Proposed Methods for 13th General Programme of Work (GPW13) Impact Measurement

DRAFT FOR CONSULTATION

VERSION 1.2.0

10 Oct 2019

Document intended for consultation and discussion only. This is a working document and is not yet complete.
Warning

This is a working document intended for review, consultation and discussion. The documentation is not yet complete, and the methods are not yet finalised. All contents and examples are draft and may be expected to change. The document has not yet been formally edited or laid out.

The document is downloadable from https://www.who.int/about/what-we-do/thirteenth-general-programme-of-work-2019-2023. It is planned to provide regular updates to this document as it evolves. The document will be versioned and dated. Please check the above web page for updates.

Once methods are completed and agreed, a final report will be produced (May 2020).

Version History

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</tbody>
</table>

Contributors and Acknowledgements

To do.
# Table of Contents

Executive Summary .................................................................................................................. 9

1 Introduction .......................................................................................................................... 13
   1.1 The WHO Impact Framework ....................................................................................... 13
   1.2 Scope of this report ...................................................................................................... 14
   1.3 Status of methods ......................................................................................................... 15

2 Programmatic Indicators and Milestones .......................................................................... 16
   2.1 46 Programmatic indicators and 40 milestones ......................................................... 16
   2.2 Use of indicators in the triple billions ......................................................................... 19
   2.3 Indicator availability and methods .............................................................................. 19
   2.4 Equity for programmatic indicators ............................................................................ 20
   2.5 Supporting and strengthening country measurement capacity .................................. 21

3 Universal Health Coverage billion ..................................................................................... 23
   3.1 Introduction .................................................................................................................. 23
   3.2 Status of UHC Billion methods ................................................................................... 24
   3.3 UHC service coverage for the Billion ......................................................................... 24
      3.3.1 Selecting a measure of UHC service coverage for the UHC billion .................... 24
      3.3.2 The UHC SDG 3.8.1 service coverage index ...................................................... 24
      3.3.3 Average service coverage .................................................................................... 25
      3.3.4 Comparing average service coverage ................................................................. 26
      3.3.5 Limitations of using average service coverage .................................................... 27
      3.3.6 UHC service coverage index for the future ........................................................ 27
   3.4 UHC financial risk protection ....................................................................................... 28
   3.5 Calculating the UHC Billion ......................................................................................... 29
      3.5.1 Combining service coverage and financial protection for the UHC billion ........... 29
      3.5.2 Calculating contributions to the UHC billion ....................................................... 29
      3.5.3 Country example of calculating contribution to UHC billion .............................. 30
      3.5.4 Sharing out the UHC billion ................................................................................ 31
   3.6 Equity for UHC ............................................................................................................. 32

4 Health Emergencies billion .................................................................................................. 33
   4.1 Status of Emergency Billion Methods ........................................................................ 33
   4.2 The Emergency Prepare indicator .............................................................................. 34
      4.2.1 Example country calculation ............................................................................... 36
   4.3 The Emergency Prevent indicator .............................................................................. 36
      4.3.1 Calculation Method ............................................................................................... 37
      4.3.2 Data sources and availability ............................................................................... 38
      4.3.3 Example country calculation ............................................................................... 38
      4.3.4 Initial Global Results ........................................................................................... 39
4.4 The Emergency Detect and Respond Indicator ................................................................. 40
   4.4.1 Concept ......................................................................................................................... 41
   4.4.2 Calculation method ....................................................................................................... 41
   4.4.3 Data sources and availability ....................................................................................... 43
   4.4.4 Example country calculation ....................................................................................... 44
   4.4.5 Limitations .................................................................................................................... 45
4.5 Combined Emergency index ............................................................................................ 46
   4.5.1 Calculating the Country Contributions to the billion .................................................. 46
4.6 Equity for Emergencies ..................................................................................................... 47
5 The Healthier Population billion ........................................................................................ 48
   5.1 Status of Healthier Populations Billion Methods .......................................................... 49
   5.2 A concept framework for Healthier Populations ............................................................ 49
   5.3 Indicators for measuring Healthier Populations ............................................................. 50
      5.3.1 Type of indicators ...................................................................................................... 50
      5.3.2 Criteria for selection of indicators ............................................................................ 50
      5.3.3 Choice of indicators .................................................................................................. 51
      5.3.4 Impact of indicators .................................................................................................. 53
      5.3.5 Reframing indicators for Healthiness ....................................................................... 53
      5.3.6 Converting non-prevalence indicators ..................................................................... 54
      5.3.7 Making use of policy information ............................................................................. 56
   5.4 The Healthier Lives Approach ....................................................................................... 57
      5.4.1 Criteria for choice of method ................................................................................... 57
      5.4.2 Concept ..................................................................................................................... 58
      5.4.3 Healthier Lives approach – a measure of change ...................................................... 58
      5.4.4 Calculating the Healthier Lives contributions .......................................................... 58
      5.4.5 Sharing out the Healthier Populations billion .......................................................... 60
   5.5 Limitations of the Healthier Lives Approach ................................................................. 60
   5.6 Other aspects .................................................................................................................. 60
      5.6.1 Equity for Healthier Populations .............................................................................. 60
      5.6.2 Data Availability ...................................................................................................... 61
      5.6.3 Dealing with uncertainty ........................................................................................... 61
      5.6.4 Negative contributions ............................................................................................. 61
   5.7 Testing the Healthier Population Billion using Historical data 2010-15 ....................... 61
   5.8 Achieving the Healthier Population Billion ................................................................. 63
   5.9 Country Examples .......................................................................................................... 63
6 Healthy Life Expectancy (HALE) ...................................................................................... 64
   6.1 Calculation of HALE ....................................................................................................... 64
   6.2 Contribution of the billions to HALE ........................................................................... 65
   6.3 Equity for HALE ............................................................................................................. 65
7 Equity .................................................................................................................................... 66
List of Figures

Fig. 0.1. WHO Impact Measurement ................................................................. 9
Fig. 1.1. The WHO Impact Framework ............................................................... 13
Fig. 1.2 The overlapping triple goals ................................................................. 14
Fig. 2.1. Indicators in the Triple Billion Indices. The 7 UHC service coverage indicators are selected from the SDG 3.8.1 tracer indicators and are all direct measures of service coverage. ......................... 19
Fig. 2.2. Availability of primary or underlying data for SDG indicators: For about one third of countries, there is no recent primary or underlying data for over half of the SDG indicators. ......................... 20
Fig. 2.3. Example of dimensions of inequality for country monitoring: One (or two) of these dimensions will be selected for each indicator and country-level .............................................. 21
Fig. 2.4. Strengthening country capacity in data and innovation: Outcome 4.1 of the proposed programme budget 2020-21. ................................................................. 22
Fig. 3.1. Universal Health Coverage within the Sustainable Development Goals ........... 23
Fig. 3.2 Distribution of UHC service coverage. The three cases below both result in a UHC of 50% (average service coverage). In the first case everyone has 50% coverage; in the second case half the population has full coverage and the remainder has no coverage, in the third case there is a mix of levels that averages out to 50%. ........................................................................ 26
Fig. 3.3 Relationship between SDG 3.8.1 UHC Index and average of 7 component indicators (see Table 3.1) for service coverage for 183 countries for years 2000 to 2017 (with values for 2015 in red). ... 27
Fig. 3.4 The population receiving UHC without catastrophic spending is a subset of the population with UHC ........................................................................ 30
Fig. 4.1. The three tracer indicators that constitute the Health Emergences Index ................ .. 33
Fig. 4.2. Comparison of SPAR and JEE IHR scores .............................................. 36
Fig. 4.3. Routine and campaign vaccinations included in the ‘Prevent’ indicator ................ 37
Fig. 4.4. Mean coverage of Emergency Prevent Indicator (2018 preliminary results) .......... 40
Fig. 4.5. Calculation of the combined emergency index ........................................... 46
Fig. 4.6 Hypothetical Country Example Contribution to “1 Billion Better Protected” ........ 47
Fig. 5.1. The healthier billion concept – improving people’s health and well-being by addressing social (& commercial), economic, environmental and behaviour risks to health. Symbol for alcohol to be reviewed. ................................................................. 48
Fig. 5.2 Health impact pyramid (Frieden) ........................................................... 50
Fig. 5.3. 14 Indicators selected for inclusion in the Healthier Populations Index ............... 52
Fig. 5.4. Relationship between total APC and prevalence of (a) heavy episodic drinking in the past month and (b) abstainers past 12 months. Approximate linear relationships can be seen. ................. 55
Fig. 5.5 Relationship between ratio of road injuries to road deaths and the social demographic index (sdi). The green line shows a fitted cubic equation plus 95% confidence intervals for the fitted line. ....56

Fig. 5.6. The healthier lives approach........................................................................................................................................57

Fig. 5.7. Contributions to the HL index calculation for 2010-15 by indicator and region (figures provisional). ...............................................................................................................................................62

Fig. 5.8. Expected number of Healthier Lives if GPW13 milestones are met together with expected corresponding DALYs averted (update needed) Add targets........................................................................63

Fig. 6.1. Difference between life expectancy and healthy life expectancy (update needed) ..........65

Fig. 8.0.1. From 2013 to 2017, countries had data for an average of 40% of the 14 UHC SCI indicators. (UHC Report 2019). ................................................................................................................................................71

List of Tables

Table 2.1. Programmatic indicators and GPW13 2023 global milestones ........................................17

Table 3.1. Indicators in the UHC SDG Index (see Appendix B.1 for details of indicators). .................25

Table 3.2 Calculation of average service coverage for Country X based on historical data for 2012 and 2017 ................................................................................................................................................31

Table 3.3 Calculation of the contribution to UHC Billion for Country X based on historical data for the 5-year period 2012 to 2017 ........................................................................................................................................31

Table 4.1. IHR Capacity score categories, and example values for Bangladesh based on the SPAR...34

Table 4.2. Emergency Prevent Indicator Categories .................................................................................35

Table 4.3. At-risk Member States (n) .................................................................................................................38

Table 4.4. Example calculation of the Emergency Prevent indicator for Nigeria .................................39

Table 4.5. Emergency Prevent Indicator levels for all Member States and at-risk Member States (n = 66) ..............................................................................................................................................40

Table 4.6 Definitions of Event Milestones used to measure timeliness ....................................................41

Table 4.7 Key event milestones and their associated indicators .................................................................42

Table 4.8 Definition of levels for the timeliness measures (thresholds may be revised) ..........................43

Table 4.9 Detect and Respond indicator levels ..............................................................................................43

Table 4.10 Example Country A (n=1): Country with one event with all dates reported .....................44

Table 4.11 Example Country B (n=1): Country with one event with no “event start date” reported.....44

Table 4.12 Example Country C (n=3): Country with multiple dates with all (or most) of the dates reported Timeliness will be calculated for each event then the average will be used.................................45
Table 5.1. Indicators considered for Healthier Population Billion. 14 have been selected for inclusion. Data sources are GHO and UN SDG databases.

Table 5.2. Global burden of disease and current data availability for indicators in the Healthier Population Billion.

Table 5.3. Indicators for measuring change in Healthiness.

Table 5.4. Estimated number of Millions of people with Healthier Lives by indicator and region for 2010 to 2015. Figures provisional and expected to change.

Table 0.1 Average Vaccine Coverage by Country Category.

Table 0.2. Current mapping of indicators to distinct population subgroups.
Executive Summary

The purpose of this document is to describe and propose details of the methods to be used to measure the impact of the World Health Organisation’s Thirteenth General Programme of Work, 2019–2023 (GPW13). At present the document provides a basis for consultation and discussion prior to the finalisation of the methods. It is planned that the document will evolve into the definitive write up of the GPW13 measurement methods.

WHO Impact Measurement is part of GPW13. It measures progress at three levels:

1. 46 programmatic indicators and milestones covering a range of health issues
2. The triple billion goals to be achieved by 2023
   - 1 billion more people benefiting from universal health coverage,
   - 1 billion more people better protected from health emergencies, and
   - 1 billion more people enjoying better health and well-being
3. Healthy life expectancy (HALE) quantifying expected years of life in good health as a measure of the overall health of populations.

The Impact Framework commits to improving equity in health at all levels of the framework.

Programmatic Indicators

The 46 programmatic indicators cover a range of key health issues and underpin the GPW13 programme. The 46 programmatic indicators were approved at WHA May 2020 after extensive internal and external consultation. They include 38 SDG indicators together with 8 non-SDG indicators that address priorities identified by member states: antimicrobial resistance; polio; risk factors for noncommunicable diseases; and emergencies. The 46 programmatic indicators are associated with 40 2023 global milestones.

The programmatic indicator approach is flexible – countries select which indicators are a priority and set their own 2023 milestones. Not every country will track every indicator. Indicators will be disaggregated by key inequality measures (such as sex, age and location).

WHO will work with countries to address gaps in data collection: for around 1/3 of countries there is no recent data for over half of the SDG health-related indicators (WHS report 2019).
The Universal Health Coverage Billion

The Universal Health Coverage (UHC) billion aims to ensure that an additional one billion people receive the health services they need without financial hardship. Universal Health Coverage (UHC) is a part of the Sustainable Development Goals (Task 3.8). The UHC billion will be based on the 2 UHC SDG indicators: - an index of coverage of essential health services (indicator 3.8.1); and a measure of the proportion of population with large household expenditure on health as a share of total household expenditures or income (indicator 3.8.2).

SDG 3.8.1, the UHC service coverage index, is currently measured using 14 sub indicators of which 8 are measures of coverage and the rest are proxy measures. Calculation of the UHC billion from the SDG indicators is not entirely straightforward because SDG 3.8.1 provides a directional index of UHC levels but is not a direct measure of service coverage. It is proposed to estimate the UHC billion using 7 of the SDG 3.8.1 tracer indicators (including family planning, antenatal care, immunisation (diphtheria, tetanus, pertussis), child pneumonia, TB, HIV, Bed nets) to calculate average service coverage (section 3.5). The average service coverage will then be combined with the financial protection measure to provide an estimate of the UHC billion. Work is ongoing to evaluate approaches to including financial protection (section 3.4).

If current progress towards UHC is maintained at a steady rate, this would result in a contribution of approximately 500 – 700 million. Considerable acceleration will be needed if the target of 1 billion is to be achieved.

The Health Emergencies Billion

The Emergencies billion goal is for 1 billion more people to be better protected from health emergencies. It will be measured using an index that is built from three simple indicators

- Emergency Prepare indicator (measuring IHR capacities)
- Emergency Prevent indicator (measuring routine and emergency vaccination coverage)
- Emergency Detect and Respond indicator (measuring timeliness)

The Emergency “Prepare” indicator measures country preparedness for emergencies. It encapsulates the level to which a country is ready to identify and respond to a range of emergency situations. It is based on the average attainment of 13 International Health regulations (IHR) capacities for surveillance and response as reported using the IHR State Parties Self-Assessment Annual Reporting (SPAR).

The Emergency “Prevent” indicator measures efforts to prevent health emergencies via vaccination coverage. Reaching high vaccination coverage in at-risk groups for vaccine-preventable infectious pathogens is a key element to tackling preventable epidemic diseases and pandemics and to the control and elimination of high-threat infectious hazards. The indicator is a weighted average of routine and campaign vaccinations for epidemic and pandemic prone diseases. The indicator can be adapted to include other mass vaccination campaigns that are needed (e.g. pandemic influenza, Ebola virus disease).

Current vaccinations used in the prevent indicator are

- priority infectious hazards: yellow fever, meningococcal meningitis A. and cholera.
- measles – measured everywhere and emphasizing the importance of routine coverage

Vaccination data will be compiled from a variety of sources, particularly for campaign coverage for which data tends to be patchy.

The Emergency “Detect and Respond” indicator measures the proportion of IHR notifiable public health events that are detected, notified and responded to in a timely fashion. The indicator focuses on three elements
• Time to detection
• Time to notification
• Time to respond

This is a new indicator of key importance for improving emergency response. Data is being gathered retrospectively from events reported to WHO under IHR regulations. The indicator is still being refined and updates are anticipated.

The Health Emergencies Protection index (HEPI) is calculated as the average of the Prepare, Prevent and Detect & Respond sub-indicators. Countries will be categorized into 5 levels of HEPI (0-30, 30-50, 50-70, 70-90 and >90 %). The “1 billion better protected” will be measured at the end of the 5-year period by considering that a full level change (+20%) to be equivalent to the total population being better protected. Where progress is slower, a smaller fraction of the population will be counted. The approach encourages incremental progress in all countries. It is expected that all countries will have scope for improvement, especially for the new timeliness indicator.

**The Healthier Population Billion**

The Healthier Population (HP) Billion goal aims to support the world’s population to live healthier lives. The key to achieving this will be via government policies and actions that promote healthier environments and encourage healthier life choices.

The proposed Heathier Lives index will be constructed using indicators that are healthier populations enablers. The index is built on the assumption that the target will primarily be met through multisectoral interventions, driven by the health sector, and influenced by policy, advocacy and regulation. These will be measured based on data on social, environmental, economic, commercial and behavioural risks. The index is not intended to include factors primarily handled within the health care system.

The proposals made in this document include

• Use of 14 indicators selected from the GPW13 programmatic indicators (Section 5.3). These are health indicators covering environmental, behavioural and social/health risk factors. They include clean air, safe water, sanitation and roads, tobacco and alcohol use, obesity, domestic violence (intimate partner; child), child nutrition and child development. Most of them are SDG indicators.
• Use of a simple unweighted counting scheme, the Healthier Lives approach, to create the Heathier Lives index which will measure progress of populations towards the billion (Section 5.4).
• Making simple adjustments for mitigating double counting and population growth as outlined in Section 5.4.4.
• Reporting data on policy implementation and legislation alongside the Healthier Lives index – such interventions will be key to progressing the HP billion. Policy measures will not be directly included in the index.

The proposed approach advocates a method which is straight-forward and transparent whilst being able to capture progress on key factors. It responds to requests for greater country autonomy and is designed to be accessible so that countries are able to calculate their own contributions to the index. It is hoped this will encourage further changes that promote healthier lives around the globe (Section 5.4.1).

The proposed method is tested using historical data for 2010 to 2015 (a 5-year period equivalent to the GPW13 period). Over this period, the number of healthier lives counted is around 500-700 million (provisional and sensitive to details of how indicators contribute). Thus, if progress continues at the same rate, the Healthier Population Billion may not be achieved. Acceleration will be required particularly for indicators where decreases in healthiness are anticipated e.g. obesity.
As a separate study of the method, the potential progress towards the Healthier Population billion is estimated using future scenarios. This examines how the Healthier Lives index would look if all indicators were to meet the GPW13 milestones and demonstrates the potential individual contributions of indicators.

The Healthier Lives approach is considered as a first step in measuring changes in healthiness linked to the GPW13 programme. Both indicators and the method may evolve over time as experience is gained. For example, the GPW13 indicators are a non-optimal set of indicators - they are not comprehensive of all key environmental, economic, behavioural and social risks affecting healthiness and they do not cover all aspects of the life course equally. More comprehensive methods may be considered in the future (Section 5.5, Appendix D).

The billion measures the impact linked to GPW13 indicators due to the joint efforts of WHO, member states and other interested parties. It is not possible to separate out the impact specifically attributable to WHO’s GPW13 impact framework. The time frame of GPW13 programme, in combination with lags in the timeliness of indicator estimates, and the time delay between an intervention and a result, will make calculation of change by 2023 a challenge.

Healthy life expectancy

Healthy life expectancy (HALE) is an indicator that provides a summary measure of average levels of population health. It quantifies the expected years of life spent in good health. HALE will be used for GPW13 baseline reporting and for monitoring progress for each Member State. HALE will facilitate cross-country comparisons, and comparisons within countries over time.

Equity

Equity in health is a cross cutting theme of the GPW13 methods: advances in global and member state health care must not leave behind those in the greatest need. Measures of inequality will be made at all three levels of the GPW13 framework: the component indicators, the triple billion goals and HALE. Specific milestones for disadvantaged groups will be used to ensure that disadvantaged groups benefit proportionally more from the triple billion goals. The key to tracking equity will be disaggregation of the 46 programmatic indicators, whenever applicable, to measure within-country inequality so that it can be addressed on a country level.
1 Introduction

1.1 The WHO Impact Framework

In May 2018, the World Health Assembly approved WHO’s 13th General Programme of Work (GPW 13). This programme focuses on measurable health impact for people at the country level. To support this WHO has created the WHO Impact Framework, a measurement system which allows health impact to be measured accountably.

The Impact Framework’s aims are to

- make a measurable impact on people’s health at country level
- increase the likelihood that the triple billion goals will be met
- accelerate progress towards the Sustainable Development Goals (SDGs)
- transform how WHO works by anchoring commitments in measurable results
- provide a means of tracking the joint efforts of the Secretariat, Member States and partners
- strengthen country data and information systems for health.

Fig. 1.1. The WHO Impact Framework

The Impact Framework measures progress at three levels:

1. 46 programmatic indicators and milestones cover a range of health issues and provide a set of measurement indicators that will be used to measure the outcomes in the programme budget (38 of which are identical to SDGs).

2. The triple billion goals:
   - 1 billion more people benefiting from universal health coverage,
   - 1 billion more people better protected from health emergencies, and
   - 1 billion more people enjoying better health and well-being

The goal will be to achieve the triple billion goals by 2023. Each of the triple billions will be measured using composite indices. The billions may overlap, that is some people may benefit from more than one of the billions (Fig. 1.2).
3. **Healthy life expectancy** (HALE) quantifies expected years of life in good health at a particular age and can be considered a summary measure of the overall health of populations. It is proposed to use HALE within GPW 13 as an overarching and comparable measure of the impact of the triple billion goals.

The Impact Framework includes a cross-cutting commitment to improving equity in health at all levels of the framework (Chapter 7).

1.2 Scope of this report

The document describes the current state of the (proposed) methods for use in the GPW13 Impact Framework. It includes method details and examples where known.

It discusses each of the three levels of the Impact framework, focussing particularly on the methodology for each of the billions and how indices and component indices will be calculated. It provides (or will provide) example calculations and considers both the global and country level.

In cases where the method is still under debate, or examples are not yet constructed, it suggests options under consideration. Sections on Status (as below) provide a summary of work in progress and will not form part of the final report.

This report is intended to evolve into a publication that documents the methods of the GPW13 programme.
1.3 Status of methods

The GPW13 programme formally commenced at the beginning of 2019. At the time of writing this report (October 2019) methods are currently work in progress and undergoing a process of consultation.

Current key areas needing to be resolved

**UHC.** A method to estimate UHC from SDG 3.8.1 indicators is proposed but requires further testing. Work is ongoing to consider options for combining service coverage with financial protection (Section 3.5.1).

**Emergencies** The method is largely ready. Recent progress has been made in gathering and developing the data and definitions of the Detect and Respond indicator. Some evolution is to be expected for this new but important indicator. The method for combining the sub indicators into an overall index is undergoing testing.

**Healthier Populations** A method for estimating the Healthier Populations is proposed in Section 5. The approach awaits consultation, review and refinement. Three indicators require transformation into prevalence and this is not yet complete. Country examples are being prepared.

**Country examples** An important next step for the report (and methods) is to include examples of each of the methods applied at a country level so countries can understand how it looks at their level, what their expected targets are for the three billions. The aim is to make the document more relevant for Member states. This work has started and is likely to be included in the next update of this report.

**Steps completed/planned for the finalisation of the methods and report include**

- September 2019: Informal review by key experts (complete).
- September 2019: WHO technical programs (complete)
- October 2019: Expert review (regions, technical experts, country experts, ERG)
- November 2019: Informal country consultation
- January 2020: Executive Board
- May 2020: WHA. Final submission

This report and methods will continue to evolve over this period.

This report is presented in the light of being the best that can be offered now and with the hope of facilitating progress and rapid completion of the methods. Updates will be issued as methods become finalised.
2 Programmatic Indicators and Milestones

2.1 46 Programmatic Indicators and 40 Milestones

The programmatic milestones cover a range of health issues and provide a set of measurement indicators that will be used to measure the outcomes of the programme budget. The programmatic milestones and the corresponding indicators are designed to be flexible. Countries will select their priorities and track progress on selected targets using the associated indicators. Not all milestones will be selected in every country, thereby focusing Member States on reporting the most important country-identified issues.

The milestones have been developed by WHO technical programmes and have undergone consultation with Member States and review by partners. They were approved by WHA 2019 after extensive consultation. Progress on the underlying issues will provide the basis for improving global health and achieving the billions.

There are 46 programmatic indicators and 40 milestones associated with these indicators (Table 2.1). The 46 selected indicators serve as a flexible toolkit to measure GPW13 performance and to track and accelerate progress toward the SDGs. The indicators have largely been selected from existing SDG indicators with the addition of a few additional emerging health topics:

- 38 of the 46 indicators are taken from the Sustainable Development Goals (SDGs)
- 25 derive from SDG 3; 13 from other SDG categories
- 8 non-SDG indicators addressing priorities identified by member states: antimicrobial resistance; polio; risk factors for noncommunicable diseases; and emergencies

Indicators will be disaggregated by key inequality measures (such as sex, age and location). Disaggregation dimensions and priority subgroups (e.g. vulnerable populations) will be identified globally and by member states.
Table 2.1. Programmatic indicators and GPW13 2023 global milestones
See also [http://apps.who.int/gb/ebwha/pdf_files/WHA72/A72_5-en.pdf](http://apps.who.int/gb/ebwha/pdf_files/WHA72/A72_5-en.pdf). Note that countries may set their own 2023 milestones. 2023 Milestones are not finalised and may be adjusted. Todo update and add column for which billion.

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<td>SDG 1.5.1</td>
<td>Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population</td>
<td>Reduce the number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population</td>
</tr>
<tr>
<td>SDG 1.a.2</td>
<td>Proportion of total government spending on essential services (education, health and social protection)</td>
<td>Increase the share of public spending on health by 10%</td>
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<td>Prevalence of stunting (height for age &lt; -2 standard deviation from the median of the WHO Child Growth Standards) among children under 5 years of age</td>
<td>Reduce the number of stunted children under 5 years of age by 30%</td>
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<td>Reduce the prevalence of wasting among children under 5 years of age to less than 5%</td>
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<td>Prevalence of malnutrition (weight for height &gt; -2 or &lt; -2 standard deviation from the median of the WHO Child Growth Standards) among children under 5 years of age (overweight)</td>
<td>Halt and begin to reverse the rise in childhood overweight (0-4 years)</td>
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<td>Maternal mortality ratio</td>
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<td>Proportion of births attended by skilled health personnel</td>
<td>Reduce the preventable deaths of newborns and children under 5 years of age by 17% and 30%, respectively</td>
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<td>Reduce neonatal mortality rate</td>
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<td>Reduce number of new HIV infections per 1000 uninfected population, by sex, age, and key populations by 78%</td>
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<td>SDG 3.3.1</td>
<td>Number of new HIV infections per 1000 uninfected population, by sex, age, and key populations</td>
<td>Reduce number of new HIV infections per 1000 uninfected population, by sex, age, and key populations by 78%</td>
</tr>
<tr>
<td>SDG 3.3.2</td>
<td>Tuberculosis incidence per 100,000 population</td>
<td>Reduce by 27% the number of new TB cases per 100,000 population</td>
</tr>
<tr>
<td>SDG 3.3.3</td>
<td>Malaria incidence per 1000 population</td>
<td>Reduce malaria case incidence by 50%</td>
</tr>
<tr>
<td>SDG 3.3.4</td>
<td>Hepatitis B incidence per 100,000 population</td>
<td>Reduce Hepatitis B incidence to 0.5% for children under 5 years</td>
</tr>
<tr>
<td>SDG 3.3.5</td>
<td>Number of people requiring interventions against neglected tropical diseases</td>
<td>Reduction of people requiring interventions by 400 million</td>
</tr>
<tr>
<td>SDG 3.4.1</td>
<td>Mortality rate attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease</td>
<td>20% relative reduction in the premature mortality (age 30-70 years) from NCDs (cardiovascular, cancer, diabetes, or chronic respiratory diseases) through prevention and treatment</td>
</tr>
<tr>
<td>SDG 3.4.2</td>
<td>Suicide mortality rate</td>
<td>Reduce suicide mortality rate by 15%</td>
</tr>
<tr>
<td>SDG 3.5.1</td>
<td>Coverage of treatment interventions (pharmacological, psychosocial and rehabilitation and aftercare services for substance use disorders)</td>
<td>Reduce service coverage of treatment interventions (pharmacological, psychosocial and rehabilitation and aftercare services for substance use disorders) to 70% *</td>
</tr>
<tr>
<td>SDG 3.5.2</td>
<td>Harmful use of alcohol, defined according to the national context as alcohol per capita consumption (aged 15 years and older) within a calendar year in litres of pure alcohol</td>
<td>7% relative reduction in the harmful use of alcohol as appropriate, within the national context</td>
</tr>
<tr>
<td>SDG 3.6.1</td>
<td>Death rate due to road traffic injuries</td>
<td>Reduce the number of global deaths and injuries from road traffic accidents by 20%</td>
</tr>
<tr>
<td>SDG 3.7.1</td>
<td>Proportion of women of reproductive age (15-49 years) who have their need for family planning satisfied with modern methods</td>
<td>Increase the proportion of women of reproductive age (15-49 years) who have their need for family planning satisfied with modern methods to 56%</td>
</tr>
<tr>
<td>SDG 3.8.1</td>
<td>Coverage of essential health services (defined as the average coverage of essential services based on tracer interventions that include reproductive, maternal, newborn and child health, infectious diseases, non-communicable diseases and service capacity and access, among the general and the most disadvantaged population)</td>
<td>Increase coverage of essential health services</td>
</tr>
<tr>
<td>SDG 3.8.2</td>
<td>Proportion of population with large household expenditures on health as a share of total household expenditures or income</td>
<td>Stop the rise in percent of people suffering financial hardship (defined as out-of-pocket spending exceeding ability to pay) in accessing health services</td>
</tr>
</tbody>
</table>
Other public health priorities, such as service coverage for severe mental disorders, care dependency in older adults, cervical cancer screening and palliative care, are areas for which additional milestones and indicators will be considered once better data become available.
2.2 Use of indicators in the triple billions

The programmatic indicators contribute either indirectly or directly to the triple billions (Figure 2.2; Table 2.1)

The UHC billion is based on the programmatic indicators SDG 3.8.1 UHC service coverage index and 3.8.2 UHC financial hardship. SDG 3.8.1 has 14 component indicators – and several of these are either programmatic indicators or are closely associated with programmatic indicators (for example tuberculosis treatment is used as a SDG 3.8.1 sub-indicator, and tuberculosis incidence rate is one of the programmatic indicators). Seven of the SDG sub-indicators are used to calculate the UHC billion (Table 3.1).

For the emergencies better protected billion, IHR and vaccine coverage are used in the estimation of the billion. Two further indicators monitor equity for emergency protection.

For the healthier populations billion, all component indicators are selected from the programmatic indicators.

Fig. 2.1. Indicators in the Triple Billion Indices. The 7 UHC service coverage indicators are selected from the SDG 3.8.1 tracer indicators and are all direct measures of service coverage.

2.3 Indicator availability and methods

The availability of data values/estimates for the 46 programmatic indicators can be found in Appendix A.2 (extend this to include underlying data availability as previously). The data is compiled from two key sources of data.

- Data was primarily extracted from https://unstats.un.org/sdgs/indicators/database/. This database contains country-reported data or official estimates agreed with countries.
- In case data was not available from this source, data from WHO’s Global Health Observatory was used.
- Data is available on the indicators from 2000-2018.

Three aspects of indicator availability are presented in Appendix A.2:

1. Number of countries which had no data for each of the indicators, 2000-2018.
2. Number of countries which have at least one data point available from 2015 or later.
3. Number of countries which have trend data available: at least two data points with the latest data from 2015 or later.
A key issue is that while indicators are available they are not always derived from primary data. For countries with no data, indicators such as under-five mortality and neo-natal mortality are estimated. The World Health Statistics 2019 reported that 63 of 194 WHO Member States lack recent primary data for more than half of the health-related SDGs indicators (Fig. 2.2), and for 40 per cent of indicators, less than half of countries have recent primary data. For many indicators, no recent sex-disaggregated data are available. Even though 10 per cent of health-related SDG indicators depend directly on reliable cause of death data, only half of all deaths around the world are reported with a cause of death and 30 million deaths are unreported each year, mainly in low-and middle-income countries.

Fig. 2.2. Availability of primary or underlying data for SDG indicators: For about one third of countries, there is no recent primary or underlying data for over half of the SDG indicators.

Source: World Health Statistics 2019

Many of the SDG indicators, GPW13 specific indicators and the methods for each of the billions depend on the availability of accurate cause of death data, household surveys, and diseases registries. The methods, data sources, frequency of data collection and other relevant information on each of the 46 programmatic indicators are provided in the metadata file (http://bit.ly/gpw13-metadata). An example of the information provided for each of the indicators can be seen in Appendix A.1

It is possible that one or more additional indicators will be proposed to Member States on vital topics where data or measurement are not yet available or agreed (e.g. ageing, palliative care, cervical cancer and mental health).

2.4 Equity for programmatic indicators

A key objective of the 46 programmatic indicators and milestones is to proportionally benefit the most disadvantaged populations and reduce within-country inequalities, i.e. differences in health that exist between population subgroups within a country.

Each country will identify, for each of its selected programmatic indicators and milestones

- at least one key dimension of inequality, and,
• for each key inequality dimension, at least one priority subgroup.

The situation in the priority subgroup(s) will be monitored alongside national average to show how the most-disadvantaged subgroups are performing compared to the population overall.

The key dimension(s) of inequality and priority subgroup(s) will differ between indicators (Fig. 2.3). Even for a given indicator, the key dimension(s) and priority subgroup(s) may differ from country to country and need not be the same as that used for global monitoring. Furthermore, the choice of key dimension(s) and priority subgroup(s) may be influenced by local data availability.

Fig. 2.3. Example of dimensions of inequality for country monitoring: One (or two) of these dimensions will be selected for each indicator and country-level

Countries should consider the following:

• At least one key dimension of inequality should be selected for each indicator, and for each inequality dimension, at least one priority subgroup should be identified. The priority subgroup is typically the most-disadvantaged or most-vulnerable subgroup.
• Geographical inequalities may be captured using administrative/district-level data. Where possible this should be included in addition to the other key dimension(s).
• Double-disaggregation should be considered wherever relevant. For instance, in a study of the smoking prevalence in Eastern European countries, data disaggregated simultaneously by sex and income showed opposite patterns in men (higher prevalence among the poor) and women (higher prevalence among the rich).

Not all the 46 programmatic indicators and milestones can be disaggregated. Some indicators and milestones are only applicable at the national level, such as SDG 3.d.1 International Health Regulations.

2.5 Supporting and strengthening country measurement capacity

The GPW13 WHO Impact Framework measurement requires reliable, timely, affordable, country-owned and accessible data, including disaggregation to enable analysis by equity and gender. Measurement of the triple billion goals depends on country measurement systems.

This report focusses on the GPW13 methods. Nevertheless, WHO is investing effort and working with a diverse set of partners, in supporting countries to strengthen their data collection, analysis, interpretation, and use functions without which robust measurement of the GPW13 will not be possible. A long-lasting
benefit of this measurement approach will be to identify and fill gaps in measurement systems at the
country level and support countries to address these to monitoring and improvement of public health impact

Fig. 2.4. Strengthening country capacity in data and innovation: Outcome 4.1 of the proposed programme
budget 2020-21.

1. Strengthened country health information systems
   To facilitate the use of data and information in policy-making and to deliver impacts

2. Monitoring of global trends
   Including GWP13 impacts and outcomes, global and regional health trends, SDG indicators, and health inequalities

3. Research systems and innovations to scale
   Strengthened evidence base, prioritization and uptake of WHO generated norms and standards, and improved research capacity and the ability to effectively scale up innovations in countries
3 Universal Health Coverage billion

3.1 Introduction

The Universal Health Coverage (UHC) billion aims to ensure that an additional one billion people receive the health services they need without financial hardship.

*Universal Health Coverage* is a part of the Sustainable Development Goals (Task 3.8) and is monitored by two indicators. These are an index of coverage of essential health services (indicator 3.8.1); and a measure of the proportion of population with large household expenditure on health as a share of total household expenditures or income (indicator 3.8.2).

Fig. 3.1. Universal Health Coverage within the Sustainable Development Goals

The UHC billion will incorporate both coverage and financial protection. These two indicators continue to be measured separately but will be jointly used to estimate the billion, i.e., people who receive the services they need without incurring financial hardship.

**Access:** the ability to use services including:
- Physical accessibility
- Financial affordability
- Social and cultural acceptability

**Coverage:** the proportion of people that receive the intervention/s they need.

**Effective coverage of a service or intervention:** the fraction of potential health gain that can be delivered by the health system through an intervention that is actually delivered.

**Effective coverage of the entire health system:** the fraction of the total potential health gain that the health system could deliver to a population that is actually delivered.

**Quality:** whether the people who need the interventions obtain them in a timely manner and at a desired level of quality (i.e., are they delivered safely, with effectiveness and with responsiveness, in an efficient manner).
### 3.2 Status of UHC Billion methods

The Universal Health Coverage billion will be based on SDG 3.8.1 and 3.8.2 (UHC report 2017, 2019; Lancet paper).

Calculation of the service coverage component of the UHC billion from SDG 3.8.1 is not entirely straightforward because SDG 3.8.1 provides a directional index of UHC service coverage levels, but it is not a direct measure of service coverage. This means that SDG 3.8.1 cannot be directly converted into a proportion of needed services that are provided. Work is underway to finalise the details - the proposed approach is to use a subset of the SDG 3.8.1 tracer indicators (family planning, antenatal care, immunisation (diphtheria, tetanus, pertussis), child pneumonia, TB, HIV, Bed nets) to create a measure of average service coverage. Average service coverage will then be combined with the financial protection measure for estimation of the UHC billion. The method is not finalised, but proposals are being worked on (Section 3.5.1).

### 3.3 UHC service coverage for the Billion

#### 3.3.1 Selecting a measure of UHC service coverage for the UHC billion

Measuring UHC service coverage is non-trivial and remains a relatively recent development in global health metrics. Methods for measuring UHC are still evolving and in the future UHC measurement is expected to benefit from improved indicators and methods (refs). For the UHC billion, the aim is to make the best use of existing methods and data whilst looking forward to the future.

Use of the SDG 3.8.1 UHC service coverage index is currently the preferred option of member states for measurement of the service coverage component of the billion. However, this index is not ideal because SDG 3.8.1 is a directional index rather than a measure of coverage. The use of transformed proxy indicators, together with geometric averaging, means that the SDG 3.8.1 is directional but is not a directly scalable measure of service coverage (e.g. if SDG 3.8.1 increases by 20% this does not mean service coverage has increased by 20%). This means that it cannot be directly converted into contributions to the billion. There is no simple perfect solution for estimation of the UHC billion based on SDG 3.8.1 alone.

This section describes how the UHC service coverage component of billion will be calculated by taking selected SDG 3.8.1 component indicators and using them to estimate average service coverage (asc). This avoids any additional data burden on countries and means the billion is closely linked to SDG 3.8.1.

The average service coverage proposed here has the advantage of simplicity and transparency and could be easily adapted if other measures of service coverage become available. For example, it may be possible to include hypertension using an alternative indicator more closely aligned to treatments. The disadvantage is that the proposed average service coverage currently includes only seven indicators (Section 3.3.3, Table 3.1). The limited number of indicators means that many important treatments are not included. It also means that overestimation of UHC service coverage is anticipated, especially given that coverage for non-communicable diseases lags behind coverage for RMNCH conditions and communicable diseases. Further discussion of the limitations of using SDG 3.8.1 as the basis for estimation of UHC coverage is provided in Section 3.3.5.

#### 3.3.2 The UHC SDG 3.8.1 service coverage index

SDG 3.8.1 is calculated using 14 component indicators that are grouped into Reproductive, maternal, newborn and child health; Infectious disease control; Non-communicable diseases and Service capacity and access (Table 3.1; Appendix B.1). These component indicators were selected to meet several criteria...
including data availability, equity disaggregation and lessening of the reporting burden. The indicators include eight direct measures of service coverage and six indicators that are proxy measures.

For the SDG 3.8.1 service coverage index, the 14 indicators are combined using a nested geometric averaging approach. Measures of service coverage (e.g., antiretroviral therapy (ART) coverage for people living with HIV) are used directly, whilst proxy measures are rescaled to a 0 to 100 scale (e.g. mean fasting plasma glucose). The rescaled indicators are combined through a series of geometric means to obtain the index. The resulting index is a performance metric (scaled from 0 to 100). Full details of the method and calculations for 2015 are available in the Tracking Universal Health Coverage Report (WHO, 2017) and the 2019 UHC report.

Table 3.1. Indicators in the UHC SDG Index (see Appendix B.1 for details of indicators).

<table>
<thead>
<tr>
<th>Tracer topic</th>
<th>Current indicator</th>
<th>Used in UHC Billion</th>
<th>Used in other billion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. RMNCH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family planning</td>
<td>Family planning (SDG)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Pregnancy care</td>
<td>Antenatal care (4+ visits)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Immunization</td>
<td>3 of diphtheria-tetanus-pertussis</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Child treatment</td>
<td>Child pneumonia care-seeking</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>2. Infectious disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>TB treatment</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>HIV</td>
<td>HIV treatment (ART)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Malaria</td>
<td>Bed nets</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Water and sanitation</td>
<td>Improved sanitation</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>3. Noncommunicable disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>Prevalence of high blood pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>Mean Fasting blood glucose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tobacco</td>
<td>Tobacco use (SDG)</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>4. Service capacity &amp; access</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital access</td>
<td>Hospital bed density</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health worker density</td>
<td>Physician, Surgeon, Psychiatrist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health security</td>
<td>International Health Regulations (SDG)</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

3.3.3 Average service coverage

Average service coverage (ASC) measures the percentage of needed services that are provided at a population level. For the GPW13 UHC billion, average service coverage, will use those SDG 3.8.1 tracer indicators that are measures of service coverage. This amounts to 7 indicators out of the 14 SDG 3.8.1 component indicators (including family planning, antenatal care, immunisation (diphtheria, tetanus, pertussis), child pneumonia, TB, HIV, Bed nets: Table 3.1, Appendix B.1).

For the UHC billion, the Average Service Coverage (ASC) is estimated for each country from the seven tracer indicators detailed above

\[
ASC = \text{Average service coverage} = \text{Average of 7 SDG 3.8.1 indicators}
\]

The goal of UHC is that everyone should have access to all the services they require. This equates to a global average service coverage of 100%. Average service coverage tracks changes that make a difference in people lives and encourage progress towards universal coverage.
If average UHC service coverage is 50%, this means that 50% of UHC services were delivered at the population-level. However, the approach does not distinguish between the following cases (Fig. 3.2):

- All people have half (50%) of the services they need;
- 50% of people have all services they need; the rest have no coverage; and
- A mix of service coverage that averages to 50% at the population level.

If average service coverage increases from, say, 50% to 72%, then the increase in service coverage is equivalent to 22% of the population moving from 0% to 100% coverage. In reality, the changes would be distributed across the population in an unknown manner.

**Fig. 3.2 Distribution of UHC service coverage.** The three cases below both result in a UHC of 50% (average service coverage). In the first case everyone has 50% coverage; in the second case half the population has full coverage and the remainder has no coverage, in the third case there is a mix of levels that averages out to 50%.

3.3.4 Comparing average service coverage

This section examines the difference between the SDG 3.8.1 UHC index of service coverage and the average service coverage measure proposed here which is based on a subset of the SDG 3.8.1 indicators.

The average service coverage has been calculated for member states and is plotted against the SDG 3.8.1 UHC index values in Fig. 3.3. The two measures are closely aligned but with some non-linearity and scatter apparent.
3.3.5 Limitations of using average service coverage

With only 7 service coverage indicators used to calculate average service coverage (Table 3.1), it is not possible to be representative of the extremely wide remit of UHC. For example, there are no indicators that reflect service coverage of NCDs (e.g. cancer treatments, or treatments for diabetes and hypertension) and there are no measures of several key health services such as access to surgical care or to essential medicines.

The limited number of indicators means that UHC estimates are likely to give an overestimate of UHC coverage because it focuses heavily on RMNCH and does not include NCDs (ref 2016 Mexico paper). The index is heavily geared towards key issues in the developing worlds and is less relevant to more developed countries.

Several of the service coverage indicators are non-optimal and could be improved without necessarily increasing burden (e.g. ANC, bed nets).

Average service coverage measures to what extent the needs of a population are met by health services - which is not the same as measuring the population receiving “full” UHC service coverage. In the WHO UHC reports (2017, 2019), an alternative approach was used to estimate the global number of people receiving ≥ 85% of services. However, this method is not suited to use in estimating the UHC billion because (1) there is too much uncertainty for use at a country level, (2) it is complex to apply and (3) it requires additional data beyond the SDG 3.8.1 indicators (see also Appendix B.3).

The Average Service Coverage approach does not measure the quality or effectiveness of treatments nor include any weighting that could account for differences in health gain.

3.3.6 UHC service coverage index for the future

Approaches to obtaining globally comparable UHC indices are likely to change as methods improve and data measurements and health treatments change.

In the original selection of SDG 3.8.1 indicators it was intended to replace proxy indicators with measurements of treatment coverage when data became available e.g. for diabetes and hypertension. It was also planned to add coverage for cervical cancer vaccines and essential medicines in the future. Of the
current 14 UHC indicators, several could merit revision in the methods or replacement with alternatives. The aim should be to include the highest impact, most measurable indicators that will drive the most important change. There are several other health areas which could also be candidates for inclusion, given the availability of data. The indicators used in SDG 3.8.1 should therefore evolve as data and medical care advance.

Alternative approaches to calculating UHC for the future are also possible (Appendix B.4). One approach under consideration is an effective coverage approach originally proposed by the GPW13 Expert Reference Group. Initial proposals were made to the IAEG in late 2018, and countries requested that a simplified effective coverage approach be developed and piloted. Details of this revised effective coverage approach are still being defined, but the aims are that (1) it focuses on quality of treatment coverage, in keeping with the definition of UHC (ref), (2) adjusts for the varying epidemiological burden in countries and (3) it weights treatments by health gain. The method will probably involve use of tracer indicators categorized by type of care (promotion, prevention, treatment, rehabilitation and palliation) and by life course, using proxies to measure the effectiveness of health services. Tracers will be combined into a UHC index by weighting by potential health gain (see also Appendix B.4.). Challenges are to minimise the additional data burden, to use country data and allow countries to carry out their own calculations.

3.4 UHC financial risk protection

Health related financial hardship occurs in two settings: when households pay a very large share of their disposable income on health services (catastrophic payments) or when payment for health services pushes the household below the poverty line (impoverishing payments). An important WHO goal is to stop the rise in percent of people suffering financial hardship in accessing health services.

<table>
<thead>
<tr>
<th>Catastrophic</th>
<th>payment for health services is very large share of household disposable income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impoverishing</td>
<td>payment for health services pushes the household below the poverty line</td>
</tr>
</tbody>
</table>

The definition of catastrophic payment requires the selection of a threshold of total household expenditure or a threshold of non-basic needs expenditure in a given year. The current WHO measure of catastrophic payment is the fraction of households with more than 10% or more than 25% of total household expenditure on healthcare in a given year. Using the 10% threshold, some countries have very high percentages of households with catastrophic payment. The 25% threshold, however, represents a very high bar. Alternative thresholds such as 15% or 20% may be more appropriate for the future.

A future goal is to use capacity to pay, e.g. non-food-expenditure, or total expenditure minus expenditure on basic needs in the place of the total-expenditure. This should reduce the anomalies seen whereby catastrophic payments can be more common amongst the rich than the poor.
3.5 Calculating the UHC Billion

The contribution to the UHC goal of 1 billion more people with access to UHC without financial hardship will be estimated from the measurements of UHC service coverage and of UHC financial health protection. The billion will measure improvements at a population level rather than an individual level, looking at the change in the service coverage provided without financial hardship to a population.

3.5.1 Combining service coverage and financial protection for the UHC billion

The UHC SDG indicators 3.8.1 and 3.8.2 measure separate dimensions of UHC. They are obtained from different data sources and cannot be directly used to determine at a household level who receives service coverage without financial protection. For an accurate combining of these two dimensions, we would require financial protection monitoring data from the same data source as the data that identifies the bundle of services they have access to within households. For the time being this is not feasible, with the lack of a common data source from which this can be directly extracted. For the future, we should aim at collecting this data.

In order to be able to combine the two UHC dimensions into contributions to the GPW13 UHC billion, a method is required, based on simplifying assumptions. The method is not yet finalised, but some provisional proposals and calculations are presented here.

Options under consideration for estimating the combined index include:

1. Assume that health related financial hardship is independent of UHC coverage: this is a proportional (or multiplicative) approach
   
   \[ \text{Average financially protected UHC coverage} = \text{Average service coverage} \times (\text{proportion without catastrophic spending}) \]

2. Develop models describing the co-distribution of level of service coverage and proportion of catastrophic spending. As outlined above, data is lacking for this and it is considered too complex at this stage.

3. Use a multidimensional index approach, e.g. arithmetic or geometric average of the two UHC dimensions. Further work needed to see if this approach is feasible.

All of the above are imperfect. In the rest of this section, we consider further how the proportional approach could be used to estimate contributions to the billion. Note that the assumption of independence of service coverage and financial hardship implies a lack of correlation between these dimensions. If violated it would lead to biases in the estimation of the billion.

3.5.2 Calculating contributions to the UHC billion

This section assumes use of the proportional approach to combining service coverage and financial protection (choice not finalized). With this approach, the average service coverage is multiplied by the proportion of the population that are financially protected (Fig. 3.4)

\[ \text{Average service coverage with financial protection} = \text{Average service coverage} \times \text{Proportion with financial protection} \]
This relationship can then be used to estimate the contribution to the UHC billion as

**Contribution to UHC billion =**

\[
ASC_{2023} \times \text{Proportion financially protected}_{2023} \times \text{population}_{2023} - ASC_{2018} \times \text{Proportion financially protected}_{2018} \times \text{population}_{2018}
\]

*Equation 3.1*

**Fig. 3.4** The population receiving UHC without catastrophic spending is a subset of the population with UHC.

### 3.5.3 Country example of calculating contribution to UHC billion

This section presents a sample calculation of how change in UHC service coverage and financial protection would contribute to the UHC billion. The calculation is based on hypothetical data for an historical 5-year period (2017 to 2022). For GPW13, data would be for the 5-year period 2018 to 2023 (not yet available). The estimation of the contribution to the billion proceeds by (step 1) calculating average service coverage from the 7 selected SDG 3.8.1 indicators, and then (step 2) combining this with financial protection to finding the increase in the population covered.

**Step 1: Calculating Average Service Coverage**

Table 3.2 Shows an example of the calculation of Average Service Coverage for the start and end of a 5-year period, calculated as the average of the seven indicators in each year. In this example, asc changes from 0.46 to 0.524.
Table 3.2 Calculation of average service coverage for Country X based on historical data for 2012 and 2017

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2012 value</th>
<th>2017 value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family Planning</td>
<td>0.535</td>
<td>0.606</td>
</tr>
<tr>
<td>Antenatal Care</td>
<td>0.3195</td>
<td>0.318</td>
</tr>
<tr>
<td>Vaccines</td>
<td>0.62</td>
<td>0.73</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>0.2786</td>
<td>0.313</td>
</tr>
<tr>
<td>HIV treatment</td>
<td>0.45</td>
<td>0.64</td>
</tr>
<tr>
<td>TB treatment</td>
<td>0.601</td>
<td>0.612</td>
</tr>
<tr>
<td>ITN bed nets</td>
<td>0.385</td>
<td>0.452</td>
</tr>
<tr>
<td>Average Service coverage</td>
<td>0.46</td>
<td>0.524</td>
</tr>
</tbody>
</table>

Step 2: Contribution to the Billion

Table 3.3 shows hypothetical data for a country for average service coverage and financial protection (here taken as proportion of population with health expenditure < 10% of household income). This data is combined as shown in equation 3.2 above:

Contribution to the billion for Country X = 0.524 * 0.96 * 55.8 – 0.46 * 0.92 * 42.2 = 10.2 Million

The estimated contribution to the UHC billion is thus 10.2 Million (based on this historical period).

Table 3.3 Calculation of the contribution to UHC Billion for Country X based on historical data for the 5-year period 2012 to 2017

<table>
<thead>
<tr>
<th>Value</th>
<th>2012</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Service coverage</td>
<td>0.46</td>
<td>0.524</td>
</tr>
<tr>
<td>Financial Protection (1 – expenditure of health &gt;10%)</td>
<td>0.92</td>
<td>0.96</td>
</tr>
<tr>
<td>Population (Millions)</td>
<td>92.7</td>
<td>106.4</td>
</tr>
<tr>
<td>Population with UHC (Millions)</td>
<td>42.2</td>
<td>55.8</td>
</tr>
<tr>
<td>Contribution to UHC billion (Millions)</td>
<td>10.2</td>
<td></td>
</tr>
</tbody>
</table>

3.5.4 Sharing out the UHC billion

In GPW13 countries select their own priorities and milestones. Nevertheless, there is a global goal to achieve the three GPW13 billions. The following section is written in response to the question posed by countries to WHO: What is my “expected” contribution to the billion, i.e. what would my contribution be, if the global effort was shared out “fairly”. The suggested expected contribution provided here is not binding, but offers countries a benchmark which may help guide plans.
For UHC, all countries are encouraged to make progress, there is always room for improvement. At the same time, in the quest for better equality in the world, it is right that those countries with lowest UHC are given the support and encouragement needed to work towards closing the existing global gap.

It is therefore proposed that the benchmark contribution of each country would be in proportion to the gap in UHC coverage.

The following numbers are fictional but illustrative. Suppose that the global population without UHC is 4.3 billion (calculation not yet carried out using the proposed GPW13 methods), then if the GPW13 UHC billion is to be achieved, 1 in 4.3 (23%) of those who currently are without UHC should gain UHC. This can be applied at a country level, the expected contribution to the billion, would be 23% of the population currently lacking UHC with financial protection.

### 3.6 Equity for UHC

Equity is inherent to the concept of Universal Health Coverage and aims to ensure that all people have access to the health services they need without suffering financial hardship. Equity in UHC coverage will be assessed by examining between-country inequalities, for example by measuring the absolute and relative difference in UHC index between low resource settings and the global average or high resource settings.

Ideally, within-country inequalities will also be examined. If data availability permits, the UHC index can be determined separately for the national and priority population subgroups of a country so as to highlight differences between them. For many countries, disaggregation by geographic location is likely to be the most feasible dimension for within-country inequality monitoring as these data are often available from existing data sources. Where further data is available, the UHC index can be broken down by age, sex, socio-economic status and place of residence (urban/rural). Where it is not feasible to disaggregate the UHC index, disaggregation of the tracer indicators can be undertaken.
4 Health Emergencies billion

The Health emergencies billion goal is for 1 billion more people to be better protected from health emergencies. It will be measured using an index that is built from three simple indicators that capture the scope of WHO’s health emergency activities (Fig. 4.1).

- Emergency Prepare indicator (measuring IHR capacities)
- Emergency Prevent indicator (measuring routine and emergency vaccination coverage)
- Emergency Detect and Respond indicator (measuring timeliness)

Fig. 4.1. The three tracer indicators that constitute the Health Emergences Index.

The Emergency Billion goal is consistent with Sustainable Development Goals 3.d and 3.d.1, and with the 2016 Review Committee report on the Role of the International Health Regulations (IHR), 2005 in the Ebola Outbreak and Response.

4.1 Status of Emergency Billion Methods

An outline method for the Emergency Billion has been completed. The index is based on three sub indicators

- Prepare. Method largely complete and initial calculation made.
- Prevent: Method largely complete and initial calculation made. Data sets for emergency vaccination coverage exist but may not be complete.
- Detect and Respond. Outline method proposed – some details of definitions are still to be clarified, e.g. threshold levels are under evaluation. Initial data collation is underway to retrospectively gather data to calculate a baseline. This indicator is still being explored and some evolution is expected, e.g. dealing with countries where there are no recent events.

The approach to counting improvements in health emergencies protection towards the billion has been refined but requires testing.
4.2 The Emergency Prepare indicator

The Emergency “Prepare” indicator measures country preparedness for emergencies. It encapsulates the level to which a country is ready to identify and respond to a range of emergency situations.

The Emergency Prepare indicator is based on attainment of International Health regulations (IHR) capacities for surveillance and response. States that are party to the International Health Regulations (IHR) (2005) are required to develop and maintain minimum core public health capacities for surveillance and response, and to report on the implementation of 13 core capacities. Each of the 13 IHR (2005) capacities is calculated as the average of its indicator scores (1–3 indicators per capacity, 24 indicators in total), with each indicator scored from 0–5 (5 steps). The assessment of these capacities provides the most comprehensive, internationally agreed and consistently measured dataset for determining the country capacity for preparedness for health emergencies.

The 13 IHR capacities are reported using the IHR State Parties Self-assessment Annual Reporting (SPAR) which became available in June 2018 (https://www.who.int/ihr/publications/WHO-WHE-CPI-2018.16/en/).

The Prepare indicator is the average of the scores for the 13 International Health Regulations (IHR) (2005) capacities (Table 4.1) as measured using SPAR:

\[
\text{Preparedness indicator} = \text{Average of 13 IHR capacities (SPAR)}
\]

<table>
<thead>
<tr>
<th>IHR Reporting capacities</th>
<th>Example of Capacity Score (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1. Legislation and Financing</td>
<td>60</td>
</tr>
<tr>
<td>C2. IHR Coordination and National IHR Focal Point Functions</td>
<td>80</td>
</tr>
<tr>
<td>C3. Zoonotic events and the human–animal interface</td>
<td>80</td>
</tr>
<tr>
<td>C4. Food safety</td>
<td>40</td>
</tr>
<tr>
<td>C5. Laboratory</td>
<td>73</td>
</tr>
<tr>
<td>C6. Surveillance</td>
<td>80</td>
</tr>
<tr>
<td>C7. Human resources</td>
<td>40</td>
</tr>
<tr>
<td>C8. National Health Emergency Framework</td>
<td>47</td>
</tr>
<tr>
<td>C9. Health Service Provision</td>
<td>60</td>
</tr>
<tr>
<td>C10. Risk Communication</td>
<td>60</td>
</tr>
<tr>
<td>C11. Points of entry</td>
<td>60</td>
</tr>
<tr>
<td>C12. Chemical events</td>
<td>40</td>
</tr>
<tr>
<td>C13. Radiation emergencies</td>
<td>40</td>
</tr>
</tbody>
</table>

**Preparedness Index (average of 13 core capacities)**

58
Over the past 8 years, all 196 WHO State Parties for IHR have reported on the implementation of these 13 core capacities at least once. Of these, as of August 7, 2019, data from 182 State Parties was available for the most recent reporting year (SPAR 2018).

The Emergency Prepare indicator allows countries to be stratified into 5 preparedness levels (Table 4.2), enabling prioritization of where preparedness efforts are most needed. Progress will be measured by the cumulative population moving from one level of preparedness to a higher level – thus encouraging improvements to be made for all Member States.

Table 4.2. Emergency Prevent Indicator Categories

<table>
<thead>
<tr>
<th>Level</th>
<th>Number of Member States</th>
<th>Cumulative Population (Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1 (&lt;30)</td>
<td>10</td>
<td>114</td>
</tr>
<tr>
<td>Level 2 (30–&lt;50)</td>
<td>56</td>
<td>627</td>
</tr>
<tr>
<td>Level 3 (50–&lt;70)</td>
<td>51</td>
<td>1,715</td>
</tr>
<tr>
<td>Level 4 (70–&lt;90)</td>
<td>46</td>
<td>2,549</td>
</tr>
<tr>
<td>Level 5 (≥90)</td>
<td>19</td>
<td>2,231</td>
</tr>
<tr>
<td>Data Pending</td>
<td>14</td>
<td>316</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>196</strong></td>
<td><strong>7,552</strong></td>
</tr>
</tbody>
</table>

*A total number of State Parties for the IHR is 196

Self-reported measures can often suffer from bias. In the case of IHR, voluntary external evaluations such as joint external evaluation (JEE) are used to assess this bias. Initial results from the new SPAR tool show a much closer alignment with the joint external evaluation (JEE) tool than the previous annual reporting tool (Fig. 4.2) with a correlation coefficient of 0.87 (Jan 2019, 63 countries) and no significant differences between the average scores for each of the technical areas. For the Emergencies Preparedness indicator, unadjusted SPAR values will be used. Bias will however continue to be assessed.
4.2.1 Example country calculation

Bangladesh has scored an average of 58% of their 13 IHR core capacities based on their IHR annual reporting (Table 4.1). Based on their average score they fall on the “Level 3” of the preparedness index (50 to 70%).

4.3 The Emergency Prevent indicator

The Emergency “Prevent” indicator measures efforts to prevent health emergencies via vaccination coverage. Reaching high vaccination coverage in at risk groups for vaccine-preventable infectious pathogens is a key element to tackling preventable epidemic diseases and pandemics, leading to the control and elimination of high-threat infectious hazards.

The Emergency Prevent indicator incorporates both routine and campaign vaccination for epidemic and pandemic prone diseases (Fig. 4.3). It focuses on three priority infectious hazards: yellow fever,
**meningococcal meningitis A** and **cholera**, all three being priority diseases calling for elimination or reduction through the implementation of global strategies in the Health Emergencies Programme. Because not all Member States are at-risk for these diseases, routine vaccination of **measles** is also included to develop estimates for all Member States and to highlight the importance of a functioning immunization programme for disease prevention.

The index will be the average coverage of relevant vaccines i.e. measles and any of the listed three diseases for which a Member State is at risk.

Fig. 4.3. Routine and campaign vaccinations included in the ‘Prevent’ indicator

![Diagram showing routine and campaign vaccinations included in the 'Prevent' indicator](image)

The index is designed to be able to include any new vaccines for epidemic-prone or for public health emergencies requiring mass vaccination campaigns (e.g., pandemic influenza, Ebola virus disease). In these contingency scenarios, Member States that are either considered affected or at-risk for the event, or for whom WHO recommends a mass vaccination occur, will have the relevant antigen added to the immunization coverage sub-index for that year.

### 4.3.1 Calculation Method

The Prevent indicator is calculated as the population weighted average of routine and campaign vaccine coverages for the applicable diseases: i.e. measles for all Member States, and yellow fever and/or cholera and/or meningitis where there is a risk.

\[
\text{Emergency Prevent indicator} = \frac{\sum_v \text{Coverage}_v \times \text{Relevant population}_v}{\sum_v \text{relevant population}_v}
\]

Where \( v \) are the relevant vaccines for the country and year of estimation (see Table 4.3). The coverage estimates are each weighted by the relevant population size. For routine vaccination, this is the total population of surviving infants. For campaigns this is the target population. The rolling/cumulative vaccinated population is used during emergencies or any supplementary campaigns.

The indicator is an absolute estimate, meaning that countries can demonstrate progress by incremental improvement independently of other countries’ performance. Ultimately, all countries should have coverage estimates of >90%. The weighting scheme places a high weight on routine vaccination, emphasizing the value of routine coverage for many diseases. A potential limitation of this approach is that small targeted campaigns will have only a small impact on the indicator. Other weighting schemes were also considered (e.g. equal weighting for all antigens – in which small campaigns (e.g. for cholera) had an oversized effect on the mean).
4.3.2 Data sources and availability

The main sources of vaccination coverage data are

- Coverage estimates for routine vaccination (yellow fever, measles) from WHO/UNICEF estimates of national immunization coverage (WUENIC); MCV1 data available for all Member States
- Routine immunization administrative coverage (meningitis A) from the WHO/UNICEF Joint Reporting Form (JRF)
- Coverage estimates for emergency requests made to the International Coordinating Group (ICG) on Vaccine Provision where available (yellow fever, cholera, and meningococcal meningitis)
- Additional meningitis and yellow fever immunization campaign coverage estimates from the WHO/UNICEF JRF
- Mass preventive oral cholera vaccination campaign coverages from the Global Task Force on Cholera Control (GTFCC)

There are 66 Member States that are currently considered at-risk by the WHO Health Emergencies Programme for at least one of yellow fever, cholera, and meningitis (Table 4.3)

Table 4.3. At-risk Member States (n)

<table>
<thead>
<tr>
<th>At-Risk for yellow fever, cholera, or meningitis</th>
<th>Number of Member States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow Fever (high risk Member States)</td>
<td>39</td>
</tr>
<tr>
<td>Cholera (affected Member States)</td>
<td>47</td>
</tr>
<tr>
<td>Meningitis (Member States at high epidemic risk)</td>
<td>26</td>
</tr>
</tbody>
</table>

Because not all Member States at high risk or affected by yellow fever, cholera, or meningitis made or had requests approved by the ICG or conducted other vaccination campaigns, the mean campaign coverage estimate was calculated using the antigen data available (i.e., non-missing). The estimate for cholera was the average of campaign coverage (when available) weighted by the relative sizes of the target population for the specific campaign(s). There is no cholera vaccination currently recommended as part of the routine vaccination schedule.

Where target population data are not available for a specific campaign, the number of doses shipped by the ICG or GTFCC will be used as a proxy for target population size.

4.3.3 Example country calculation

A sample calculation of the prevent indicator is provided for Nigeria which is at-risk for yellow fever and meningitis A. Routine coverage is therefore evaluated for measles, yellow fever and meningitis A with the relevant population being the population of surviving infants. Emergency campaigns were also undertaken for yellow fever, meningitis A and cholera. The numerator for the emergency prevent is the sum of vaccinated populations in each category, including rolling/cumulative vaccinated populations since 2015. The denominator is the total of the relevant populations. The 2018 ratio of these is 0.76.
Table 4.4. Example calculation of the Emergency Prevent indicator for Nigeria

Country Category: At-risk for yellow fever, cholera, and meningitis
Surviving Infants (UNDP 2018): 6,976,955

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Type</th>
<th>Coverage (%)</th>
<th>Relevant Population</th>
<th>Vaccinated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measles</td>
<td>Routine</td>
<td>65</td>
<td>6,976,955</td>
<td>4,535,0214</td>
</tr>
<tr>
<td>Yellow Fever</td>
<td>Routine</td>
<td>65</td>
<td>6,976,955</td>
<td>4,535,021</td>
</tr>
<tr>
<td>Meningitis A</td>
<td>Routine</td>
<td>0*</td>
<td>6,976,955</td>
<td>0</td>
</tr>
<tr>
<td>Yellow Fever</td>
<td>2017 Campaign</td>
<td>87</td>
<td>3,290,824</td>
<td>2,872,799</td>
</tr>
<tr>
<td>Yellow Fever</td>
<td>2018 Campaign</td>
<td>94</td>
<td>33,633,032</td>
<td>31,605,998</td>
</tr>
<tr>
<td>Meningitis</td>
<td>2017 Campaign</td>
<td>86</td>
<td>2,335,349</td>
<td>2,008,400</td>
</tr>
<tr>
<td>Meningitis</td>
<td>2016 Campaign</td>
<td>87</td>
<td>197,117</td>
<td>171,492</td>
</tr>
<tr>
<td></td>
<td>2015 Campaign</td>
<td>66</td>
<td>515,967</td>
<td>340,538</td>
</tr>
<tr>
<td>Cholera</td>
<td>2017 Campaign</td>
<td>104</td>
<td>1,710,984</td>
<td>1,780,520</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>62,614,138</td>
<td>47,849,789</td>
</tr>
</tbody>
</table>

Index 0.766

*Introduction of Meningitis A vaccination scheduled in 2019

4.3.4 Initial Global Results

The 2018 emergency prevent indicator has been estimated in October 2019 for 194 Member States and was based on incomplete data (Fig 4.5, Table 4.4).

The 2018 preliminary results show an average global coverage of 85%, with 5.6 billion persons in 112 Member States having the highest level of prevention (>90%). This means 2 billion people reside in 82 Member States where routine and emergency vaccination could be strengthened. 50 of the 66 at-risk Member States have mean coverage <90%, with 1.5 billion of people living in Member States with a level of prevention <90% and 26 Member States falling into the lowest three categories of vaccination coverage (Fig. 4.4, Table 4.5).
Table 4.5. Emergency Prevent Indicator levels for all Member States and at-risk Member States (n = 66)

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of Member States</th>
<th>Total Population (millions)</th>
<th>Number of at-risk Member States</th>
<th>Total at-risk states Population (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1: &lt;30</td>
<td>1</td>
<td>109</td>
<td>1</td>
<td>109</td>
</tr>
<tr>
<td>Level 2: 30–&lt;50</td>
<td>9</td>
<td>151</td>
<td>8</td>
<td>150</td>
</tr>
<tr>
<td>Level 3: 50–&lt;70</td>
<td>22</td>
<td>447</td>
<td>17</td>
<td>393</td>
</tr>
<tr>
<td>Level 4: 70–&lt;90</td>
<td>55</td>
<td>1,267</td>
<td>24</td>
<td>832</td>
</tr>
<tr>
<td>Level 5: ≥90</td>
<td>112</td>
<td>5,613</td>
<td>16</td>
<td>2,140</td>
</tr>
<tr>
<td>Total</td>
<td>194</td>
<td>7,587</td>
<td>66</td>
<td>3,466</td>
</tr>
</tbody>
</table>

4.4 The Emergency Detect and Respond Indicator

For the “Detect and Respond” indicator, countries will be assessed on timeliness of detection, notification and response to public health events, including outbreaks and emergencies. Timeliness is a critical aspect of improving public health impacts and protecting lives and is a key performance measure for surveillance systems. The Detect and Respond indicator will measure the level to which a member state can react appropriately to an event of potential public health concern. The goal will be to encourage member states to respond more quickly to major public health emergencies.
4.4.1 Concept

The Detect and Respond indicator will monitor the proportion of IHR notifiable events that were detected and responded to in a timely fashion. IHR notifiable events are events that have already been determined by Member States to be serious, unusual or unexpected, or pose a risk of international spread or risk of international travel or trade restrictions.

The indicator will focus on three key aspects of timeliness

- Time to detection ($t_0$)
- Time to notification ($t_1$)
- Time to respond ($t_2$)

and these will be averaged to give an overall measure of timeliness.

The three timeliness components will be measured based on four event milestones: event start, detection, notification and response (Table 4.6). Further details are shown in Table 4.7, which also lists key proxy measures that can be used to estimate the event milestones.

The definitions of the event milestones are still being refined. The varied types of possible response measures pose a particular challenge. A single definition for the start of a response is also not currently available. Work is continuing towards identifying a suitable approach to define and facilitate recording of timeliness measures. In order to account for missing dates, proxy dates will be used as an approximation where they are available. For example, if date of symptom onset for the index case is not available, then the date of first recorded visit to a healthcare facility will be used as a proxy for the missing information (Table 4.7).

<table>
<thead>
<tr>
<th>Event Milestone</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event Start</td>
<td>The true start of the event. If the true start date is not fully known, a proxy start date for an event will be used e.g. the symptom onset date of the earliest reasonably identified case</td>
</tr>
<tr>
<td>Event Detection</td>
<td>Date when the event was first detected. If detected by WHO and informed to the MS, the earliest detection date will be used.</td>
</tr>
<tr>
<td>Event Notification</td>
<td>Date when the event was reported to WHO by the MS under IHR. If there is no reporting by the MS, this will be the date when the verification request was sent to the MS</td>
</tr>
<tr>
<td>Event Response</td>
<td>Date when event was first responded to, e.g. earliest date of any public health intervention. Definition not finalised.</td>
</tr>
</tbody>
</table>

4.4.2 Calculation method

Each of the three components of timeliness will be stratified into five levels (Table 4.7) with Level 5 being shortest delay and Level 2 the longest delay. Level 1 is used to indicate that no data was recorded for the event and is aimed at encouraging collection of date data in order to measure timeliness.
<table>
<thead>
<tr>
<th>Date Milestones</th>
<th>Ideal Indicator</th>
<th>Examples of alternative proxy indicators</th>
</tr>
</thead>
</table>
| Date Event Started | Date of index case symptom onset | Symptom onset date of first reported case (=initial case)  
First visit to healthcare facility  
Suspected primary case  
Most likely exposure date (estimated)  
First exposure date (estimated)  
Latest exposure date (estimated)  
Outbreak start date  
Date of death of first reported case (=initial case)  
First report of the outbreak |
| Date Event Detected | Date the local health authorities detect the event | First confirmatory laboratory test  
First sample collection date  
Ministry of Health(MoH) press release date  
Rapid Diagnostic Test (RDT) date  
First time diagnosed as suspected case  
Date other external party reported to MoH  
Date outbreak declared  
Date local health authority reported to MoH  
Preliminary laboratory test  
Communication from laboratory to MoH  
Date first communication between third party member states happened  
Date local health authority detected signal through media |
| Date Event Notified to WHO | Date event notified to WHO (under IHR) | Date national governmental agency, the International Health Regulation National Focal Point (IHR NFP) reported to WHO |
| Date Event Responded To | Earliest date of any public health intervention to control the event | Field investigation started  
Incident management system set up  
Vaccination campaign started  
Active surveillance initiated  
Rapid response team deployed  
Active surveillance initiated  
Risk communication started  
Date quarantine started  
Vector control campaign launched  
Food/Product recall started  
National Emergency Operation Center (EOC) activated  
Expert group established |
### Table 4.8 Definition of levels for the timeliness measures (thresholds may be revised)

<table>
<thead>
<tr>
<th>Timeliness to Detect (t0) Event Start -&gt; Detect</th>
<th>Timeliness to Notify (t1) Detect -&gt; Notify</th>
<th>Timeliness to Respond (t2) Detect -&gt; Respond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level(t0) 5 &lt;= 2 days</td>
<td>Level(t1) 5 &lt;= 1 day</td>
<td>Level(t2) 5 &lt;= 2 day</td>
</tr>
<tr>
<td>Level(t0) 4 3-6 days</td>
<td>Level(t1) 4 2-5 days</td>
<td>Level(t2) 4 2-14 days</td>
</tr>
<tr>
<td>Level(t0) 3 7-16 days</td>
<td>Level(t1) 3 6-16 days</td>
<td>Level(t2) 3 14-37 days</td>
</tr>
<tr>
<td>Level(t0) 2 &gt;17 days</td>
<td>Level(t1) 2 &gt;17 days</td>
<td>Level(t2) 2 &gt;38 days</td>
</tr>
<tr>
<td>Level(t0) 1 No date reported</td>
<td>Level(t1) 1 No date reported</td>
<td>Level(t2) 1 No date reported</td>
</tr>
</tbody>
</table>

The detect and respond indicator (timeliness) is calculated as the average of the three timeliness measures (Table 4.8) rescaled between 0 and 100.

$$\text{Timeliness} = \frac{\sum_{n=0}^{2} \text{Level}(t_n)}{3} \times 20$$

Note that the factor of 20 above converts this indicator into the scale of 0 to 100.

For reporting purposes, the Detect and Respond indicator will be converted into categorized into 5 levels corresponding to 0-30, 30-50, 50-70, 70-90 and >90 % (Table 4.9).

### Table 4.9 Detect and Respond indicator levels

<table>
<thead>
<tr>
<th>Detect and Respond Indicator</th>
<th>Range of Timeliness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 5</td>
<td>Timeliness &gt;=90</td>
</tr>
<tr>
<td>Level 4</td>
<td>70&lt;=Timeliness&lt;90</td>
</tr>
<tr>
<td>Level 3</td>
<td>50&lt;=Timeliness&lt;70</td>
</tr>
<tr>
<td>Level 2</td>
<td>30&lt;=Timeliness&lt;50</td>
</tr>
<tr>
<td>Level 1</td>
<td>Timeliness &lt;30</td>
</tr>
</tbody>
</table>

Baseline estimates of the Detect and Respond indicator will be established. These will enable year-on-year progress to be tracked. The baselines will be determined from all the events that were reported between 2014 and 2018. It is proposed that Member states with no full date points or no events reported will automatically be assigned to a baseline of level 1 (under evaluation). Using this approach, even countries with no full date points or no events reported can be part of the calculation and have a score.

#### 4.4.3 Data sources and availability

The key data sources for IHR-notifiable events that occur in a given year at the country level are:

- Event Information Site (EIS). A Web-based platform that allows secure communication between WHO and the IHR National Focal Points (NFPs) as defined in Article 11.1 of the IHR (2005). EIS is only accessible to NFPs and UN partners.

- Event Management System (EMS). WHO’s central internal electronic system for entering, accessing and managing information for all potential and substantiated events. All event details, relevant
communications, WHO assessments and decisions must be recorded in EMS. EMS will require adaptation for
GPW13.

Occurrence of IHR notifiable events is highly variable and unpredictable, hence many Member States will
not be affected by notifiable events. As an example, out of 194 WHO Member States, 121 (62 %) have
experienced an event that was notified through EIS between 2014 – 2019. Out of these, in 2019 from 1
January through 12 September, only 39 countries (20%) have had an event which was notified through EIS.
Additionally, the number and nature of potential acute health events varies greatly depending on the MS
context (e.g. their burden of diseases, access to health care, safe water and sanitation, and gross domestic
product per capita).

The collection of timeliness measures will likely need to be arrived at in a phased manner. Initially, existing
methods for timeliness to event detection, and data from after action reviews can be used to set 2019
baseline data for the GPW13. The data strengthening needs for effective implementation of indicator are
described in greater detail in Brief Methods Note for 1 Billion Better Protected from Health Emergencies:
“Detect and Respond” Annex 2 (See Appendix C.2).

Countries will be encouraged to make incremental progress on timeliness of detection, IHR notification and
response to events, regardless of baseline values.

4.4.4 Example country calculation

Sample calculations are provided to illustrate the calculation of the Detect and Respond indicator. In the
first example (Table 4.10), a single event has occurred, and data is available for each of the timeliness
measures. The second example illustrates the case where data is missing for one of the measures and no
proxy date could be identified (Table 4.11. The third example illustrates how multiple events are used, with
each event being separately graded and then an average taken (Table 4.12).

| Table 4.10 Example Country A (n=1): Country with one event with all dates reported |
|----------------------------------|----------------|----------------|----------------|
| Time                             | Time to Detection (t0) | Time to Notification (t1) | Time to Response (t2) |
| Median duration                  | 31 days           | 67 days          | 57 days         |
| Sublevel                         | 2                 | 2                | 2               |
| Timeliness (%)                   |                   | 40               |                 |
| Timeliness Level                 |                   | 2                |                 |

| Table 4.11 Example Country B (n=1): Country with one event with no “event start date” reported. |
|----------------------------------|----------------|----------------|----------------|
| Time                             | Time to Detection (t0) | Time to Notification (t1) | Time to Response (t2) |
| Median duration                  | N/A             | 33 days         | 44 days         |
| Sublevel                         | 1               | 2               |                |
| Timeliness (%)                   | 26              |                 |                 |
| Timeliness Level                 | 1               |                 |                 |
Table 4.12 Example Country C (n=3): Country with multiple dates with all (or most) of the dates reported. Timeliness will be calculated for each event then the average will be used.

<table>
<thead>
<tr>
<th>Event 1</th>
<th>Event 2</th>
<th>Event 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>Time to Detection (t0)</td>
<td>Time to Notification (t1)</td>
</tr>
<tr>
<td>Median duration</td>
<td>3 days</td>
<td>1 days</td>
</tr>
<tr>
<td>Sublevel</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Event Timeliness (%)</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Timeliness Level</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Event 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
</tr>
<tr>
<td>Median duration</td>
</tr>
<tr>
<td>Sublevel</td>
</tr>
<tr>
<td>Event Timeliness (%)</td>
</tr>
<tr>
<td>Timeliness Level</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Event 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
</tr>
<tr>
<td>Median duration</td>
</tr>
<tr>
<td>Sublevel</td>
</tr>
<tr>
<td>Event Timeliness (%)</td>
</tr>
<tr>
<td>Timeliness Level</td>
</tr>
</tbody>
</table>

Overall

| Timeliness (%) | (4+5+1)/3 *20 = 67 |
| Timeliness Level | 3      |

All data provided in the country example tables are subject to change. In addition, the definition of “Date Event Responded” will require further refinement.

4.4.5 Limitations

Detect and Respond timeliness data has not previously been gathered in a systematic manner, despite being a key measure of responsiveness in emergency situations. This makes collation of retrospective data challenging. For the future, data collection will require the enhancement and systematic use of EMS and EIS.

The number and nature of potential acute health events varies enormously according to MS states context (e.g. their burden of diseases, access to health care, safe water and sanitation, and gross domestic product). It is therefore planned to calculate this indicator using a rolling time period (3-years). Nevertheless, not all countries will have had a notifiable event in a three-year period. The low frequency of events, combined with their very variable nature makes this indicator sensitive to a single event. This may cause significant fluctuations in the overall Health Emergencies Protection Index. There is the risk that a single event with poor timeliness could cause a drop in the better protected index and thus a negative contribution to the billion. In
the future it is hoped that the database of events may be extend beyond IHR notifiable events in order that there is a larger pool of data.

4.5 Combined Emergency index

The health emergency protection index (HEPI) is calculated as the average value of the 3 tracer indicators, (i.e. the Prepare, Prevent, Detect and Respond indicators). HEPI summarises a country’s overall level of protection from health emergencies.

HEPI is calculated as the arithmetic mean of the sub indicators:

\[
Health\,\,Emergencies\,\,Protection\,\,Index = \frac{(Prepare + Prevent + Detect\,\,and\,\,Respond)}{3}
\]

Fig. 4.5. Calculation of the combined emergency index

Countries will be categorized into 5 levels of HEPI (0-30, 30-50, 50-70, 70-90 and >90 %) (Fig. 4.5) with the objective that countries work towards moving up a level.

4.5.1 Calculating the Country Contributions to the billion

Countries whose HEPI index changes by the equivalent of a full level change will be considered to have the entire population “better protected”. A full level change equates to at least a 20% change in the HEPI index, for example from 57% to 77%.

In order that progressive improvements in Health Emergencies Protection can be recognised for all countries, the Better Protected Billion will count incremental change. This will be measured relative to the 20% benchmark level. For example, a country for which HEPI has increased 20% would contribute 100% of its population, for an increase of 10% it would contribute 50% of its population, and for an increase of 5% would contribute 25% of the population (see box).

Simplified calculation:

\[
Contribution\,\,to\,\,1\,\,Billion = \frac{Population \times Increase\,\,in\,\,HEPI}{20}
\]
All countries can thus contribute to the “1 billion better protected” as long as they have demonstrated progress.

Fig. 4.6 Hypothetical Country Example Contribution to “1 Billion Better Protected”

Final country calculations for contribution to the billion will use UNDP population estimates for baseline (2018) and final (2023) years.

\[
\text{Contribution to 1 Billion} = \frac{\text{Final HEPI} \times \text{Population (2023)} - \text{Baseline HEPI} \times \text{Population (2018)}}{20}
\]

4.6 Equity for Emergencies

Equity for Emergencies will be assessed by examining between-country inequalities, for example by measuring the absolute and relative difference in the better prepared for Emergencies index between low resource settings and the global average or high resource settings.

In addition, within-country equity will be monitored by two of the 46 programmatic indicators which consider at-risk/ vulnerable populations in emergency settings. These are vaccine coverage of at-risk groups for epidemic or pandemic prone diseases; proportion of vulnerable people in fragile settings provided with essential health services.
The Healthier Population billion is 1 billion more people enjoying better health and well-being. It is a goal that aims to enable and encourage people to lead healthier lives.

The key to achieving the Healthier Population billion will be via government policies and actions that promote healthier environments (e.g. clean air, water and urban infrastructure) and encourage healthier life choices such as reduced use of alcohol and tobacco, better nutrition and healthier body weight. The billion includes aspects central to health that are determined by social, environmental, economic and commercial factors which are largely outside of the health sector. It is not intended to include factors primarily handled within the health care system. It will be mainly met through multisectoral interventions driven by the health sector and influenced by policy, advocacy and regulation. It will measure change using data on social, environmental and behavioural risks (Fig. 5.1).

The Healthier Population billion attempts to measure the impact of WHO’s impact framework on the health and well-being of the world’s populations. It limits itself to examining changes in relevant indicators included in the GPW13 programme. It will measure the overall global impact on these indicators of all interventions from WHO, member states and other interested parties (and not just the particular contribution from WHO).

Fig. 5.1. The healthier billion concept – improving people’s health and well-being by addressing social (& commercial), economic, environmental and behaviour risks to health. Symbol for alcohol to be reviewed.

The Healthier Lives index described below is the first time that WHO has attempted to create a combined measure of change in the domain of the behavioural, environmental and socially determined healthiness of global populations. The method is purposefully kept straight-forward and is constrained to use indicators that are a part of the GPW13 monitoring.

It is anticipated that lessons will be learnt during GPW13, and that our understanding of the best way to measure changes in world healthiness will develop further. It is hoped that this may in the future inspire a more general and comprehensive index of healthiness. In addition, whilst the current approach captures change in several key risk factors linked to healthiness, it does not provide a comprehensive coverage of factors and sectors. We are likely to wish to revisit the selection of indicators beyond GPW13.
It is recognised that the measurement approach taken here is an initial one and that improved approaches are possible. The method is a practical way forward given the constraints of the GPW13 programme and the requirement that the method can be assimilated by member states. Further discussion of these matters may be found in the Appendix D.7 and Appendix D.9 (Known issues and consultation steps).

5.1 Status of Healthier Populations Billion Methods

This document provides a proposal for the estimation of the Healthier Population Billion. The approach awaits consultation, review and refinement. Three indicators require transformation into prevalence and these transformations are not yet complete. Some adjustment to the indicators included is possible − e.g. use of trans-fats and suicide mortality data. Country examples are in preparation to show how the billion will look at a country level. Several details are not yet resolved, for example dealing with uncertainty.

5.2 A concept framework for Healthier Populations

A useful conceptual framework to illustrate the areas targeted for the healthier populations billion is the health impact pyramid (Frieden 2010). As shown in Fig. 5.2, this pyramid illustrates the impact and focus of interventions ranging from individual level interventions at the top to those addressing socioeconomic factors at the bottom. Interventions at the top of the pyramid require more effort to generate benefit for individuals; those at the bottom are more complex but have the potential to generate greater impact at the population level. Much of the focus of the work carried out to achieve this billion is centred around ensuring that the environmental, social and commercial contexts in which individuals live are conducive to healthy choices. While individuals have responsibility for their decisions (to be physically active or not) and choices (of what to eat, drink and whether or not to smoke), there are numerous social and commercial influences over what choices are made available to individuals.

In addition to the choices of food products, factors such as the design of urban infrastructure can play an important role in influencing the choice to walk or cycle. Individuals are less likely to choose modes of transport that are more physically active if the environments are unsafe. As such, ensuring healthier behaviours on the part of individuals requires changes to the context to make the default or easiest choices (what to eat, what to drink, what mode of transport to use, etc), the healthiest choices.

Creating a context that enables healthy choices requires interventions that address the bottom layer of this pyramid, socioeconomic factors. Such interventions are complex and often involve actions and the leadership of sectors outside of health. The price of oil for example, influences the choice in transport modes/systems which directly contributes to the quality of air and subsequently the risk of health outcomes such as asthma. Where oil prices are low, transport systems favour the use of private vehicles which in turn is a disincentive for walking and cycling. The cost of transport is also factor in determining what the types and origins of food products that are made available to the public. Similar analyses can be made for other behavioural risk such as the use of tobacco and alcohol.
5.3 Indicators for measuring Healthier Populations

5.3.1 Type of indicators

An important choice is to determine what type of indicators will be used in measuring Healthier Populations. Key contenders are

1. indicators measuring risk to health (e.g. prevalence of tobacco use, (lack of) access to clean water). Such indicators are typically the outcome of policy and regulation and can be considered as a measure of the effectiveness of policy, legislation, education and regulation.

2. indicators measuring policy, regulation etc. Policy, laws, taxation, advocacy, regulation, education and investments are key drivers for change in social, environmental and behavioral risks. There may however be a gap between whether a policy is in place and whether it is effective. Such indicators are not directly translatable into a number of healthier lives.

Both above types of indicators are valid - each has its merits. However, for GPW13, most of the indicators in the measurement framework fall in the first category and it makes sense to base the Healthier Lives index on these measures of risks to health. Using a mix of risks and policies is not advised because of the likely differences in effective impact on healthiness. For example, where a new government policy is implemented this could be taken as applying to a whole population. This is not readily comparable with the impact on health for people who have, say, stopped using tobacco.

5.3.2 Criteria for selection of indicators

The Healthier Populations Billion concept is part of the GPW13 programme and will use and measure change linked to relevant GPW13 programmatic indicators. The index described here is consequently constructed using a subset of the 46 GPW13 programmatic indicators (Table 2.1).
Key criteria for selecting from the GPW13 indicators are

- Focus is largely outside health sector
- Significant impact on population healthiness
- Motivates change
- Emphasis towards healthiness
- Indicator is a measure of risk or can be used as a proxy for risk.
- Ideally indicator is as population prevalence

5.3.3 Choice of indicators

Fourteen GPW13 indicators have currently been identified for inclusion in the measurement of the HP billion. Table 5.1 lists the potential candidates that were considered – these are all the GPW13 indicators that have some focus beyond the health sector.

The indicators in Table 5.1 that were not selected were excluded for the following reasons

- Mortality data where there is an alternative exposure indicator (WASH, air pollution mortality), or where global burden is lesser (mortality due to poisoning)
- More relevant to the health sector (sexually informed choice) although also impacted by health and non-health sector policies (e.g. access to contraception) but (arguably) the main focus is inside the health sector.

The indicators still under discussion for possible inclusion have the following pros and cons.

- The trans-fats indicator is a policy indicator not comparable to the remaining risk indicators. Data exists that demonstrates that where WHO best practice policies are implemented, the population consuming more than the recommended levels of intake of trans-fats almost disappears. It will be necessary to estimate the benefit to a population in a way that is comparable to the other indicators. The DALYS per person for this indicator are an order of magnitude smaller than the other indicators.
- Suicide mortality is the only GPW13 indicator for mental health. Mental health is not otherwise included in any of the billions – falling between the UHC billion and the healthier population billion. Investigation is needed to determine if a suitable transformation can be used to convert this into a measure of the prevalence of healthiness.

Note that whilst stunting and wasting conditions should be handled by the health sector once they exist, they are caused by factors outside the health sector (e.g. social determinants, lack of safe water and sanitation, poor feeding practices, lack of education, etc). On these grounds they are considered to belong in the HP Index.

Three of the selected 14 indicators do not fully meet the criteria stated above. They are included because each is a top contributor to the global burden. The three indicators are

- Alcohol, for which the SDG indicator is mean intake of alcohol in litres (i.e. not expressed as a prevalence).
- Air pollution, for which the SDG indicator is mean PM2.5 (also not expressed as a prevalence)
- Road mortality, which is a measure of mortality and included as a proxy for road safety. Although all other measures of mortality have been excluded, an exception is made for this indicator because of the very high burden with which it is associated and the lack of an alternative measure of road safety.

The above three indicators require a transformation to convert to a prevalence that is suitable for measurement of healthier lives. Details of the conversions are under development (see Section 5.3.6 below (and a planned Appendix) for details).

If included, trans-fats and suicide mortality would also require transformation.
Table 5.1. Indicators considered for Healthier Population Billion. 14 have been selected for inclusion. Data sources are GHO and UN SDG databases.

<table>
<thead>
<tr>
<th>Indicator short name</th>
<th>Dataset</th>
<th>Data coverage</th>
<th>Data coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPW13 indicators selected</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>SDG 3.a.1 Tobacco use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDG 3.5.2 Alcohol (litres)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDG 3.6.1 Road deaths</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDG 2.2.1 Childhood stunting &lt;5</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>SDG 2.2.2 Childhood wasting &lt;5</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>SDG 2.2.2 Childhood overweight &lt;5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WHA66.10 Obesity</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>SDG 11.6.2 Mean particulates (PM2.5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDG 7.1.2 Clean fuels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDG 6.1.1 Safely managed water</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>SDG 6.2.1 Safely managed sanitation</td>
<td></td>
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<tr>
<td>SDG 4.2.1 Developmentally on track u5</td>
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<td></td>
<td></td>
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<tr>
<td>SDG 5.2.1 Partner violence for women</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>SDG 16.2.1 Violence against children</td>
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<td></td>
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<tr>
<td>GPW13 indicators still under consideration</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>WHA66.10 Protected from trans fats</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDG 3.4.2 Mortality due to suicide</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>GPW13 indicators considered but not used</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>SDG 3.9.1 Mortality ambient air pollution</td>
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</tr>
<tr>
<td>SDG 3.9.2 Mortality unsafe WASH</td>
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<td></td>
</tr>
<tr>
<td>SDG 3.9.3 Mortality poisoning.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDG 5.6.1 Informed sexual choice (F)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 5.3. 14 Indicators selected for inclusion in the Healthier Populations Index
5.3.4 Impact of indicators

A key limitation of the method used to calculate the Healthier Population billion is that changes in the indicators are not weighted by health gain. It is therefore important to ensure that the counting of additional healthiness from the indicators corresponds to an important health gain. One common measure of health impact is the global burden of disease. Table 5.2 shows the burden of disease associated with the indicators in the index demonstrating the important impact on health made by many of the indicators. It should be noted that additional healthiness is not necessarily best measured by burden of disease. For example, the effect of intimate partner violence and of childhood overweight appears relatively small. But these factors can have long lasting implications for people’s lives.

Table 5.2. Global burden of disease and current data availability for indicators in the Healthier Population Billion.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco use</td>
<td>177</td>
<td>0.20</td>
<td>145</td>
<td>149</td>
</tr>
<tr>
<td>Obesity</td>
<td>135</td>
<td>0.18</td>
<td>190</td>
<td>190</td>
</tr>
<tr>
<td>Ambient air pollution</td>
<td>103</td>
<td>0.03</td>
<td>189</td>
<td>189</td>
</tr>
<tr>
<td>Alcohol use</td>
<td>99</td>
<td>0.19</td>
<td>189</td>
<td>189</td>
</tr>
<tr>
<td>Childhood wasting &lt;5</td>
<td>86</td>
<td>0.79</td>
<td>80</td>
<td>47</td>
</tr>
<tr>
<td>Clean household fuels</td>
<td>77</td>
<td>0.05</td>
<td>191</td>
<td>191</td>
</tr>
<tr>
<td>Road injuries/deaths</td>
<td>71</td>
<td>0.37</td>
<td>194</td>
<td>174</td>
</tr>
<tr>
<td>Safe water</td>
<td>53</td>
<td>0.04</td>
<td>78</td>
<td>84</td>
</tr>
<tr>
<td>Safe sanitation</td>
<td>40</td>
<td>0.02</td>
<td>84</td>
<td>78</td>
</tr>
<tr>
<td>Childhood stunting &lt;5</td>
<td>14</td>
<td>0.10</td>
<td>86</td>
<td>47</td>
</tr>
<tr>
<td>Intimate Partner Violence</td>
<td>5</td>
<td>0.02</td>
<td>83</td>
<td>47</td>
</tr>
<tr>
<td>Childhood overweight &lt;5</td>
<td>0.6</td>
<td>0.01</td>
<td>1</td>
<td>17</td>
</tr>
<tr>
<td>Developmentally on track &lt;5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Violence against children</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: DALYS are from IHME GBD 2016 (WHO does not produce DALYS for most of these risk factors). Indicators are ordered by Global Burden of disease. Data availability columns show (a) those indicators for which it was possible to calculate a change over a 5-year period (approximately 2010-2015 - see also Section 5.7) and (b) which indicators have recent estimates available. Data from GHO and UN SDG databases.

5.3.5 Reframing indicators for Healthiness

The GPW13 indicators are varied. For some indicators, higher values are healthier (% access to safe water), for other low values are healthier (% children experiencing violence). For use in the Healthier Population calculations, all indicators will be represented on a scale of healthiness with 0% being the least healthy and 100% being the most healthy. For example, for SDG 3.a.1 Prevalence of tobacco use, the indicator, x, will be transformed to 100 - x. A value of 0%, the least healthy, would mean everyone uses tobacco, and a value of 100% (the most healthy) would mean no one uses tobacco. This inversion is required for Tobacco use, Stunting, Wasting and Overweight in Under 5s, Obesity, Intimate Partner Violence, and Violence against children (Table 5.3). Alcohol, Road safety and PM2.5 indicators are not on a 0 – 100 scale and require transformation to a scale of prevalence (see Section 5.3.6). Childhood wasting <5 and overweight <5 are both forms of unhealthy weight as measured by ratio of height to weight and will be combined to create a healthy child weight indicator.
### 5.3.6 Converting non-prevalence indicators

The GPW13 includes important indicators that relate to population healthiness but which are not measures of prevalence. These indicators are not suited for direct use for the Healthier Population billion. Given that countries do not wish to gather additional information and that it is important that these issues are reflected in the billion, a compromise approach is proposed. This is to calibrate a simple transformation of each indicator into a measure of prevalence that can then be included in the billion. The transformations are approximations and require some subjective choices to be made. In choosing the transformations the goal has been to find approaches that

- are straightforward to apply
- measure an increase in healthiness that is justifiable
- are more or less comparable to other indicators
- make intuitive sense

Given that the term “healthier” is a qualitative judgement, it is difficult to be more rigorous than this.

The transformations described below are still under development and liable to change. Changes will inevitably affect contributions made to the billion.

**Reduced harmful use of Alcohol**

Provisional approach, under discussion with the programme on alcohol, drugs and addictive behaviours.
The Alcohol related SDG 3.5.2 indicator measures total alcohol per capita (15+ years) consumption (APC) in litres of pure alcohol per calendar year. In order to make use of this SDG in the Healthier Population billion, the goal is to provide a simple transformation that translates the change in total APC into a proportion of the population that can be considered healthier (in terms of alcohol consumption).

The transformation must be possible without countries collecting any data other than the SDG indicator. To calibrate the transformation, use is made of existing modelled estimates of drinking behaviours at country populations levels (ref Lancet): the prevalence of heavy episodic drinkers (%), and the prevalence of abstainers (15+). Populations will be deemed healthier if they reduce heavy episodic drinking or increase the number of abstainers – both implying a reduced alcohol consumption.

There are approximately linear relationships between total APC and prevalence of heavy episodic drinkers and abstainers respectively (Fig. 5.4):-

\[
\text{Change in prevalence heavy episodic drinkers} \ (\%) = 2.8 \times \text{change in total APC (litres)}
\]

\[
\text{Change in prevalence abstainers} \ (\%) = -4.8 \times \text{change in total APC (litres)}
\]

These relationships will be used to calculate the alcohol contributions to the Healthier Population billion. Note that, an additional adjustment is planned to compensate for the likelihood that there are overlaps between reductions in heavy episodic drinking and increases in abstainers (e.g. heavy drinkers who stop drinking).

Fig. 5.4. Relationship between total APC and prevalence of (a) heavy episodic drinking in the past month and (b) abstainers past 12 months. Approximate linear relationships can be seen.

Road safety

Provisional approach, under discussion with the Road safety programme.

Safer roads not only result in fewer deaths and injuries, but also provide key health-related benefits, for example people are more likely to be physically active if roads are safer, e.g. by walking and cycling.

The SDG indicator for road safety measures mortality. For the Healthier Populations billion, we require a measure which expresses the proportion of population experiencing safer roads. As a first step we propose to use the SDG mortality rate to approximately estimate the number of road injuries and road deaths. The additional population avoiding road injury or death will then be considered to be “healthier”. This is likely to be an underestimate of benefit because it excludes the important secondary effects of safer roads.
The probability of death from road injuries is dependent on many factors including health care and other services in a country. Fig. 5.5 illustrates the relationship between the ratio of road injuries to road deaths as a function of social demographic index (sdi), a measure of country development status (data from IHME, add references).

The relationship seen in Fig. 5.5 can be used to transform SDG 3.6.1, road mortality, into an estimate of the proportion of the population experiencing injury or death due to roads over a 5-year period. This will be in the form of a cubic relationship involving SDG 3.6.1 and sdi. To keep things simple, the sdi value used will be for the baseline year 2018.

![Graph showing the relationship between the ratio of road injuries to road deaths and the social demographic index (sdi).](image)

*Fig. 5.5 Relationship between ratio of road injuries to road deaths and the social demographic index (sdi). The green line shows a fitted cubic equation plus 95% confidence intervals for the fitted line.*

**Clean Air**

Provisional approach, under development.

The SDG 11.6 indicator for air particulates measures the mean concentration of PM2.5. The data is derived from underlying gridded estimates of PM2.5 and this underlying data can potentially be used to calculate alternative estimates that are expressed as prevalence of population.

An initial approach has been tried in which the proportion of population who experience safe air quality, i.e. mean PM2.5 of less than the 10 µg/m³ WHO guideline level, is calculated. This resulted in approximately 170 Million people benefitting over a historical 5-year period mainly in Europe and the US. This appears contrary to the perception that global air quality is getting worse. Use of the 10 µg/m³ threshold highlights where air quality has dropped below the WHO guideline but does not reflect the cases where air quality exceeds this guideline and is worsening, as is experienced in other parts of the world. Use of a second additional threshold, 25 µg/m³ is also under consideration. This would count people who get better/worse air quality at one or other level. Preliminary results, jointly using the two levels, show a similar net positive contribution to the billion. Neither approach captures a worsening global air quality as might have been anticipated. Work continues towards finalisation of the method.

Note that the precise choice of the transformation of this indicator could potentially have a very large effect on the billion.

### 5.3.7 Making use of policy information

Policy and regulation is key to addressing risks to health and achieving healthier populations. Understanding what interventions have already taken place will assist with progressing the HP billion.
Many of the Healthier Population indicators run alongside programs that support and measure interventions (e.g. MPOWER for tobacco, INSPIRE for violence against children, NCD progress monitoring, etc. (ref)).

Policy measures will not be directly included in the calculation of the Healthier Population billion. However, it is planned that information on policy implementation and legislation will be reported and tracked alongside the Healthier Lives index.

5.4 The Healthier Lives Approach

5.4.1 Criteria for choice of method

The following criteria have been used in selecting the method for counting the HP billion:

- The method should estimate the number of lives that are healthier.
- The method should be simple to understand, straightforward to apply and suitable for calculation by all countries.
- The method must be based on indicators from the GPW13 programmatic indicators (largely SDG indicators) and avoid imposing any further data collation burden on member states.
- The method should count change that is meaningful for healthiness (e.g. new access to water is likely to result in a healthier life, whereas implementing a policy at population level may not mean all the population is healthier)
- The method should be ready to use by autumn 2019 and not require a long development schedule.
- Simplicity and broad applicability is preferred over sophisticated complexity. The method will be a first attempt that can be further developed and refined over time.

Based on the above, the recommended method for measurement of Healthier Populations is the Healthier Lives Approach (Fig. 5.6) (NB this was formerly termed the lives touched approach in earlier documents).

Alternative methods have been considered, notably a GPW13 Expert Reference Group (ERG) recommendation to weight indicators by DALYs averted so as to estimate a relative health gain for each indicator. Further details of alternative approaches can be found in Appendix D.2.

*Fig. 5.6. The healthier lives approach*
5.4.2 Concept

The healthier lives approach counts the number of people whose lives are newly healthier as measured by the net change in one or more of the component indicators. Conceptually, if a person becomes newly healthier in more than one way (e.g. clean water and safer roads) then this will be counted as just one extra healthier life. If a person become healthier in one way but less healthy in another (stops use of tobacco but starts to drink alcohol) then they would not count as a healthier life (the effects cancel out). In practice, the healthier lives approach cannot count at the level of an individual — it measures change at an aggregated population level using change in population prevalence.

The healthier lives approach uses a simple unweighted counting scheme. This approach has the advantage of simplicity and yet provides a direct measurement of lives: it is comparatively easy to understand, and it is hoped that it will be accessible to all countries. An important disadvantage of the approach is that disparate impacts on individuals are given equal weight, e.g. access to clean air vs access to safe sanitation vs avoiding partner violence.

5.4.3 Healthier Lives approach — a measure of change

The Healthier Lives approach will be used to calculate a Healthier Lives (HL) index. The index measures the net number of people, at a population level, whose lives are newly healthier in some way. This could be due to parts of the population having new access to clean water, or due to a reduction in the prevalence of smoking, or due to more people accessing safer roads.

The Healthier Lives index presented here is an index of change over time, e.g. using the period 2018 – 2023 for GPW13. This contrasts with the Universal Health Coverage (UHC) index for which the index is a measure of coverage for a specific point in time (Appendix D.2).

Note that the HL index does not count the number of people who are fully healthy, and it does not assess the average healthiness of a population. In some instances, a population may experience better conditions (better air quality, reduced alcohol consumption, reduced body weight from obese to overweight) but there may remain scope for further future improvements (excellent air quality, zero alcohol consumption, healthy weight). Counting as a healthier life does not mean a life is 100% healthy with no room for improvement.

5.4.4 Calculating the Healthier Lives contributions

For simplicity we start by considering the case of no population growth, and no double counting (adjustments for population growth and double counting are covered in subsequent sections). The contribution to the billion from indicator \( i \), is then:

\[
Contribution_i = \text{pop}_i \times \Delta p_i
\]

where \( \text{pop}_i \) is the population relevant to indicator \( i \) (e.g. population of children under 5) and,

\( \Delta p_i \) is the change in indicator prevalence (expressed as a proportion) over a period of time.

For example, if the adult population is 1 million and the prevalence of clean water is 60% at the start of the period and 62% at the end of the period, then

\[
Contribution_{\text{clean water}} = 1 \, 000 \, 000 \times 0.02 = 20 \, 000
\]
The contribution over all indicators is then summed over all indicators

$$\text{Total Contribution} = \sum_I \text{pop}_I \times \Delta p_I$$

Reducing double counting

The above formula is only correct if there are no overlaps in who receives health gains. In practice, it is likely that there will be some overlap and so double counting could occur. For example, some people may both stop smoking and gain access to clean water.

A first-level correction for double counting will be used. This is based on an assumption that populations who become healthier within a country are independent.

Consider an extreme case in which 100% of a population (newly) gets clean air and clean water. If these two contributions were counted separately into the billion, then 200% of the population could be counted. The correction proposed here, will recognize the overlap between the two indicators and count exactly 100% of the population as healthier.

Now consider if 50% of the population newly gets clean air, 50% clean water. We cannot know if this is 100% get 1 thing (air or water), or 50% get 2 things (air and water), or somewhere in the middle. The simplest statistical assumption would be that it is random who gets water and who gets clean air. Under randomness, that would typically mean about 25% of the population get just water, 25% get just clean air and 25% get both (simple probabilities). So that means 75% of the population get clean air, or clean water or both (compare with 100% if we just added 50% and 50% without a correction).

The correction means that at a country level it is not possible for >100% of the population to contribute to the billion. However, if there are strong correlations (e.g. everyone who gets clean air also gets clean water) then the correction will not allow for this – it will reduce but not eliminate overcounting. The correction also takes account of the fact that not all indicators are improving, and that not all indicators apply to all age groups. Details of the form of the correction for double counting are given in Appendix D.3.

Handling population growth

The HP must count lives that are newly healthier as a result of intervention, and not lives that are newly healthier simply due to population growth.

Handling change in population is based on a counter-factual approach, what might have happened if no additional interventions take place. For this, the baseline assumption is that, in the absence of any intervention, the new population defaults to the same prevalence rate as the existing population for each indicator. With this assumption, we can calculate the index using the population at the end of the period, and the observed changes in prevalence for each indicator, i.e.

$$\text{Contribution} = \sum_I \text{pop}_{\text{end}, I} \left\{ \prod_{\Delta p_i < 0} (1 - |\Delta p_i|) - \prod_{\Delta p_i > 0} (1 - |\Delta p_i|) \right\}$$

Where \( \text{pop}_{\text{end}, I} \) is the final population for tranche \( I \), and the term in brackets is the contribution to the billion allowing for double counting (see above section).

This provides a robust method of calculation. Alternative and more general forms of handling population growth are also possible and are considered in Appendix D.5.
To do. Add an extension to deal with indicators that are age-stratified.

5.4.5 Sharing out the Healthier Populations billion

In GPW13, countries select their own priorities and milestones. Nevertheless, there is a global goal to achieve the three GPW13 billions. The following section is written in response to the question posed by countries to WHO: What is my “expected” contribution to the billion, i.e. what would my contribution be, if the global effort was shared out “fairly”. The suggested expected contribution provided here is not binding but offers countries a benchmark which may help guide plans.

For Healthier Populations, all countries are encouraged to make progress and it is proposed that this progress should be shared out evenly in proportion to the population of each country. Many of the indicators included in this billion affect developed countries at least as much as developing countries, for example obesity. For the billion to be achieved in a world of 7.5 Billion people, this would represent 1 in 7.5 worldwide living healthier lives.

5.5 Limitations of the Healthier Lives Approach

The Healthier Lives approach is proposed as a first step in measuring changes in healthiness linked to the GPW13 programme. The method however has several limitations. A detailed list of known issues is provided in Appendix D.7. Here a brief summary is made.

The GPW13 indicators are non-optimal set of indicators for measuring change in overall population non-health-sector healthiness - they are not comprehensive of all environmental, behavioural and social risks affecting healthiness and they do not cover all aspects of the life course equally. The indicators are unweighted despite differences in relative health impacts. In the future a more general index and framework for healthiness could be envisaged, with a broader coverage of sectors and factors, and with more balancing across the life course. It is possible that future approaches could build in more comprehensive adjustments for population growth and double counting.

The billion measures the impact linked to GPW13 indicators due to the joint efforts of WHO, member states and other interested parties. However, it is not possible to separate out the impact specifically attributable to WHO’s GPW13 impact framework. The time frame of GPW13 programme, in combination with lags in the timeliness of indicator estimates, and the time delay between an intervention and a result, will make calculation of change by 2023 a challenge. Decreases in healthiness are expected for some indicators, e.g. obesity, but effective interventions that can halt or reverse change are not yet known.

5.6 Other aspects

5.6.1 Equity for Healthier Populations

Equity for Healthier Populations will be assessed by examining between-country inequalities, for example by measuring the absolute and relative difference in Healthier Populations index between low resource settings and the global average or high resource settings.
5.6.2 Data Availability

Delays in receiving data are likely to cause problems for estimation of the billion in 2023. This is the case for all the billions. Projection/forecasting methods may need to be used, in order that the billion can be estimated.

The index can be calculated without estimation or infilling of missing data — but will of course then lack contributions for country-indicator combinations. Healthier lives are currently calculated only where estimates are available. Of course, missing data will mean that some newly healthier lives are not counted. It is proposed to use the program specific methods for imputing and projecting indicator estimates (where available).

5.6.3 Dealing with uncertainty

It is intended that estimates of uncertainty will be calculated for the Healthier Population Billion contributions (in keeping with adhering to GATHER guidelines (http://gather-statement.org/). The approach to handling uncertainty is not yet determined.

5.6.4 Negative contributions

Negative contributions to the HL index can occur if an indicator prevalence has worsened over time. Negative contributions point to where there is an ongoing problem and where particular attention is needed. This is likely to be the especially important for overweight and obesity and for alcohol. Results will be reported that provide a breakdown of healthier lives into where there are improvements and worsening situations (see Section 5.7).

5.7 Testing the Healthier Population Billion using Historical data 2010-15

The Healthier Lives index is an index that measures change over a period. To test the performance of the HL index, the index has been calculated at country level for indicators for which change could be measured over (approximately) the period 2010 to 2015. If data was available for a similar period (e.g. 2009 to 2013), this also was used — with a simple linear rescaling used to make it equivalent to a 5-year period. Even so, not all indicators have enough data for this historical period to measure change. In some cases, there are important regional data gaps, e.g. very few countries are included in the Africa region for water and sanitation. The summary contributions by region and by indicator are shown in Table 5.4. No infilling has been performed and the values only sum change where it was measured.

Important things to note from this exercise:

1. Figures are provisional and liable to change. This is particularly the case for indicators where a conversion to prevalence is needed and has not been finalized. The estimates for air pollution (PM2.5) could perhaps change considerably (currently 170 Million additional healthier lives, ie. not reflecting worsening air pollution in parts of the world). No infilling of missing data has been made, and additional contributions are expected (e.g for water and sanitation).

2. For the period 2010 to 2015, the Healthier Lives index is estimated to be around 670 Million but with considerable uncertainty (particularly relative to the contribution for PM2.5, which could make either a positive or negative contribution). It seems most likely that the billion will require acceleration during GPW13.

3. Without the hefty contribution from China for sanitation, the total would be much reduced.

There are typically a mix of negative and positive contributions within a region (see also
4. Fig. 5.7). Alcohol has the most mixed picture with some regions making progress (EUR) and others losing ground (WPR, SEAR). Increases in Obesity are globally the largest contributor to less healthy lives.

Table 5.4. Estimated number of Millions of people with Healthier Lives by indicator and region for 2010 to 2015. Figures provisional and expected to change.

<table>
<thead>
<tr>
<th>SDG / WHO short name</th>
<th>African Region</th>
<th>Region of the Americas</th>
<th>Eastern Mediterranean Region</th>
<th>European Region</th>
<th>South East Asian Region</th>
<th>West Pacific Region</th>
<th>World</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obesity</td>
<td>-11</td>
<td>-25</td>
<td>-15</td>
<td>-20</td>
<td>-20</td>
<td>-35</td>
<td>-126</td>
</tr>
<tr>
<td>Alcohol</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>36</td>
<td>-66</td>
<td>-20</td>
<td>-46</td>
</tr>
<tr>
<td>Childhood overweight &lt;5</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>-4</td>
<td>-1</td>
</tr>
<tr>
<td>Childhood wasting &lt;5</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Road injuries/deaths</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>Childhood stunting &lt;5</td>
<td>8</td>
<td>4</td>
<td>2</td>
<td>14</td>
<td>0</td>
<td>3</td>
<td>29</td>
</tr>
<tr>
<td>Safe water</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>9</td>
<td>2</td>
<td>75</td>
</tr>
<tr>
<td>Tobacco</td>
<td>3</td>
<td>19</td>
<td>-1</td>
<td>16</td>
<td>19</td>
<td>18</td>
<td>75</td>
</tr>
<tr>
<td>Ambient Air Quality (PM2.5)</td>
<td>0</td>
<td>107</td>
<td>0</td>
<td>77</td>
<td>-4</td>
<td>-1</td>
<td>178</td>
</tr>
<tr>
<td>Clean household fuels</td>
<td>12</td>
<td>12</td>
<td>20</td>
<td>7</td>
<td>127</td>
<td>70</td>
<td>248</td>
</tr>
<tr>
<td>Safe sanitation</td>
<td>5</td>
<td>42</td>
<td>6</td>
<td>21</td>
<td>247</td>
<td>247</td>
<td>322</td>
</tr>
<tr>
<td>Total (corrected)</td>
<td>27</td>
<td>154</td>
<td>16</td>
<td>138</td>
<td>65</td>
<td>270</td>
<td>670</td>
</tr>
</tbody>
</table>

Notes: Negative values indicate that overall lives have become less healthy. No infilling has been undertaken, values are summed over countries where there is sufficient data to estimate change for 2010 to 2015 (approximately). The high values for WPR and safe sanitation are due to significant sanitation improvements in China. The row showing totals includes the correction for double counting (thus is less than the sum of the values in the column above). Data from GHO and UN SDG databases. (Data on air pollution likely to change (reduce)).

Fig. 5.7. Contributions to the HL index calculation for 2010-15 by indicator and region (figures provisional).

Notes: Positive and negative contributions are shown separately. Increases in Obesity are the largest contributor to less healthy lives. Alcohol has the most mixed picture with some regions making progress (EUR) and others losing ground (WPR, SEAR). Estimates for Ambient Air are being re-estimated and could change. Data from GHO and UN SDG databases.
5.8 Achieving the Healthier Population Billion

The purpose of this Section is to demonstrate what would happen if GPW13 met the proposed indicator milestones, and how these would contribute to the billion. Historical data suggests that several of the milestones are aspirational rather than realistic. It is not expected that all these milestones are achieved.

For each indicator, we estimate how many lives would be impacted if the GPW13 programmatic indicator global milestones are achieved (Fig. 5.8). These are global estimates only and, for this exercise, we do not account for overlaps in indicators.

Differences in contributions from the indicators reflect both variations in the ambitiousness of the milestone and the size of the affected population. Some milestones are more realistic and others largely aspirational. For example, the milestones for water and sanitation stem from the SDG 2030 objective of universal access to safe water and sanitation. If these ambitious milestones were to be met, they alone would mean that the HP billion goal would be exceeded. However, the GPW13 outcomes over the next 5 years may be very different from the milestones set because many indicators are not currently on track for the stated milestones.

The 2023 milestones for ambient air pollution and for clean household fuels are not finalised and have been set to a nominal illustrative 5% in Fig. 5.8. For obesity, the milestone is to halt rise which would give zero lives changes and zero DALYS averted. For this exercise, to better understand the relative impact of obesity change on the billion, an artificial value of 3% has been used below.

The impact of meeting proposed milestones is assessed in Fig. 5.8 as (a) number of healthier lives and (b) DALYs averted (assuming that lives improved are evenly distributed across the population). Water and sanitation impact global DALYS through sheer numbers of people affected. Tobacco and childhood wasting are the next two greatest impacts on DALYS.

Fig. 5.8. Expected number of Healthier Lives if GPW13 milestones are met together with expected corresponding DALYS averted (update needed) Add targets.

<table>
<thead>
<tr>
<th>Healthier Lives indicators</th>
<th>No of Lives improved if GPW target met (millions)</th>
<th>DALYs averted if GPW target met (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe water</td>
<td>1,000</td>
<td>36</td>
</tr>
<tr>
<td>Safe sanitation</td>
<td>800</td>
<td>13</td>
</tr>
<tr>
<td>Tobacco use</td>
<td>224</td>
<td>44</td>
</tr>
<tr>
<td>Ambient air pollution*</td>
<td>180</td>
<td>5</td>
</tr>
<tr>
<td>Clean Household fuels*</td>
<td>73</td>
<td>4</td>
</tr>
<tr>
<td>Road injuries/deaths</td>
<td>39</td>
<td>14</td>
</tr>
<tr>
<td>Obesity*</td>
<td>26</td>
<td>7</td>
</tr>
<tr>
<td>Alcohol use</td>
<td>36</td>
<td>7</td>
</tr>
<tr>
<td>Childhood wasting &lt;5</td>
<td>13</td>
<td>26</td>
</tr>
<tr>
<td>Childhood stunting &lt;5</td>
<td>19</td>
<td>2</td>
</tr>
</tbody>
</table>

5.9 Country Examples
6 Healthy Life Expectancy (HALE)

Healthy life expectancy (HALE) is an indicator that provides a summary measure of average levels of population health. HALE quantifies the expected years of life in good health at a particular age.

HALE has been selected because it can be used across the triple billions and because it is aligned with SDG 3. It will be used for GPW13 baseline reporting and monitoring in future years for each Member State. HALE will facilitate cross-country comparisons, and comparisons within countries over time.

HALE is currently reported annually as part of the Global Burden of Disease (GBD) and also as part of the WHO’s Global Health Estimates (GHE).

WHO is tasked with developing standard guidance and providing tools and technical assistance to Member States to apply standardized methods to measure and report on HALE themselves, based on the input data sources that are available.

6.1 Calculation of HALE

HALE is estimated using Sullivan’s method (ref: Sullivan DF. HSMHA Health Rep, 1971). Two main variants of this method exist – the conventional approach and the GBD approach. Both approaches share the same conceptualization but differ in the levels of detail of the measurement for disability, depending on the availability of corresponding information in the data inputs. The GBD approach is the most widely used method for the estimation of HALE, being used by institutions such as IHME and WHO, although with some differences in which data are used as inputs (ref: GBD 2016 DALYs and HALE Collaborators. Lancet. 2017; WHO GHE2015. 2015).

In the simpler Conventional approach, prevalence of disability from population-based, nationally-representative surveys are used. The input data are: 1) sex-specific period life tables by country, and 2) age-sex-specific prevalence of overall morbidity, preferably adjusted for severity, by country. For each age interval, the total person-years lived in the period life table is partitioned into those lived in healthy and unhealthy states, using the prevalence of overall morbidity as the fraction.

In the GBD approach the input data are: 1) sex-specific period life tables by country, and 2) age-sex-specific estimates of years of healthy life lost due to disability (YLD) by cause across a comprehensive set of disease and injuries, adjusted for severity. By summing YLD over all causes and adjusting for independent morbidity by country, age, and sex, the fractions of years of healthy life lost in total years lived by each age-sex-country group are derived. For each age interval, the corresponding fraction is then used to partition the years lived in the period life table into years lived in healthy and unhealthy states.

In both methods, to estimate HALE at age x, the total person-years lived in a healthy state in all age intervals above age x are summed and divided by the survivor at age x in the period life table.
6.2 Contribution of the billions to HALE

Ideally the contribution of each “billion” to changes in HALE will be quantified. It requires that underlying data are available to quantify the impact of improvement in indicators of the billions on overall mortality and cause-specific morbidity. A particular issue will be to deal with some of the health-related overlaps between the indicators used in the billions (e.g. vaccines (second and third billion) and smoking (COPD in first billion and smoking prevalence in third billion). The methodology is currently under development. However, given the extensive additional data that will be needed for the calculations and the complex analysis, this is unlikely to be feasible within the GPW13 period.

6.3 Equity for HALE

HALE estimates will initially be calculated at the country level and disaggregated by sex.

The equity target for HALE is to reduce absolute inequality between countries, and to reduce the absolute and relative differences between HALE in low resource settings compared to global and/or high resource settings.

In the future it is hoped that in some settings sub-national estimates of HALE will also be possible. This will require disaggregation of disease burden sub-nationally. HALE may additionally be subdivided by life course stage.
7 Equity

Equity is the absence of unfair and avoidable differences in health. Monitoring health inequalities, i.e. observable differences in health, is essential for achieving health equity. Health inequalities may exist between countries and between population subgroups within a country. The GPW 13 aims to reduce both between- and within-country inequalities.

Inequalities will be monitored at all three levels of the GPW 13 impact framework: the 46 programmatic indicators and milestones, the triple billion targets and HALE. Importantly, within-country inequality monitoring depends on the availability of real data. If real data are not available, within-country inequalities are hard to measure and monitor based on estimates.

For HALE and the triple billion targets, which are measured using composite indices, data availability is generally insufficient to allow for data disaggregation and within-country inequality monitoring. The focus will therefore be on monitoring between-country inequalities. Comparisons can be made based on country income, for example by comparing the situation in low income countries with the global average. In addition, for countries where disaggregated data are available, case studies can be undertaken to monitor within-country inequalities.

For the 46 programmatic indicators, the main aim will be to monitor within-country inequalities. Within-country inequality measurement is of particular importance as it is the most actionable on a country level. Disaggregation will be tailored to the indicator of interest for global monitoring and will ideally focus on the inequality dimension (axis of disaggregation) most relevant to each member state when it comes to national monitoring. Sex disaggregation should be undertaken, wherever relevant.

For reductions in inequality to be achieved, specific targets for priority subgroups will be used. These targets, when rolled up across countries, will result in priority subgroups benefitting proportionally more from the triple billion goals. They will mean that the pace of improvement for an indicator is faster for a priority subgroup than at the national level and/or for a defined advantaged group.
8 Country Examples

Work in progress

This chapter to contain case studies of countries, including selection of targets, calculation of the billions, target contributions to each billion and examples of capacity building.

Glossary
### Appendix A.1 Example of metadata for one of the programmatic indicators (SDG 1.5.1)

<table>
<thead>
<tr>
<th>Milestone #1</th>
<th>Reduce the number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator</td>
<td>Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000</td>
</tr>
<tr>
<td>SDG/ Core 100</td>
<td>SDG 1.5.1</td>
</tr>
<tr>
<td>Definition</td>
<td>This indicator measures the number of people who died or went missing from disasters per 100,000 population.</td>
</tr>
<tr>
<td>Method of estimation/calculation</td>
<td>Number of deaths attributed to disasters over 100,000 Global population</td>
</tr>
<tr>
<td>Numerator</td>
<td>The Sendai Framework and SDG 1.5.1 do not include deaths that are conflict-related, or violent deaths.</td>
</tr>
<tr>
<td>Denominator</td>
<td>Global population</td>
</tr>
<tr>
<td>Preferred data sources</td>
<td>Data are available from the Sendai Framework monitoring platform, overseen by UNISDR (<a href="https://sendaimonitor.unisdr.org/">https://sendaimonitor.unisdr.org/</a>). Data provider at national level is appointed Sendai Framework Focal Points. In most countries disaster data are collected by line ministries and national disaster loss databases are established and managed by special purpose agencies including national disaster management agencies, civil protection agencies, and meteorological agencies. The Sendai Framework Focal Points in each country are responsible of data reporting through the Sendai Framework Monitoring System.</td>
</tr>
<tr>
<td>WHO GPW13 Framework</td>
<td></td>
</tr>
<tr>
<td>Disaggregation</td>
<td>Country (country population as denominator); Hazard type</td>
</tr>
<tr>
<td>Expected frequency of data collection</td>
<td>Annual</td>
</tr>
<tr>
<td>Limitations</td>
<td>Currently data from UNISDR and UNSD are available for only 73 countries in 2017. Data availability are expected to increase during the period. Data disaggregated by hazard type (e.g., biological, climatological, hydrological) will be available in future years allowing for</td>
</tr>
<tr>
<td>Data type</td>
<td>Rate</td>
</tr>
</tbody>
</table>
Table to be reformatted and updated to also include whether there is underlying data availability. Need to take account of denominators e.g. for Malaria and Immunisation.
## Appendix A.3

### Country selection of GPW3 priorities

In 2018, member states were asked to select their priorities amongst the then current GPW3 programmatic indicators. The figure below shows the number of countries by region selecting each of the available Impact Framework indicators.

<table>
<thead>
<tr>
<th>Impact Framework targets</th>
<th>AS</th>
<th>EM</th>
<th>EU</th>
<th>ML</th>
<th>WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased IMR capacity and health emergency preparedness</td>
<td>46</td>
<td>21</td>
<td>27</td>
<td>10</td>
<td>28</td>
</tr>
<tr>
<td>20% relative reduction in the premature mortality (age 30–70 yrs) from NCDs (cardiovascular, cancer, diabetes, or chronic...</td>
<td>39</td>
<td>26</td>
<td>44</td>
<td>18</td>
<td>38</td>
</tr>
<tr>
<td>Increase access to essential health services (including promotion, prevention, curative, rehabilitative, and palliative care) with a focus</td>
<td>39</td>
<td>26</td>
<td>44</td>
<td>18</td>
<td>38</td>
</tr>
<tr>
<td>Increase availability of essential medicines for primary health care, including the ones new to or change to a new</td>
<td>26</td>
<td>30</td>
<td>36</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>Increase maternal mortality rate by 30%</td>
<td>12</td>
<td>22</td>
<td>25</td>
<td>19</td>
<td>11</td>
</tr>
<tr>
<td>Reduce tuberculosis deaths (including TB deaths among people with HIV) by 50%</td>
<td>11</td>
<td>12</td>
<td>23</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Reduce the preventable deaths of newborns and children under 5 yrs of age by 30%</td>
<td>14</td>
<td>17</td>
<td>26</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>Reduce the global maternal mortality ratio by 30%</td>
<td>17</td>
<td>33</td>
<td>35</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>All countries reporting on IMR core capacities annually</td>
<td>15</td>
<td>36</td>
<td>36</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Timely detection, risk assessment and response for acute health emergencies</td>
<td>13</td>
<td>32</td>
<td>32</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Increase treatment coverage of RR-IB to 80%</td>
<td>11</td>
<td>31</td>
<td>32</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Increase coverage of 2nd dose of measles containing vaccine (MCV2) to 90%</td>
<td>19</td>
<td>35</td>
<td>32</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>Reduce number of new HIV infections per 1,000 uninfected population, by sex, age, and key populations by 75%</td>
<td>9</td>
<td>12</td>
<td>29</td>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>Increase in number of healthcare workers protected from infectious hazards (bi)</td>
<td>9</td>
<td>12</td>
<td>29</td>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>Reduce the number of HBV/HCV-related deaths by 40%</td>
<td>3</td>
<td>7</td>
<td>20</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Eradicate polio: zero cases of poliomyelitis caused by wild poliovirus (WPV) or circulating vaccine-derived poliovirus (cVDPV)</td>
<td>2</td>
<td>7</td>
<td>21</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>Mat and begin to reverse the rise in childhood overweight (3–19 yrs) and obesity (6–17 yrs)</td>
<td>1</td>
<td>5</td>
<td>14</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Reduce mortality from climate-sensitive diseases by 30%</td>
<td>1</td>
<td>5</td>
<td>14</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>7% relative reduction in the harmful use of alcohol as appropriate, within the national context</td>
<td>0</td>
<td>3</td>
<td>26</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Provide access to safely managed drinking water services for 1 billion more people</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Increase service coverage of treatment interventions (pharmacological, psychosocial and rehabilitation and alternative services)</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>7% relative reduction in the prevalence of insufficient physical activity in persons aged 18+ yrs</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Reduce malaria deaths by 50%</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Eliminate at least one neglected tropical disease in 30 additional endemic countries (cumulative total number of countries)</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Increase in emergency vaccination coverage</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Increase the proportion of women of reproductive age (aged 15–49 yrs) who have their need for family planning satisfied with...</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Reduce the mortality rate attributed to household and ambient air pollution by 5%</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Reduce the number of global deaths and injuries from road traffic accidents by 30%</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Provide access to safely managed sanitation services for 800 million more people</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Reduce the number of global deaths and injuries from road traffic accidents by 30%</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Eliminate industrially produced trans fats (increase the percentage of people protected by effective regulations)</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Increase percent of publicly financed health expenditures by 30%</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>20% relative reduction in the prevalence of stomatitis</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Increase the number of people living with HIV/AIDS who have access to the effective ART</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Reduce number of deaths attributed to disasters by per 100,000 population by 5%</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Reduce suicide mortality rate by 15%</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Reduce the number of disturbed children under 5 yrs of age by 30%</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Reduce the number of older adults (65 yrs who are care dependent) by 15 million</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Reduce the prevalence of wasting among children under 5 yrs of age by 50% or less by 2020</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Increase the proportion of ever-partnered women and girls aged 15–49 yrs (secondary or sexually active) by a current or...</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Increase the proportion of children under 5 yrs of age who are developmentally on track in health, learning and psychosocial well...</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Reduce suicide mortality rate by 15%</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Increase the proportion of women aged 35–49 yrs who make their own informed decisions regarding sexual relations, contraception...</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Increase coverage of human papilloma virus vaccine among adolescent girls (11-15 yrs) to 50%</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Increase the availability of oral morphine in facilities caring for patients in need of this treatment for palliative care at all levels...</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>3</td>
<td>7</td>
</tr>
</tbody>
</table>
Appendix B  
Universal Health Coverage Index

Appendix B.1  
SDG 3.8.1 component indicators

Extract from SDG 3.8.1 metadata. List of component indicators. The first seven indicators will be used for the UHC billion.

I. Reproductive, maternal, newborn and child health
1. Family planning: Percentage of women of reproductive age (15–49 years) who are married or in-union who have their need for family planning satisfied with modern methods (SDG indicator 3.7.1, metadata available here)
2. Pregnancy and delivery care: Percentage of women aged 15–49 years with a live birth in a given time period who received antenatal care four or more times
3. Child immunization: Percentage of infants receiving three doses of diphtheria-tetanus-pertussis containing vaccine
4. Child treatment: Percentage of children under 5 years of age with suspected pneumonia (cough and difficult breathing NOT due to a problem in the chest and a blocked nose) in the two weeks preceding the survey taken to an appropriate health facility or provider

II. Infectious diseases
5. Tuberculosis: Percentage of incident TB cases that are detected and successfully treated
6. HIV/AIDS: Percentage of people living with HIV currently receiving antiretroviral therapy
7. Malaria: Percentage of population in malaria-endemic areas who slept under an insecticide-treated net the previous night [only for countries with high malaria burden]
8. Water and sanitation: Percentage of households using improved sanitation facilities

III. Noncommunicable diseases
9. Hypertension: Age-standardized prevalence of non-raised blood pressure (systolic blood pressure <140 mm Hg or diastolic blood pressure <90 mm Hg) among adults aged 18 years and older
10. Diabetes: Age-standardized mean fasting plasma glucose (mmol/L) for adults aged 25 years and older
11. Tobacco: Age-standardized prevalence of adults >=15 years not smoking tobacco in last 30 days (SDG indicator 3.a.1, metadata available here)

IV. Service capacity and access
12. Hospital access: Hospital beds per capita, relative to a maximum threshold of 18 per 10,000 population
13. Health workforce: Health professionals (physicians, psychiatrists, and surgeons) per capita, relative to maximum thresholds for each cadre (part of SDG indicator 3.c.1).
14. Health security: International Health Regulations (IHR) core capacity index, which is the average percentage of attributes of 13 core capacities that have been attained (SDG indicator 3.d.1, see metadata here)

Appendix B.2  
Data Availability for SDG 3.8.1 component indicators

There are many gaps in primary data availability for the UHC SCI tracer indicators (Fig. B.0.1), particularly for recent years (2015-2017). Across UHC SCI tracer indicators, over a quarter of the latest country data points pre-date 2010.

Fig. B.0.1. From 2013 to 2017, countries had data for an average of 40% of the 14 UHC SCI indicators. (UHC Report 2019).
Where primary data is missing, imputation methods have been applied. These include

- Using a validated model to provide estimates. This is used for:
  - need for family planning (FP);
  - diphtheria-tetanus-pertussis, three doses (DTP3);
  - HIV (ART) coverage;
  - tuberculosis case detection and treatment (TB);
  - ITN use;
  - access to at least basic sanitation (WASH);
  - prevalence of non-elevated blood pressure (BP);
  - mean fasting plasma glucose (FPG);
  - and prevalence of tobacco non-use (TOB).

- Linearly interpolating between available data points and/or extending latest reported value to subsequent years when no newer data are available. This is used for antenatal care, at least four visits (ANC4); care-seeking for suspected pneumonia (PNEU); hospital beds per 10,000 (HOSP); health worker density (HWD); and IHR scores.

- Imputing from countries with similar characteristics (WHO region or World Bank income group). This is used when no data points exist for an indicator for a country.

Appendix B.3 UHC and full service coverage

The WHO has estimated the number of people globally who are considered to have full UHC coverage (UHC report 2019). This method uses estimates of average service coverage and then uses data on maternal and child health intervention to convert average coverage to full coverage. This conversion looks at what fraction of interventions each mother-child pair received – the “co-coverage”. This is then used to evaluate approximately how many people have access to >85% of essential services. Details of the UHC report method are provided in a technical note [https://www.who.int/healthinfo/universal_health_coverage/report/uhc_report_2017_technical_note.pdf?ua=1]. The approach uses 8 of the SDG 3.8.1 indicators but adds 4 additional tracer indicators to calculate the average service coverage. Household survey data is then used to determine co-coverage (i.e who has 85% of services needed) by performed a series of regressions relating co-coverage to average UHC service coverage. At present, there is very limited data on co-coverage and it covers only some services. This adds considerable uncertainty to the calculation. The method can only sensibly be used to estimate contributions to the UHC billion at a regional or income-group level and does not allow country contributions to be measured.
The above approach is not recommended for counting the UHC billion. It is a more complex approach, with greater uncertainty and requiring more data and analysis. The results are sensitive to the choice of threshold, and also to any extensions to the service coverage indicators (add lancet ref). It is not suitable for calculation by countries because insufficient data is available for estimation at a country level (uncertainties are thus very high) and it is a relatively complex calculation.

**How different are average coverage and the 85% coverage approach?**

(All numbers provisional and to be updated).

Both average and 85% coverage approaches are both valid approaches for counting how many people have UHC - although the concept and interpretation is a little different. Average coverage provides a simpler, more robust, more transparent approach which is better suited for use by member states.

The UHC 2019 report estimates that at current rates the increase in population with UHC coverage over 2018 to 2023 would be somewhere between 400 and 600 million people. Using the average service coverage approach proposed for the UHC billion, the likely increase in coverage would be around 600 million i.e. similar but probably a little greater than the UHC report method.

With either approach, considerable acceleration will be required if the UHC billion is to be achieved.

**Appendix B.4 Measuring UHC service coverage — future directions**

Extract from UHC 2019 report: Box 1.3 Measuring UHC service coverage: current limitations and future directions

UHC is meant to ensure that people receive the essential health services they need, with adequate quality to be effective, and to do so without incurring financial hardship. The inclusionary nature of UHC and its emphasis on providing quality care across a wide set of services – promotive, preventive, curative, rehabilitative, and palliative health services across the life course – poses unique challenges for monitoring UHC progress in policy-relevant, actionable ways. No measure of UHC service coverage will be perfect, particularly in the absence of routine and representative data systems that simultaneously capture intervention need, receipt, and effectiveness across health service domains and for all populations. As a result, UHC monitoring must recognize the current limitations and identify approaches for continuous improvement in the future – all with the overarching goal of providing the best possible data and evidence base for achieving UHC worldwide.

Since its introduction in the 2017 Global Monitoring Report, the UHC SCI offers several improvements such as increasing country-year coverage of primary data and producing a time series for tracking trends over time. Many of its current limitations, particularly country-indicator coverage in the most recent years, stem from longstanding gaps in broader data systems and/or lags in primary data publication. Household surveys are vital components to a country’s overarching health data ecosystem, alongside well-functioning civil registration and vital statistics systems and routine, representative administrative data platforms. And they are often the only available data sources to monitor trends in equity and provide more disaggregated data. However, especially due to the inherent periodicity of household surveys, they provide valuable complementary information to civil registration and vital statistics and other data sources within national health information systems, such as disease registries, vaccination records, and health facility surveys.

The SDGs explicitly call for investing in and strengthening national data systems, which directly support UHC monitoring and can thus foster greater accountability and action for improving service coverage. Other limitations, such as the use of health system inputs (such as the density of hospital beds) and prevalence-based measures like non-tobacco use to approximate service availability, also stem from a global paucity of data on more direct measures of different types of service coverage. Although the use of proxy
measures is often necessary, it is important to continually revisit how well various proxy indicators can actually capture progress on health service coverage across settings – and whether they may inadvertently reflect factors outside health services.

Achieving UHC not only involves ensuring access and receipt of essential health services needed by people – it also requires that those services are of sufficient quality to be effective and thus provide the health gains associated with them. Understanding whether and how much people are actually benefiting from the interventions they receive is critical for addressing any gaps in service provision, and more broadly, overall accountability of health systems to the populations they serve. From vaccination and HIV treatment to hypertension, numerous studies show that focusing on coverage alone risks painting an overly positive picture of intervention impact and program success; for instance, while about 30% of people in 44 low- and middle-income countries received treatment for hypertension, only 10% achieved control. To truly deliver on the promise of UHC – to improve health outcomes throughout the life course – tracking health service effectiveness alongside the receipt of needed services must be prioritized.

We need to understand whether the interventions that the health system delivers have their desired effect in improving the health of the population. For some conditions such as hypertension and diabetes, measuring treatment and control to assess effective coverage is relatively straightforward. For other conditions proxy measures are frequently required. The premise of such proxy measures, that capture outcomes, is that if effective interventions of sufficient quality are received in a timely manner, some negative outcomes should not occur. Moving from measures of service coverage to an overarching measure of effective coverage that captures interventions across levels of care (primary, secondary and tertiary) and range of services (promotive, preventive, curative, rehabilitative and palliative) is a priority.

Evaluating how well different indicators of effective service coverage, both direct and proxy measures, represent health needs across the life course is an important next step for monitoring UHC service coverage at both national and global levels. Globally, technical groups and collaborations such as the Countdown to 2030 for Women’s Children’s and Adolescent’s Health are considering ways to address long-standing challenges in measuring effective coverage and applications for measuring progress on UHC. Member States endorse this priority and WHO aims to support country efforts to strengthen data systems and improve methods for monitoring effective coverage. Building on this information by tracking the full cascade of care, health systems could then be able to track where changes are needed, identify bottlenecks, implement solutions, and measure progress on an ongoing basis.

Appendix B.5     A UHC effective service coverage index

Work is underway to explore use of new index of UHC which would have the aims of

• Measuring effective coverage of treatment – taking care of service quality (via proxies if need be).
• Covering the major health interventions that people need at different stages of the life course in different settings (see box)
• Weighting contributions to the index by potential health gain (DALYs)
• Suitable for estimation of contributions to the UHC billion
• Limits reporting burden but encourages forward look at data needs

<table>
<thead>
<tr>
<th>Type of care:</th>
<th>The life course:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promotion</td>
<td>reproductive and newborn,</td>
</tr>
<tr>
<td>Prevention</td>
<td>under 5,</td>
</tr>
<tr>
<td>Treatment Communicable, Maternal,</td>
<td>5-19,</td>
</tr>
<tr>
<td>Perinatal, Nutritional</td>
<td>20-64</td>
</tr>
</tbody>
</table>
Precise details of the new index are not yet available and it is intended that new index of UHC will be tested on pilot countries as a first step.

**Appendix C** Emergencies Preparedness Billion Appendices

**Appendix C.1** Data Sources for the Emergency Prevent Index

[Is this appendix needed?]

The sub-index includes data for routine and emergency immunizations. For baseline values, a mean vaccine coverage estimate will be computed (n= yellow fever, meningitis and cholera specific at-risk/affected countries) using 2017 coverage data. 2017 data are used because WUENIC estimates are generated annually, for the preceding year, and available at approximately the annual midpoint.

Routine immunizations data are available from all Member States, using the WHO-UNICEF coverage estimates (WUENIC), which are generated annually after submission of Joint Reporting Forms (JRF) from all Member States, after review by a panel of experts that triangulate coverage estimates, survey results, historical trends, and country context. Currently, WUENIC coverage estimates for meningitis vaccination are unavailable.

Emergency stockpiles of yellow fever, cholera, and meningitis vaccines are managed by the International Coordinating Group (ICG) on Vaccine Provision; a global multi-organization mechanism to manage and coordinate the provision of emergency vaccine supplies and antibiotics to countries during major outbreaks. The ICG works to improve cooperation and coordination of epidemic preparedness and response. It also works on forecasting vaccine stocks, negotiating vaccine prices through its networks or partners, evaluating interventions and standard protocols for managing diseases. Countries make emergency vaccination requests to the ICG, typically during emergencies. The ICG makes requests and their approval publicly available, as well as the number of doses requested and shipped. Currently, only a subset of coverage estimates are currently available from 2017 for yellow fever (50%) and cholera (78%). Coverage estimates for all approved requests for meningitis vaccination were available for 2017.

- MenA routine immunization administrative coverage data from the WHO/UNICEF Joint Reporting Form (JRF) (https://www.who.int/immunization/monitoring_surveillance/routine/reporting/en/);
- Emergency immunization coverage for cholera, meningitis and yellow fever using the International Coordinating Group (ICG) on Vaccine Provision data (http://www.who.int/csr/disease/icg/en/);
- Additional meningitis and yellow fever immunization campaign coverage estimates from the WHO/UNICEF JRF (https://www.who.int/immunization/monitoring_surveillance/routine/reporting/en/);
- Mass preventive oral cholera vaccination campaign coverage data from the Global Task Force on Cholera Control (GTFCC) (https://www.who.int/cholera/task_force/en/).

Table 3: Data Availability, Routine and Emergency Vaccinations (2017)
<table>
<thead>
<tr>
<th>Antigen</th>
<th>Denominator (number of Member States)</th>
<th>Routine Coverage Data Source (Member States with data available)</th>
<th>Preventive Vaccination Campaign Data Availability</th>
<th>Emergency Vaccination Campaign Data Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCV1</td>
<td>194</td>
<td>WUENIC (194)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>YF</td>
<td>39</td>
<td>WUENIC (35)&lt;sup&gt;1,2&lt;/sup&gt;</td>
<td>JRF</td>
<td>ICG (1)&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
<tr>
<td>MenA</td>
<td>26</td>
<td>JRF (6)&lt;sup&gt;3,4&lt;/sup&gt;</td>
<td>JRF</td>
<td>ICG (4)&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>OCV</td>
<td>47</td>
<td>N/A</td>
<td>GTFCC</td>
<td>ICG (9)&lt;sup&gt;7&lt;/sup&gt;; GTFCC</td>
</tr>
</tbody>
</table>

1 35 of yellow fever high risk Member States have WUENIC data on routine yellow fever vaccination

2 An additional 4 Member States have WUENIC data on routine yellow fever vaccination, but are not at high risk for yellow fever

3 6 countries at high epidemic risk for meningitis have routine immunization data available (administrative coverage); WUENIC estimates are not available for meningitis but will be used when available

4 An additional 9 countries have routine immunization data available (administrative coverage), but are not considered to be at high epidemic risk for meningitis

5 2 Member States with ICG approved or partially approved requests (Brazil, Nigeria); 1 with coverage data available

6 4 Member States with ICG approved or partially approved requests (Togo, Cameroon, Nigeria, Niger [Benin request not approved])

7 9 Member States with ICG approved or partially approved requests (South Sudan, Somalia, Mozambique, Malawi, Yemen, Sierra Leone, Nigeria, Bangladesh, Chad [Philippines request not approved]); of which 7 have coverage data available

Table 0.1 Average Vaccine Coverage by Country Category

<table>
<thead>
<tr>
<th></th>
<th>Number States</th>
<th>Mean Coverage (%)</th>
<th>Range of coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow Fever Only</td>
<td>14</td>
<td>75</td>
<td>16-99</td>
</tr>
<tr>
<td>Cholera Only&lt;sup&gt;9&lt;/sup&gt;</td>
<td>22</td>
<td>81</td>
<td>53-99</td>
</tr>
<tr>
<td>Meningitis Only&lt;sup&gt;10&lt;/sup&gt;</td>
<td>2</td>
<td>43</td>
<td>39-48</td>
</tr>
<tr>
<td>Yellow Fever and Cholera&lt;sup&gt;11&lt;/sup&gt;</td>
<td>4</td>
<td>66</td>
<td>35-86</td>
</tr>
<tr>
<td>Yellow Fever and Meningitis&lt;sup&gt;12&lt;/sup&gt;</td>
<td>3</td>
<td>54</td>
<td>45-60</td>
</tr>
<tr>
<td>Cholera and Meningitis&lt;sup&gt;13&lt;/sup&gt;</td>
<td>3</td>
<td>48</td>
<td>45-50</td>
</tr>
<tr>
<td>Yellow Fever, Cholera, and Meningitis&lt;sup&gt;14&lt;/sup&gt;</td>
<td>18</td>
<td>60</td>
<td>21-88</td>
</tr>
<tr>
<td>All at-risk states</td>
<td>66</td>
<td>67</td>
<td>58-99</td>
</tr>
<tr>
<td>-------------------</td>
<td>----</td>
<td>----</td>
<td>-------</td>
</tr>
<tr>
<td>Routine Only</td>
<td>128</td>
<td>92</td>
<td>16-99</td>
</tr>
<tr>
<td>All</td>
<td>194</td>
<td>83</td>
<td>16-99</td>
</tr>
</tbody>
</table>

9 Estimate for 18 of 22 Member States was generated using DPT3 and MCV1 coverage only

10 Estimate for 2 of 2 Member States was generated using DPT3 and MCV1 coverage only

11 Estimate for 1 of 4 Member States was generated using DPT3, MCV1, and YF coverage only

12 Estimate for 3 of 3 Member States was generated using DPT3, MCV1, and YF coverage only

13 Estimate for 3 of 3 Member States was generated using DPT3 and MCV1 coverage only

14 Estimate for 1 Member State was generated using DPT3, MCV1, YF, cholera, and meningitis (all antigens); estimate for 3 Member States was generated using DPT3, MCV1, YF, and meningitis; estimate for 10 Member States was generated using DPT3, MCV1, and YF; estimate for 1 Member State was generated using DPT3, MCV1, and cholera; estimate for 3 Member States was generated using DPT3 and MCV1 coverage only (total 18 Member States)
Annex 2

Decision instrument for the assessment and notification of events that may constitute a public health emergency of international concern

Events detected by national surveillance system (see Annex 1)

- A case of the following diseases: unusual or unexpected and may have serious public health impact, and thus shall be notified:
  - Smallpox
  - Polioenteritis due to wild-type poliovirus
  - Human influenza caused by a new subtype
  - Severe acute respiratory syndrome (SARS).

- Any event of potential international public health concern, including those of unknown cause or sources and those involving other events or diseases than those listed in the box on the left and the box on the right shall lead to utilization of the algorithm.

- An event involving the following diseases shall always lead to utilization of the algorithm, because they have demonstrated the ability to cause serious public health impact and to spread rapidly internationally:
  - Cholera
  - Typhoid fever
  - Yellow fever
  - Viral hemorrhagic fevers (Ebola, Lassa, Marburg)
  - West Nile fever
  - Other diseases that are of special national or regional concern, e.g., dengue fever, Rift Valley fever, and meningococcal disease.

Is the public health impact of the event serious?

- Yes
- No

Is the event unusual or unexpected?

- Yes
- No

Is there a significant risk of international spread?

- Yes
- No

Is there a significant risk of international travel or trade restrictions?

- Yes
- No

Event shall be notified to WHO under the international health regulations.

---

1. As per WHO case definitions.
2. The disease list shall be used only for the purposes of these Regulations.
Appendix D.1
Country selection of GPW13 priorities relating to Healthier Populations

In 2018, member states were asked to select their priorities amongst the then current GPW13 programmatic indicators (this list of indicators has since been modified – so not all indicators used in the current HP billion were present at the time of this exercise). The figure below shows the number of countries by region selecting each of the available Healthier Population related Impact Framework programmatic indicators.

Appendix D.2
Alternative methods for measuring Healthier Population Billion

The main criteria used in selection of the method for counting the HP billion are listed in Section 5.4.1.

This appendix provides further detail on alternative methods that have been considered. The alternatives are typically more complex, require more development, and are considered less likely to be easily assimilated by all member states. Nevertheless, further exploration of these methods is merited, and it is possible that these (or variants) may be used in the future to create an improved Healthier Lives index (or perhaps Healthiness Index).

An important alternative approach, recommended by the Expert Review Group (ERG) of the GPW13 programme, would be to weight the contributions of the different indicators. This addresses an obvious shortcoming of the unweighted Healthier Lives approach in which all indicators are treated as having equal impact on healthiness. The ERG recommended development of an approach in which each of the indicators are converted into the equivalent health gain. The use of DALYS averted was proposed as a possible measure of health gain.

Using a weighting scheme aims to quantify the relative health gain due to different indicators, e.g. for safer use of alcohol versus a violence free childhood. It requires determining both a weighting scheme and then a means of converting the health gains back into a number of lives. The use of DALYS averted as weights is conceptually appealing in that it provides a principled basis for aggregation across disparate efforts. A disadvantage is that it requires considerably more effort to communicate how the calculations are implemented and does not map as directly to the ‘billion-persons’ heuristic. Furthermore, DALYS averted may not provide the ideal weighting scheme for measuring change in healthiness. Firstly, care would be needed in how DALYS are applied to age groups (we would probably need to use the total DALYS averted across the full age spectrum). For example, changes in overweight u5s and teenage smokers could be considered key ages with the potential to most impact long term population healthiness. A young smoker is more likely to end up as a life/long smoker, an overweight u5 may be more likely to end up as an obese...
adult. Yet the DALYs for these age groups are low because health impacts are not felt until later in life. Secondly, it is not clear that DALYs fully capture all aspects that constitute healthiness, for example the associated well-being and impacts on relationships. The impact of “on track” child development, or violence issues may affect healthiness in a way that extends beyond lives lost or disability.

A further option that may be worth considering for the future is whether it would be possible to create an index of non-health-sector related healthiness. This would be an index that would rank the healthiness of a population from 0 (worst possible) to 100% (best possible). This would be akin to the Universal Health Coverage index and would apply to a point in time (and thus not be limited to measurement of change). It would require a more complex approach and would require significant methodological developments.

Appendix D.3 Details of the correction for double counting

A first-level correction for double accounting can be made based on the assumption that the observed change in each of the indicators occurs randomly (independently). Note that for this index, independence is assumed between changes in indicators; this is not the same as assuming independence between the indicators. The assumption appears to be reasonable at a within-country level, based on examination of historical data (maximum observed correlations for changes in indicators are < 0.4, see also Appendix D). However, the approach remains a simplification and cannot account for correlations within sub-populations. For example, many of the indicators are highly correlated with socioeconomic/income levels (e.g. access to safe water and sanitation, clean fuels, childhood stunting) so improvements may be expected to centre on addressing needs of lower income populations — this would cause double counting but is not captured in the double counting correction. Use of other methods such as joint distribution estimation are also possible but will also require further data.

The total contribution to the billion, correcting for double counting, is the difference between the proportion of the population who are healthier, as measured by one or more indicators, and the proportion who are less healthy. This can be written as follows

\[
Contribution = \sum_{j} \left( \prod_{\Delta p_{i} > 0} (1 - |\Delta p_{i}|) - \left( \prod_{\Delta p_{i} < 0} (1 - |\Delta p_{i}|) \right) \right)
\]

(Eqn 1)

which simplifies to

\[
Contribution = \sum_{j} \prod_{\Delta p_{i} < 0} (1 - |\Delta p_{i}|) - \prod_{\Delta p_{i} > 0} (1 - |\Delta p_{i}|)
\]

where \(|\Delta p_{i}|\) is the absolute value of the change in prevalence for indicator \(i\), \(j\) are distinct population tranches (e.g. <5s, 5-9s, over 18s) and \(i\) are the indicators relevant to each population tranche. Note that different tranches of the population are affected by different sets of indicators (e.g. compare indicators relevant to under 5s versus indicators relevant to adults, Error! Reference source not found.), and overlaps are calculated for each population tranche separately.
Notes: The violence against women indicator applies to ever partnered women over the age of 15, which is approximated by the number of married women aged 15-65. Populations in the age range 15-65 are therefore separated into the population of partnered women (pw) and the remaining population (other). Ages 15-17 and 18-19 are separated out because of differences in indicator ages ranges.

The above formula derives from simple probabilistic arguments. First note that \((1 - |\Delta p_i|)\) is the proportion of the population seeing no change in indicator \(i\). Then \((1 - |\Delta p_1|) \times (1 - |\Delta p_2|)\) is the proportion of the population with no change indicator 1 and no change in indicator 2, and \(\Pi_i(1 - |\Delta p_i|)\) is the proportion of the population with no change in any of the \(i\) indicators. This means that the remaining proportion, \(1 - \Pi_i(1 - |\Delta p_i|)\), is the proportion of the population where one or several indicators have changed over the period, i.e., the proportion living newly healthier lives.

The correction also needs to take account of the fact that not all indicators are improving. Where \(\Delta p > 0\) it means that the population has reduced exposure to risks to healthiness, and where \(\Delta p < 0\) it indicates the population is experiencing increased exposure to health risks. If 10% of a population become healthier due to improved air quality and 10% become less healthy due to increased body weight, then, in the Healthier Lives approach, the net number of healthier lives is zero – the two changes offset each other.

In Eqn 1 above, the first term, \(1 - \Pi_{\Delta p_i>0}(1 - |\Delta p_i|)\), is the proportion of population who became healthier, and the second term, \(1 - \Pi_{\Delta p_i<0}(1 - |\Delta p_i|)\), is the proportion who became less healthy. The net contribution is the difference between these two.
Appendix D.4 Correlations between changes in Healthier Population indicators

The correction for double counting relies on independence between changes in different indicators. We evaluate the level of correlation using the 2010-2015 dataset of observed changes in indicators. The observed correlations in the changes are modest (Figure D.1) with most being non-significant (at the 0.05 level) and the maximum correlation being 0.39 between the child nutrition indicators.

Figure D.1 Correlations in changes in observed indicators for 2010-2015 (approx.). Correlations are shown as coloured ellipses (top right) and as numbers (bottom left). A grey X indicates that the correlation is not significant (0.05 level). Data from GHO and UN SDG.

Appendix D.5 Alternative approaches for handling population growth

In the context of the Healthier Population Billion, it is important to carefully consider how to handle population growth. In particular, how the additional people in a population will impact the billion. Change in population healthiness that is due solely to population change should not be counted into the final number. If population growth were to be included (e.g. adding in all new non-smokers) then much of the healthier billion could be achieved due to population growth alone. Conversely, it would mean that declines in population could be interpreted as losses of healthy lives.

It is not practical to deal with population growth in full detail for GPW13 – for example by tracking changes in population age structure. This is in part because for most SDG/GPW13 indicators we do not know the breakdown by age. In part, because the level of complexity would be disproportionate to the rest of the approach.

The simplest robust approach to population growth is to calculate the change in prevalence multiplied by the final population (as described in Section 0 above).

\[ Contribution_i = pop_{end} \times (prev_{i-end} - prev_{i-start}) \]  

(Eqn A.0)

This approach assumes a counterfactual scenario where the additional population inherits the same prevalence as the existing population (the default, non-intervention case). For example, without intervention, the additional population would have the same proportion of smokers or of obesity. This is a reasonable first approximation for many behavioural indicators but may be less desirable for some of the environmental risk indicators.
More generally, it could be argued that population growth should be treated differently for different indicators (and countries). For example, indicators such as water and sanitation require additional resource to maintain the same prevalence of access to safe water for a larger population. This is because, without intervention, the larger population would have proportionally less access to safe water than the current population (the additional population would “dilute” access to safe water).

A generalisation of Eqn A.0 allows the additional population to be modelled as having a different prevalence to the initial population:

\[ Contribution_i = pop_{end} \times (prev_{i-end} - cf_{prev_{i-start}}) \]  

(Eqn A.1)

Where \( cf_{prev} \) is the counter factual prevalence for the case that the original population is augmented by new population but without additional intervention, and is given by:

\[ cf_{prev_{i-start}} = \frac{prev_{i-start}^+g*prev_{i-g}}{1+g} \]

with

\[ g = \text{the population growth over the period} \]

\[ prev_{i-g} = \text{the prevalence of healthy people for indicator } i \text{ in the new population without intervention.} \]

In the case where \( prev_{i-g} = prev_{i-start} \), Eqn A.1 simplifies to Eqn A.0 above.

This generalised approach is more flexible but also requires estimation of \( prev_{i-g} \), the expected prevalence in the new population without intervention. Care is also needed because \( prev_{i-g} \) may be different for cases where there is growth or decline in the population. Where \( g \) is negative, it is proposed to set \( prev_{i-g} = prev_{i-start} \).

The more generalized method it is more complex to understand and requires estimation of further parameters. At present, the use of the simpler but robust approach of Eqn A.0 and Section 0 is proposed.

**Appendix D.6 Choosing a scenario for measuring change**

For the purposes of the Healthier Population Billion, the additional healthier lives will be measured as the change in healthier lives since the baseline year (expected to be 2018).

For many of the indicators, there is already an underlying trend in the data which could be expected to continue. Such trends, if continued, will be added into the billion - even though they may not be attributable to interventions within 2019-2023. Improving trends are expected for several indicators. Worsening trends are likely for obesity and unsafe use of alcohol unless interventions are accelerated. As mentioned above, indicators which change for the worse will make negative contributions to the billion.

An alternative scenario for measuring the billion would be look at the changes over and above existing trends and only count into the billion any change that is additional to the background change. Consider for example, if tobacco use is currently in decline and the current trend in a region/country is equivalent to a 5% reduction over 5 years. A country with a 7% decrease over the GPW13 period would then contribute 7 - 5% = 2% to the billion, and a country with a change of 3% reduction in tobacco use during GPW13 (less than current regional trend) would end up with a negative, 3 - 5% = -2%, contribution.

This approach is not selected for the following reasons
It is more complex and makes the billion harder to interpret. It means that countries which continue to progress at a steady rate could get no recognition in terms of a contribution to the billion. Only change over and above the background trend would be counted as healthier lives. Indicators which are getting worse but at a steady rate (e.g. obesity) would have a lesser impact on the billion if measured in this way – however, the world needs to pay particular attention to topics where healthiness is in decline.

Further historical data is needed to estimate the baseline trend and there is already a shortage of historical data. Baseline trends would in many cases need to be estimated (regional, global, …) and in many cases there would be insufficient data for reliable estimates to be made.

Appendix D.7 Known issues and limitations with the Healthier lives approach

The objective of the GPW13 billion is to measure and encourage improvements in the healthiness of the world’s populations. The proposed method offers a reasonable first attempt at this - able to monitor important changes in population healthiness linked to GPW13 whilst being a method that can be applied at country level. It does however have its limitations. Known issues (and some response to these) include:

5. The framework for the Healthier Population Billion is built on indicators that were selected for the GPW13 programme. This a non-optimal set of indicators for measuring change in overall population healthiness - the indicators are not comprehensive of all environmental, behavioural and social risks affecting healthiness. The Healthier Lives index proposed here will be specific to the GPW13 programme. In the future a more general index and framework for healthiness could be envisaged, with a broader coverage of sectors and factors. See Table G for candidate additional indicators (Appendix G)

6. The GPW13 healthier population framework does not allow fully for the life course. There are important differences in the number and type of indicators that apply to different population groups. Young children are perhaps both under and over represented – there are several indicators specific to under 5s, but at the same time, the counting scheme, which counts all indicators equally, is likely to under-play the importance of a healthy start in life. Other ages groups may also not be well represented, for example adolescents and the elderly.

7. The billion measures the joint efforts of WHO, member states and other interested parties, probably with a noticeable time lag. It is not possible to separate out the impact attributable to WHOs GPW13 impact framework.

8. The index is an index of change not absolute level. The method will not provide a ranking of (non-health-sector) healthiness. It is not designed for this purpose.

9. The method weights all indicators equally. Although a change in each indicator marks an important step in likely healthiness, this is not ideal.

10. The method simplifies many underlying relevant factors, such as population growth, and could be outperformed by more comprehensive approaches. Nevertheless, a simple method is preferred for practical reasons. Uptake of the methods at country level and by the WHA executive board is required. Countries are more likely to accept a straight-forward method.

11. There has been noticeable concern during consultations about the impact of double counting on the billion. This has been partially addressed using a correction based on assumptions of independence of change. The correction reduces the impact of double counting but does not account for within-population correlations. More comprehensive corrections may also be possible.

12. Handling population growth. A robust first approximation is used. It assumes that the additional population, without intervention, “inherits” the same prevalence as the current population. It neglects
differences between indicators in the interplay between population growth and the impact on indicator values.

13. Not all indicators are expressed as a prevalence and not all indicators are measures of risk (for example, road deaths are an outcome, used as a proxy for risk). Conversion into a measure of prevalence is needed for inclusion of an indicator into the method. A discussion and rationale as to the choices made is provided in Section 5.3.6 & (eventually) Appendix X.

14. Noise in the data due to sample size and measurement errors, especially those spread over time, could cause noise in the index. Smoothing and use of consistent estimates will be used when available.

15. Some GPW13 datasets are not yet available for all regions, for example water and sanitation data is very lacking in Africa. It is hoped that this will improve during GPW13.

16. The trans fats indicator is not included at present (it measures policy not risk). Country effort to act to remove trans fats from foods will not be recognized in the billion.

17. The time frame of GPW13 programme, in combination with lags in the timeliness of indicator estimates will make calculation of change by 2023 a challenge. Unless the timeliness of data improves, projection and forecasting may be required. This will reduce the level of “measurement” of this billion.

18. Interventions put in place during GPW13 may not produce effects quickly enough to be measured by 2023.

19. Based on current data and trends the Healthier Population Billion is unlikely to be achieved. It may however, encourage action in several important areas.

Appendix D.8 Gaps in the Healthier Lives Index indicators

There are several important exclusions from the healthier billion for which it is hoped that further indicators could be included in future approaches (Table G)

Table G. Showing sectors and indicators that could be considered missing from the HL index. These may be relevant for future versions of an index to measure healthier populations. Physical inactivity and long working hours indicators are shown in blue as suitable data is known to be available for these indicators. (List to be added to, data may also be available for other indicators)

<table>
<thead>
<tr>
<th>Potential future extra indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sector</strong></td>
</tr>
<tr>
<td>Climate</td>
</tr>
<tr>
<td>Healthy life style</td>
</tr>
<tr>
<td>Labour</td>
</tr>
<tr>
<td>Food Safety</td>
</tr>
<tr>
<td>Dietary</td>
</tr>
<tr>
<td>Dietary</td>
</tr>
<tr>
<td>Poverty</td>
</tr>
<tr>
<td>Human Capital index</td>
</tr>
<tr>
<td>Well being</td>
</tr>
<tr>
<td>Chemicals?</td>
</tr>
<tr>
<td>Older people</td>
</tr>
<tr>
<td>Gender equality</td>
</tr>
<tr>
<td>Indicator</td>
</tr>
<tr>
<td>Health related climate support</td>
</tr>
<tr>
<td>Physical activity</td>
</tr>
<tr>
<td>Long working hours</td>
</tr>
<tr>
<td>Access to safe foods</td>
</tr>
<tr>
<td>Salt intake</td>
</tr>
<tr>
<td>Sugar intake</td>
</tr>
<tr>
<td>Urban housing (SDG 11.1.1)</td>
</tr>
<tr>
<td><strong>Potential future extra indicators</strong></td>
</tr>
<tr>
<td><strong>List to be added to, data may also be available for other indicators</strong></td>
</tr>
</tbody>
</table>
Appendix D.9 Consultation Process

The Healthier Population Billion has been developed by the WHO secretariat with extensive input and consultation within and external to WHO (which continues). The following has already taken place.

- Recommendations made by GPW13 Expert Review Group (for both a lives-touched approach and DALYs averted weighting scheme)
- Outline calculations made for lives touched approach (now renamed to healthier lives approach)
- Presentation of outline for method made to WHO programs, to informal country consultation and to PAHO region (Spring 2019).
- Discussions of approach with Tom Frieden and Rafael Lozano.
- Creation of secretariat working group May 2019
- Creation of technical/ method working sub group and of framework sub group.
- Discussions held with each WHO programme with relevant indicators.
- Internal consultation with WHO programmes
- Comment from selected experts

Comments have been received from programs and countries and many of these have led to alterations to the methods (dealing with double counting, handling population growth, selection of indicators, requirement for countries to be able to calculate)

Next steps planned

- Examination by technical experts
- Consultation with regional focal points
- Member state consultation
- Continuation of working group
- Report/ Journal write up

Appendix D.10 Indicator Appendices (work packages)

For each indicator there will be 1 to 2 pages detailing brief description of indicator, recommended interventions, policies, best buys etc and where to get further information.

Alcohol

Tobacco

Etc

Appendix E HALE calculation template

An Excel spreadsheet (or online tool) will be made available to countries who wish to calculate HALE. An example of this is shown in Table E.1.
Table E.1 Illustration of calculation of HALE for a country using an excel spreadsheet template

<table>
<thead>
<tr>
<th>Age Interval</th>
<th>Survivors</th>
<th>Total years lived in age interval</th>
<th>Total years lived from age x</th>
<th>Life expectancy (LE)</th>
<th>Years lost due to disability per capita (YLD)</th>
<th>HALE = ( (1 - \text{YLD}) \times \text{LE\Sigma L} )</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0.022</td>
<td>0.019</td>
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<td>0.019</td>
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<td>150,691</td>
<td>48.2</td>
<td>0.035</td>
<td>0.019</td>
<td>45.4</td>
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<td>90-94</td>
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