UAE–Belém work programme on indicators

Target 9c: Health

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1. Description of the approach:

The expert group followed a logical approach to compile and suggest indicators to monitor the progress in the target "Attaining resilience against climate change related health impacts, promoting climate-resilient health services, and significantly reducing climate-related morbidity and mortality, particularly in the most vulnerable communities." The expert group reviewed the compilation of indicators, provided by the secretariat, initially using the guidance provided at SB-60 and subsequently at the CMA-6. The target was then analyzed, breaking it into logical components. These include:

> ***(i) Changing morbidity and mortality associated with climate-sensitive hazards*** to measure the health-related impacts, directly or indirectly sensitive to climate change, and hence simultaneously assesses attainment of resilience to climate change.
>
> ***(ii) Progress towards delivering climate-resilient health systems***, and reducing population exposure and vulnerabilities, related to assessing healthcare provision, continuity of health services in the context of climate change and related impacts and the impact of climate change events on health infrastructure and services.

These components were deliberated by the group to understand the metrics that could be needed to monitor its progress. The group subsequently mapped these metrics to available compiled indicators, while checking against the guidance and criteria provided at the SB-60 and CMA-6. Where needed, an indicator was modified to meet the criteria.

The proposed set of indicators is a result of this process. Necessary information,including on rationale for inclusion, metadata and status data availability have also been provided which can be further expanded based on the guidance to be provided at SB-62.

The chosen indicators focus on main domains relevant to health adaptation to climate change. These domains have been informed by review of the literature on climate hazards and adaptation needs, and well-established frameworks.

Indicators are proposed as core indicators, which we recommend all countries implement, and subsidiary sub-indicators, which can complement the findings of the core indicators, for a more thorough assessment. In some cases, a main indicator is proposed, which is composed of multiple sub-indicators. This aligns with the approach taken in other international processes, including the SDGs and the Sendai Framework, and is intended to support an adequate assessment of adaptation progress.

2. Experiences from the process

Since mid-2024, this group of experts has been working on identifying the best possible indicators to monitor progress against target 9c. Throughout the following months, we gained a better understanding of the requirements and constraints in this process. We are very grateful to the parties for the trust placed in us, and to the Secretariat for the invaluable support.

However, there are numerous areas in which the process could have been optimised, to make better use of time and resources. The lack of a clear authority for decision making on technical issues, process, interim timelines and format of outputs has meant that 78 experts have had to self-organise to reach consensus decisions. This often represented unnecessary uncertainties or delays, and misalignment in process and outputs that could be avoided through clear leadership and mandate, including to the Secretariat, in the leadership and management of the process.

The process has also not followed what would have been the standard process for the technical work on indicator selection. Many months of focus on a list of indicators created through an open consultation deterred from meaningful progress in the development of adequate ones. As a group of experts, we are generally aware of the indicators available, their strengths and limitations, and could have identified suitable indicators earlier if not focusing on that initial list.

Working on a voluntary basis has also meant that the time available to identify suitable indicators has been limited, especially given tight timelines. This format will make the upcoming work of indicator refinement and metadata development extremely challenging, and it is advised that a new approach, in light of the above challenges observed in the process so far, is taken to ensure timely and quality delivery of the next steps.

3. Further details on individual indicators

This section provides details and rationale of the indicators selected, which are presented in the associated table.

In total, we are proposing 15 core indicators, some of which are composed of sub indicators, or include subsidiary indicators for a more comprehensive reporting. These are summarised in Table 1, below

Table 1: summary of core and supplementary or sub-indicators selected for target 9c. The index numbers in brackets refer to the indices provided in the attached excel file.

	Core indicator	**Supplementary or sub-indicators**
1	(9c05a) heat-related mortality, broken down by age group and gender	(9c05b) heat-related hospital admissions, broken down by age group and gender (9c05c) Observed excess deaths during heatwaves compared to a counterfactual expected mortality without the implementation of relevant adaptation measure
2	(9c04a) Suicides attributable to climate-sensitive extreme events	(9c04b) Mental health service emergency admissions attributable to climate-sensitive extreme events
3	(9c17) Food security and undernutrition	-
4	(9c15) Labour supply and temperature	-
5	(9c06) Number of destroyed or damaged health facilities attributed to climate-related disasters	-
6	(9c07) Number of disruptions to health services attributed to climate-related disasters	-
7	(9c08) Proportion population exposed to hazards in the past 12 months who encountered barriers to accessing medical care or hygiene products as a result, by sex, location and displacement	-
8	(9c09): Health impacts of climate-related disasters	-
9	(9c09): Health impacts of climate-related disasters	(9c09a) Number of deaths attributed to climate-related disasters, per 100,000 population. (9c09b) Number of missing persons attributed to climate-related disasters, per 100,000 population. (9c09c) Number of injured or ill people attributed to climate-related disasters, per 100,000 population. (9c09d) Number of refugees, migrants and persons displaced by climate-related disasters, per 100,000 population. (9c10) Percentage of population exposed to or at risk from climate-related disasters protected through pre-emptive evacuation following early warning

		(9c11) Proportion of population affected by wildfires in the past 12 months
10	(9c28) emergency care visits for asthma	-
11	(9c01) Climate-sensitive infectious disease incidence & suitability	(9c01a) dengue incidence per 100,000 population and (9c01b) climate suitability for dengue disease transmission (9c01c) malaria incidence per 100,000 population and (9c01d) Climate suitability for malaria disease transmission (9c01e) Incidence of West Nile virus infections per 100,000 population and (9c01f) Climate suitability for West Nile virus transmission. (9c01g) Chikungunya incidence per 100,000 population and (9c01h) Climate suitability for Chikungunya transmission (9c01i) Zika incidence per 100,000 population and (9c01j) Climate suitability for Zika transmission (9c01k) Lyme incidence per 100,000 population and (9c01l) Climate suitability for tick-borne disease transmission (9c01m) Tick-borne encephalitis incidence per 100,000 population and (9c01l) Climate suitability for tick-borne disease transmission (9c02) SDG 6.3.2: Proportion of bodies of water with good ambient water quality (9c03) Lancet Countdown 2024 Indicator 1.3: Climatic suitability for vibrio bacteria
12	(9c13) Coverage of essential health services	(9c12) Number of children covered by climate and environmental health prevention in primary health care
13	(9c18) Climate change and health vulnerability and adaptation assessment conducted in the past 5 years	-
	(9c19a) Health component of National Adaptation Plan developed and implemented	(9c21) Climate-related health emergency and disaster preparedness and management actions integrated into disaster risk reduction (9c14) National research plan on climate change and health developed
14	(9c24b) Information on weather and climate conditions for climate-sensitive health risks integrated into the implementation of health programmes	(9c22) Climate-informed health EWS allowing the prediction of the risk of specific outbreaks available (9c23a) Percentage of health facilities built or retrofitted to be climate resilient based on national, regional or global guidance (9c25) Funding to implement climate change and health interventions available
15	(9c24a) Mechanism established for collection and analysis of data to inform the management of climate-related environmental determinants of health within the health system	(9c26a) The Ministry of Health workforce has received training on climate change and health (in the last two years)

3.1 Indicators monitoring the changing morbidity and mortality related with climate change

The following indicators monitor changes in climate change-related morbidity and mortality, associated with the main health impacts of climate change.

3.1.1 Heat-related morbidity and mortality

Proposed indicators:

- **Core indicator: (9c05a) heat-related mortality, broken down by age group and gender**
  - **Supplementary indicator: (9c05b) heat-related hospital admissions, broken down by age group and gender**
  - **Supplementary indicator: (9c05c) Observed excess deaths during heatwaves compared to a counterfactual expected mortality without the implementation of relevant adaptation measures**

The rising temperatures are resulting in growing exposure to health-threatening heat, and leading to adverse health impacts. Heat exposure can lead to heat stress and potentially lethal heat stroke if the body's cooling capacity is exceeded.[1] Elderly populations and very young children are particularly at risk, and it can exacerbate underlying chronic health conditions (like cardiovascular disease, kidney disease, or respiratory illness) and increase the health risks of those facing infectious diseases. It is estimated that the higher temperatures and ageing populations resulted in a 106% increase in the number of average annual heat-related deaths of adults older than 65 years between 1990–99 and 2014–23, 139% higher than the 44% increase expected if temperatures had not changed from baseline levels.[2] Additionally, heat exposure increases the risk of adverse pregnancy outcomes.[3] While hyperthermia can be in some cases identified as a cause of morbidity or mortality, and thereby the link between heat and adverse health outcomes and health impacts be made directly, in most cases the impact of heat is immediately evident, particularly when affecting other health conditions or pregnancy outcomes. For this reason, epidemiological models are often utilised to quantify heat-related health impacts, estimating the number of deaths that can be directly related to heat exposure, even if heat-related impacts are not specified in the cause of death.

Keeping this in mind, the health group is proposing two complementary indicators that capture heat-related health impacts, heat-related mortality (9c05a) and heat-related hospital admissions, as a proxy for morbidity (9c05b). Both of these indicators use similar approaches, identifying the influence of heat over mortality or hospital admissions. The suggestion is for these to be broken down by age group and gender, to better reflect the different vulnerabilities of different age groups and gender (the latter of which often depends on social norms and differential behaviour).

A third indicator is being proposed, to directly capture the extent to which adaptation interventions have reduced the exposure or vulnerability to heat, and therefore lead to less health impacts than would have been expected without these interventions (9c05c). This indicator builds on analysis carried out by the UK, to estimate the lives saved by discrete heat and health alerts. While more complex, this indicator can be informative in capturing the effectiveness of adaptation interventions:

3.1.2 Extreme weather and mental health

Proposed indicators:

[1] Ebi KL, Capon A, Berry P, et al. Hot weather and heat extremes: health risks. The Lancet 2021; 398: 698–708.
[2] Romanello M et al. The 2024 report of the *Lancet* Countdown on health and climate change: facing record-breaking threats from delayed action. The Lancet, Volume 404, Issue 10465, 1847 - 1896
[3] Chersich MF, Pham MD, Areal A, et al. Associations between high temperatures in pregnancy and risk of preterm birth, low birth weight, and stillbirths: systematic review and meta-analysis. BMJ 2020; 371. DOI:10.1136/BMJ.M3811.

- **Core indicator: (9c04a) Suicides attributable to climate-sensitive extreme events**

  - **Supplementary indicator: (9c04b) Mental health service emergency admissions attributable to climate-sensitive extreme events**

Climate change affects mental health in various and complex ways. It acts as a risk amplifier, affecting the underlying physical health, socioeconomic, environmental, and working conditions on which mental health depends. Exposure to extreme weather, especially extreme heat, can also exacerbate underlying mental health conditions, while the devastation and traumatic situations that can be linked with extreme weather events can also lead to mental health impacts.[4] However, there is a scarcity of global definitions and standardised diagnosis on climate change and health. For this and other reasons, data on mental health impacts are scarce in most countries, and, when they exists, data generally lack global standardisation. Additionally, linking causality of climate drivers to adverse mental health outcomes requires advanced epidemiological models, and good data on exposure to environmental hazards. To bypass these limitations, and capture progress towards reduction of mental health morbidity and mortality that may result from adaptation efforts, two indicators are proposed**.** Both of these indicators use epidemiological models to assess mental health impacts (mortality in the case of 9c16; hospitalisations as a proxy for morbidity in the case of 9c17) linked to climate-sensitive extreme events. These would include extreme heat (heatwaves); extreme precipitation events; or other extreme weather events.

3.1.3 Food insecurity and malnutrition

Proposed indicator:

- **Core indicator: (9c17) Food security and undernutrition**

In 2023, 733 million people were undernourished.[5] Climate change affects food security through multiple pathways, including by reducing food productivity, affecting supply chains, reducing food safety and increasing the risk of food contamination, and affecting food affordability. The resulting increase in food insecurity increases the risk of malnutrition and undernutrition, which is associated with a large burden of disease and mortality. Estimates suggest that the higher frequency of heatwave days and drought months in 2022, compared with 1981–2010, was associated with at least 151 million more people experiencing moderate or severe food insecurity.[6] The impacts of climate change on food security and nutritional status can be used to track the adaptation gap in the context of climate change impacts on access to food and nutrition and informs targeted interventions such as climate-smart agriculture and resilient food systems.

3.1.4 Occupational health impacts:

Proposed indicator:

- **Core indicator: (9c15) Labour supply and temperature**

Workers can be particularly vulnerable to the health impacts of climate change, especially those that work outdoors. Heat stress and other health impacts of climate change on workers can reduce labour supply (working hours). Changes in the reduction of labour supply due linked to heat exposure are indicative of health impacts

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[4] Lawrance, E. L., Thompson, R., Newberry Le Vay, J., Page, L., & Jennings, N. (2022). The Impact of Climate Change on Mental Health and Emotional Wellbeing: A Narrative Review of Current Evidence, and its Implications. International Review of Psychiatry, 34(5), 443–498. https://doi.org/10.1080/09540261.2022.2128725

[5] Food and Agriculture Organization of the United Nations, International Fund for Agricultural Development, UNICEF, World Food Programme, WHO. The state of food security and nutrition in the world 2023. Food and Agriculture Organization of the United Nations: 2023

[6] Romanello M et al. The 2024 report of the *Lancet* Countdown on health and climate change: facing record-breaking threats from delayed action. The Lancet, Volume 404, Issue 10465, 1847 - 1896

of climate change on working populations, and can be used to track adaptation. Adaptation measures might include adjusted work schedules, cooling technologies, proper hydration protocols, and protective equipment (Robinson et al., 2025).

3.1.5 Impacts on Health systems and facilities

Proposed indicators

- **Core indicator: (9c06) Number of destroyed or damaged health facilities attributed to climate-related disasters**

  This indicator builds upon the already established indicator (D-2) of the Sendai Framework and SDG indicator 11.5.3, with modified methodology and definitions in support of the GGA monitoring framework. It provides an essential metric and concrete measure of the vulnerability and resilience of health systems to climate hazards. Damage to health facilities directly undermines the ability to deliver essential and emergency health services during and after climate-related events. It also increases health risks and mortality. This proposed indicator supports climate adaptation, informs resilient design and retrofitting, and guides resource allocation to protect critical services.

- **Core indicator: (9c07) Number of disruptions to health services attributed to climate-related disasters**

  This indicator builds upon the already established indicator (D-7) of the Sendai Framework and SDG target 11.5.3, with modified methodology and definitions. It is highly relevant as both a direct and supporting metric for climate change-related health impact.

  With its sub-indicators, this proposed indicator serves as a compound measure that complements the monitoring of climate-sensitive morbidity and mortality by capturing service interruptions that can exacerbate underlying health risks (e.g., vector-borne diseases, climate disaster injuries). It supports attribution of health impacts to specific climate change impacts and drivers, such as extreme heat, floods, or cyclones, where health outcomes deteriorate due to service disruptions linked to climate events increasingly shaped by climate change.

  While highly relevant to the target 9c, indicators 9c06 and 9c07 also align with the SDGs and the Sendai Framework, and leverage existing data reporting mechanisms, reducing the reporting burden and increasing the feasibility of tracking health-related climate impacts and promoting equitable, climate-resilient health systems.

- **Core indicator: (9c08) Proportion population exposed to hazards in the past 12 months who encountered barriers to accessing medical care or hygiene products as a result, by sex, location and displacement**

  This indicator measures how climate-change related hazardous events directly and indirectly impacted the population by impeding access to essential health services and hygiene. By disaggregating data by sex, location, and displacement status, this indicator supports the formal monitoring of inequitable burdens of health. It provides a linkage between epidemiology and climate change related hazard data, strengthening adaptation planning and assessments.

3.1.6 Injury from extreme events

- **Core indicator: (9c09): Health impacts of climate-related disasters**

  This indicator has four sub-indicators:

  - **Sub-indicator: (9c09a) Number of deaths attributed to climate-related disasters, per 100,000 population.**

- **Sub-indicator: (9c09b) Number of missing persons attributed to climate-related disasters, per 100,000 population.**
- **Sub-indicator: (9c09c) Number of injured or ill people attributed to climate-related disasters, per 100,000 population.**
- **Sub-indicator: (9c09d) Number of refugees, migrants and persons displaced by climate-related disasters, per 100,000 population.**

  Collectively, they capture the overall human impacts of climate-related disasters on society and on public health. Sub-indicators 9c09a, 9c09b and 9c09c are modified from the similar indicators of SDGss 1, 11 and 13, 11 and 13 and Sendai Framework global targets A, and B, both on measuring the reduction of human vulnerability, and climate-related risk.

  9c09a measures death - The number of people who died during the climate-related disaster, or directly after, as a direct result of the hazardous event.

  9c09a measures missing persons: the number of people whose whereabouts are unknown since the climate-related hazardous event. It includes people who are presumed dead, for whom there is no physical evidence such as a body, and for which an official/legal report has been filed with competent authorities.

  9c09c measures Injured or ill population, or the people who are suffering from a new or exacerbated physical or psychological harm, trauma or an illness as a result of a climate-related disaster.

  9c09d measures the number of individuals who have been forcibly displaced (internally or across borders), temporarily or permanently, as a direct result of climate-related disasters, including:

  - Internally displaced persons (IDPs) due to sudden-onset or slow-onset disasters.
  - Cross-border disaster-displaced persons; and
  - Migrants or refugees who cite disaster-related or climate-related considerations as the primary or secondary causes of movement.

- **Sub-indicator: (9c10) Percentage of population exposed to or at risk from climate-related disasters protected through pre-emptive evacuation following early warning**

  The percentage of people identified as being at risk or exposed to a climate-related disaster who were safely evacuated in advance of the event as a result of an early warning system (EWS) and organized disaster reduction and climate change adaptation response. It reflects how effective an at-risk population can be protected before the onset of climate-related hazards. This indicator is also reflected under Target 10(a) as an indicator for early warning systems.

- **Sub-indicator: (9c11) Proportion of population affected by wildfires in the past 12 months**

  The proportion of the population who experienced impacts from wildfires over the past 12 months. This indicator should include people affected through displacement, injury, illness (e.g., respiratory issues due to smoke), loss of housing or livelihoods, or disruption to basic services, such as healthcare, education, or clean air access.

3.1.7 Infectious diseases

Proposed Indicators

- **Core indicator: (9c01) Climate-sensitive infectious disease incidence & suitability**

Climate change is increasing the risk of deadly infectious diseases, especially those transmitted by vectors, air, water, soil and food. Preventative measures and health system adaptation is essential to minimise the impact of these diseases. Monitoring their incidence or healht impact is therefore key to evaluate the success of adaptaiotn interventions. However, the incidence of these infectious diseases is often determined by a multiplicity of factors, which can include people movement, urbanisation, hygiene, and basic healthcare access and quality. It is therefore important to ascertain the influence of climate change in their spread, and distinguish it from other factors. While attribution of infectious disease impact to climate change remains technically challenging, well-developed and validated models exist to assess the influence of climate change on the risk of transmission of many climate-sensitive infectious diseases.

We therefore propose a two-pronged approach, where the assessment of morbidity and mortality from climate-sensitive infectious diseases is monitored in conjunction with the climate-determined risk for such diseases, to better ascertain whether climate change impacts might be affecting disease transmission, and where adaptation efforts might have been effective.

It is also important to note that the geographical distribution of climate-sensitive infectious diseases varies broadly around the world. In order to effectively measure adaptation, parties therefore need to monitor the risk and incidence of infectious diseases which affect their region. This necessarily implies that a one-size-fits-all approach is not suitable in this case, and different countries will need to assess the incidence and risk of transmission of different diseases, to adequately monitor progress towards the GGA. As such, the following indicators are offered as a list of sub-indicators for countries to choose from, and thereby report on the core indicator 9c01 (Climate-sensitive infectious disease incidence & suitability). In this way, while different countries will be monitoring different diseases, they will all be monitoring the changing climate-sensitive infectious disease incidence and suitability.

Of note, infectious disease indicators must be reported as a coupled pair, composed of one indicator of incidence or impact, and one on climate-defined risk. For this reason, the sub-indicator options are described in such pairs below.

- **Sub-indicators: (9c01a) dengue incidence per 100,000 population and (9c01b) climate suitability for dengue disease transmission**

  About half of the world's population is now at risk of dengue with an estimated 100–400 million infections occurring each year. Dengue is a climate-sensitive disease because its transmission is closely linked to environmental conditions that affect mosquito populations, particularly the *Aedes aegypti* and *Aedes albopictus* species.[7] These mosquitoes thrive in warm, humid environments, making tropical and subtropical regions especially vulnerable. Rising global temperatures, altered rainfall patterns, and increasing urbanization enhance mosquito breeding and longevity, facilitating the spread of the dengue virus.[8] For example, stagnant water from heavy rains provides ideal breeding grounds, while higher temperatures can accelerate mosquito life cycles and viral replication. Given these environmental dependencies, dengue incidence serves as a vital indicator of climate-related health risks. Monitoring dengue trends can indicate changing environmental conditions and potential outbreaks. This is especially important as climate change contributes to the expansion of the geographic range of vector-borne diseases such as dengue into previously unaffected regions.

[7] Farooq Z, Segelmark L, Rocklöv J, Lillepold K, Sewe MO, Briet OJT, Semenza JC. Impact of Climate and Aedes albopictus Establishment on Arbovirus Outbreaks in Europe: A Time-to-Event Analysis. *Lancet Planetary Health* (in press).
[8] Semenza JC, Paz S. Climate Change and Infectious Disease in Europe: Impact, Projection and Adaptation. *The Lancet Regional Health – Europe.* 2021 Oct 1;9:100230. https://doi.org.10.1016/j.lanepe.2021.100204

Changing climatic conditions are affecting the transmission of infectious diseases of public health concern, including dengue. Climatic suitability for the transmission of dengue by *Aedes albopictus* and *Aedes aegypti* increased by 46.3% and 10.7% respectively, between 1951–1960 and 2014–2023.[9]

- **Sub-indicators: (9c01c) malaria incidence per 100,000 population and (9c01d) Climate suitability for malaria disease transmission**

  Globally in 2023, there were an estimated 263 million malaria cases and 597 000 malaria deaths in 83 countries. Malaria is a climate-sensitive disease because its transmission depends on environmental conditions that affect both the *Anopheles* mosquito (the vector) and the *Plasmodium* parasite (the pathogen). Temperature, rainfall, and humidity all play critical roles in the mosquito's lifecycle and the development of the parasite inside the mosquito. Warm temperatures accelerate the mosquito's breeding cycle and reduce the time it takes for the malaria parasite to mature within the mosquito. When temperatures are consistently between 20°C and 30°C, the risk of malaria transmission increases significantly. However, extremely high temperatures can reduce mosquito survival, slightly limiting transmission in very hot conditions. Rainfall is another major factor, as it creates standing water that serves as breeding grounds for *Anopheles* mosquitoes. Areas with seasonal rains often see spikes in malaria cases shortly afterward. Conversely, droughts can reduce mosquito habitats, but in some cases, human behaviors like water storage during dry periods can create new breeding sites. Climate change contributes to malaria's spread by altering these key environmental factors. Warming temperatures are expanding the geographical range of malaria, introducing the disease to new regions that were previously too cool for transmission. As a result, monitoring malaria trends is vital for understanding and responding to climate-related health risks.

  Between 1951–60 and 2014–23, an extra 17·1% of the global land area became suitable for the transmission of Plasmodium falciparum and an extra 21·8% for the transmission of Plasmodium vivax.[10]

- **Sub-indicators: (9c01e) Incidence of West Nile virus infections per 100,000 population and (9c01f) Climate suitability for West Nile virus transmission.**

  West Nile virus (WNV) can cause a fatal neurological disease in humans. WNV is a climate-sensitive disease because its transmission depends on environmental conditions that affect mosquito populations and bird migration patterns—both of which are influenced by climate.[11] The virus is primarily spread by *Culex* mosquitoes, which become more active, abundant, and efficient at transmitting the virus in warm temperatures. Higher temperatures accelerate the mosquito life cycle and shorten the incubation period of the virus within the mosquito, increasing the risk of transmission to humans and animals. Rainfall and humidity also play a key role by creating breeding sites for mosquitoes, while drought conditions can sometimes concentrate birds and mosquitoes around limited water sources, intensifying transmission.[12] Since birds are the primary hosts of WNV, their migratory behavior—also influenced by seasonal climate patterns—affects how and where the virus spreads. Climate change, with its effects on temperature, rainfall, and extreme weather events, can extend the mosquito season, expand the geographic range of both mosquitoes and birds, and lead to outbreaks in areas that previously had low

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[9] Romanello M et al. The 2024 report of the *Lancet* Countdown on health and climate change: facing record-breaking threats from delayed action. The Lancet, Volume 404, Issue 10465, 1847 - 1896

[10] Romanello M et al. The 2024 report of the *Lancet* Countdown on health and climate change: facing record-breaking threats from delayed action. The Lancet, Volume 404, Issue 10465, 1847 - 1896

[11] Farooq Z, Rocklöv J, Wallin J, Abiri N, Odhiambo Sewe M, Sjödin H, Semenza JC. Artificial intelligence to predict West Nile virus outbreaks with eco-climatic drivers. *The Lancet Regional Health – Europe* 2022 Mar 30; 17:100370. doi: 10.1016/j.lanepe.2022.100370.

[12] Moirano G, Fletcher C, Semenza JC, Lowe R. Short-term effect of temperature and precipitation on the incidence of West Nile Neuroinvasive Disease in Europe: a multi-country case-crossover analysis. Lancet Reg Health Eur. 2024 Dec 4;48:101149. doi: 10.1016/j.lanepe.2024.101149. PMID: 39717226; PMCID: PMC11665362.

or no risk.[13] As a result, WNV is a key example of how vector-borne diseases are tightly linked to environmental shifts.

Driven by changes in temperature, WNV–R0 was, on average, 4·3% higher in 2014–23, compared with 1951–60, in the regions where the three Culex mosquitoes occur. Increases in WNV–R0 in the same period occurred in very high (8·3%), high (6·2%), and medium (4·2%) HDI countries, whereas there was a decrease in low HDI countries (–1·1%).[14]

- **Sub-indicators: (9c01g) Chikungunya incidence per 100,000 population and (9c01h) Climate suitability for Chikungunya transmissio**

Chikungunya causes fever and severe joint pain, which is often debilitating and may be prolonged; other symptoms include joint swelling, muscle pain, headache, nausea, fatigue and rash. Chikungunya is a climate-sensitive disease because its transmission depends on environmental conditions that affect the survival and activity of the *Aedes* mosquitoes—mainly *Aedes aegypti* and *Aedes albopictus*—which are responsible for spreading the Chikungunya virus.[15] These mosquitoes thrive in warm, humid climates, and their reproduction, biting frequency, and the development of the virus within them are all enhanced by higher temperatures. Climate factors such as increased temperature, changes in rainfall patterns, and rising humidity create ideal conditions for mosquito breeding and survival. Rain provides standing water for mosquito larvae to develop, while warmer temperatures shorten the mosquito life cycle and speed up the virus incubation period, allowing for faster transmission to humans. In contrast, drought can lead to increased water storage in open containers, which may also serve as breeding sites. Additionally, climate change is expanding the geographic range of Aedes mosquitoes into regions that were previously too cool, resulting in new outbreaks in parts of Europe and beyond. As global warming continues, chikungunya is expected to become a risk in more areas, highlighting the need for integrated surveillance and public health preparedness.

The annual average transmission risk (basic reproduction number [R0]) of *Ae albopictus* and *Ae aegypti* increased by 46·3% and 10·7%, respectively from 1951–60 to 2014–23.[16]

- **Sub-indicators: (9c01i) Zika incidence per 100,000 population and (9c01j) Climate suitability for Zika transmission**

Zika virus infection during pregnancy can cause infants to be born with microcephaly and other congenital malformations as well as preterm birth and miscarriage. Zika is a climate-sensitive disease because its primary mode of transmission—via *Aedes* mosquitoes—is heavily influenced by environmental and climatic conditions. These mosquitoes thrive in warm, humid climates typical of tropical and subtropical regions. Climate factors such as temperature, rainfall, and humidity directly affect mosquito breeding, survival, and biting behavior, as well as the replication rate of the Zika virus within the mosquito. Higher temperatures can shorten the mosquito's development cycle and increase their feeding frequency, raising the likelihood of virus transmission. Rainfall creates standing water in containers, drains, and other areas, providing ideal breeding sites for Aedes mosquitoes. In contrast, drought can also contribute to outbreaks, as people store water in open containers, which become

[13] Farooq Z, Sjödin H, Semenza JC, Tozan Y, Sewe MO, Wallin J, Rocklöv J. European projections of West Nile virus transmission under climate change scenarios. *One Health.* 2023; (16): 100509.
[14] Romanello M et al. The 2024 report of the *Lancet* Countdown on health and climate change: facing record-breaking threats from delayed action. The Lancet, Volume 404, Issue 10465, 1847 - 1896
[15] Farooq Z, Segelmark L, Rocklöv J, Lillepold K, Sewe MO, Briet OJT, Semenza JC. Impact of Climate and Aedes albopictus Establishment on Arbovirus Outbreaks in Europe: A Time-to-Event Analysis. *Lancet Planetary Health* (in press).
[16] Romanello M et al. The 2024 report of the *Lancet* Countdown on health and climate change: facing record-breaking threats from delayed action. The Lancet, Volume 404, Issue 10465, 1847 – 1896

mosquito habitats[17]. Climate change—through rising temperatures, shifting precipitation patterns, and increased frequency of extreme weather events—can expand the geographic range of *Aedes* mosquitoes into new regions. This increases the potential for Zika outbreaks in areas that previously had little or no risk.

The annual average transmission risk (basic reproduction number [R0]) of *Ae albopictus* and *Ae aegypti* increased by 46·3% and 10·7%, respectively from 1951–60 to 2014–23.[18]

- **Sub-indicators: (9c01k) Lyme incidence per 100,000 population and (9c01l) Climate suitability for tick-borne disease transmission**

  Lyme disease is a bacterial illness transmitted to humans through the bite of infected ticks. The most serious complication is a disorder that affects the central nervous system, called Lyme neuroborreliosis, which occurs in around 10% of cases. This disorder can lead to facial paralysis, inflammation of the layers protecting the brain and spinal cord, and pain in the nerve roots, which connect the spinal cord to the nerves. Lyme disease is a climate-sensitive disease because its transmission depends on environmental factors that influence the survival, reproduction, and activity of ticks—primarily *Ixodes* species, such as the blacklegged tick (*Ixodes scapularis*) in North America and the castor bean tick (*Ixodes ricinus*) in Europe.[19] These ticks thrive in temperate climates with sufficient humidity and moderate temperatures, conditions increasingly influenced by climate change. Warmer temperatures extend the active season of ticks, allowing them to feed, reproduce, and spread over a longer portion of the year. Milder winters increase tick survival rates, while earlier springs and later autumns give them more time to quest for hosts, raising the risk of human exposure. In addition, shifts in temperature and precipitation patterns are enabling ticks to expand into higher altitudes and latitudes where Lyme disease was previously rare or nonexistent. Climate also affects the distribution and behavior of host animals such as deer and rodents, which ticks feed on and which often carry *Borrelia* bacteria. As these animal populations grow or migrate in response to environmental changes, the likelihood of human-tick encounters increases.

- **Sub-indicators: (9c01m) Tick-borne encephalitis incidence per 100,000 population and (9c01l) Climate suitability for tick-borne disease transmission**

  Tick-borne diseases correspond to the majority of vector-borne diseases in temperate North America, Europe and Asia. The impact of tick-borne diseases on veterinary health and the associated economic losses are also significant with about 80% of the world's cattle population affected. Ticks can transmit different bacterial or viral diseases to humans, such as Lyme diseases (LD), tick-borne encephalitis (TBE) and Crimean-Congo Haemorrhagic Fever (CCHF). LD is the most frequent tick-borne disease in Europe, with over 200,000 cases reported per year in Western Europe alone. TBE produces between 10,000 and 12,000 clinically reported cases worldwide each year, although the actual number of clinical cases is believed to be significantly higher. This indicator for the climate suitability of tick-borne disease transmission uses a threshold-based approach that makes use of the climatic and environmental requirements for a selection of the most common and widespread tick species to engage in questing. Questing ticks and the diseases they can transmit are a growing burden worldwide with (re)emerging diseases affecting human and animal health. The indicator's relevance for policy comes from the fact that it identifies the suitability for ticks' questing activity in relation to both climatic and land cover conditions and, hence, it could be used to take preventive action such as vaccination or tick avoidance

[17] Paz S, Semenza JC. El Niño and climate change—contributing factors in the dispersal of Zika virus in the Americas? The Lancet. 2016 Feb 20;387(10020):745.
[18] Romanello M et al. The 2024 report of the *Lancet* Countdown on health and climate change: facing record-breaking threats from delayed action. The Lancet, Volume 404, Issue 10465, 1847 - 1896
[19] Semenza JC, Paz S. Climate Change and Infectious Disease in Europe: Impact, Projection and Adaptation. *The Lancet Regional Health – Europe.* 2021 Oct 1;9:100230. https://doi.org.10.1016/j.lanepe.2021.100204

during outdoor human activities but also in climate change mitigation/adaptation policies and land use policies. Indeed, the causes behind the identified increase in cases are varied, and sometimes of local nature, and include climate trends and land use changes. Compared to 1951-1960, the area that is climatically suitable for *Rhipicephalus sanguineus* and *Hyalomma* ticks has expanded, putting millions more at risk.[20]

Tick-borne encephalitis (TBE) is an infectious disease that affects the central nervous system and is transmitted by the bite of infected ticks. TBE is a climate-sensitive disease because its transmission is directly influenced by environmental conditions that affect tick populations and their activity, particularly *Ixodes ricinus* in Europe and *Ixodes persulcatus* in parts of Asia.[21] These ticks thrive in temperate climates with mild winters and adequate humidity, and their life cycle, abundance, and geographic distribution are all highly sensitive to temperature and weather patterns. Warmer temperatures and shorter winters increase tick survival and extend their active season, allowing for more opportunities to bite humans and transmit the TBE virus. Climate change has enabled ticks to expand into higher altitudes and northern latitudes, introducing TBE to areas that were previously unaffected. For example, parts of Scandinavia, central Europe, and even higher-elevation regions have reported increasing TBE cases in recent years. Changes in precipitation and vegetation also impact tick habitats and the availability of host animals, such as rodents and deer, which ticks feed on to complete their life cycle. As these host populations shift due to climate and environmental change, so does the risk of human exposure.

- **Core indicator: (9c02) SDG 6.3.2: Proportion of bodies of water with good ambient water quality**

Globally, water pollution caused an estimated 1.4 million premature deaths in 2019, and without improved water quality monitoring and management, the health and livelihoods of 4.8 billion people could be at risk by 2030. Climate change is increasingly recognized as a compounding factor in water quality degradation, as reflected in the review of the JMP/GLAAS indicators for climate-resilient WASH. Rising global temperatures exacerbate existing threats—floods and droughts directly impact water quality, while polluted water bodies contribute significantly to greenhouse gas emissions. Current estimates indicate that half of global methane emissions originate from freshwater ecosystems, a proportion expected to grow as temperatures increase. Since 2021, reporting on this indicator has expanded, with 89 countries initially participating and 120 reporting by 2023, demonstrating its global relevance. The health implications of water quality are multifaceted, encompassing (1) safeguarding human health during recreational use, (2) ensuring safe drinking water supplies, (3) supporting nutrition through fisheries and irrigation, and (4) strengthening community resilience against water-related disasters. The core parameters of SDG Indicator 6.3.2 do not directly provide information on risk to human health, with the exception of nitrate in groundwater, but they could indicate indirect risks, such as toxic algal blooms driven by high nutrient and low oxygen concentrations. It would therefore need to be modified.[22] These risks disproportionately affect marginalized communities, who face higher exposure to waterborne contaminants and associated health burdens, including gastrointestinal diseases and cancer.

- **Sub-indicator: (9c03) Lancet Countdown 2024 Indicator 1.3: Climatic suitability for vibrio bacteria**

Vib``rio bacteria are climate-sensitive because their growth and survival are strongly influenced by environmental conditions—particularly temperature and salinity in coastal waters.[23] These bacteria thrive in warm, brackish (slightly salty) marine environments, and their abundance increases

[20] Romanello M et al. The 2025 Report of the Lancet Countdown on Health and Climate Change. The Lancet (in preparation).
[21] Semenza JC, Paz S. Climate Change and Infectious Disease in Europe: Impact, Projection and Adaptation. *The Lancet Regional Health – Europe.* 2021 Oct 1;9:100230. https://doi.org.10.1016/j.lanepe.2021.100204
[22] Semenza JC, Hess JJ, Provenzano D. Climate change, marine pathogens, and human health. *JAMA* (in press).
[23] Semenza JC, Trinanes J, Lohr W, Sudre B, Löfdahl M, Martinez Urtaza J, Nichols GL, Rocklöv J. Environmental suitability of Vibrio infections in a warming climate: An early warning system. *Environ Health Perspect*. 2017 Oct 10;125(10):107004. doi: 10.1289/EHP2198.

significantly when water temperatures rise above 20°C (68°F). As a result, warmer ocean temperatures due to climate change create more favorable conditions for Vibrio proliferation. A record 83 countries showed coastal water conditions suitable for the transmission of Vibrio pathogens at any one time in 2023, and the length of coastlines with suitable conditions reached a new record high of 88 348 km in 2023—up by 14·8% from the previous high in 2018, and 32% above the 1990–99 average. The total population living within 100 km of coastal waters with conditions suitable for Vibrio transmission reached a record high of 1·42 billion, and 2023 saw an estimated 692 000 vibriosis cases, setting a new record, increased by 13·5% from the previous record high in 2022.[24]

3.1.8 Respiratory illness

Proposed indicator:

- **Core indicator: (9c28) emergency care visits for asthma**

Asthma is a syndrome of reversible airway inflammation related to multiple exposures, several of which are climate-sensitive, including aeroallergens (pollen) and wildfire smoke[25]. Asthma is prevalent globally and responsive to preventive measures including early warning systems with appropriate risk communication, trigger avoidance, controller medications, and acute health care access for rescue therapy[26]. Incidence of asthma morbidity and mortality are tracked at a country level, and sub-nationally for several countries, in the Global Burden of Disease Study (GBD)[27]. Country-level incidence from 1990 onwards and disease burden for asthma are available at ghdx.healthdata.org. Emergency visits for asthma indicate prevalence of severe disease and trends reflect adequacy of preventive measures that are part of climate change adaptation in the health sector.

3.2 Promoting climate-resilient health services

The expert group identified indicators related to efforts for promoting climate-resilient health services, as per paragraph 9c D2/CMA5. These indicators overlap with the dimensional targets, set in paragraph 10 D2/CMA5. Given the overlap, the following indicators were divided into four groups, corresponding to the four targets laid out in paragraph 10. However, they are relevant to paragraph 9c as well. They were chosen based on the criteria described above. In addition, they form part of the World Health Organization's General Programme of Work 2025-2028, meaning that data is collected from all countries. Specific information is available at https://www.who.int/publications/i/item/9789240081888

3.2.1 Healthcare provision

Proposed indicators:

- **Core indicator: (9c13) Coverage of essential health services**
  - **Supplementary indicator: (9c12) Number of children covered by climate and environmental health prevention in primary health care**

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[24] Romanello M et al. The 2024 report of the *Lancet* Countdown on health and climate change: facing record-breaking threats from delayed action. The Lancet, Volume 404, Issue 10465, 1847 - 1896

[25] Biagioni B, Cecchi L, D'Amato G, Annesi-Maesano I. Environmental influences on childhood asthma: climate change. Pediatric Allergy and Immunology. 2023 May;34(5):e13961.

[26] Hu Y, Cheng J, Liu S, Tan J, Yan C, Yu G, Yin Y, Tong S. Evaluation of climate change adaptation measures for childhood asthma: a systematic review of epidemiological evidence. Science of The Total Environment. 2022 Sep 15;839:156291.

[27] Wang Z, Li Y, Gao Y, Fu Y, Lin J, Lei X, Zheng J, Jiang M. Global, regional, and national burden of asthma and its attributable risk factors from 1990 to 2019: a systematic analysis for the Global Burden of Disease Study 2019. Respiratory research. 2023 Jun 23;24(1):169.

Access to health care is essential to reduce vulnerability to health effects of climate change, build resilience to climate-health related hazards, and increase adaptive capacity. As such, access to health services should be regarded as a key adaptation strategy. Ensuring access to health services in the aftermath of extreme events reduces adverse health impacts, especially long-term ones. Additionally, climate-resilient health-care facilities reduce the risk of critical health infrastructures being unavailable following extreme events such as floods. This can be an issue in both high and low-income countries (EUCRA Chapter 14).

3.2.2 Impact, vulnerability and risk assessment.

Proposed indicator:

- **Core indicator: (9c18) Climate change and health vulnerability and adaptation assessment conducted in the past 5 years**

These indicators also serve paragraph 10a. Climate change is already changing the geographical range and numbers of cases of injuries, illnesses and deaths from climate-related health outcomes. It is also affecting the functioning of public health and health care systems. To avoid substantial increases in morbidity and mortality projected for a wide range of health outcomes over the coming decades, urgent action is needed from local to national to global settings.

Vulnerable populations and geographical regions are being affected differently, with increases in poverty and inequities linked to climate change. A key driver of population health will be the degree of success or failure of current policies and programmes to reduce climate-sensitive diseases and health outcomes. To protect the health of communities it is also imperative to understand the strengths and weaknesses of the health system and its specific programmes to manage climate change impacts. This would help identify actions needed to increase the resilience of communities and of health systems.

A health vulnerability and adaptation assessment is a tool that allows countries to evaluate which populations and specific geographies are most vulnerable to different kinds of health effects from climate change; to identify weaknesses in the systems that should protect them; and to specify interventions to respond. Guidance for countries is available at: https://www.who.int/publications/i/item/9789240036383

3.2.3 Planning

Proposed indicators:

- **Core indicator: (9c19a) Health component of National Adaptation Plan developed and implemented**
  - **Supplementary indicator: (9c21) Climate-related health emergency and disaster preparedness and management actions integrated into disaster risk reduction**
  - **Supplementary indicator: (9c14) National research plan on climate change and health developed**

These indicators also serve paragraph 10 b. A Health National Adaptation Plan (HNAP) is a plan developed by a country's Ministry of Health as part of – and contribution to – the UNFCCC NAP process. The HNAP outlines actions to build climate-resilient health and climate-resilient health systems that can anticipate and transform, and faced with a changing climate, to protect population health while improving the management of other health threats. HNAP development ensures prioritization of actions to address the health impacts of climate change at all levels of planning. As such, it helps integrate the health sector with national and international climate change agendas, including the assessment of impacts of adaptation actions in other sectors. HNAPs promote and facilitate coordinated and inclusive climate change and health planning among health stakeholders at different levels of government and across health-determining sectors. Having this plan in place also promotes health sector access to climate funding for adaptation.

Two sub indicators are complementary to having a HNAP in place. Having a climate-related health emergency and disaster preparedness and management plan with actions integrated into disaster risk reduction plans is critical to planning for health adaptation and resilience. Having a national research plan on climate change and health in place can help countries identify evidence based priorities and interventions. Guidance to conduct a HNAP at the national level is available at:

https://www.who.int/publications/i/item/9789240018983

3.2.4 Implementation

Proposed indicators:

- **Core indicator: (9c24b) Information on weather and climate conditions for climate-sensitive health risks integrated into the implementation of health programmes**
  - **Supplementary indicator: (9c22) Climate-informed health EWS allowing the prediction of the risk of specific outbreaks available**
  - **Supplementary indicator: (9c23a) Percentage of health facilities built or retrofitted to be climate resilient based on national, regional or global guidance**
  - **Supplementary indicator: (9c25) Funding to implement climate change and health interventions available**

Climate-related information is key for implementing immediate and short-term action by health systems. Health systems are in a process of increasing integration of climate change into their programmes, but much action is still needed. While information from meteorological services is used by health systems, for example in the detection and action to protect people from extreme heat, there is still much room for improvement, and expansion to other health concerns. Current guidance highlights the key climate hazards that health systems and health facilities need to be prepared for (such as floods, droughts, wildfires, storms, temperature extremes, sea-level rise). For health facilities impacts, implementation aims at protecting the health workforce, ensuring the adequate provision of water, sanitation hygiene and health care waste in facilities, having on-going access to energy, and actions to protect infrastructure, technologies and health related products.

Three sub indicators provide additional support in implementation of actions. Implementing climate-informed health early warning systems at the right level (e.g. local or sub-national) would allow the prediction and level of risk of specific outbreaks, leading to prompt implementation of health protecting actions. Several such systems are in place, for example for outbreaks of vector-borne diseases. Then, climate hazards impact on the health of people and also on the facilities built to protect health. Thus, it is relevant to measure the percentage of health facilities built or retrofitted to be climate resilient based on national, regional or global guidance. None of the above can be implemented without funding specifically allocated for the health sector to implement climate change and health interventions.

Several guidance documents are available to implement – and measure impacts of –interventions described above. These include on early warning systems (https://www.who.int/publications/i/item/9789240036147), and on interventions to protect health facilities (https://www.who.int/publications/i/item/9789240012226 and https://www.who.int/publications/i/item/9789240022904).

10d. Monitoring, evaluation and learning

Proposed indicators:

- **Core indicator: (9c24a) Mechanism established for collection and analysis of data to inform the management of climate-related environmental determinants of health within the health system**
  - **Supplementary indicator: (9c26a) The Ministry of Health workforce has received training on climate change and health (in the last two years)**

Adaptation and resilience building in the health sector requires on-going information to help manage climate hazards and climate related environmental determinants of health. Over time, this allows for monitoring progress and to learn from the process. Building capacity of the health workforce is key to health adaptation.

4. Remaining gaps

While there are no major gaps immediately identified, the indicators presented here were developed following multiple iterations of revision of the list of indicators shared by the Secretariat in 2024, and build on indicators presented there. However, they will need to be further refined before they can be adopted by countries. The refinement should take into consideration input from other relevant experts, which can be collected through consultations.

Of note, the time constraints in the development of this set of indicators meant that alignment across targets could not be yet thoroughly undertaken. A thorough cross-target assessment must be undertaken to ensure there are no major gaps in the final list of proposed indicators.

Of note, these are the best available indicators that could be designed under current methodologies and time constraints. However, further methodological developments could deliver major improvements to the current list of indicators in the future, including by allowing for a quantification of the changes in morbidity and mortality that can be formally attributable to climate change. It should be noted, however, that development and refinement of such indicators and associated methodologies will necessitate investment of time and additional resources, as data needed to track many of the proposed indicators are not currently collected by countries and methods for some indicators need to specified.

5. Recommendations for expert work after the SBs

Recommendations on the next steps for the experts' work:

Metadata development: the development of adequate metadata to accompany the indicators is a substantial endeavour. As such, in cases in which metadata is not yet available, we recommend this is developed only after the final list of indicators has been accepted at COP30. We strongly recommend that this endeavour is extended through at least 6 months in 2026, and that adequate financial and human resource is allocated to its delivery.

Ahead of COP30, it would be useful for the parties to provide further guidance on the specific information needed to evaluate and select the indicators. Of note, further requests must be commensurate with the resources available, noting that the experts are on a voluntary basis, and with limited time availability.

Indicator refinement and alignment: As mentioned in the previous section, the current indicators may need to be further refined, including by ensuring alignment with other targets, and by incorporating further feedback and inputs from other experts and organisations. In the second half of the year, we therefore recommend that priority is put on enabling engagement is facilitated across target expert groups, and with other experts, in order to avoid overlaps and any major gaps in the final suite of indicators.

Balance pragmatism and ambition for a successful outcome: While the development of adequate and useful GGA indicators requires innovation and an ambitious advancement of data ecosystems, we, as experts, strongly believe that the final list of indicators must balance that ambition with pragmatism. This is essential to ensure countries will be capable of reporting these indicators, and therefore that progress against the GGA is adequately monitored. To enable this, we strongly recommend that the parties mandate the development of an assessment of feasibility and data readiness of the indicators, to ensure they can realistically be produced and reported by countries, even if new data collection is required. This is a substantial endeavor that needs to be carried out for all indicators and all targets, and therefore needs to be well-coordinated across expert groups. We strongly advise that the Secretariat is given the mandate and the resource to carry this work forward, with the guidance of the experts.

Ways of working: As a group of experts, we are strongly committed to supporting parties in the identification of the best possible indicators to meaningfully monitor progress against the achievement of the important targets outlined in the GGA. However, the development of indicators is a highly technical and complex endeavour. It requires well-defined processes and timelines, protocols, and clear deliverables. It also requires substantial leadership and programme management, rather than relying on self-organisation of a group of 78 experts, with no clear roles, responsibilities, or coordinating roles. The way of working so far has meant that valuable time has been sub-optimally spent, and that the process has been more time consuming than it could have been. It has also put a big burden on experts who are supporting the process in their spare time, and on a voluntary basis.

To ensure the remaining work can be more optimally delivered, and to ensure the experts continue to be engaged and willing to contribute, we strongly recommend that:

a) The process and deliverables are very clearly defined, with agreed timelines, templates for delivery, and clear guidance
b) The Secretariat is empowered to offer more guidance and support to experts, with a mandate to take decisions on process and format of deliverables, outputs, and deadlines.
c) A coordinating team is defined, with clear roles and responsibilities, to support the process, coordinate the experts, and facilitate the process of decision-making, including on process and format of delivery.
d) Experts are consulted on the feasibility of delivery of the work requested, and on the necessary timelines
e) Resources are explicitly allocated to support this work, including through contracts that offer support and commitment for the work to be delivered. The indicator development work is crucial, and requires adequate resources to support it.

Indicator longevity: The scientific field of climate change and health is rapidly evolving, as is our understanding of the health impacts of climate change, and adaptation options. Given this, it is strongly advised that a process is put in place to ensure the indicators are reviewed to enable periodic refinement, to ensure they still reflect the latest and best available science and evolving field of domain knowledge. This could be considered consistent with the cycles of Global Stocktake of the Paris Agreement.