top ten causes by age and sex.

GBD age groupings	Indonesia	
	Female	Male
0-6 days (early neonatal)	99.9%	99.9%
7-27 days (late neonatal)	99.5%	99.3%
28-364 days (post neonatal)	95.0%	90.2%
1-4 years	84.6%	79.5%
5-9 years	76.2%	76.7%
10-14 years	69.8%	68.1%
15-19 years	63.1%	54.4%
20-24 years	57.7%	48.3%
25-29 years	56.1%	49.0%
30-34 years	55.2%	54.3%
35-39 years	56.6%	57.3%
40-44 years	58.7%	61.2%
45-49 years	62.2%	64.6%
50-54 years	63.5%	66.6%
55-59 years	65.1%	68.0%
60-64 years	67.0%	69.1%
65-69 years	69.0%	70.4%
70-74 years	70.9%	71.9%
75-79 years	73.0%	73.2%
80+ years	76.6%	75.9%

Defining the age bands for the framework

While the burden and specific types of NCDs change remarkably across the life-course (particularly in early to mid-life), there are also periods such as later life where the main NCDs change little. We sought to define age-bands that reflected this pattern. When we examined the Global Burden of Diseases Study (2015) data by age, similarities emerged in the profile of burden of disease between age groupings. Where there was significant overlap in the important causes of disease burden we combined the age groups together to ensure the framework was not overly repetitive. For example, when we report against age 25-39 years this includes the GBD2015 age groupings 25-29 years, 30-34 years, and 35-39 years. Across the three age groups there are 15 individual causes included on the framework for age 25-39 years (2 female only, 3 male only and 10 shared causes).

We have purposefully given space within the framework for detail to emerge on the rapid transition of life from infancy through to the end of adolescence. The variability in the top ten NCD outcomes over this period was striking. This made retaining the early years of the life-course in smaller, more refined age groups, a logical choice.

Table 1.1. Selected age groupings.

GBD age groupings	Current framework age groupings
Early Neonatal (<=7 days)	<1yr
Late Neonatal (8-28 days)	
Post Neonatal (29-365 days)	
01 to 04	01 to 04
05 to 09	05 to 09
10 to 14	10 to 14
15 to 19	15 to 19
20 to 24	20 to 24
25 to 29	25 to 39
30 to 34	
35 to 39	
40 to 44	40 to 59
45 to 49	
50 to 54	
55 to 59	
60 to 64	60+
65 to 69	
70 to 74	
75 to 79	
80+	

Government policy and strategic priorities

Policies and frameworks were examined to establish which NCD outcomes and risk factors are of priority to the Indonesian government.

Strategic Plan of the Ministry of Health 2015 to 2019

The Ministry of Health's (MOH) Strategic plan for 2015-2019 lays out 12 strategic targets to achieve by 2019. There was only 1 strategic target, and a few indicators that specifically linked to a NCD outcome or risk factor. However, we should acknowledge that there were many targets, relating to the improvement of: access to health services, access to pharmaceuticals and devices, human resourcing, health research, and, the integrated health information system. All of these could potentially impact on the outcomes, risks and determinants of NCD. Specific targets relating to NCDs have been included in our framework.

Indonesian Action Plan for NCD (version 2)

The Indonesian government's Directorate of NCD produces the Action Plan for NCD (the 'action plan') which identifies and reports on several NCD outcomes such as cerebrovascular disease, cardiovascular disease, diabetes mellitus, hypertension and chronic lung disease. Those outcomes described in the 'action plan' were mapped on our framework.

Community Based Intervention on Non-Communicable Disease (Posbindu screening program)

The Posbindu PTM prioritises screening and prevention of NCD risk factors in Indonesia. The Posbindu prioritises the measurement of: body mass index (BMI), blood pressure, cholesterol, blood glucose, and physical activity in adolescents and adults aged 15 and up. These risk factors were mapped on our framework.

Non-government frameworks

WHO Global Action Plan for the Prevention and Control of Non-Communicable Diseases 2013-2020

In 2013 the WHO launched the Global Action Plan for the Prevention and Control of Non-Communicable Diseases 2013-2020 [1]. The action plan sets out six objectives, nine voluntary global targets and 25 indicators to measure progress against the targets. The overall vision and goal of the action plan is to reduce the preventable and avoidable burden of morbidity, mortality and disability due to non-communicable diseases. The WHO targets and indicators relating to NCD risks, outcomes, and determinants were mapped onto our framework.

South East Asia Region WHO Global Action Plan for the Prevention and Control of Non-Communicable Diseases 2013-2020

The SEA WHO NCD Action Plan provided a roadmap for regional and national actions for developing and implementing policies and programs to reduce the burden of NCDs within the region. While taking specific regional issues into account, it is coherent with the major global strategies for prevention and control of NCDs which has ten targets. In terms of NCD outcome, the action plan targeted four major NCDs cardiovascular diseases, cancers, diabetes, or chronic respiratory diseases. The common risk factors that are focused on include tobacco control, physical activities, salt intake, obesity, blood pressure. This policy is also aimed at reducing inequalities in NCD burden due to social determinants such as education, gender, socioeconomic status, ethnicity and migrant status. The WHO SEA action plan describes a life-course approach to prevention and control of NCDs, starting with maternal health, infant, children, adolescents and youth, and ageing population.

State of Health Inequality in Indonesia report (SOHII)

The SOHII report is a collaboration between WHO and the Indonesian MoH and covers eleven health indictors. In order to show the inequality, each of the indicators was presented and disaggregated by several dimensions, such as socio-economic status, educational status, place of residence - urban-rural and provinces. The report indicated that health inequalities exist to a various extent across dimensions, such as economic status, education, occupation, employment status, age, sex, place of residence and provinces.

Stakeholder Consultation

Our stakeholder group is comprised of researchers, policy makers, health care providers and community members, all aged 18 years and over, and all formally consenting to participate. The stakeholders provided input into the completeness of the reporting framework, advice on data availability and quality, interpretation of data and policy recommendations.

Key findings: The reporting framework

Below we have plotted the preliminary reporting framework for NCD. As described in the method above, the reporting framework has 3 main parts: Outcomes, Risk Factors and Determinants.

NCD Outcomes:

In the NCD outcomes section we have plotted disease/ health condition outcomes across relevant age groups. The source is noted (please see legend below). Colour coding is used to identify if an

outcome is relevant to both sexes (green), males only (yellow) and females only (orange). Sometimes different data sources/ frameworks identified different sexes as priorities within an age group. In these cases, we have marked with a small 'f' or 'm' next to the relevant acronym. E.g. GBD_f would refer to the Global Burden of Disease study identifying females as a priority in this age group. The 'Brief Rationale' column gives a short overview of which ages and sexes have been prioritised, and (where necessary) sometimes identifies a specific outcome where a disease group has been listed.

NCD Risk Factors:

In the NCD Risk Factors (RF) section we have plotted the identified RF across relevant age groups. The source is noted (please see legend below). Initial analysis of the most relevant RF for males and females identified that the top ten risk factors were the same across males and females. The 'Brief Rationale' for this section therefore relates to the type of NCD outcome that the RF is attributable to. The rationale for inclusion is based on the attributable risk to the top NCD outcomes rather than the age groupings or gender affected.

NCD Determinants:

In the NCD Determinants section we have proposed the use of the framework described in the Commission on Social Determinants of Health (CSDH) as a part of a surveillance system for health equity [20]. Overall social determinants of health were very poorly defined or used in the policies and frameworks we analysed for the purpose of building this framework. Sometimes determinants were identified but were defined as risk factors or outcomes, or not included at all. Hence, we have integrated the existing CSDH framework which covers the key categories relevant for measuring the determinants of health, into our NCD Determinants section.

Box A. Reporting Framework Legend

Key Acronyms:
GBD = Global Burden of Disease study 2015
PTM = Indonesian National Action Plan on Non-Communicable Disease - Version 2
CBI = Community Based Intervention on Non-Communicable Disease (Posbindu screening program)
RENSTRA = Strategic Plan of the Ministry of Health 2015 to 2019
WHO = World Health Organisation Global Action Plan for the Prevention and Control of Non-Communicable Disease
WHOSEA= Action Plan for the Prevention and Control of Non-Communicable Disease in South East Asia
SOHII = The State of Health Inequality in Indonesia report (WHO and MoH collaboration)
AG = Advisory Group

Sex Differences:
Colour coding: when sex varies between age groups: orange for females, yellow for males, green for both. In some cases, sex varies within age groups, and between priority areas/ data sources: (m) denotes priority for males and (f) for females.

The 'Brief Rationale' column gives a short overview of which ages and sexes have been prioritised, and (where necessary) sometimes identifies a specific outcome where a disease group has been listed.

Table 1.2. NCD Outcomes

	<1y	1-4	5-9	10-14	15-19	20-24	25-39	40-59	60y+	Brief Rationale
Neoplasms	PTM, WHOSEA	PTM, WHOSEA	PTM, WHOSEA	PTM, WHOSEA	PTM, CBI, WHOSEA	PTM, CBI, WHOSEA	PTM, CBI, WHO, WHOSEA	PTM, CBI, WHO, WHOSEA	PTM, CBI, WHO, WHOSEA	PTM: all cancer, all ages, WHO*: age 30-70yrs, WHO SEA*: all ages, CBI: age 15+
Breast cancer					CBI	CBI	GBD, PTM, CBI, RENSTRA	GBD, PTM, CBI, RENSTRA	CBI	GBD: top 10 age 35-59, PTM: age 30-50, CBI: age 15+, RENSTRA: age 30-50
Cervical cancer					CBI	CBI	PTM, CBI, RENSTRA WHO, A	PTM, CBI, RENSTRA WHO, A	CBI, AG	AG: age 35-69, WHO: age 30-49, PTM: age 30-50, CBI: age 15+, RENSTRA: age 30-50
Colorectal Cancer							CBI	CBI	CBI	CBI: age 35+
Leukaemia	GBD	GBD	GBD	GBDm	CBI	CBI	CBI	CBI		GBD: top 10 post neonatal - age 9 (f), age 14 (m), CBI: age 15-59
Tracheal, bronchus and lung cancer					CBI	CBI	CBI	CBI, AG	CBI, AG	AG: relevant ages 50+ selected by examining GBD data, CBI: age 15+
Retinoblastoma					CBI	CBI	CBI	CBI	CBI	CBI: age 15+
Prostate cancer									GBD	GBD: top 10 age 75-80+,
Cardiovascular diseases	WHOSEA	WHOSEA	WHOSEA	WHOSEA	WHOSEA	WHOSEA	WHO, WHOSEA	WHO, WHOSEA	WHO, WHOSEA	WHO*: All CVD priority for 30-70yrs, WHO SEA*: all ages
Cerebrovascular disease	GBD, PTM	PTM	PTM	PTM	PTM	GBDm, PTM	GBD, PTM, CBI	GBD, PTM, CBI	GBD, PTM, CBI	GBD: top 10 early, late & post-natal, and age 20-80+ (m) 25-80+ (f), PTM: All ages, CBI: age 35+
Hypertensive heart disease									GBD	GBD: top 10 women age 65-80+
Ischemic heart disease					PTM,	PTM,	GBD, PTM, CBI	GBD, PTM, CBI	GBD, PTM, CBI	GBD: top 10 age 25-80+, PTM: Age 15+, CBI: age 35+

		<1y	1-4	5-9	10-14	15-19	20-24	25-39	40-59	60y+	Brief Rationale
Chronic respiratory diseases		WHOSEA	WHOSEA	WHOSEA	WHOSEA	WHOSEA	WHOSEA	WHO, WHOSEA,	WHO, WHOSEA,	WHO, WHOSEA,	WHO*: All CRD priority for age 30-70, WHO SEA*: all ages
	Asthma	PTM	GBD, PTM	GBD, PTM	GBD, PTM	GBD, PTM, CBI	GBDm, PTM, CBI	GBDm, PTM, CBI	GBD, PTM, CBI	GBD, PTM, CBI	GBD: top 10 age 1-19(f) 1- 29(m) and 50-80+ (both), PTM: all ages, CBI: age 15+
	Chronic obstructive pulmonary disease	GBD						PTM, CBI	GBDm, PTM, CBI	GBD, PTM, CBI	GBD: top 10 post neonatal and age 45-80+ (m), 55 -80+ (f), PTM: age 30+, CBI: age 35+
Cirrhosis											
	Cirrhosis & oath chronic liver diseases		GBD			PTM	PTM	GBDm, PTM	GBDm, PTM	PTM	GBD: top 10 age 1-4, age 35-55, PTM*: Chronic Liver Disease, no age specified
Neurological disorders											
	Alzheimer disease & other dementias									GBD	GBD: top 10 age 70-80+
	Epilepsy	GBD	GBD	GBD							GBD: top 10 early, late & post neonatal - age 9
	Migraine			GBD	GBD	GBD	GBD	GBD	GBD		GBD: top 10 age 5-49 (f), 10-34 (m)
Mental and substance use disorders		AG	AG	AG	AG	SOHII, AG	SOHII, AG	SOHII, AG	SOHII, AG	SOHII, AG	SOHII: age 15+, AG: all ages
	Anxiety disorders			GBD	GBD	GBD	GBD	GBD			GBD: top 10 age 5-19 (m), 5-34 (f)
	Autism spectrum disorders		GBD	GBD	GBD						GBD: top 10 age 1-14
	Bipolar						GBD				GBD: top 10 age 20-24
	Conduct disorder			GBD	GBD	GBD					GBD: top 10 age 5-19
	Depressive disorders				GBD	GBD	GBD	GBD	GBD	GBD	GBD: top 10 age 10-64(f), 15-54(m)
	Other mental & substance use disorders						GBD				GBD: top 10 age 20-24
	Schizophrenia							GBD			GBD: top 10 age 25-29(f), 30-34(m)
	Self-harm						GBD	GBD			GBD: top 10 all-cause DALY rank age 20-25

		<1y	1-4	5-9	10-14	15-19	20-24	25-39	40-59	60y+	Brief Rationale
Diabetes, urogenital, blood, and endocrine diseases											
	Chronic kidney disease	GBD, PTM	GBD, PTM	PTM	PTM	PTM	GBD, PTM	GBD, PTM, CBI	GBD, PTM, CBI	GBD, PTM, CBI	GBD: top 10 post neonatal - age 4 (m), 20-80+ (m), age 24-29 (f) and age 45-80+ (f), PTM: all ages, CBI: age 35+
	Diabetes mellitus	AG, GBDf, WHOSEA	AG, WHOSEA	AG, WHOSEA	AG, WHOSEA	PTM, WHO, AG, WHOSEA, SOHII	PTM, WHO, WHOSEA, AG, SOHII,	GBD, PTM, CBI WHO, WHOSEA, AG, SOHII	GBD, PTM, CBI WHO, WHOSEA, AG, SOHII	GBD, PTM, CBI WHO, WHOSEA, AG, SOHII	GBD: top 10 early & late neonatal (f) and age 25-80+, PTM: age 15+, WHO: age 18+, WHO SEA*: all ages, SOHII: age 15+, CBI: age 35+
	Endocrine, metabolic, blood, and immune disorders	GBD	GBD								GBD: top 10 early neonatal (both)- age 4 (m)
	>> Thyroid disorders					CBI	CBI	CBI	CBI	CBI	CBI: age 15+
	Hemoglobinopathies and haemolytic anemias	GBD	GBD	GBD	GBD						GBD: top 10 early neonatal - age 14
	Hemoglobinopathies and haemolytic anemias >> Thalassemia					CBI	CBI				CBI: age 15-24
	Urinary diseases and male infertility	GBD									GBD: top 10 early & late neonatal
Diabetic complications											
	Diabetic Retinopathy	AG	AG	AG	AG	AG	AG	AG	AG	AG	AG: age not specified
	Peripheral Vascular disease	AG	AG	AG	AG	AG	AG	AG	AG	AG	AG: age not specified

	<1y	1-4	5-9	10-14	15-19	20-24	25-39	40-59	60y+	Brief Rationale
Musculoskeletal disorders										
Low back & neck pain				GBD	GBD	GBD	GBD	GBD	GBD	GBD: top 10 age 10-80+ (f), 15-80+ (m)
Osteoporosis							CBI	CBI	CBI	CBI: age 35+
Rheumatoid arthritis							CBI	CBI	CBI	CBI: age 35+
Other Musculoskeletal					GBD	GBD	GBD	GBD	GBD	GBD: top 10 age 15-69 (m), 15-79(f)
Other non-communicable diseases										
Congenital birth defects	GBD	GBD	GBD	GBD	GBD					GBD: top 10 early neonatal - age 19
Sense organ disease >> Other hearing loss		GBD	GBD	GBD	GBD	GBD	GBD	GBD, CBI	GBD, CBI	GBD: top 10 age 1-80+, CBI: age 40+
Sense organ disease >> Other vision loss							CBI	CBI	CBI	CBI: age 35+
Sense organ disease >> Cataracts							CBI	PTM, CBI	PTM, CBI	PTM: age 40+, CBI: age 35+
Skin diseases >>Acne vulgaris				GBD	GBD	GBD				GBD: top 10 age 10-19 (m) 10-24 (f)
Skin diseases >>Dermatitis		GBD	GBD							GBD: top 10 age 1-9
Skin diseases >>Urticaria		GBD								GBD: top 10 age 1-4
Sudden infant death syndrome (SIDS)	GBD									GBD: top 10 late & post neonatal

Table 1.3. NCD Risk Factors

Top Risk Factors for NCDs in Males & Females										
	<1y	1-4	5-9	10-14	15-19	20-24	25-39	40-59	60y+	
Air pollution (ambient particulate matter & household air pollution)	GBD, AG, WHOSEA	AG, WHOSEA	AG, WHOSEA	AG, WHOSEA	AG, WHOSEA	AG, WHOSEA	AG, WHOSEA	GBD, AG, WHOSEA	GBD, AG, WHOSEA	Attributable RF for Neoplasms; CVD; Chronic respiratory diseases; and Other non-communicable diseases.
Low physical activity				GBD, PTM, WHO	GBD, PTM, CBI WHO, WHOSEA	GBD, PTM, CBI WHO, WHOSEA	GBD, PTM, CBI WHO, WHOSEA	GBD, PTM, CBI WHO, WHOSEA	GBD, PTM, CBI WHO, WHOSEA	Attributable RF for Neoplasms; CVD; and Diabetes, urogenital, blood, & endocrine diseases.
Occupational risks (ergonomic, particulates, noise, asthmagens, carcinogens & injury)					GBD	GBD	GBD	GBD	GBD	Attributable RF for Neoplasms; Chronic respiratory diseases; Musculoskeletal disorders; and Other non-communicable diseases.
Impaired kidney function						GBD	GBD	GBD	GBD	Attributable RF for CVD and Diabetes, urogenital, blood, & endocrine diseases.
Alcohol use			AG, WHOSEA	GBD, WHOSEA	GBD, PTM, CBI WHO, WHOSEA	GBD, PTM, CBI WHO, WHOSEA	GBD, PTM, CBI WHO, WHOSEA	GBD, PTM, CBI WHO, WHOSEA	GBD, PTM, CBI WHO, WHOSEA	Attributable RF for Neoplasms; CVD; Cirrhosis; Mental & substance use disorders; and Self harm.
Drug use				GBD	GBD	GBD	GBD	GBD	GBD	
Unsafe sex (related to cervical cancer)					AG	AG	AG	AG	AG	Attributable RF for Neoplasms.
Sexual abuse & violence (childhood sexual abuse & intimate partner violence)		GBD	GBD	GBD	GBD	GBD	GBD	GBD	GBD	Attributable RF for Mental & substance use disorders; and Self harm.
Other environmental (lead & radon exposure)							GBD	GBD	GBD	Attributable RF for Neoplasms, CVD, Mental & substance use disorders, Diabetes, urogenital, blood, & endocrine diseases.

Top Risk Factors for NCDs in Males & Females										
	<1y	1-4	5-9	10-14	15-19	20-24	25-39	40-59	60y+	
Dietary Risks	CBI, WHOSEA	GBD, PTM, WHOSEA	GBD, PTM, WHOSEA	GBD, PTM, WHOSEA, SOHII	GBD, PTM, CBI, WHO, WHOSEA, SOHII	GBD, PTM, CBI, WHO, WHOSEA, SOHII	GBD, PTM, CBI, WHO, WHOSEA, SOHII	GBD, PTM, CBI, WHO, WHOSEA, SOHII	GBD, PTM, CBI, WHO, WHOSEA, SOHII	Attributable RF for Neoplasms; CVD; and Diabetes, urogenital, blood, & endocrine diseases.
High total cholesterol					GBD, CBI, WHO	GBD, CBI, WHO	GBD, CBI, WHO	GBD, CBI, WHO	GBD, CBI, WHO	Attributable RF for CVD
High blood pressure					GBD, PTM, CBI, RENSTRA, WHO, WHOSEA, SOHII	GBD, PTM, CBI, RENSTRA, WHO, WHOSEA, SOHII	GBD, PTM, CBI, RENSTRA, WHO, WHOSEA, SOHII	GBD, PTM, CBI, RENSTRA, WHO, WHOSEA, SOHII	GBD, PTM, CBI, RENSTRA, WHO, WHOSEA, SOHII	Attributable RF for CVD and Diabetes, urogenital, blood, & endocrine diseases.
Tobacco (smoking)	GBD, PTM, RENSTRA	GBD, PTM, RENSTRA	GBD, PTM, RENSTRA	GBD, PTM, RENSTRA, WHO, SOHII	GBD, PTM, CBI, RENSTRA, WHO, WHOSEA, SOHII	GBD, PTM, CBI, WHO, WHOSEA, SOHII	GBD, PTM, CBI WHO, WHOSEA, SOHII	GBD, PTM, CBI WHO, WHOSEA, SOHII	GBD, PTM, CBI WHO, WHOSEA, SOHII	Attributable RF for Neoplasms, CVD, Chronic respiratory diseases, Diabetes, urogenital, blood, & endocrine diseases, & Other non-communicable diseases.
High blood sugar			AG	AG	GBD, CBI, WHO	GBD, CBI, WHO	GBD, CBI, WHO	GBD, CBI, WHO	GBD, CBI, WHO	Attributable RF for CVD and Diabetes, urogenital, blood, & endocrine diseases.
Obesity> High body-mass index & Central obesity			GBD, WHOSEA	GBD, WHO, WHOSEA	GBD, PTM, CBI, WHO, WHOSEA	GBD, PTM, CBI, RENSTRA, WHO, WHOSEA	GBD, PTM, CBI, RENSTRA, WHO, WHOSEA	GBD, PTM, CBI, RENSTRA, WHO, WHOSEA	GBD, PTM, CBI, RENSTRA, WHO, WHOSEA	Attributable RF for Neoplasms; CVD; Diabetes, urogenital, blood, & endocrine diseases; and Musculoskeletal disorders

Social determinants of health

Data collection, collation and analysis of the social determinants of health is a crucial part of any national health surveillance system. The framework below was proposed in the Commission on Social Determinants of Health (CSDH) as a part of a surveillance system for health equity [20]. The determinants were identified in the CSDH report and cover the key categories relevant for adequately measuring the determinants of health; including several aimed at monitoring beyond the health-sector. This framework provides a strong basis from which to define indicators for social determinants for NCD.

Table 1.4. Social Determinants of NCDs

The Social Determinants for NCDs in Males & Females			
Daily living conditions.	**Health behaviours:**	Smoking	Already covered by the risk factors outlined above.
		Alcohol	
		Physical activity	
		Diet and nutrition	
	Physical and social environment:	Water and sanitation	
		Housing conditions	
		Infrastructure, transport, and urban design	
		Air quality	
		Social capital	
	Working Conditions:	Material working hazards	
		Stress	
	Health Care:	Coverage	
		Health-care system infrastructure	
	Social protection:	Coverage	
		Generosity	
Structural drivers of health inequity.	**Gender:**	Norms & values	
		Economic participation	
		Sexual & reproductive health	
	Social inequities:	Social exclusion	
		Income and wealth distribution	
		Education	
	Socio-political context:	Civil rights	
		Employment conditions	
		Governance & public spending priorities	
		Macroeconomic conditions	

Section 1 Discussion: A revised reporting framework for Indonesia

- This framework shows how the impact of NCDs across the life-course is varied and multifaceted; however, it also highlights important prospects for prevention and early intervention.
- There is little evidence of NCDs in childhood and adolescence being a priority in Indonesia; in either government or non-government frameworks or policy documents.

- Clear priorities/ focus in frameworks are missing for children and adolescents in: leukaemia, chronic liver disease, mental disorders, epilepsy, migraine, congenital defects, sense organ disorders, SIDS, chronic skin disorders and endocrine, metabolic, blood, and immune disorders (other than diabetes mellitus).
- Clear priorities/ focus in frameworks are missing for adults and older people in: prostate cancer, neurological disorders (migraine and Alzheimer disease and dementia), mental and substance use disorders and some musculoskeletal disorders.

Many of the adult onset cancers are well represented in existing frameworks, such as breast cancer, cervical cancer, and lung cancer. Prostate cancer and leukaemia were notably missing, despite apparent burden. Cardiovascular disease is prioritised for adults and has clear indicators within existing frameworks. Chronic Respiratory diseases, like cancer, generally have clear targets and indicators for adults while children and adolescents are not prioritised or indicators lack specificity around target ages, despite the burden of asthma being significant across the life-course. Likewise, Diabetes has indicators defined for adults across many frameworks, but not for children and adolescents. Given the increasing prevalence of type 2 diabetes and associated risk factors, clear indicators need to be defined and measured across the life-course.

Our framework highlights the importance of mental disorder, in particular, that the there is a significant burden experienced by children and young people, and the most prevalent disorders (anxiety and depression) firmly have their geneses in late childhood and early adolescence. The complete lack of strategic priority linked to mental or substance use disorders, in any of the key NCD frameworks we reviewed, was a significant finding. Given the strong link between chronic mental disorders and chronic physical disorders mental disorders, both should be a part of any coordinated approach to the prevention and treatment of NCDs. Indonesia's Strategic Plan of National Drug control 2015-2019 does prioritise increasing awareness on substance use and data is collected through a household survey. However, the report has an adult focus and categorises age simply as >30 and <=30, which lacks the specificity needed to adequately measure this issue.

Neurological disorders (including dementia) show a lack of clear targets and indicators, there is very limited evidence on the prevalence of dementia in Indonesia. The burden of migraine is also significant, impacting across the life-course from age 5 to 59. Musculoskeletal disorders have some presence in current frameworks, however low back and neck pain (significant from and 10years and up) is not represented.

For Endocrine, metabolic, blood and immune disorders (other than diabetes) GBD 2015 notes a burden for ages 0-4, however the evidence of coverage in an Indonesian NCD framework was for thyroid disorders, screened for in age 15+ at POSBINDU. The burden related to hemoglobinopathies and haemolytic anaemias, and urinary diseases is all experienced in age 14 or younger, and again the only strategic priority for this was screening for/ reporting on thalassemia in age 15+ at POSBINDU. There is a significant burden of hearing loss across the life-course however it is only a priority for the government POSBINDU screening program for people over 40yrs. Similarly, congenital birth defects and chronic skin disorders lack strategic priorities.

Overall, RENSTRA has very little in the way of priorities for non-communicable disease. The WHO action plan and SEA region action plan only focus on cancer, CVD, chronic respiratory and diabetes. The Indonesian action plan on NCD expands on the WHO framework, however there is still a clear lack of priority given to children and adolescents, despite them experiencing a significant burden.

Section 2

Data and indicators to measure NCDs in Indonesia

In this section, we have explored how well our NCD framework can be populated by sound, nationally representative, data. We also consider here the completeness of the data, the quality of the measures and the suitability to the population measured. We then defined indicators to apply to the reporting framework.

Section 2 Contents

- Method: Data sources identified and evaluated to define indicators with which to populate the reporting framework with quality Indonesian data.
- Key Findings: Map of data availability, quality and proposed indicators. The data map (similar to the reporting framework) has 3 main parts: Outcomes, Risk Factors and Determinants.
- Discussion: This section discusses the data sources prioritised in the data map and the proposed indicators.

Method

Available data sources have been identified through reviewing Global Health Data Exchange (ghdx.healthdata.org), a resource that provides a comprehensive catalog of surveys, censuses, vital statistics and other health-related data. Potentially suitable data sources we identified include:

- The Ministry of Health's RISKESDAS;
- The Indonesian Family Life Survey;
- The Indonesian Demographic and Health Survey;
- STEPS survey http://www.who.int/chp/steps/indonesia/en/;
- Global school-based student health survey (GSHS);
- Social survey Susenas - http://www.rand.org/labor/bps/susenas.html.

Each source was examined in detail. In selecting data sources, national data were preferenced over sub-national data sources, given the national focus of this work. Data needed to be easily sourced in a short time frame, and available for research purposes. Therefore we selected data sources that has national, provincial and district coverage and that specifically included NCD in their framework.

NCDs are not routinely reported from health services. Recently, the Indonesian Government introduced POSBINDU *Pos Pembinaan Terpadu untuk Penyakit Tidak Menular* – Integrated post for NCDs. It is a community based initiative for the screening and diagnosis for NCD outcomes and risks within community settings and at Puskesmas. This program, however, are currently largely used by older adults. Young adults and adolescents seem less likely to utilise Posbindu.

The Posbindu data were reported online to a website managed by the NCDs directorate within the Ministry of Health. However, the coverage and completeness of the data reported remained low and it did not give a representative picture of NCDs in the community as a whole. Furthermore, the POSBINDU data is not publicly accessible.

Measures have been taken to improve surveillance around cancer registration, risk factors for NCDs (the POSBINDU initiative), and mortality (Sample Registration System- SRS), however these initiatives are not yet fully implemented across the population. While vital registration in Indonesia is incomplete, RISKESDAS provides the most reliable data on population health, representative to the provincial level. Most importantly, the RISKESDAS results have been preferred as a main source for several NCD policies in the past few years.

Description of the data sources

RISKESDAS 2013:

The Riskesdas used Indonesian block census 2010 as the primary sampling unit (PSU). A total of 12,000 census blocks were selected using *probability proportional to size* (PPS) method. A total of 300,000 households from 12,000 census blocks were selected to obtain a representative sample from district level. Similarly, a total 75,000 households were selected from 3000 census blocks for provincial representation and 25,000 households from 1,000 census blocks were selected for national representation. Urban and rural distribution has been considered in the sampling frame. This national survey included 294,959 households and 1,027,763 household members.

This cross-sectional household survey was designed to be representative at a national and provincial level, with additional sampling of some districts. The survey included specific measure of some NCD outcomes (asthma, chronic lung disease, cancer) and some behavioural risk factors (tobacco smoking and substance use). It additionally included measure of biomarkers on a subsample of respondents, allowing for the assessment of some intermediate health outcomes (such as hypertension or dislipidaemia).

Data Quality

The quality of the data source was also evaluated by population level, measures and method. The method employed was modified from Azzopardi and colleagues and described in Box B below [2]. Once a sound data source and indicator was identified, the search was concluded.

Box B - Method for evaluation of data quality [2]
All data were assessed by population, measure and method. Within data sources there could be variability within these domains, depending on the outcome of interest; assigned a letter, number and colour code.
Population A= National sample from all jurisdictions B= Multiple (but not all) provinces C= Single province or district D= Multiple communities of sites (either within or across provinces or districts) E= Single community or site
Measures 1 = Direct assessment of health condition 2 = Self-report measure of health condition 3 = Parent/ proxy report of health condition
Quality of method Shaded Green - Methodologically sound (Both sample and measure are appropriate) Shaded Yellow - Some Methodological flaws (limited sample OR issues with measure) Shaded Amber - Methodological flaws and limitations (potential limitations with sample AND issues with measure).

Key Findings: Data, availability and proposed indicators.

Table 2.0 *NCD Outcomes*

NCD OUTCOMES: Data Availability, Quality & Proposed Indicators											
	<1	1-4	5-9	10-14	15-19	20-24	25-39	40-59	60+	Data Source	Proposed Indicator
Neoplasms	A2	A2	A2	A2	A2	A2	A2	A2	A2	Riskesdas 2013	Self-reported/ parent reported ever diagnosed all Cancers (population prevalence, in <1-60+)
Breast cancer					A2	A2	A2	A2	A2	Riskesdas 2013	Breast cancer ever diagnosed (population prevalence, in 15-60+)
Cervical cancer					A2	A2	A2	A2	A2	Riskesdas 2013	Cervical cancer ever diagnosed (population prevalence, in 15-60+)
Colorectal Cancer							A2	A2	A2	Riskesdas 2013	Colorectal cancer ever diagnosed (population prevalence, in 25-60+)
Leukaemia	A2	A2	A2	A2	A2	A2	A2	A2		Riskesdas 2013	Leukaemia ever diagnosed (population prevalence, in <1-59)
Tracheal, bronchus and lung cancer					A2	A2	A2	A2	A2	Riskesdas 2013	Tracheal, bronchus and lung cancer ever diagnosed (population prevalence, in 15-60+)
Retinoblastoma	A2	A2	A2	A2	A2	A2	A2	A2	A2	Riskesdas 2013	Retinoblastoma ever diagnosed (population prevalence, in <1-60+) (not prompted)
Prostate cancer									A2	Riskesdas 2013	Prostate cancer ever diagnosed (population prevalence, in 60+)
Cardiovascular diseases	**<1**	**1-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-39**	**40-59**	**60+**	**Data Source**	**Proposed Indicator**
Cerebrovascular disease	A2	A2	A2	A2	A2	A2	A2	A2	A2	Riskesdas 2013	Cerebrovascular disease ever diagnosed (population prevalence, in <1-60+)
Hypertensive heart disease									A2	Riskesdas 2013	Hypertensive heart disease ever diagnosed (population prevalence, in 60+)
Ischemic heart disease					A2	A2	A2	A2	A2	Riskesdas 2013	Ischemic heart disease ever diagnosed (population prevalence, in 15-60+)

Chronic respiratory diseases	**<1**	**1-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-39**	**40-59**	**60+**	**Data Source**	**Proposed Indicator**
Asthma	A2	A2	A2	A2	A2	A2	A2	A2	A2	Riskesdas 2013	Self-report current asthma symptoms, (population prevalence, in <1-60+)
Chronic obstructive pulmonary disease	A2						A2	A2	A2	Riskesdas 2013	Self-report current COPD symptoms, (population prevalence, in <1-60+)

NCD OUTCOMES: Data Availability, Quality & Proposed Indicators											
Cirrhosis	**<1**	**1-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-39**	**40-59**	**60+**	**Data Source**	**Proposed Indicator**
Cirrhosis											Data Gap
Neurological disorders	**<1**	**1-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-39**	**40-59**	**60+**	**Data Source**	**Proposed Indicator**
Alzheimer disease and other dementias											Data Gap
Epilepsy											Data Gap
Migraine											Data Gap
Mental and substance use disorders	**<1**	**1-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-39**	**40-59**	**60+**	**Data Source**	**Proposed Indicator**
					A2	A2	A2	A2	A2	Riskesdas 2013	Self-report symptoms of mental distress, (population prevalence, in 15+)
Anxiety disorders											Data Gap
Autism spectrum disorders											Data Gap
Bipolar											Data Gap
Conduct disorder											Data Gap
Depressive disorders											Data Gap
Other mental and substance use disorders											Data Gap
Schizophrenia											Data Gap
Self-harm						A2	A2			Riskesdas 2013	Self-report injury, where the cause of injury was self-harm or suicide attempt, (population prevalence, in 20-39yrs)

NCD OUTCOMES: Data Availability, Quality & Proposed Indicators											
Diabetes, urogenital, blood, and endocrine diseases	**<1**	**1-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-39**	**40-59**	**60+**	**Data Source**	**Proposed Indicator**
Chronic kidney disease					A2	A2	A2	A2	A2	Riskesdas 2013	Chronic renal failure ever diagnosed (population prevalence, in <1-60+)
Diabetes mellitus					A1/A2	A1/A2	A1/A2	A1/A2	A1/A2	Riskesdas 2013	Self-report Diabetes Mellitus ever diagnosed (population prevalence, in 15-60+) and Direct assessment of DM (biomedical sample) (population prevalence, in 15-60+)
Endocrine, metabolic, blood, and immune disorders											Data Gap
Endocrine, etc. >> Thyroid Disorders					A2	A2	A2	A2	A2	Riskesdas 2013	Self-report thyroid disorder (population prevalence, 15 years+)
Hemoglobinopathaemolytichemolytic anaemias	A1	A1	A1	A1						Riskesdas 2013, direct assessment	Direct assessment, anaemia, (population prevalence, 1-14 years)
Hemoglobinopathies and haemolytic anaemias>> Thalassemia											Data Gap
Urinary diseases and male infertility											Data Gap

NCD OUTCOMES: Data Availability, Quality & Proposed Indicators											
	<1	1-4	5-9	10-14	15-19	20-24	25-39	40-59	60+	Data Source	Proposed Indicator
Musculoskeletal disorders					A2	A2	A2	A2	A2	Riskesdas 2013	Ever diagnosed with joint disease, rheumatism, or gout &/or Current joint pain, inflammation, stiffness and swelling (population prevalence, in 15 years +).
Low back & neck pain											Data Gap
Osteoporosis											Data Gap
Rheumatoid arthritis											Data Gap
Other Musculoskeletal											Data Gap
Other non-communicable diseases	**<1**	**1-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-39**	**40-59**	**60+**	**Data Source**	**Proposed Indicator**
Congenital birth defects											
Sense organ disease >> Other hearing loss			A1	A1	A1	A1	A1	A1	A1	Riskesdas 2013, direct assessment	Moderate to severe hearing loss, as identified in physical examination (population prevalence, in 6 yrs+).
Sense organ disease >> Blindness & Low vision							A1	A1	A1	Riskesdas 2013, direct assessment	Moderate to severe vision loss (blindness), as identified in physical examination (population prevalence, in 25 yrs+). Low vision, as identified in physical examination (population prevalence, in 25 yrs+).
Sense organ disease >> Cataracts							A1	A1	A1	Riskesdas 2013, direct assessment	Physical examination to determine if untreated cataract present (population prevalence, in 25 yrs+).
Skin diseases >>Acne vulgaris											Data Gap
Skin diseases >>Dermatitis											Data Gap
Skin diseases >>Urticaria											Data Gap
Sudden infant death syndrome											Data Gap

Table 2.1. *NCD Risk Factors*

NCD RISK FACTORS: Data Availability, Quality & Proposed Indicators.											
Behavioural	**<1**	**1-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-39**	**40-59**	**60+**	**Data Source**	**Proposed Indicator**
Dietary Risks >Consumption of fruit				A2	A2	A2	A2	A2	A2	Riskesdas 2013	Self-report inadequate fruit consumption (population prevalence in ages 10-60+)
>Consumption of veg				A2	A2	A2	A2	A2	A2	Riskesdas 2013	Self-report inadequate veg consumption (population prevalence in ages 10-60+)
>Total energy intake from saturated fatty acids				A2	A2	A2	A2	A2	A2	Riskesdas 2013	Self-report discretionary food intake (population prevalence in ages 10-60+)
>Consumption of carbohydrates				A2	A2	A2	A2	A2	A2	Riskesdas 2013	Self-report carbohydrate intake (population prevalence iphysical0-60+)
Low physical activity				A2	A2	A2	A2	A2	A2	Riskesdas 2013	Self-report physical activity guideline for age group not met (population prevalence, 10-60+)
Tobacco >>Daily smoke status				A2	A2	A2	A2	A2	A2	Riskesdas 2013	Self-report, daily smoke status (population prevalence, in 10 years+)
Tobacco >>Age at commencement				A2	A2	A2	A2	A2	A2	Riskesdas 2013	Self-report age at smoking commencement and Self-report age daily smoking commenced (population prevalence, in 10 years+)
Tobacco >>Second-hand smoke				A2	A2	A2	A2	A2	A2	Riskesdas 2013	Self-report experiencing daily second-hand smoke in the home, in transit or in the work place (population prevalence, in 10 years+)
Tobacco >>Chewing				A2	A2	A2	A2	A2	A2	Riskesdas 2013	Self-report, daily tobacco chewing status (population prevalence, in 10 years+)
Tobacco >>Policy				A2	A2	A2	A2	A2	A2	Riskesdas 2013	Self-report, positive attitude to the "smoke free area" policy (population prevalence, in 10 years+)
Alcohol >>											Self-report drank >=1 alcoholic drink on one or more of the past 30 days (population prevalence in 13-15 years)
Alcohol >> Alcohol consumption per capita											Data Gap
Drug use											Self-report lifetime drug use (population prevalence in 13-15 years)
Unsafe sex >> Sexual initiation <13											Self-report sexual initiation aged <13yrs (population prevalence in 13-15 years)
Unsafe sex >> Sexually active age 16 or less											Self-report ever had sex in the past 12mths (population prevalence in 13-15 years)

NCD RISK FACTORS: Data Availability, Quality & Proposed Indicators.											
Metabolic	**<1**	**1-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-39**	**40-59**	**60+**	**Data Source**	**Proposed Indicator**
High blood pressure					A1	A1	A1	A1	A1	Riskesdas 2013	Measured systolic/diastolic blood pressure equal to or greater than 140/90 mmHg (population prevalence, in 15-60+)
High blood sugar					A1	A1	A1	A1	A1	Riskesdas 2013	Direct assessment, impaired fasting blood glucose, (population prevalence, in 15-60+)
Obesity> High body-mass index					A1	A1	A1	A1	A1	Riskesdas 2013	Measured BMI using age and sex specific cut off points for overweight and obese, population prevalence in 15-60+ years.
Obesity> Central obesity					A1	A1	A1	A1	A1	Riskesdas 2013	Measured Central obesity (waist circumference ≥80 cm in women and ≥90 cm in men), population prevalence in 15-60+ years.
High total cholesterol					A1	A1	A1	A1	A1	Riskesdas 2013	Direct assessment, high total cholesterol, (population prevalence, 15 years +)
Impaired kidney function						A1	A1	A1	A1	Riskesdas 2013	Direct assessment,) (population prevalence, 15 years+)
Environmental	**<1**	**1-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-39**	**40-59**	**60+**	**Data Source**	**Proposed Indicator**
Air pollution											Data Gap
Occupational risks											Data Gap
Other environmental											Data Gap
Other	**<1**	**1-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-39**	**40-59**	**60+**	**Data Source**	**Proposed Indicator**
Sexual abuse & violence >>childhood sexual abuse											Data Gap
Sexual abuse & violence >>intimate partner violence											Data Gap

Table 2.2. Social determinants of Health

For NCD Determinants data we have begun to map some key data that could potentially populate the proposed indicators. Many of the determinants identified relate to structures beyond the health system and investigating these is beyond the scope of this project. However, selected data sources and indicators have been proposed for a selection of Determinants below.

The Social Determinants for NCDs in Males & Females			Potential Data Source	Proposed Indicator
Daily living conditions	Health behaviours:	Smoking	Already covered by the risk factors outlined above.	
		Alcohol		
		Physical activity		
		Diet and nutrition		
	Physical & social environment:	Water and sanitation	National Socio-economic survey (SUSENAS)	Access to clean water and sanitation
		Housing conditions	Demographic and health survey (DHS)	Overcrowding
		Infrastructure, transport, and urban design	Bappenas data repository / Ministry of Transport	Ease of accessing transport when needed
		Air quality	Indonesian Department of Meteorology, Climatology and Geophysics	Air Quality monitoring
		Social capital		Report feeling safe in their community at night
	Working Conditions:	Material working hazards	Basic Health Research (RISKESDAS)	Persons who experienced a work-related injury or illness in past 12mths
		Stress	Bappenas data repository	Self-reported stressful work conditions, Strength of legislation around OH&S for MH
	Health Care:	Coverage	Hospital administrative data, Demographic and health survey (DHS)	Common cancer screening rates, Vaccination rates
		Health-care system infrastructure	Health Facilities Research (Rifaskes)	Access to Puskesmas (primary health care facilities)
	Social protection:	Coverage		Percentage of lower income households in housing distress
		Generosity	National Socio-economic survey (SUSENAS)	Percentage of health care expenditure not financed by private out-of-pocket expenses
Structural drivers of health inequity	Gender:	Norms & values	Bappenas data repository	Beliefs around: Gender ratio of time spent in unpaid work, Gender pay gap
		Economic participation	National Socio-economic survey (SUSENAS)	Labour force participation rate by gender
		Sexual & reproductive health	Demographic and health survey (DHS)/ National	Met need for contraception

			Population and Family Planning Board	
	Social inequities:	Social exclusion		Disconnection with community
		Income and wealth distribution	National Socio-economic survey (SUSENAS)	Average weekly ordinary time earnings for full-time adults
		Education	Ministry of Finance	Education attainment Education funding
	Socio-political context:	Civil rights		Strength of legislation protecting civil rights
		Employment conditions	The National Labor Force Survey (SAKERNAS)	Unemployment rate, Underemployment rate
		Governance & public spending priorities		Percentage of GDP spent on health care
		Macroeconomic conditions		Unemployment rate

Measures of Inequity

Where data is available we will stratify by certain measures of inequity for selected indicators. Sex and socioeconomic status are the measures we will use.

Socio-economic Status (SES)

Differences in socio-economic status will be measured wealth status using assets index – wealth quintile, urban and rural and educational status

In RISKESDAS, household's assets index was used an indicator of living standards as proxy indicator for socioeconomic status (SES). The assets components included type of housing, ownership of house, sources of drinking water, type of latrine, fuel for cooking, electricity, ownership of a fridge, mobile phone, home phone, TV, radio, bicycle, motorcycle, car, and housing ownership. Respondents were grouped by wealth into quintiles, with the first quintile the lowest and the most deprived, followed by the second, the third, the fourth and fifth quintile, with the latter bring the wealthiest group.

Section 2 Discussion: Data and indicators to measure NCD in Indonesia

The first step in accountability is collecting, analysing and evaluating available evidence. The work presented in section one and two, building the reporting framework and mapping (and critically appraising) the available data, will form a part of the first step in increasing accountability on NCD outcomes and risk factors. There are several considerations of note regarding the data sources selected here and the indicators proposed. These strengths and limitations are discussed below.

RISKESDAS prioritised.
In defining indicators for this project, we prioritised data available from national surveys over administrative datasets for many health outcomes and risk factors. This is primarily because these national surveys are designed to measure the health of the population. Furthermore, in the absence of NCD registry and inadequate hospital information system, it is believed that Riskesdas would provide better indicator of prevalence of NCDs data than administrative data. This is particularly true where biomedical samples or anthropometric measurements are taken to confirm diagnosis or presence of risk factors.

In Indonesia, the first national health survey that covered NCD was Riskesdas *(Riset Kesehatan Dasar)*. The first Riskesdas was conducted in 2007 followed by the second Riskesdas in 2010. The most recent Riskesdas data available, was for the survey conducted in 2013. This survey covered several NCD outcomes and their risk factors and can be generalised at district, provincial and national level. The survey has been a major reference since it began, being the first survey that was designed to measure population health in Indonesia. Riskesdas has also largely focussed on five major NCDs. The primary reason for choosing those particular outcomes, and risk factors, to measure in Riskesdas, was that these NCDs were those named as priorities in the WHO NCD action Plan.

Variation in the quality of indicators.
Within Riskesdas measures can vary a great deal. Firstly, they used self-report measures, where respondents were asked whether they had ever been diagnosed by medical doctor with a particular outcome. For instance, for cancer, respondents were asked: “Have you been diagnosed cancer by medical doctor? If so, what type of cancer?”. This approach is appropriate in a household survey as it can be relatively cheap, fast, and easy compared to using anthropometric or biomedical measures. This method can thorough, such as in the extensive dietary recall questions within Riskesdas. However, there may also be limitations in the quality of response elicited, due to bias in respondents recall, lack of knowledge of diagnostic/ screening tests, poorly designed survey instruments, healthy respondent bias, and untruthful responses.
Secondly, they used a several questions to identify symptoms and generated diagnosis from the symptoms reported. The measure of mental disorder for instance, was derived from the response to twenty questions about symptoms. Respondents were categorised as having an emotional disorder when they answered yes to at least six questions, and each of the questions is considered to have an equal weight. Further validation on this measurement is required, if it is to be continued to be used in Riskesdas.
Thirdly, Riskesdas used some anthropometric or biomedical measures. This included measurement of blood pressure, height and weight, blood and urine samples. This final method may be considerably better validity than self-report method for certain NCD outcomes and risks, especially those with few obvious symptoms such as hypertension and diabetes. However, there are barriers to participation due to the burden involved in giving samples, time and costs.

Suitability of measure for children and adolescents.
Riskesdas used self-report for age 15 years and up. However, for several NCDs risk factors such as smoking, poor diet, physical activities and alcohol consumption, respondents age >= 10 were included. Children answered questions directly in some instances, however sometimes a parent proxy was used. Parents may be best proxy informants of childhood illness and some behavioural or physical symptoms. However, this method is problematic and calls into question the sensitivity of the survey for capturing health risk behaviours such as smoking and alcohol use, but even for less-sensitive daily recall questions such as those relating to physical activity and dietary intake, or less visible symptoms such as mental disorder, or neck and back pain.

Given the important risk factors and outcomes pertinent to children and adolescents (such as tobacco uptake, substance use, overweight, anxiety and depression) are impacted by perceived stigma and potential parental repercussions, it is vital that respondents can answer questions confidentially. There is a need to extend current data collection systems to include a confidential self-report survey which is administered directly to children and young people, perhaps by expanding the scope of the current Basic Health Survey to include better items for children and young people and improved methodology specific to this age group.

Data gaps.
Many NCD outcomes and risk factors do not have nationally representative data available, hence no indicator has been defined. Other data gaps identified are not a complete lack of data but of questionable quality, such as old data, missing data for certain age groups, or the measure used suspected to be less reliable in certain age groups.
One of the key aims of this study was to recognise key data gaps, to identify priorities for future research. Data gaps exist for outcomes such as Chronic liver disease, Neurological disorders, Mental disorder and self-harm, Congenital birth defects, Skin diseases, Sudden infant death syndrome; and risk factors such as Alcohol and drug use, Unsafe sex, Sexual abuse and Intimate partner violence. Other measures are included, but sub-optimal in measurement quality, such as measures for Mental disorders, Cancer, and Cardiovascular disease.

Summary.
Indonesia's population surveys provide a good foundation of public health data. The key public health survey, Riskesdas, is currently the main source of representative data on NCDs for the archipelago. Administrative data sets and disease registries still have improvements that need to be made before they contribute in a significant way to measuring the key indicators for NCD.
Furthermore, the available data has certain limitations, outlined above, which mean indicators need to be interpreted with care. There are also data gaps across outcomes and age groups which identify future research priorities, such as the lack of quality data available for Mental disorders. For the purposes of this study there is sufficient data to begin to describe the profile of NCD for Indonesia, with respect to the common risks and outcomes experienced across the life-course.

Section 3

An Updated NCD Profile for Indonesia

In this section, we have analysed the data sources identified in Section 2. Where possible we have reported on the indicator proposed in the data map.

Section 3 Contents

- Method: Data sources identified in Section 2 were analysed and presented in tables and bar graphs.
- Key Findings: Data visualisations, with disaggregation by age and sex are presented here. Selected data are disaggregated by SES quintile, and geographical location are also presented here. The profile has 2 main parts: Outcomes and Risk Factors. Data tables can be found in the appendix.
- Discussion: This section discusses the profile of NCD in Indonesia and key limitations to the data analysis.

Method

Access to the Riskesdas survey data was applied for via the Indonesian National Institute of Heath Research and Development (NIHRD). When calculating prevalence estimates we adjusted for survey design and weighted the data to be nationally representative. Estimates were disaggregated by age (using age bands defined earlier), sex (male and female), socio-economic status (household assets index quintiles) and for selected measures- by province. We analysed the data using Stata statistical software, release 14. We then visualized the data using Microsoft Excel version 15. Data tables are available in the appendix.

Key Findings: Profile of NCD for Indonesia

The figures and a brief analysis is provided below, grouped by disease grouping and risk factor type.

NCD Outcomes

Chronic respiratory diseases and Neoplasms

Figure 3.1 shows that in Indonesia, Asthma prevalence was much higher among females than males in all age group except age over 60 years old. In Riskesdas, asthma and chronic obstructive pulmonary disease (COPD) were identified with a series of self-report symptoms, such as difficulty breathing. The prevalence of asthma was higher among adolescent and young adults. COPD was found to be much higher among males age over 60. Cancer (all types of cancer) was higher among females, and the prevalence increases with age (Figure 3.1). The prevalence of Asthma and COPD in all age group decreases as wealth index increases. In contrast, the prevalence of cancer increases as wealth index increases (Figure 3.2). Cancer was defined by self-reported from respondents whether they have been diagnosed with cancer by health workers.

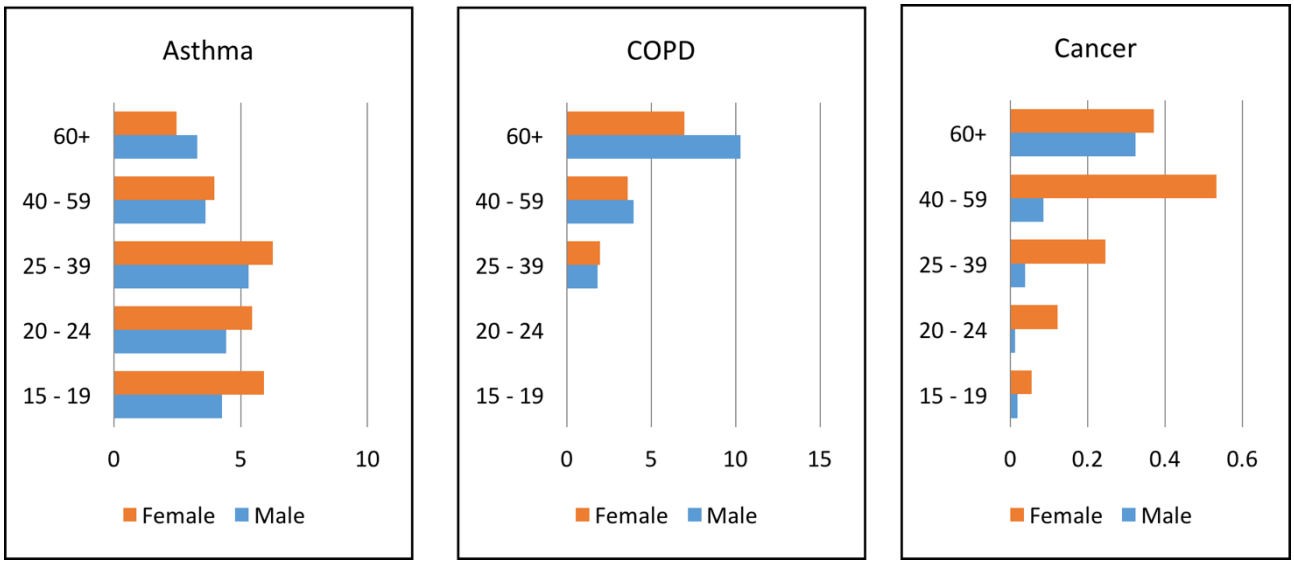


Figure 3.1. Prevalence of Asthma, COPD and Cancer by Age and Sex.

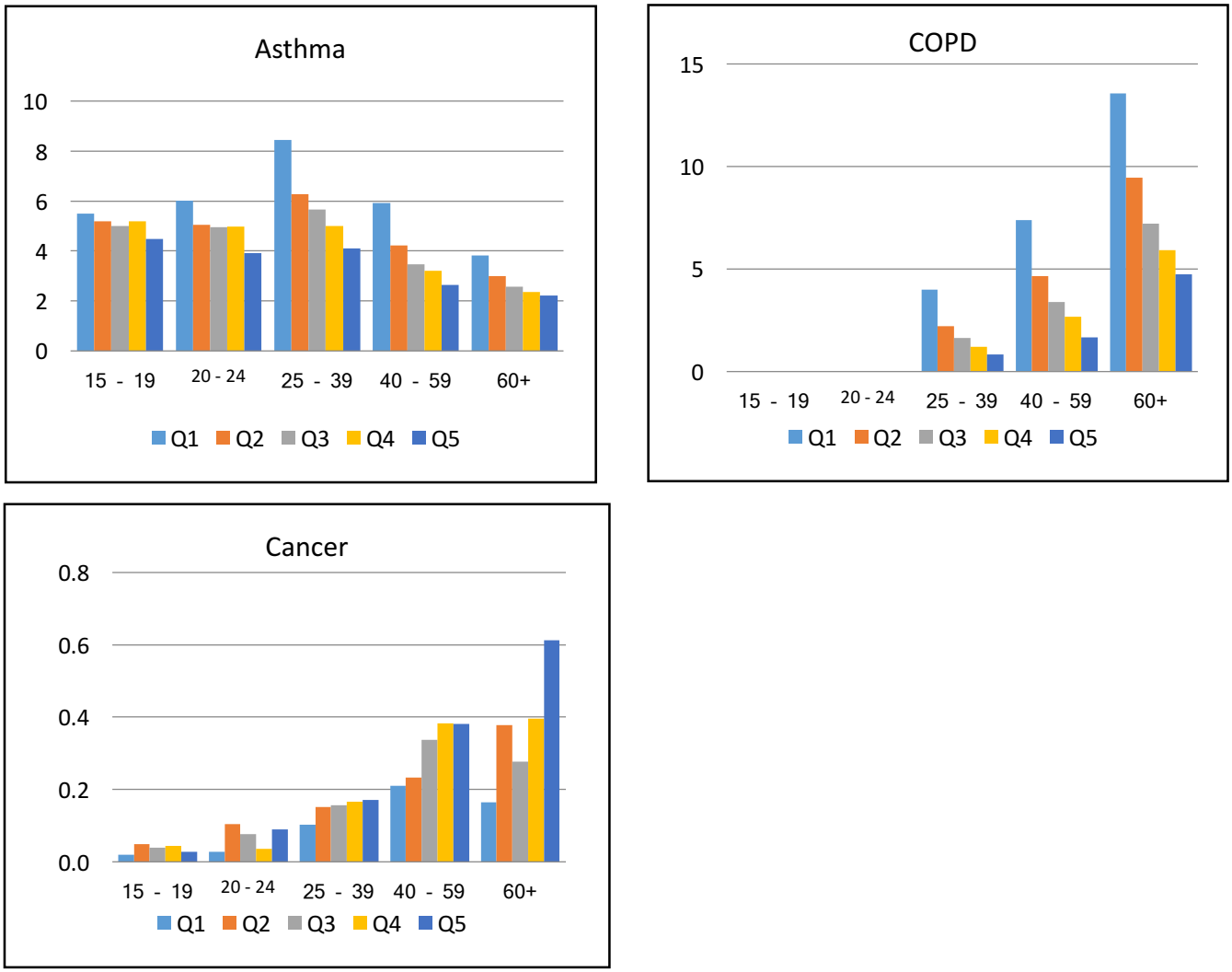


Figure 3.2. Prevalence of Asthma, COPD and Cancer by Age and Quintile

Cardiovascular diseases and Chronic Renal Failure.

Figure 3.3 shows the prevalence of CHD gradually increases with age between 15 years and 59 years, however the age 60+ group has double the prevalence of the 40-59 group. Stroke has a very similar pattern however the increase in prevalence for the 60+ age group is even greater. Chronic renal failure has a gradual increase with age, with males being more affected from age 25 onward.

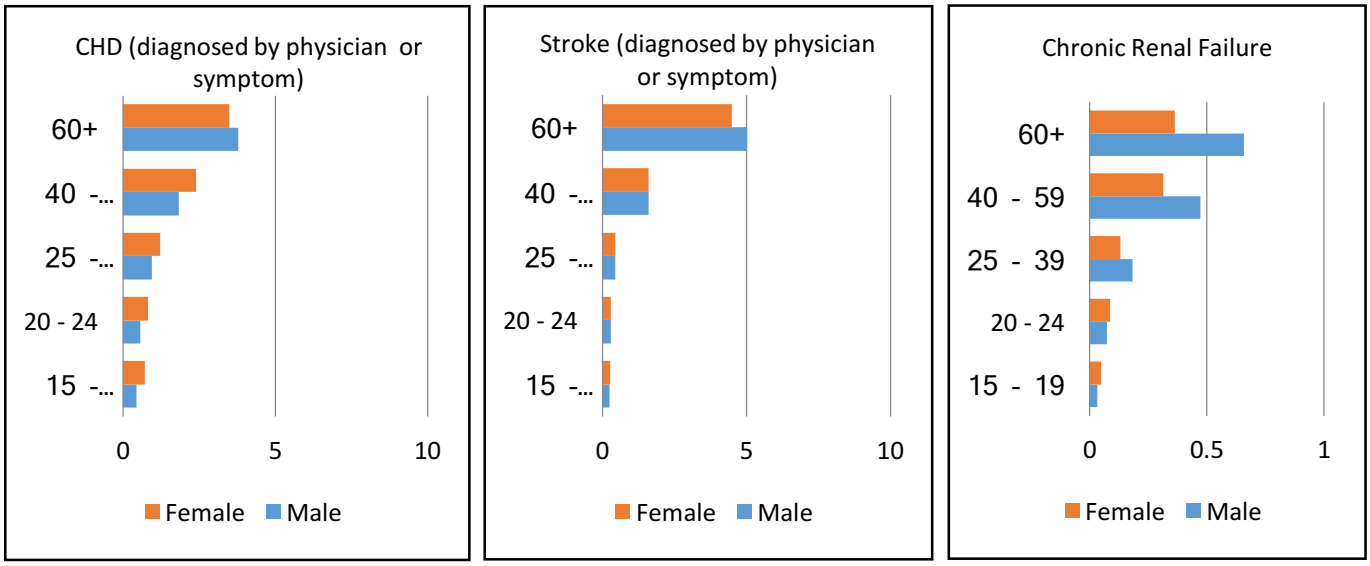


Figure 3.3. Prevalence of Chronic Heart Disease, Stroke, and Chronic Renal Failure by Age and Sex.

Diabetes and Hyperthyroidism.

Figure 3.4 shows the prevalence of diabetes either diagnosed by a health workers &/or based on symptoms increased greatly from age 40. The prevalence increases as wealth increases from age 40+, however, in the younger age ranges there does appear to be a trend indicating the opposite, with the lower quintiles reporting higher prevalence (figure 3.5).

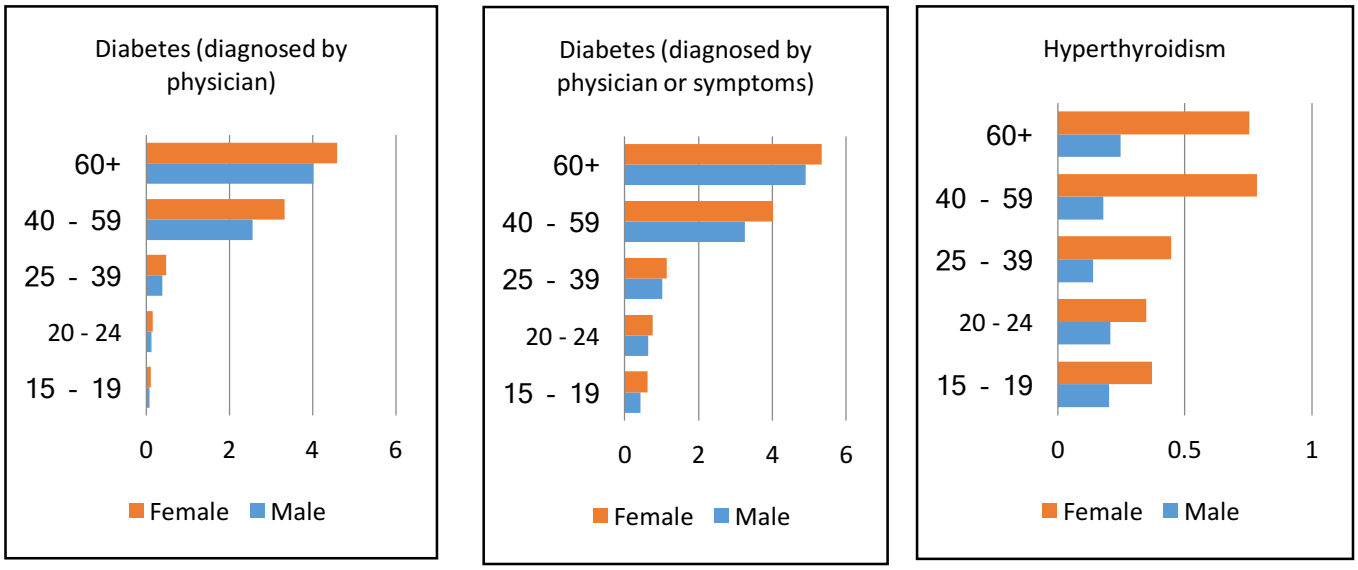


Figure 3.4. Prevalence of Diabetes Mellitus, and Hyperthyroidism by Age and Sex

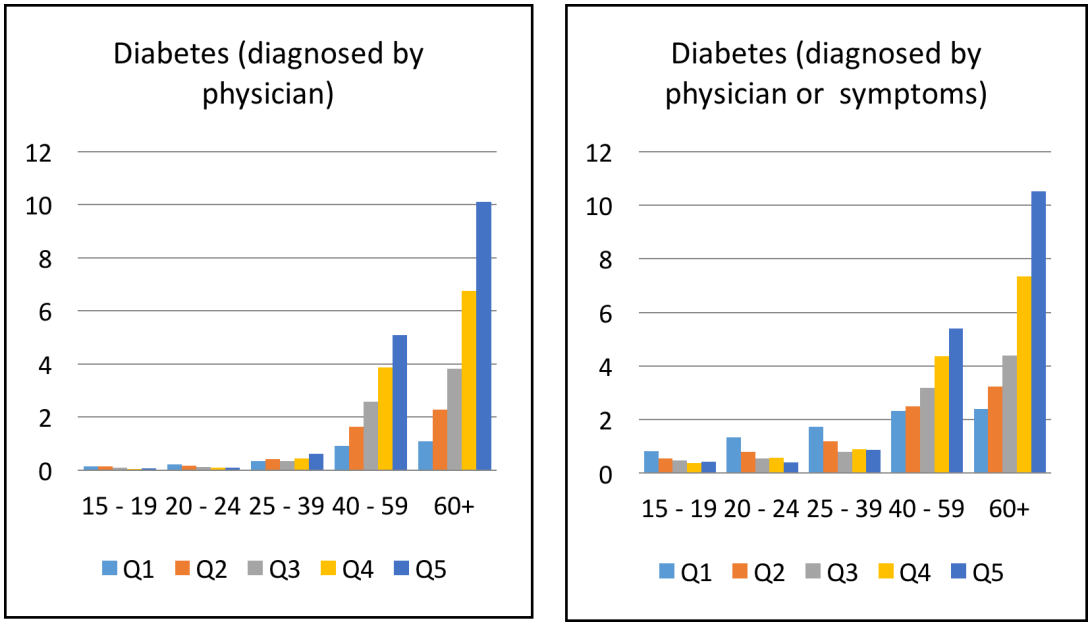


Figure 3.5. Prevalence of Diabetes and Stroke, diagnosed by Physician &/or Symptoms by Age and Quintile.

Mental Disorder, Disabilities and Musculoskeletal disorders

Mental health disorders in Riskesdas are measured by asking of list of twenty symptoms and if respondents have at least six of symptoms then they were categorised as having an emotional disorder. All questions had equal weight. The prevalence of mental health was much higher among females than males in all age groups. Furthermore, the prevalence for over 60s was higher that other age groups (Figure 3.6). Disability appears to increase dramatically at age 60 + as well, after a reasonably consistent prevalence across the life-course, and is also more prevalent in females. It appears that these mental health disorder and disability decreases as wealth index increases in all age groups (Figure 3.7). Musculoskeletal outcomes have a significant prevalence across the life-course, gradually increasing with age to peak at age 60+. Females appear to be more affected across the age groups.

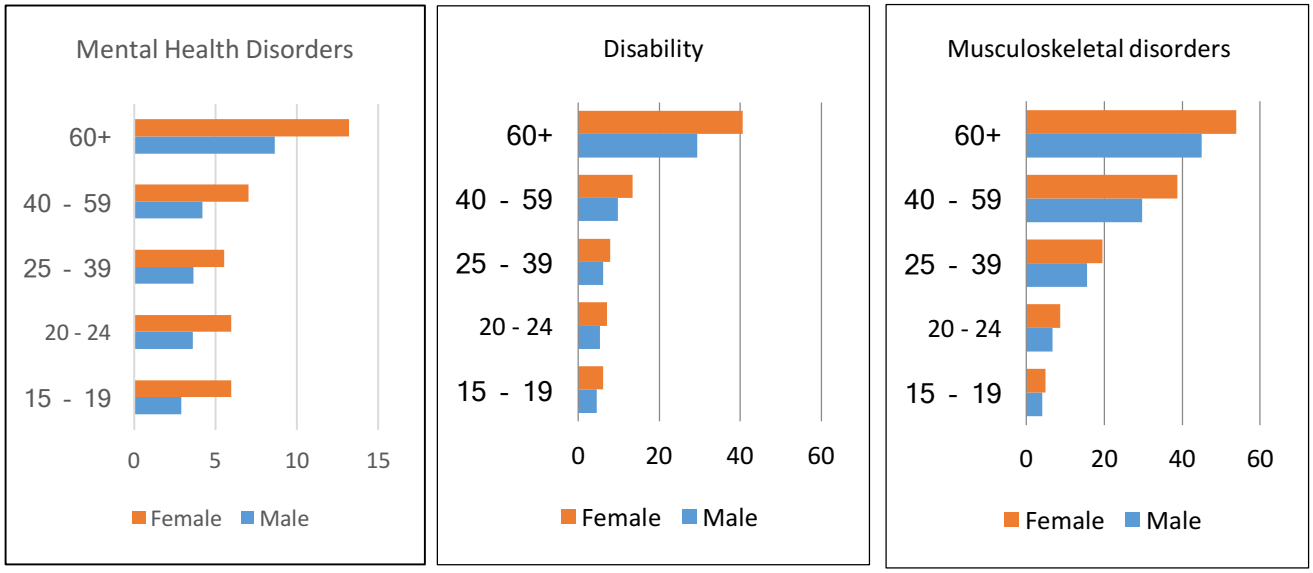


Figure 3.6. Prevalence of Mental Health Disorders, and Disability by Age and Sex.

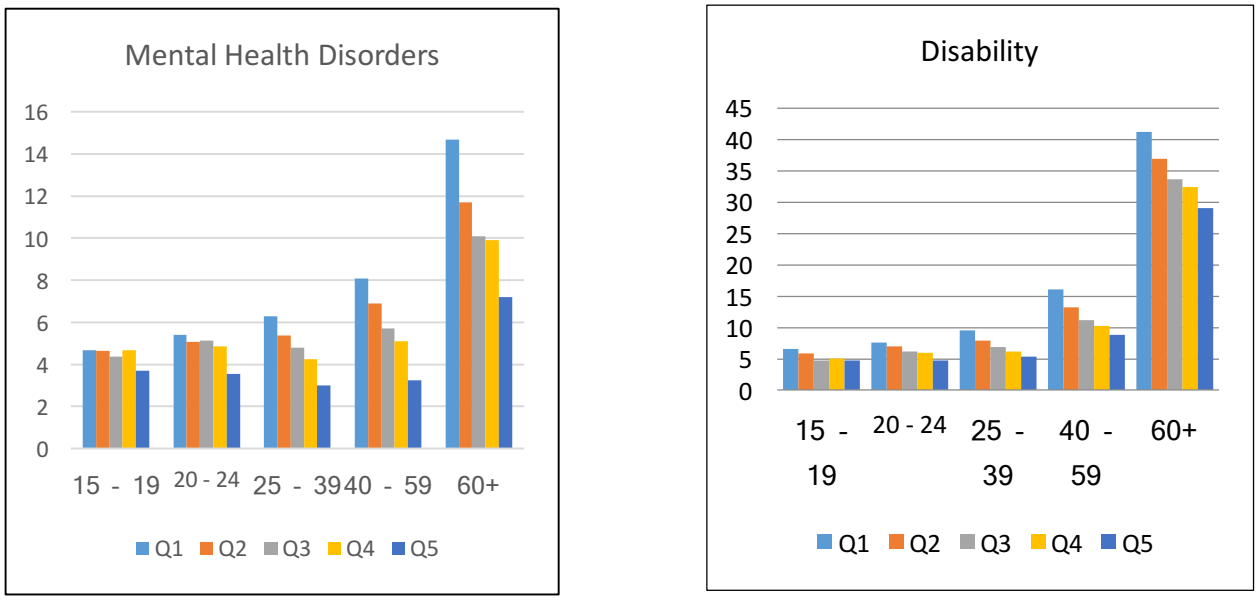


Figure 3.7. Prevalence of Mental Health Disorders, and Disability by Age and Quintile.

Blindness and Low Vision.

The prevalence of blindness and low vision rapidly increases from age 60+, with the prevalence of blindness and low vision both more than quadrupling. Both low vision and blindness were more prevalent in females from age 40, however in the earlier age groups the trend is less clear. The trend across wealth quintiles was similar, with little difference evident until age 40, where the trend shows that the least well-off are experiencing a higher rate of low vision and blindness.

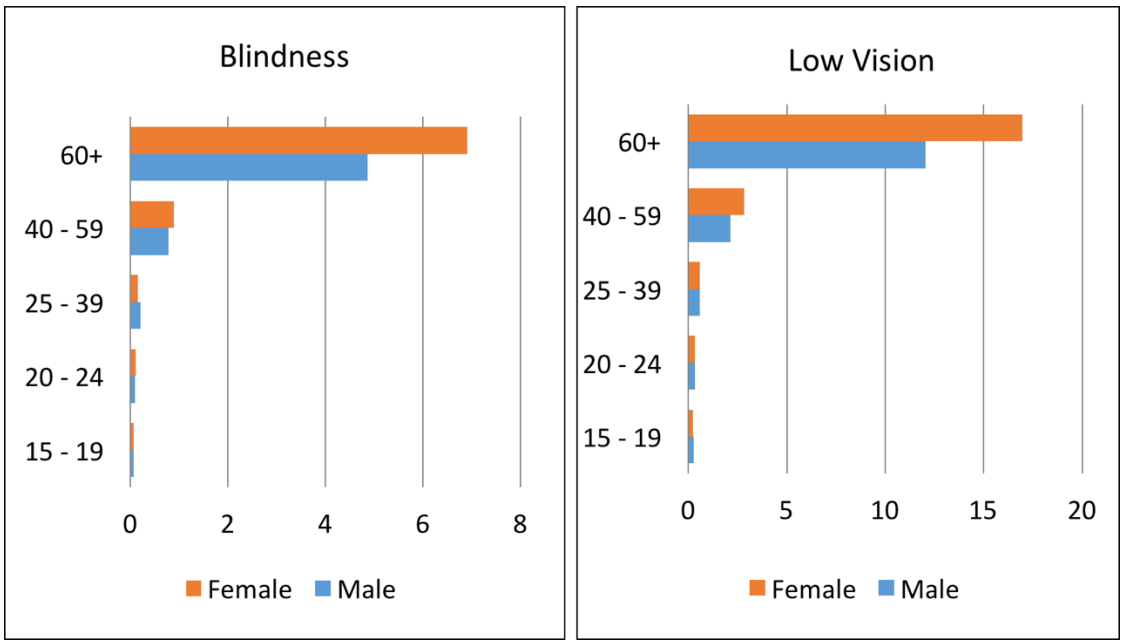


Figure 3.8. Prevalence of Blindness and Low Vision by Age and Sex.

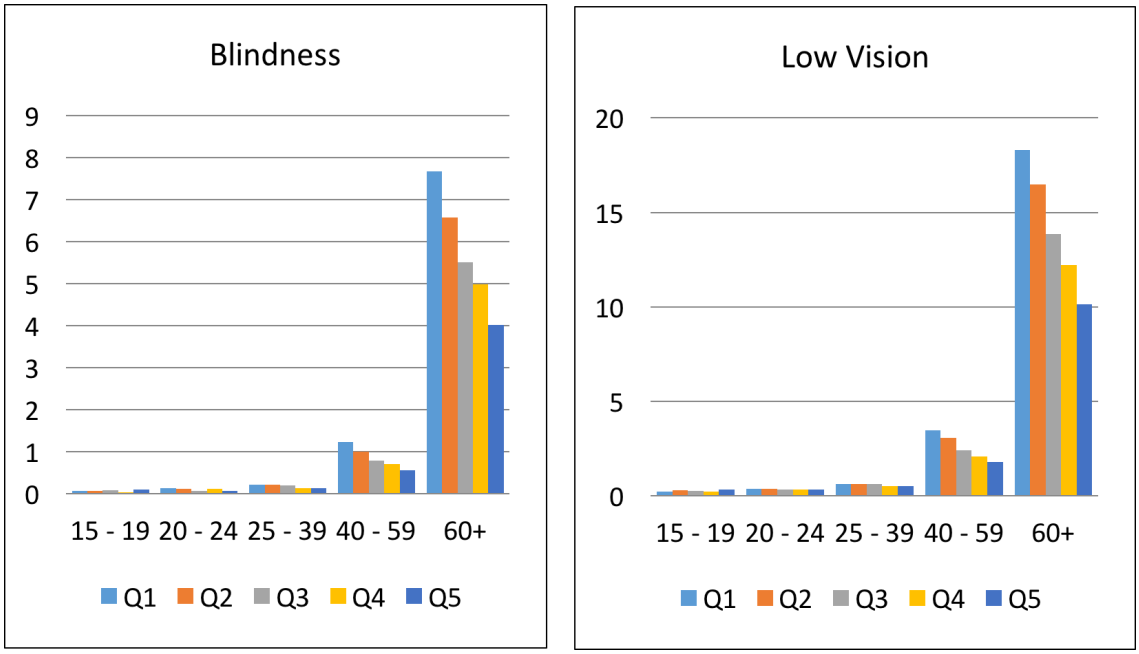


Figure 3.9. Prevalence of Blindness and Low Vision, by Age and Quintile.

NCD Risk Factors

Smoking, Physical inactivity, and Lack of consumption of fruit and vegetables.

Smoking, one of the main risk factors of NCD is very prevalent in Indonesia, particularly among males. The prevalence among females was very low comparatively (Figure 3.10). However, females are less active than males across all age groups. It appears that there is a high prevalence of low consumption of fruit and vegetables across the life-course, across age groups. The proportion of people who smoke and eat less fruit and vegetables decreases as wealth index increases in all age groups. However, lack of physical activity appeared to increase as SES did (Figure 3.11). There is a variation of prevalence of smokers in Indonesia across provinces, ranged from 22% in Papua to 40% in Bangka Belitung provinces (Figure 3.12)

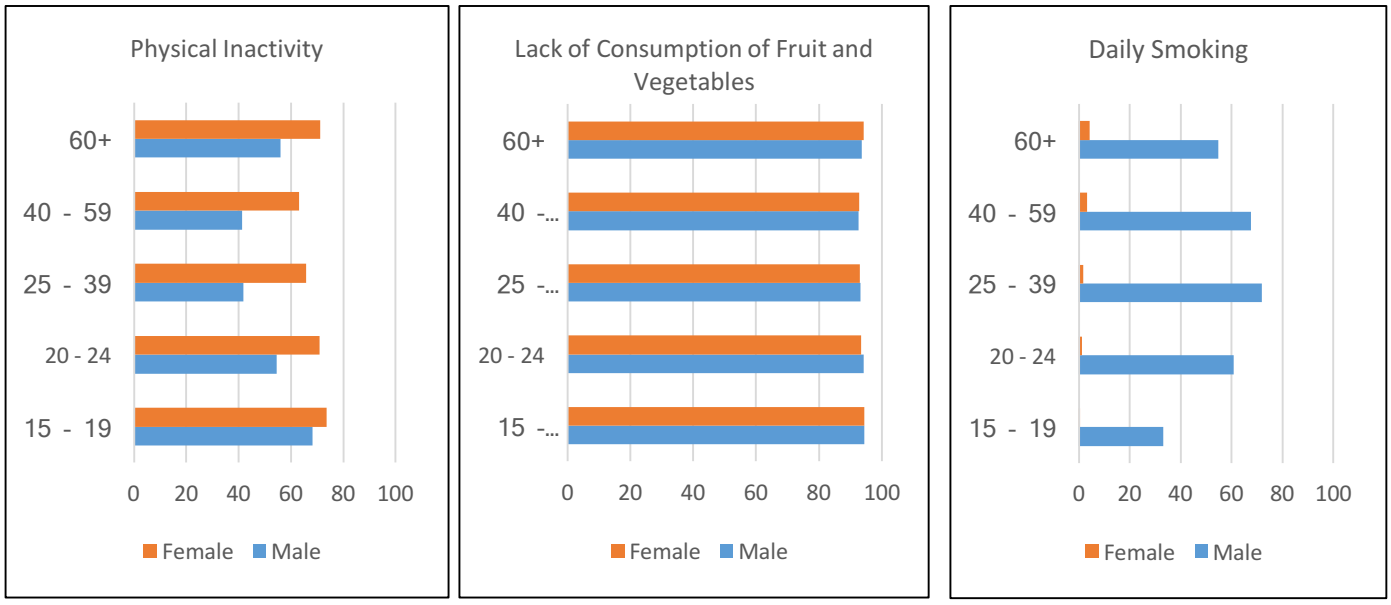
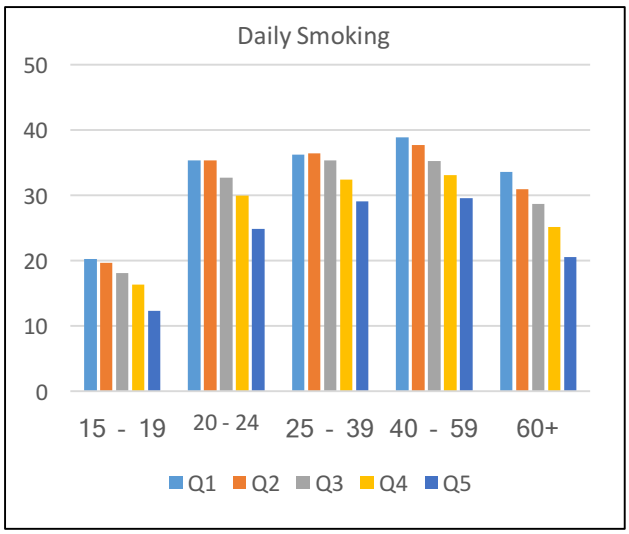
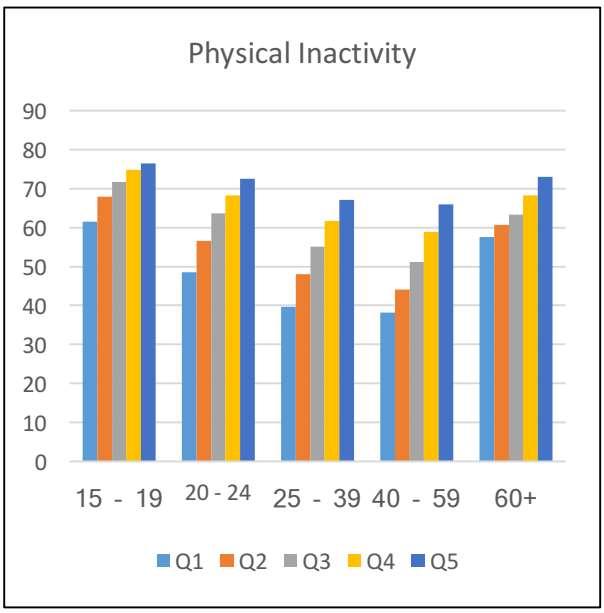


Figure 3.10. Prevalence of Physical Inactivity, Lack of Fruit and Vegetable Consumption and Daily Smoking, by Age and Sex.





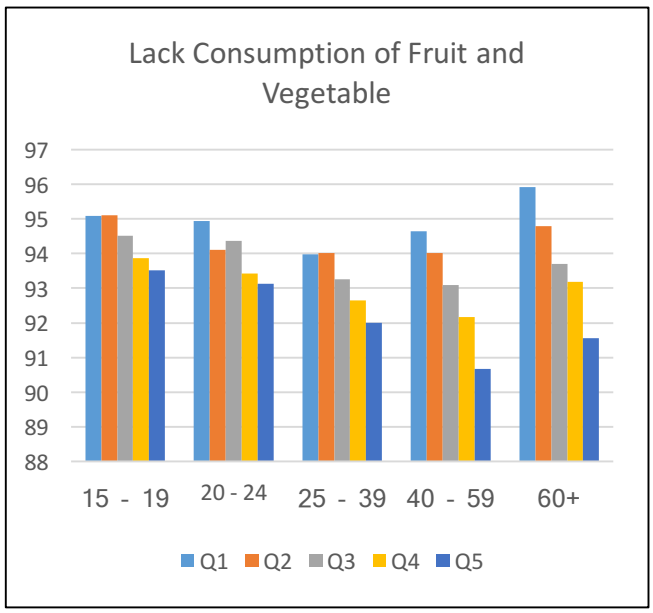


Figure 3.11. Prevalence of Daily Smoking, Physical Inactivity and Lack of Fruit and Vegetable Consumption, by Age and Quintile.

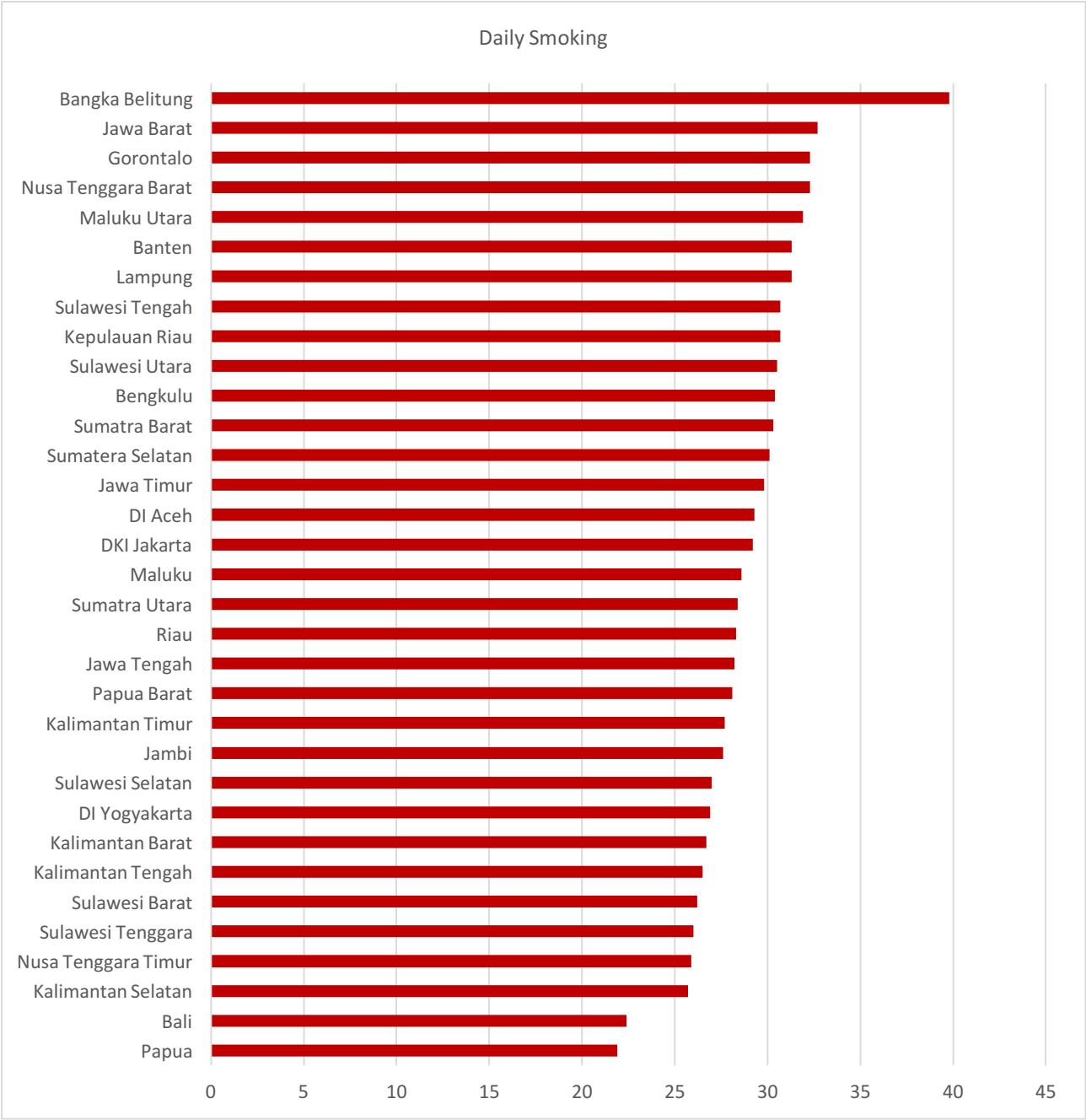


Figure 3.12. Prevalence of daily smoking across provinces

Overweight or Obesity and Hypertension.

Overweight/ obesity was found to have higher prevalence among females than males in all age group and increases as age increases (Figure 3.13). The prevalence increases as wealth index increases (Figure 3.14)

Figure 3.13. Prevalence of Obesity (based on Body Mass Index), and Central Obesity by Age and Sex

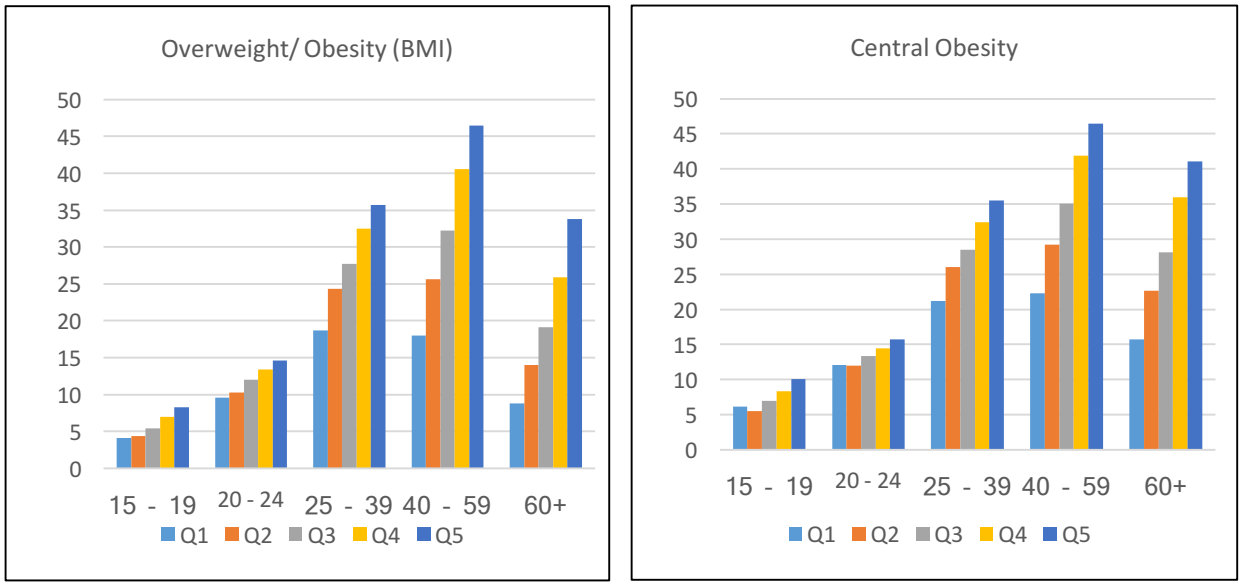


Figure 3.14. Prevalence of Overweight or Obesity (based on Body Mass Index) and Central Obesity by Age and Quintile

Hypertension is prevalent across the life-course, gradually increasing with age, with females reporting a higher proportion of the population affected. Of interest here, is the contrast between those reporting to be already diagnosed with hypertension, and those who do have hypertension based on measurement. The prevalence essentially doubles when an objective anthropometric measure is used.

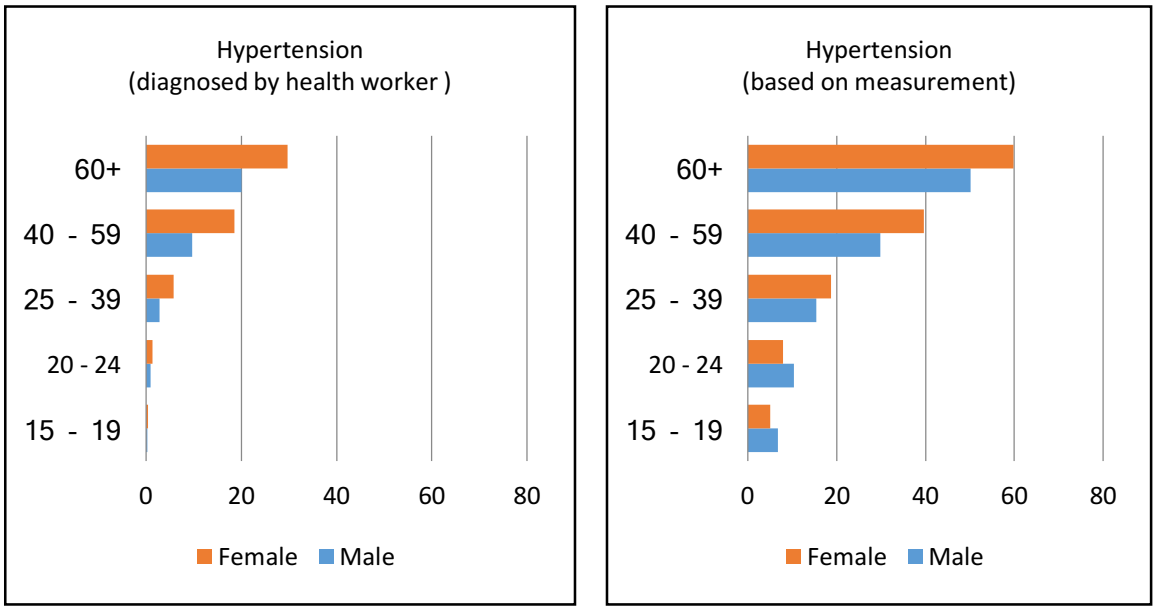


Figure 3.15. Prevalence of Hypertension Diagnosed by Health Worker, and based on measurement, by Age and Sex.

Section 3 Discussion: An Updated NCD Profile for Indonesia

The next step in accountability for NCDs is 'sharing the account' or communicating findings around the NCDs impacting the population. We have found that the profile of NCD in Indonesia extends beyond the traditional focus of policy (cardiovascular disease (CVD), diabetes, cancer and chronic respiratory diseases (CRD)) and there is significant burden evident across the life-course. There is a self-confirming bias to current systems which routinely collect and report on data only from age 15, and only on certain NCD outcomes and risk factors. Current data systems do cover some important NCDs at different stages of the life-course, however there is a need to extend and invest in further objective measures of NCD outcomes, risks and determinants, at different ages.

Despite data limitations, the framework we have developed has effectively illustrated that NCDs extend beyond cardiovascular disease, diabetes, cancer and chronic respiratory disease. Reporting of NCDs in Indonesia should include these important NCDs, but also include a focus on musculoskeletal disorders, poor mental health, chronic liver diseases, kidney disease, neurological diseases, chronic skin conditions, vision and hearing defects, congenital defects and SIDS. Many of these conditions are preventable, and key to successful prevention is also the rigorous measurement of risk factors and determinants.

There are some limitations to the findings presented here, and therefore they should be interpreted with care. There are differences between our data map (and which indicators could *potentially* be populated by Riskesdas data), and what we were eventually granted access to, differed a great deal.

We were unable to analyse the biomedical data, any data for under 15 years (despite many outcomes and risk factors being asked of age 10 years+) and many self-report items.

There were inadequate measures for Mental health, both of symptoms of distress and diagnosis of specific illnesses. There is need for the use of a well-validated objective measure to replace the current tool. Musculoskeletal diseases have a simple self-report measure which encompasses all musculoskeletal disorders, this lacks the specificity required to adequately measure this illness. Similarly, cancer and cardiovascular diseases could be underrepresented in this profile, both because the simple self-report measure fails to capture the details of these diseases, and because of certain responder biases.

Missing data, complete lack of data for under 15 years, along with problems with quality of the data, are also limitations to how well data presented represents NCD across the life-course. Despite these issues, we see that NCDs which emerge in adolescence provide a particularly important target for intervention as this can improve the health of young people now, their health as adults, and the health of the next generation

Summary.
The profile of NCD in Indonesia includes musculoskeletal disorders, poor mental health, neurological disease, skin conditions, chronic renal disease, kidney disease, congenital defects, vision and hearing defects, alongside the more common focus on: CVD, diabetes, cancer, and CRD. Despite data limitations, we could begin to visualise a comprehensive picture of NCD across the life-course, for Indonesians. This profile and the refined reporting framework will help to inform where there is the greatest need for improved data collection, transparency in reporting and action on NCDs in Indonesia.

Section 4

Discussion and recommendations

NCDs are the leading causes of death and ill-health in Indonesia, however there still exists a significant double burden of injury and communicable diseases. NCD outcomes are chronic, insidious and stigmatizing, and yet are largely preventable. The profile of NCD in Indonesia includes musculoskeletal disorders, poor mental health, chronic liver diseases, kidney disease, neurological disease, chronic skin conditions, vision and hearing defects, as well as the more commonly reported on outcomes: cardiovascular disease, diabetes, cancer, and chronic respiratory diseases. Key to prevention strategies are objective measures of risks and determinants.

A strong national reporting framework for NCD is the key to action.
Population based national data is vital to our understanding of these NCD outcomes, risk factors and social determinants; and informing our efforts to prevent sudden death and chronic ill-health. Key to informing national data collection is a strong reporting framework which comprises well-defined indicators. Indicators can then be measured, reported on and used to monitor and track progress to goals.

Current frameworks are inadequate.
A major barrier to policy has been the inadequacy of NCD measurement and reporting to date. Current frameworks in Indonesia are limited in their definition of NCD, the coverage of NCD across the life-course and their consideration of the differing needs across varied geographic areas and SES. The two key frameworks in Indonesia, Indonesian Action Plan for NCD v.2, and WHO SEA action plan, vary in quality and contribution to accountability on NCDs. Limitations include: a limited definition of NCD, an adult-outcome focus, a lack of disaggregation by sex, geography and SES, and poorly defined indicators.

NCDs occur across the life-course and not just in adulthood.
NCDs that emerge in childhood and adolescence provide a particularly important target for intervention as this can improve the health of young people now, their health as adults, and the health of the next generation. In Indonesia, some NCD outcomes and their risk factors among young adolescent (<15 years) have been measured in RISKESDAS, however there are omissions (such as mental health, and smoking initiation) and data collection with validated measures are needed. Several NCDs which, if not diagnosed and treated quickly, can result in child mortality, have not been well monitored such as: types 1 diabetes, congenital defects and leukaemia.

While a national, dedicated child and youth health behaviour data collection system is ideal, expansion of the current RISKESDAS Survey is likely to be a more cost-effective option. Ideally there could be an expansion of the sampling frame used, to be inclusive of children, adolescents and adults not in standard household situations. Such as those experiencing severe mental illness, chronic physical illness, homeless youth, and other groups experiencing adversity. Similarly, the POSBINDU community surveillance system target age group could be expanded to include younger adolescents and perhaps children.

Current data systems need to be extended.
There is a pressing need to extend our national data collection to have better coverage of key NCD outcomes, risks and determinants. While selected NCDs and their risk factors have been monitored regularly in RISKESDAS, the NCD outcomes have been poorly defined. Most of the NCDs covered were

based on self-report whether respondents have been diagnosed by health workers or based on symptoms such as mental health, some were based on direct measurement, such as: measured blood pressure, blood or urine samples, however it is difficult to access the latter for research purposes.

Extending RISKESDAS to include neglected NCDs and investing in objective measures (self-report survey, anthropometric and biomedical) for children and adolescents will address many of the current gaps in NCDs and be of significant value to building accountability for NCDs. The continued roll-out of the POSBINDU initiative across the archipelago, and promotion within schools and other settings accessible to children and adolescents could improve the representative quality of the data sourced from POSBINDU. Likewise, continued expansion of key registries (cancer and mortality), are essential to addressing the gaps in health data for Indonesia.

Currently available data should be presented in a transparent, accessible way.
The technology exists to make fully interactive and downloadable data visualisations from complex multidimensional datasets. The Institute of Health Metric's GBD Compare Viz Hub (https://vizhub.healthdata.org/gbd-compare/) is a great example of this. There is absolutely a need for better access to integrated data on NCD outcomes, risk factors and determinants; this allows for monitoring and reporting of national trends over time, to guide NCD control in Indonesia.

High quality data which allows for transparency and accountability around the reporting on national trends, by measures of inequity, and against national and international health prevention targets, will provide the evidence needed to properly respond to the NCD epidemic. Better access to quality data will benefit researchers, educators, health care providers, service planners, policy makers and decision makers.

NCDs vary sub-nationally in Indonesia.
Inequalities are evident in Indonesia, across socio-economic status and between geographical regions. In RISKESDAS determinants such as wealth index and geographical variation have been presented. While wealth index quintile is relevant in monitoring NCDs, Indonesia's geographic diversity shouldn't be overlooked in data collection systems. Geographical analysis is an important analysis to explore equity of NCDs in Indonesia. Differing geographical profiles of NCD outcomes, risks and determinants offer distinct opportunities to consider, in prevention and treatment of NCDs.

The profile of NCD in Indonesia extends beyond cardiovascular disease, diabetes, cancer and chronic respiratory disease. The focus of NCD in Indonesia should include those outcomes, risks and determinants identified here as significant. As a priority, these outcomes, risks, and determinants should be measured and reported across the life-course and not just in adults. Data should be available in a transparent and accessible way, to a subnational level.

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Appendix

Data Tables - NCD Outcomes

Asthma

Age Group	Total (%) 95%CI	Gender (%) 95%CI		Quintile (%) 95%CI				
		Male	Female	Q1	Q2	Q3	Q4	Q5
15 - 19	5.059	4.255	5.907	5.509	5.203	4.994	5.203	4.471
	[4.886,5.238]	[4.056,4.464]	[5.659,6.166]	[5.097,5.952]	[4.847,5.582]	[4.662,5.349]	[4.874,5.554]	[4.16,4.804]
20 - 24	4.935	4.422	5.46	6.007	5.044	4.949	4.978	3.917
	[4.741,5.137]	[4.182,4.675]	[5.192,5.741]	[5.476,6.587]	[4.639,5.483]	[4.566,5.362]	[4.617,5.365]	[3.582,4.281]
25 - 39	5.828	5.313	6.26	8.451	6.279	5.67	5.011	4.114
	[5.686,5.973]	[5.141,5.49]	[6.09,6.435]	[8.032,8.891]	[6.006,6.564]	[5.43,5.92]	[4.798,5.233]	[3.919,4.318]
40 - 59	3.793	3.616	3.961	5.931	4.222	3.477	3.203	2.631
	[3.7,3.888]	[3.5,3.736]	[3.843,4.083]	[5.651,6.225]	[4.029,4.424]	[3.316,3.646]	[3.052,3.361]	[2.494,2.775]
60+	2.859	3.282	2.469	3.816	3.005	2.573	2.367	2.214
	[2.744,2.979]	[3.112,3.462]	[2.326,2.62]	[3.545,4.108]	[2.782,3.245]	[2.352,2.814]	[2.135,2.624]	[1.975,2.48]
Total	4.553	4.225	4.858	6.363	4.819	4.326	4.101	3.395
	[4.468,4.64]	[4.128,4.323]	[4.758,4.959]	[6.117,6.619]	[4.671,4.971]	[4.199,4.456]	[3.978,4.227]	[3.282,3.511]

Chronic Obstructive Pulmonary Disease

Age group	Total (%) 95%CI	Gender (%) 95%CI		Quintile (%) 95%CI				
		Male	Female	Q1	Q2	Q3	Q4	Q5
15 - 19								
20 - 24								
25 - 39	1.898	1.806	1.977	3.976	2.197	1.645	1.187	0.8144
	[1.812,1.989]	[1.695,1.923]	[1.87,2.09]	[3.673,4.303]	[2.016,2.392]	[1.502,1.801]	[1.076,1.308]	[.7223,.9181]
40 - 59	3.771	3.961	3.59	7.374	4.654	3.373	2.676	1.656
	[3.665,3.881]	[3.826,4.102]	[3.469,3.716]	[7.021,7.744]	[4.443,4.875]	[3.208,3.545]	[2.536,2.824]	[1.545,1.774]
60+	8.532	10.26	6.942	13.55	9.446	7.192	5.917	4.733
	[8.3,8.769]	[9.934,10.59]	[6.679,7.215]	[12.95,14.17]	[9.033,9.877]	[6.819,7.584]	[5.547,6.31]	[4.377,5.117]
Total	4.044	4.456	3.669	7.63	4.998	3.575	2.673	1.791
	[3.948,4.142]	[4.337,4.579]	[3.567,3.773]	[7.325,7.947]	[4.829,5.173]	[3.445,3.709]	[2.566,2.785]	[1.702,1.884]

Cancer (all cause)

Age group	Total (%) 95%CI	Gender (%) 95%CI		Quintile (%) 95%CI				
		Male	Female	Q1	Q2	Q3	Q4	Q5
15 - 19	0.036	0.0181	0.0548	0.0196	0.0484	0.0398	0.0434	0.0273
	[.025,.0517]	[.0083,.0392]	[.0365,.0825]	[.0063,.0607]	[.0242,.0967]	[.019,.0834]	[.0217,.0867]	[.0113,.0655]
20 - 24	0.0668	0.0126	0.1223	0.0277	0.104	0.0766	0.0356	0.0895
	[.0494,.0903]	[.0047,.0335]	[.089,.1679]	[.0089,.086]	[.0591,.183]	[.0412,.1423]	[.0148,.0854]	[.0509,.1574]
25 - 39	0.1509	0.0374	0.2462	0.1029	0.15	0.1571	0.166	0.1718
	[.1351,.1685]	[.0272,.0514]	[.2192,.2765]	[.0744,.1424]	[.117,.1951]	[.1234,.2001]	[.1331,.207]	[.1382,.2134]
40 - 59	0.3154	0.0862	0.5331	0.2096	0.2326	0.338	0.3831	0.3813
	[.2938,.3385]	[.0714,.1041]	[.4945,.5747]	[.1695,.2592]	[.1935,.2796]	[.291,.3926]	[.3343,.439]	[.3347,.4343]
60+	0.3487	0.3245	0.371	0.1651	0.3779	0.2762	0.3966	0.6121
	[.312,.3898]	[.2745,.3837]	[.32,.4301]	[.1174,.2319]	[.3044,.4689]	[.2119,.36]	[.3074,.5116]	[.4959,.7554]
Total	0.2139	0.0865	0.3322	0.1326	0.1991	0.2167	0.2418	0.2682
	[.2029,.2255]	[.0771,.0972]	[.3134,.352]	[.1133,.1552]	[.1768,.2242]	[.1932,.243]	[.2177,.2685]	[.243,.2959]

CHD (diagnosed by physician or symptom)

Age group	Total (%) 95%CI	Gender (%) 95%CI		Quintile (%) 95%CI				
		Male	Female	Q1	Q2	Q3	Q4	Q5
15 - 19	0.5718	0.4472	0.7033	0.8094	0.6413	0.4488	0.548	0.4526
	[.5193,.6296]	[.3871,.5166]	[.6229,.7938]	[.6704,.9769]	[.529,.7771]	[.3574,.5635]	[.4473,.6711]	[.3627,.5646]
20 - 24	0.6902	0.5724	0.8108	0.9797	0.8754	0.7968	0.5049	0.3879
	[.6237,.7638]	[.4935,.6639]	[.7099,.9258]	[.7921,1.211]	[.7136,1.073]	[.6526,.9725]	[.4004,.6364]	[.296,.5083]
25 - 39	1.09	0.936	1.219	1.923	1.26	1.034	0.7865	0.5718
	[1.028,1.154]	[.8676,1.01]	[1.139,1.304]	[1.706,2.166]	[1.147,1.383]	[.9355,1.142]	[.7064,.8756]	[.5062,.6459]
40 - 59	2.113	1.82	2.392	3.265	2.153	1.882	1.807	1.692
	[2.038,2.19]	[1.733,1.911]	[2.293,2.495]	[3.021,3.527]	[2.011,2.306]	[1.76,2.013]	[1.694,1.927]	[1.582,1.808]
60+	3.625	3.771	3.491	3.931	3.169	3.095	3.493	4.79
	[3.486,3.77]	[3.585,3.966]	[3.315,3.676]	[3.608,4.282]	[2.929,3.428]	[2.859,3.35]	[3.203,3.807]	[4.436,5.171]
Total	1.681	1.518	1.831	2.473	1.766	1.521	1.382	1.361
	[1.629,1.734]	[1.462,1.577]	[1.767,1.898]	[2.302,2.657]	[1.679,1.857]	[1.45,1.596]	[1.316,1.451]	[1.296,1.43]

Stroke (diagnosed by health worker or symptom)

Age group	Total (%) 95%CI	Gender (%) 95%CI		Quintile (%) 95%CI				
		Male	Female	Q1	Q2	Q3	Q4	Q5
15 - 19	0.2563	0.2417	0.2718	0.3264	0.2662	0.267	0.2116	0.2236
	[.2209,.2973]	[.1965,.2973]	[.2236,.3302]	[.2378,.4478]	[.1957,.362]	[.1996,.3571]	[.1548,.2892]	[.1624,.3076]
20 - 24	0.2831	0.2799	0.2863	0.4713	0.3553	0.2068	0.2204	0.2089
	[.2422,.3309]	[.2255,.3473]	[.2297,.3568]	[.3535,.6282]	[.2601,.4853]	[.1421,.3011]	[.1552,.313]	[.1443,.3024]
25 - 39	0.4428	0.4468	0.4395	0.7206	0.5044	0.4053	0.3382	0.287
	[.409,.4795]	[.4021,.4965]	[.3987,.4845]	[.6051,.858]	[.4362,.5831]	[.348,.4721]	[.2895,.3952]	[.2411,.3415]
40 - 59	1.6	1.601	1.599	1.523	1.548	1.648	1.683	1.58
	[1.547,1.655]	[1.529,1.676]	[1.528,1.674]	[1.394,1.664]	[1.436,1.668]	[1.54,1.764]	[1.577,1.796]	[1.479,1.688]
60+	4.753	5.028	4.499	3.861	4.129	5.008	5.495	5.815
	[4.608,4.902]	[4.82,5.245]	[4.308,4.697]	[3.586,4.157]	[3.863,4.412]	[4.708,5.326]	[5.148,5.864]	[5.433,6.223]
Total	1.366	1.401	1.334	1.399	1.397	1.43	1.334	1.28
	[1.332,1.401]	[1.357,1.447]	[1.292,1.378]	[1.309,1.495]	[1.33,1.467]	[1.367,1.496]	[1.273,1.397]	[1.22,1.344]

Chronic Renal Failure (diagnosed by physician)

Age group	Total (%) 95%CI	Gender (%) 95%CI		Quintile (%) 95%CI				
		Male	Female	Q1	Q2	Q3	Q4	Q5
15 - 19	0.0406	0.0316	0.0501	0.0522	0.0544	0.0341	0.038	0.0273
	[.0289,.057]	[.0187,.0534]	[.0326,.0768]	[.0261,.1043]	[.0283,.1046]	[.0153,.0758]	[.0181,.0796]	[.0113,.0655]
20 - 24	0.0795	0.0723	0.0869	0.1017	0.078	0.0919	0.0711	0.0597
	[.06,.1054]	[.0481,.1088]	[.0596,.1266]	[.0564,.1832]	[.0406,.1497]	[.0522,.1618]	[.0383,.1321]	[.0299,.1193]
25 - 39	0.1536	0.1821	0.1297	0.1676	0.1852	0.1549	0.1494	0.1173
	[.1375,.1716]	[.157,.2112]	[.1106,.1521]	[.1312,.2141]	[.1481,.2316]	[.121,.1982]	[.1187,.188]	[.0899,.1529]
40 - 59	0.3902	0.4708	0.3136	0.3768	0.4261	0.3684	0.4249	0.3572
	[.3653,.4166]	[.4325,.5124]	[.2845,.3456]	[.3215,.4417]	[.3692,.4917]	[.3192,.4252]	[.3732,.4837]	[.3111,.4102]
60+	0.5044	0.6582	0.3626	0.4251	0.478	0.4706	0.6589	0.5338
	[.4594,.5538]	[.5848,.7409]	[.3122,.4211]	[.3423,.528]	[.3941,.5797]	[.3836,.5773]	[.5432,.7991]	[.4242,.6717]
Total	0.2629	0.3177	0.212	0.2584	0.2907	0.2535	0.2814	0.2319
	[.2502,.2762]	[.2981,.3386]	[.1972,.2279]	[.2298,.2905]	[.2622,.3223]	[.2284,.2813]	[.2553,.3102]	[.2081,.2585]

Diabetes (diagnosed by physician or symptoms)

Age group	Total (%) 95%CI	Gender (%) 95%CI		Quintile (%) 95%CI				
		Male	Female	Q1	Q2	Q3	Q4	Q5
15 - 19	0.5219	0.4224	0.627	0.8225	0.5445	0.4829	0.3906	0.4198
	[.4681,.5819]	[.3606,.4947]	[.5492,.7156]	[.6559,1.031]	[.4377,.6772]	[.3891,.5993]	[.3085,.4946]	[.3352,.5257]
20 - 24	0.7029	0.6447	0.7625	1.331	0.7974	0.5516	0.576	0.3954
	[.6329,.7807]	[.5576,.7454]	[.6629,.877]	[1.1,1.609]	[.6416,.9905]	[.433,.7024]	[.4627,.7167]	[.2997,.5216]
25 - 39	1.081	1.021	1.133	1.724	1.184	0.8016	0.8902	0.8818
	[1.019,1.148]	[.9461,1.101]	[1.057,1.214]	[1.499,1.982]	[1.073,1.306]	[.7195,.893]	[.8063,.9828]	[.797,.9755]
40 - 59	3.652	3.261	4.024	2.315	2.487	3.19	4.356	5.406
	[3.564,3.742]	[3.153,3.373]	[3.906,4.144]	[2.131,2.514]	[2.339,2.644]	[3.036,3.352]	[4.181,4.538]	[5.209,5.611]
60+	5.123	4.893	5.336	2.391	3.228	4.394	7.344	10.52
	[4.96,5.292]	[4.68,5.116]	[5.12,5.559]	[2.159,2.647]	[2.991,3.483]	[4.104,4.704]	[6.93,7.78]	[10.01,11.05]
Total	2.415	2.211	2.604	1.888	1.851	2.077	2.727	3.411
	[2.36,2.471]	[2.148,2.276]	[2.537,2.674]	[1.734,2.055]	[1.766,1.94]	[1.997,2.16]	[2.638,2.819]	[3.305,3.521]

Hyperthyroidism

Age group	Total (%) 95%CI	Gender (%) 95%CI		Quintile (%) 95%CI				
		Male	Female	Q1	Q2	Q3	Q4	Q5
15 - 19	0.2842	0.201	0.3719	0.1436	0.2117	0.267	0.4449	0.3217
	[.2487,.3247]	[.1619,.2495]	[.3164,.4371]	[.0929,.2219]	[.1522,.2946]	[.1996,.3571]	[.3544,.5584]	[.2435,.4249]
20 - 24	0.2767	0.2076	0.3475	0.1941	0.1907	0.2605	0.3911	0.3133
	[.2374,.3226]	[.1626,.265]	[.2875,.4199]	[.1244,.3027]	[.1256,.2893]	[.1863,.3642]	[.2978,.5134]	[.2318,.4234]
25 - 39	0.305	0.1378	0.4453	0.3065	0.2607	0.3074	0.3424	0.3016
	[.2803,.3318]	[.1111,.1709]	[.4087,.4851]	[.2395,.3921]	[.2145,.3168]	[.2597,.3638]	[.2919,.4015]	[.2555,.356]
40 - 59	0.4889	0.1788	0.7835	0.4571	0.5085	0.4178	0.5447	0.5084
	[.461,.5183]	[.1566,.2041]	[.7351,.8351]	[.3939,.5304]	[.4462,.5794]	[.365,.4782]	[.4856,.6109]	[.4533,.57]
60+	0.511	0.2468	0.7547	0.3951	0.4644	0.4911	0.6205	0.6549
	[.4647,.5619]	[.2026,.3008]	[.6781,.8398]	[.3136,.4978]	[.3789,.5689]	[.402,.5997]	[.5055,.7615]	[.5311,.8072]
Total	0.3921	0.1808	0.5882	0.3428	0.3673	0.3625	0.4617	0.4171
	[.3753,.4096]	[.1649,.1984]	[.5618,.6159]	[.3016,.3895]	[.3348,.403]	[.3322,.3955]	[.4254,.5011]	[.3846,.4523]

Mental Health Disorders

Age group	Total (%) 95%CI	Gender (%) 95%CI		Quintile (%) 95%CI				
		Male	Female	Q1	Q2	Q3	Q4	Q5
15 - 19	4.391	2.889	5.976	4.667	4.628	4.363	4.666	3.697
	[4.196,4.595]	[2.708,3.082]	[5.685,6.282]	[4.22,5.159]	[4.268,5.016]	[4.022,4.733]	[4.324,5.034]	[3.391,4.029]
20 - 24	4.768	3.595	5.968	5.407	5.062	5.125	4.857	3.559
	[4.551,4.995]	[3.367,3.838]	[5.656,6.296]	[4.894,5.969]	[4.634,5.527]	[4.715,5.569]	[4.467,5.279]	[3.218,3.933]
25 - 39	4.678	3.669	5.525	6.294	5.385	4.782	4.241	3.001
	[4.516,4.846]	[3.512,3.833]	[5.32,5.737]	[5.84,6.781]	[5.104,5.68]	[4.534,5.044]	[4.011,4.484]	[2.815,3.2]
40 - 59	5.653	4.215	7.02	8.065	6.884	5.718	5.095	3.237
	[5.488,5.823]	[4.056,4.379]	[6.806,7.241]	[7.608,8.547]	[6.588,7.192]	[5.467,5.979]	[4.86,5.34]	[3.055,3.43]
60+	11.01	8.642	13.2	14.68	11.71	10.09	9.916	7.203
	[10.73,11.3]	[8.337,8.956]	[12.82,13.59]	[14.01,15.36]	[11.22,12.23]	[9.619,10.59]	[9.406,10.45]	[6.744,7.691]
Total	5.801	4.387	7.115	7.895	6.785	5.806	5.247	3.614
	[5.653,5.954]	[4.256,4.521]	[6.93,7.305]	[7.505,8.303]	[6.555,7.023]	[5.608,6.009]	[5.058,5.442]	[3.459,3.776]

Disability

Age group	Total (%) 95%CI	Gender (%) 95%CI		Quintile (%) 95%CI				
		Male	Female	Q1	Q2	Q3	Q4	Q5
15 - 19	5.371	4.601	6.184	6.619	5.91	4.738	5.024	4.798
	[5.12,5.634]	[4.337,4.88]	[5.859,6.525]	[6.036,7.253]	[5.475,6.378]	[4.365,5.142]	[4.634,5.445]	[4.382,5.252]
20 - 24	6.228	5.391	7.084	7.625	6.994	6.198	5.98	4.73
	[5.94,6.529]	[5.076,5.724]	[6.716,7.471]	[6.947,8.363]	[6.433,7.6]	[5.718,6.715]	[5.517,6.48]	[4.311,5.187]
25 - 39	7.101	6.148	7.901	9.538	7.941	6.884	6.225	5.331
	[6.852,7.359]	[5.894,6.412]	[7.612,8.2]	[8.922,10.19]	[7.534,8.368]	[6.539,7.246]	[5.904,6.562]	[4.984,5.7]
40 - 59	11.67	9.751	13.49	16.08	13.18	11.17	10.26	8.783
	[11.39,11.95]	[9.466,10.04]	[13.16,13.82]	[15.39,16.8]	[12.72,13.66]	[10.78,11.56]	[9.891,10.64]	[8.393,9.189]
60+	35.18	29.36	40.54	41.2	36.88	33.68	32.44	29.08
	[34.69,35.67]	[28.82,29.91]	[39.95,41.13]	[40.24,42.17]	[36.07,37.69]	[32.89,34.49]	[31.57,33.32]	[28.15,30.04]
Total	12	10.11	13.76	16.02	14	11.67	10.23	8.737
	[11.76,12.25]	[9.877,10.35]	[13.48,14.04]	[15.47,16.59]	[13.62,14.38]	[11.37,11.98]	[9.932,10.54]	[8.411,9.074]

Joint disease/ Rheumatism/ Gout (diagnosed by health worker or symptom)

Age group	Total (%) 95%CI	Gender (%) 95%CI		Quintile (%) 95%CI				
		Male	Female	Q1	Q2	Q3	Q4	Q5
15 - 19	4.433	4.045	4.842	6.443	4.713	4.5	3.939	2.933
	[4.252,4.621]	[3.835,4.267]	[4.597,5.099]	[5.951,6.972]	[4.358,5.094]	[4.165,4.861]	[3.644,4.256]	[2.675,3.216]
20 - 24	7.662	6.762	8.584	12.57	8.546	7.868	5.923	4.566
	[7.381,7.953]	[6.441,7.097]	[8.211,8.972]	[11.71,13.48]	[7.974,9.154]	[7.37,8.396]	[5.51,6.366]	[4.169,4.999]
25 - 39	17.63	15.48	19.43	25.29	19.73	17.34	15.15	11.88
	[17.31,17.95]	[15.13,15.84]	[19.06,19.81]	[24.46,26.14]	[19.18,20.28]	[16.87,17.83]	[14.72,15.6]	[11.46,12.31]
40 - 59	34.27	29.64	38.68	42.65	38.04	35.24	31.91	26.03
	[33.88,34.67]	[29.22,30.06]	[38.22,39.13]	[41.81,43.5]	[37.39,38.7]	[34.64,35.85]	[31.35,32.48]	[25.45,26.62]
60+	49.54	44.97	53.76	56.01	51.66	48.42	46.12	42.39
	[49.03,50.05]	[44.36,45.57]	[53.16,54.35]	[55.05,56.97]	[50.82,52.49]	[47.56,49.27]	[45.21,47.03]	[41.37,43.43]
Total	25.19	22.08	28.08	32.57	28.42	25.52	22.22	18.41
	[24.9,25.48]	[21.79,22.38]	[27.76,28.4]	[31.93,33.21]	[27.97,28.87]	[25.12,25.92]	[21.86,22.59]	[18.03,18.79]

Blindness

Age group	Total (%) 95%CI	Gender (%) 95%CI		Quintile (%) 95%CI				
		Male	Female	Q1	Q2	Q3	Q4	Q5
15 - 19	0.0731	0.0745	0.0715	0.0718	0.0726	0.0852	0.038	0.0981
	[.0571,.0935]	[.053,.1048]	[.05,.1022]	[.0398,.1296]	[.0412,.1278]	[.0514,.1413]	[.0181,.0796]	[.0619,.1557]
20 - 24	0.105	0.1006	0.1094	0.1386	0.1213	0.0766	0.1209	0.0746
	[.0822,.134]	[.0712,.1422]	[.0775,.1545]	[.0837,.2294]	[.0719,.2047]	[.0412,.1423]	[.0752,.1943]	[.0402,.1386]
25 - 39	0.1823	0.2086	0.1603	0.2179	0.2193	0.2072	0.1432	0.1361
	[.165,.2015]	[.1819,.2393]	[.1388,.1851]	[.1769,.2683]	[.1782,.2699]	[.1689,.2542]	[.1125,.1823]	[.1061,.1746]
40 - 59	0.8385	0.7809	0.8933	1.235	1	0.7995	0.7027	0.5616
	[.7956,.8837]	[.7282,.8374]	[.837,.9533]	[1.119,1.363]	[.9058,1.105]	[.7216,.8858]	[.633,.7799]	[.5005,.6301]
60+	5.927	4.871	6.902	7.683	6.578	5.514	4.996	4.022
	[5.74,6.121]	[4.654,5.097]	[6.646,7.167]	[7.242,8.147]	[6.224,6.952]	[5.183,5.865]	[4.64,5.378]	[3.684,4.389]
Total	1.123	0.9761	1.26	1.663	1.466	1.1	0.8329	0.649
	[1.09,1.158]	[.9384,1.015]	[1.217,1.305]	[1.573,1.757]	[1.394,1.541]	[1.042,1.162]	[.7831,.8859]	[.6039,.6975]

Low Vision

Age group	Total (%) 95%CI	Gender (%) 95%CI		Quintile (%) 95%CI				
		Male	Female	Q1	Q2	Q3	Q4	Q5
15 - 19	0.2563	0.271	0.2408	0.2219	0.2722	0.2557	0.1953	0.3326
	[.2246,.2925]	[.2269,.3237]	[.1976,.2934]	[.1588,.3101]	[.2034,.3642]	[.1899,.3441]	[.141,.2704]	[.2582,.4284]
20 - 24	0.3292	0.3302	0.3282	0.342	0.3553	0.3064	0.3342	0.3133
	[.2867,.378]	[.2725,.4001]	[.2696,.3995]	[.2482,.4709]	[.2619,.4819]	[.2233,.4204]	[.2514,.4442]	[.2319,.4233]
25 - 39	0.5713	0.5738	0.5692	0.6177	0.6262	0.624	0.5208	0.4859
	[.5377,.6069]	[.5267,.6251]	[.5264,.6154]	[.5322,.7168]	[.553,.709]	[.552,.7052]	[.4581,.5921]	[.4258,.5546]
40 - 59	2.492	2.148	2.82	3.45	3.067	2.387	2.07	1.771
	[2.407,2.58]	[2.054,2.246]	[2.708,2.936]	[3.231,3.683]	[2.882,3.264]	[2.244,2.539]	[1.942,2.206]	[1.643,1.908]
60+	14.6	12.05	16.96	18.29	16.48	13.85	12.2	10.14
	[14.29,14.93]	[11.7,12.42]	[16.55,17.37]	[17.61,18.99]	[15.9,17.08]	[13.31,14.42]	[11.63,12.79]	[9.591,10.72]
Total	2.974	2.529	3.387	4.168	3.905	2.946	2.233	1.839
	[2.91,3.039]	[2.462,2.598]	[3.307,3.469]	[4.011,4.331]	[3.771,4.043]	[2.842,3.054]	[2.146,2.324]	[1.754,1.928]

Data Tables - NCD Risk Factors

Tobacco Consumption

Age group	Total (%) 95%CI	Gender (%) 95%CI		Quintile (%) 95%CI				
		Male	Female	Low SES	Q2	Q3	Q4	High SES
15 - 19	17.17	33.02	0.4482	20.24	19.67	18.08	16.35	12.32
	[16.88,17.47]	[32.49,33.55]	[.3869,.5191]	[19.5,21]	[19.02,20.33]	[17.49,18.69]	[15.79,16.94]	[11.82,12.83]
20 - 24	31.33	60.86	1.126	35.34	35.29	32.65	29.98	24.83
	[30.93,31.74]	[60.21,61.52]	[1,1.268]	[34.36,36.34]	[34.38,36.21]	[31.82,33.5]	[29.19,30.78]	[24.06,25.61]
25 - 39	33.72	71.8	1.758	36.26	36.38	35.29	32.44	29.06
	[33.5,33.94]	[71.4,72.19]	[1.653,1.87]	[35.67,36.85]	[35.96,36.8]	[34.9,35.69]	[32.06,32.82]	[28.66,29.46]
40 - 59	34.6	67.54	3.285	38.84	37.69	35.27	33.05	29.6
	[34.38,34.82]	[67.18,67.91]	[3.152,3.424]	[38.29,39.38]	[37.29,38.09]	[34.9,35.65]	[32.68,33.43]	[29.22,29.99]
60+	28.45	54.77	4.164	33.59	30.94	28.72	25.1	20.56
	[28.11,28.78]	[54.21,55.34]	[3.955,4.383]	[32.87,34.31]	[30.34,31.55]	[28.1,29.35]	[24.42,25.78]	[19.87,21.28]
Total	31.19	96	4	34.8	33.91	32.11	29.72	26.08
	[31.02,31.35]	[95.86,96.13]	[3.867,4.136]	[34.4,35.21]	[33.65,34.18]	[31.86,32.36]	[29.47,29.97]	[25.82,26.35]

Physical Inactivity

Age group	Total (%) 95%CI	Gender (%) 95%CI		Quintile (%) 95%CI				
		Male	Female	Q1	Q2	Q3	Q4	Q5
15 - 19	70.85	68.3	73.54	61.53	67.89	71.74	74.8	76.47
	[70.4,71.3]	[67.74,68.85]	[72.98,74.09]	[60.46,62.58]	[67.02,68.74]	[70.96,72.5]	[74.05,75.54]	[75.71,77.22]
20 - 24	62.71	54.63	70.97	48.6	56.63	63.64	68.3	72.55
	[62.16,63.25]	[53.91,55.35]	[70.33,71.6]	[47.38,49.81]	[55.55,57.7]	[62.67,64.6]	[67.4,69.19]	[71.63,73.46]
25 - 39	54.91	41.84	65.88	39.67	48.07	55.15	61.69	67.06
	[54.47,55.35]	[41.29,42.39]	[65.39,66.36]	[38.78,40.57]	[47.37,48.76]	[54.52,55.78]	[61.07,62.31]	[66.41,67.71]
40 - 59	52.52	41.36	63.13	38.14	44.09	51.13	58.9	65.86
	[52.11,52.94]	[40.86,41.86]	[62.66,63.6]	[37.37,38.91]	[43.45,44.74]	[50.53,51.73]	[58.33,59.48]	[65.23,66.49]
60+	63.79	55.92	71.06	57.61	60.69	63.38	68.29	73.03
	[63.35,64.23]	[55.34,56.5]	[70.55,71.56]	[56.72,58.49]	[59.93,61.45]	[62.61,64.14]	[67.48,69.09]	[72.16,73.88]
Total	57.76	47.97	66.84	45.11	51.72	57.55	63.57	68.78
	[57.4,58.11]	[47.56,48.39]	[66.46,67.22]	[44.44,45.77]	[51.22,52.23]	[57.09,58]	[63.12,64.02]	[68.27,69.27]

Lack of Consumption of Fruit and Vegetable

Age group	Total (%) 95%CI	Gender (%) 95%CI		Quintile (%) 95%CI				
		Male	Female	Q1	Q2	Q3	Q4	Q5
15 - 19	94.36	94.35	94.38	95.08	95.11	94.51	93.87	93.52
	[94.11,94.6]	[94.05,94.64]	[94.08,94.66]	[94.51,95.59]	[94.66,95.53]	[94.08,94.92]	[93.42,94.29]	[93.04,93.97]
20 - 24	93.92	94.32	93.52	94.93	94.1	94.37	93.43	93.12
	[93.63,94.2]	[93.96,94.65]	[93.15,93.87]	[94.28,95.51]	[93.51,94.63]	[93.87,94.83]	[92.89,93.93]	[92.56,93.64]
25 - 39	93.1	93.24	92.99	93.98	94.01	93.26	92.65	92
	[92.85,93.34]	[92.96,93.51]	[92.71,93.25]	[93.38,94.53]	[93.6,94.4]	[92.89,93.61]	[92.26,93.01]	[91.57,92.42]
40 - 59	92.74	92.65	92.82	94.64	94.01	93.1	92.17	90.68
	[92.49,92.98]	[92.37,92.91]	[92.55,93.08]	[94.18,95.07]	[93.64,94.36]	[92.74,93.45]	[91.77,92.54]	[90.23,91.11]
60+	93.97	93.58	94.33	95.91	94.8	93.7	93.19	91.55
	[93.69,94.23]	[93.25,93.9]	[94.02,94.62]	[95.47,96.32]	[94.35,95.22]	[93.23,94.15]	[92.67,93.69]	[90.91,92.15]
Total	93.3	93.31	93.3	94.7	94.27	93.51	92.75	91.73
	[93.09,93.51]	[93.08,93.53]	[93.07,93.52]	[94.27,95.09]	[93.96,94.57]	[93.22,93.79]	[92.43,93.06]	[91.37,92.09]

BMI/ Obesity

Age group	Total (%) 95%CI	Gender (%) 95%CI		Quintile (%) 95%CI				
		Male	Female	Q1	Q2	Q3	Q4	Q5
15 - 19	5.952	5.46	6.475	4.121	4.348	5.434	7.014	8.317
	[5.779,6.131]	[5.237,5.693]	[6.227,6.733]	[3.769,4.504]	[4.031,4.688]	[5.096,5.792]	[6.648,7.398]	[7.892,8.763]
20 - 24	12.16	9.898	14.59	9.595	10.29	12.03	13.41	14.64
	[11.87,12.46]	[9.541,10.27]	[14.16,15.03]	[8.965,10.26]	[9.723,10.89]	[11.45,12.63]	[12.83,14.02]	[13.99,15.33]
25 - 39	28.14	20.61	34.71	18.71	24.31	27.69	32.46	35.72
	[27.87,28.41]	[20.28,20.94]	[34.35,35.06]	[18.14,19.3]	[23.83,24.8]	[27.23,28.16]	[31.99,32.93]	[35.18,36.27]
40 - 59	33.51	25.61	41.03	17.99	25.61	32.27	40.57	46.43
	[33.21,33.81]	[25.28,25.94]	[40.65,41.4]	[17.52,18.48]	[25.16,26.07]	[31.8,32.73]	[40.1,41.05]	[45.91,46.94]
60+	19.08	14.9	23.01	8.781	14	19.17	25.89	33.76
	[18.74,19.42]	[14.52,15.3]	[22.55,23.47]	[8.351,9.231]	[13.52,14.51]	[18.57,19.78]	[25.15,26.64]	[32.89,34.65]
Total	24.94	18.82	30.73	14.59	19.67	24.18	29.92	34.52
	[24.73,25.14]	[18.61,19.05]	[30.48,30.98]	[14.25,14.94]	[19.38,19.95]	[23.89,24.46]	[29.61,30.22]	[34.15,34.89]

Central Obesity

Age group	Total (%) 95%CI	Gender (%) 95%CI		Quintile (%) 95%CI				
		Male	Female	Q1	Q2	Q3	Q4	Q5
15 - 19	7.527	2.969	12.52	6.14	5.484	6.957	8.345	10.07
	[7.297,7.764]	[2.782,3.169]	[12.11,12.95]	[5.634,6.69]	[5.073,5.926]	[6.497,7.448]	[7.868,8.848]	[9.54,10.62]
20 - 24	13.62	4.522	23.93	12.03	11.99	13.32	14.47	15.67
	[13.28,13.97]	[4.257,4.803]	[23.33,24.53]	[11.21,12.91]	[11.32,12.69]	[12.64,14.02]	[13.81,15.15]	[14.93,16.43]
25 - 39	29.08	10.45	45.47	21.23	25.98	28.48	32.39	35.5
	[28.79,29.38]	[10.18,10.72]	[45.06,45.89]	[20.55,21.93]	[25.48,26.49]	[27.99,28.98]	[31.89,32.9]	[34.93,36.08]
40 - 59	36.02	15.77	55.65	22.29	29.22	35.04	41.88	46.44
	[35.7,36.33]	[15.47,16.06]	[55.23,56.07]	[21.74,22.84]	[28.74,29.71]	[34.56,35.53]	[41.38,42.39]	[45.89,46.99]
60+	27.91	11.73	44.6	15.69	22.68	28.14	35.95	41.04
	[27.48,28.34]	[11.36,12.11]	[43.97,45.24]	[15.05,16.34]	[22.03,23.34]	[27.4,28.9]	[35.06,36.84]	[40.05,42.04]
Total	28.17	11.32	44.54	18.64	23.57	27.55	32.48	36.24
	[27.94,28.41]	[11.12,11.52]	[44.22,44.85]	[18.2,19.08]	[23.25,23.89]	[27.23,27.88]	[32.13,32.83]	[35.83,36.65]

Hypertension (diagnosed by heatlh worker)

Age group	Total (%) 95%CI	Gender (%) 95%CI		Quintile (%) 95%CI				
		Male	Female	Q1	Q2	Q3	Q4	Q5
15 - 19	0.2842	0.2439	0.3266	0.3068	0.3025	0.2613	0.2767	0.2781
	[.2502,.3227]	[.2022,.2943]	[.2765,.3857]	[.2282,.4124]	[.2294,.3987]	[.1959,.3485]	[.2094,.3656]	[.2114,.3657]
20 - 24	1.097	0.8932	1.306	1.137	1.205	1.356	1.067	0.7535
	[1.017,1.184]	[.7951,1.003]	[1.185,1.439]	[.9483,1.362]	[1.018,1.426]	[1.169,1.572]	[.9093,1.251]	[.6195,.9162]
25 - 39	4.404	2.844	5.713	3.879	4.669	4.732	4.625	4.112
	[4.3,4.51]	[2.734,2.959]	[5.563,5.868]	[3.665,4.103]	[4.452,4.895]	[4.522,4.951]	[4.427,4.832]	[3.922,4.31]
40 - 59	14.18	9.611	18.53	10.75	13.84	14.52	15.74	15.34
	[14,14.37]	[9.424,9.802]	[18.26,18.8]	[10.39,11.12]	[13.49,14.2]	[14.17,14.87]	[15.4,16.09]	[15,15.68]
60+	25.04	19.97	29.72	19.32	23.8	26.06	28.61	29.72
	[24.69,25.39]	[19.55,20.39]	[29.24,30.2]	[18.68,19.98]	[23.2,24.42]	[25.39,26.74]	[27.85,29.38]	[28.91,30.54]
Total	9.741	6.948	12.33	7.889	10.07	10.25	10.28	10.03
	[9.625,9.858]	[6.838,7.059]	[12.18,12.49]	[7.667,8.118]	[9.861,10.27]	[10.05,10.45]	[10.09,10.48]	[9.833,10.23]

Hypertension (based on measurement)

Age group	Total (%) 95%CI	Gender (%) 95%CI		Quintile (%) 95%CI				
		Male	Female	Q1	Q2	Q3	Q4	Q5
15 - 19	5.921	6.734	5.067	6.224	5.899	5.995	5.747	5.792
	[5.73,6.118]	[6.471,7.007]	[4.841,5.303]	[5.778,6.702]	[5.52,6.302]	[5.62,6.394]	[5.395,6.12]	[5.422,6.186]
20 - 24	9.15	10.37	7.902	9.483	9.065	9.047	8.86	9.357
	[8.881,9.426]	[9.998,10.76]	[7.582,8.234]	[8.831,10.18]	[8.525,9.636]	[8.523,9.601]	[8.37,9.376]	[8.803,9.942]
25 - 39	17.18	15.38	18.69	15.33	17.58	17.55	17.83	17.45
	[16.95,17.41]	[15.09,15.67]	[18.41,18.97]	[14.85,15.83]	[17.15,18.02]	[17.14,17.97]	[17.44,18.23]	[17.02,17.89]
40 - 59	34.88	29.81	39.69	30.04	34.37	35.77	36.73	36.47
	[34.6,35.15]	[29.49,30.13]	[39.35,40.04]	[29.47,30.63]	[33.87,34.88]	[35.28,36.26]	[36.25,37.21]	[35.97,36.98]
60+	55.19	50.16	59.85	52.59	55.61	55.22	56.81	56.39
	[54.78,55.6]	[49.63,50.69]	[59.34,60.36]	[51.74,53.43]	[54.87,56.35]	[54.44,55.99]	[55.96,57.66]	[55.47,57.31]
Total	26.29	23.46	28.92	24.39	27.32	26.96	26.42	26.23
	[26.09,26.49]	[23.23,23.68]	[28.69,29.15]	[23.97,24.81]	[26.98,27.66]	[26.65,27.28]	[26.12,26.73]	[25.89,26.57]

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