LANCET-SIGHT COMMISSION

PEACEFUL SOCIETIES through HEALTH and GENDER EQUALITY

SIGHT.
SWEDISH INSTITUTE FOR GLOBAL HEALTH TRANSFORMATION

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INDICATOR ANALYSIS

MALARIA INCIDENCE (NUMBER OF NEW CASES PER 1,000 POPULATION AT RISK)

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FOR THE LANCET-SIGHT COMMISSION ON PEACEFUL SOCITIES THROUGH HEALTH AND GENDER EQUALITY

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Overview	According to the 2019 WHO report on malaria, "In 2018, an estimated 228 million cases of malaria occurred worldwide", 94% of which were in the Africa region (1, p. xii). Six countries in Africa account for more than half of the world's malaria cases, with Nigeria alone accounting for 25%. In 2018, 405,000 people died from malaria (1). Children under five are the most vulnerable group and account for 67% of deaths (1). One of the major preventative strategies is using insecticide-treated mosquito nets (ITN), yet "nearly 40% of pregnant women did not sleep under an ITN in 2018 and two thirds did not receive the recommended three or more doses of preventive therapy" (1, p. iv). In 2018, US$2.7 billion was invested in malaria control and prevention (1).
How is the indicator calculated?	The number of suspected malaria cases confirmed by either microscopy or rapid diagnostic test / Population at risk (number of people living in areas where malaria transmission occurs) (2).

GLOBAL TRENDS	
What are the global patterns for this indicator? Trends, geographic patterns etc.	The WHO found that "there were about 155 million malaria cases in the 11 high burden to high impact (HBHI) countries in 2018, compared with 177 million in 2010. The Democratic Republic of the Congo and Nigeria accounted for 84 million (54%) of total cases" (1). The cases per 1,000 at risk has decreased between 2010 and 2018, "from 71 to 57 cases per 1,000 population at risk", with progress slowing down from 2014 onwards (1). The South-East Asia Region saw a 70% reduction in incidence rate during the same period, and all other regions reported little to no progress (1).

RELEVANCE TO UNDERSTANDING RELATIONSHIPS AMONG GENDER, HEALTH, FRAGILITY/PEACE	
How could this indicator contribute to our understanding of how gender, health and fragility and peace influence one another?	The two most at-risk groups for malaria are pregnant women and children, especially in Africa. People living with HIV/AIDS are also at a higher risk. When a pregnant woman has malaria, it "impacts the health of the fetus, leading to prematurity and low birthweight, major contributors to neonatal and infant mortality" (1). More specifically, "Maternal anaemia, of which malaria remains an important contributor, puts the mother at increased risk of death before and after childbirth", so malaria is inherently tied to reducing maternal mortality rates (1). Addressing malaria means addressing a major health concern for a huge part of the population in some of the most impoverished contexts in Africa. Prompt diagnosis and treatment are essential to reducing overall malaria rates. "Poor access to health care providers or lack of awareness of malaria symptoms among caregivers" are major barriers, indicating the importance of access to healthcare, especially for women (1). This access is compromised in conflict settings, and malaria might not be detected in fragile settings or situations of forced displacement. The 2017 WHO report notes that complex situations such as conflict "often disrupt service delivery and the implementation of interventions", and often cause a high rate of incidence and death from malaria (3, p. 50) This impact is most noticeable among women and children in conflict settings as

	"worsening nutritional conditions impair their capacity to fight the disease" (3, p. 50).

UTILITY	
What does the indicator measure?	The indicator measures the incidence, or the number of new cases of malaria per 1000 population living in areas where malaria transmission occurs. The WHO "compiles data on reported confirmed cases of malaria, submitted by the national malaria control programmes. The denominator is estimated, using risk mapping and population data", and these data are collected annually (2).
What does it NOT measure - what does it miss?	The indicator does not measure the incidence for the total population unless the total population is considered the population at risk. As such, it's comparison with other countries requires an understanding of the size of the population at risk of malaria within a country. Additionally, it does not measure the number of deaths per 1,000, nor the number who received some/any treatment. Additionally, the number of cases is an estimate, so it does not reflect the stage at which someone was diagnosed or sought treatment.

AVAILABILITY	
Sources for indicator (CRVS, DHS etc.);	This indicator is typically measured through household surveys, such as MIS and DHS. Data in Sub-Saharan Africa, the area with the highest burden, "covers 4-year periods because most countries conduct household surveys once every 3–5 years" (1, p. 52). The WHO's World Malaria Reports combine data reported by National Malaria Programs (reported cases, reporting completeness and likelihood that cases are parasite positive) with data obtained from nationally representative household surveys on health service use. Indicator data are available from the following sources: 1. WHO's Global Health Observatory (country level 2000-2019) https://www.who.int/data/gho/data/indicators/indicator-details/GHO/malaria-incidence-(per-1-000-population-at-risk) 2. WHO's World Malaria Reports (country and regional level 2010-2018) (1)
Most recent date available;	Data can be found on malaria incidence per 1000 as recently as 2018 from the WHO World Malaria Report (1). The most recent World Bank data are available from 2019.
Availability across geographic areas;	Yes. The WHO and individual country governments have made a strong effort since the MDGs to collect data on malaria incidence. Data are mainly available where the burden of disease is the highest and are therefore highly concentrated in Africa.

Availability in conflict affected settings;	Yes "the Global Malaria Programme, in collaboration with the WHO Health Emergencies Programme, pays close attention to the malaria situation in complex settings, and facilitates the response", so data are widely available in conflict settings (3, p. 50). Data is available in the GHO from 2000-2019 in Yemen, South Sudan, Somalia, DRC and Afghanistan.

GRANULARITY	
Disaggregation at national level	
Data disaggregated by sex;	Yes.
Data disaggregated by identity group (race, ethnicity);	No. The WHO 2010 world malaria report mentions that ethnic minorities in several developing countries are more likely to have malaria, but the data are not further disaggregated (4).
Data disaggregated by income	No. Although most reports mention the economic burden that malaria places on families, "particularly those who are least able to pay for prevention and treatment and most affected by loss of income due to the disease" (5). Malaria data are available for regional comparisons between high income countries to middle- and low income countries. Much of the literature notes that malaria is considered a disease of the "rural poor", but global data from major institutions that is disaggregated by income is not readily available (6).
Data disaggregated by citizenship	No.
Data disaggregated by migration background	No.
Disaggregation at sub-national level	
Data disaggregated by geographic region;	No. Many reports from the WHO note that there is decreased access to health services in rural areas as compared to urban areas, putting rural individuals at a higher risk for malaria. Further, fertility rates disaggregated by rural/urban locations are used to help estimate the number of pregnant women who may have malaria in many countries, but these data are usually incorporated into an overall country aggregate (3). Rural and urban comparisons can sometimes be found for specific countries from individual researchers.
Data disaggregated by identity group (race, ethnicity);	No.
Data disaggregated by income.	No.

Data disaggregated by age	Yes.

SOURCES OF BIAS	
What bias can exist with these data?	The indicator of malaria incidence per 1000 is based on several estimations, which can exaggerate or understate the burden of disease in any country.

VALIDITY	
Clear and accepted international standards for indicator;	No. The WHO has a clear way in which it calculates malaria incidence, but researchers may choose to include different variables. Countries may only choose to disclose the numbers they are certain of, which fall far below the estimates of the WHO that account for underreporting (2).
Validity of measurement of indicator generally accepted;	The literature indicates that the calculations and measurements of this indicator are frequently debated and can yield different results.

RELIABILITY	
Reliability of indicator generally accepted;	One report concluded that "estimates of malaria incidence derived from routine surveillance data were typically lower than those derived from surveys of parasite prevalence" (7).

COMPLEXITY	
Enables analysis across time and location.	Yes, this indicator does enable for analysis across time and location as there is no geographic or time-related limitation explicitly identified within its definition.

OTHER REFLECTIONS

Are indicator values imputed/modelled?	For most of the countries where malaria transmission has been eliminated, reported case counts from national malaria programs are directly used as the numerator of the indicator. Outside of this approach, the WHO makes use of three methods to estimate values for the indicator's numerator (malaria case count) (1). 1-The first method is used for countries and areas outside of Africa and for low-transmission countries and areas in Africa. In this method, the number of cases is estimated using an equation that considers the number of confirmed cases in the public sector, the suspected cases tested, the presumed cases (not tested but treated as malaria), the reporting completeness, the test positivity rate and the fraction of cases seeking treatment in the private/public sector. 2-The second method is used for high transmission countries in Africa and for some countries in the WHO Eastern Mediterranean Region. In this method the prevalence of the malaria parasite is first modelled using available prevalence data, sociodemographic covariates, and data on the distribution of malaria interventions. An ensemble model is then used to estimate the malaria case count based on the estimated parasite prevalence. 3-For other countries, values recorded by national surveillance programs are directly used. Some values are imputed based on years where the quality of data was higher while adjusting for population growth. The WHO's "*World Malaria Report 2019"* details which method was used to estimate the malaria case count for each country (1). The denominator of the indicator (Population at risk of malaria), defined as the population living in areas where malaria transmission occurs (incidence above 0), is calculated by the WHO based on estimates provided by National Malaria Programmes (1). *Uncertainty bounds are included with WHO estimates and should be considered during analysis.*

References

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