# Anaemia prevalence estimates and determinants SDG 2.2.3

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World Health Organization

# Introduction

- Accurate and timely data needed for countries to achieve health goals and targets

- Core function of WHO is to monitor the health situation and assess health trends

- The Micronutrients Database in the WHO Vitamin and Mineral Information System (VMNIS):
  – Compiles national, sub-national and first administrative level data on the vitamin and mineral status of populations
  – Used to monitor micronutrient status, provide global estimates of the burden of micronutrient malnutrition, and calculate trends in status over time

SDG indicator 2.2.3: Prevalence of anaemia in women aged 15-49 years, by pregnancy status (%)

# Data sources VMNIS Micronutrients database

- Ministries of health through WHO regional and country offices

- National research and academic institutions

- Non-governmental organizations

- Organizations of the UN system

- Reports and peer-review publications generated by partners or implementing partners

- Peer-review publications found literature search

# Inclusion criteria VMNIS Micronutrients database

- Sampling frame of defined population

- Sample representative at national, regional and 1st admin level

- Population-based, household-based or facility based sample (complying with representativeness)

- Cross-sectional sample or baseline assessment of interventions

- Standard, validated data collection techniques and laboratory methodology

# Global estimates of anaemia prevalence

- Produced by WHO since at least the early 1980s

- **Bayesian hierarchical mixture** model as of 2011
  - Estimates informed by data from each country-year itself, if available, and by data from other years in the same country and in other countries
  - Estimates also informed by **covariates**
  - Includes variance term to account for **unobserved design factors** (e.g. sample design, season, method of haemoglobin measurement, type of blood sample)
  - Accounts for **additional factors** (e.g. subnational data, imprecise age ranges)
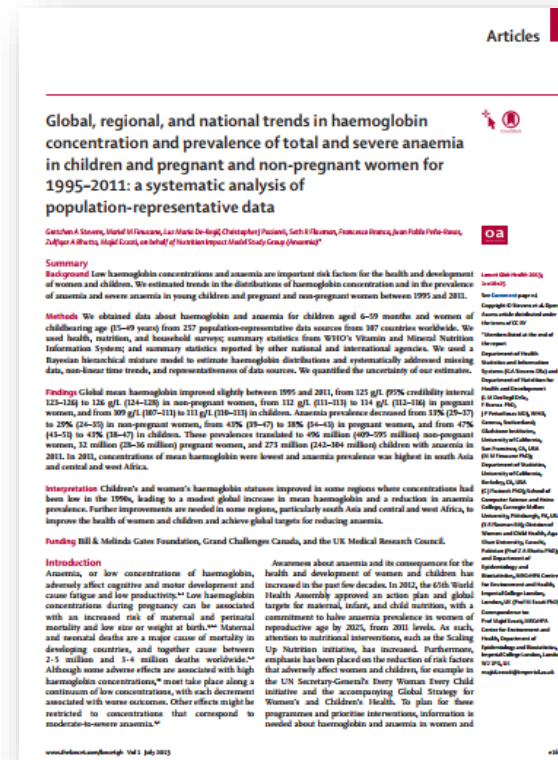
# Anaemia prevalence estimates
2000-2019

- **Survey data**
  - Restricted to data on **children 6-59 months** and **women of reproductive age**
  - National and subnational (if representative of at least 3 1st admin levels) data
  - Haemoglobin adjusted for elevation using US CDC formula
  - Haemoglobin adjusted for smoking status if available

- **Data availability for latest round of estimates (2000-2019)**
  - **489** population-representative **data sources** from **133 countries** worldwide with **4.5 million** hemoglobin **measurements**
    - 458 (94%) nationally representative sources
    - 408 (83%) sources had data for women (providing an average of 2.1 data sources per country)
    - 393 (80%) sources had data for children (providing an average of 2.0 data sources per country)
  - Countries with at least one data source represent 92% of women and children in the world
  - Countries with at least 2 data sources represent 85% of women and children in the world

# Determinants of anaemia
## Consideration for covariates in statistical model

- **Determinants**
  - Development & socio-demographics
    - Maternal education
    - Urban/rural residence
    - Fertility rate
  - Health & nutrition
    - Dietary intake of iron and other micronutrients
    - Body mass index / weight-for-age Z scores
    - Malabsorption disorders
    - Intestinal helminths and parasites
    - Malaria and other disease incidence
  - Genetics
    - Hemoglobinopathies, thalassemias, haemoglobin variants, G6PD deficiency

| Population group | Covariates in 1990-2016 model | Covariates in 2000-2019 model |
|---|---|---|
| Children | Maternal education<br>Proportion of population in urban areas<br>Prevalence of sickle-cell disorders and thalassaemias<br>Mean weight-for-age Z score | Socio-demographic index<br>Meat supply (kcal/capita)<br>Shock-free under-five mortality |
| Women | Maternal education<br>Proportion of population in urban areas<br>Prevalence of sickle-cell disorders and thalassaemias<br>Mean body mass index | Socio-demographic index<br>Meat supply (kcal/capita)<br>Mean body mass index |

# Anaemia prevalence estimates
## 2000-2019

- Estimated distributions of haemoglobin concentration in each country-year for each population group
- Calculated population mean and prevalence of anaemia[1] for each country-year
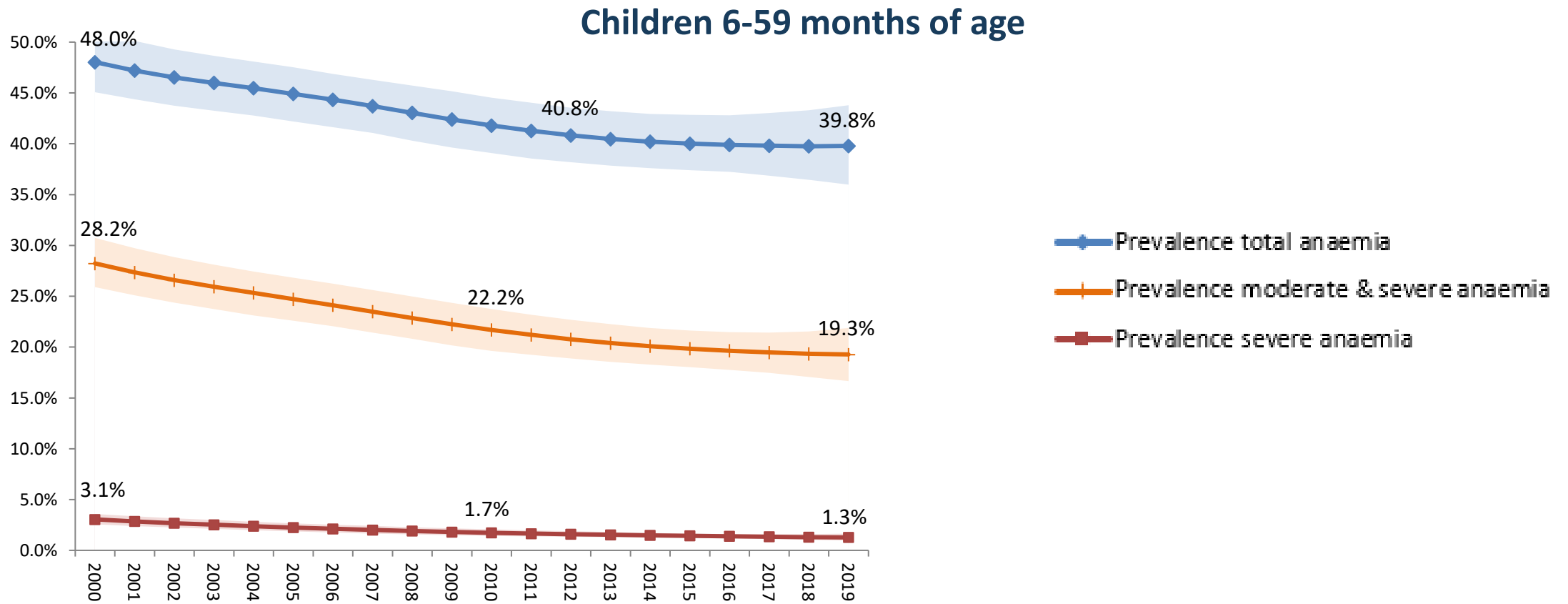
**Children 6-59 months of age**



[1] Total anaemia defined as <110 g/L in pregnant women and children 6-59 months of age and <120 g/L in non-pregnant women
Moderate+severe anemia defined as <100 g/L in pregnant women and children 6-59 months of age and <110 g/L in non-pregnant women
Severe anaemia defined as <70 g/L in pregnant women and children 6-59 months age and <80 g/L in non-pregnant women
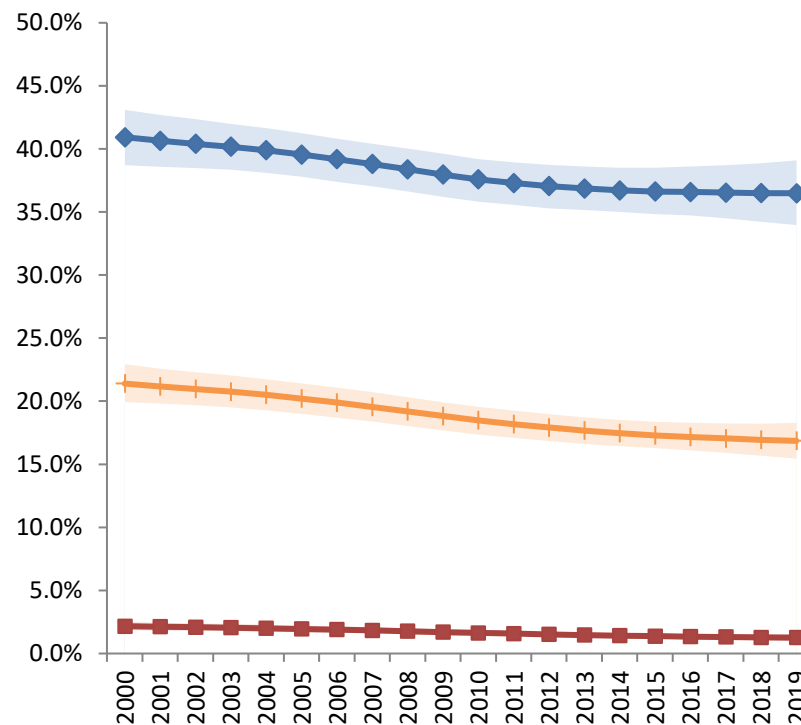
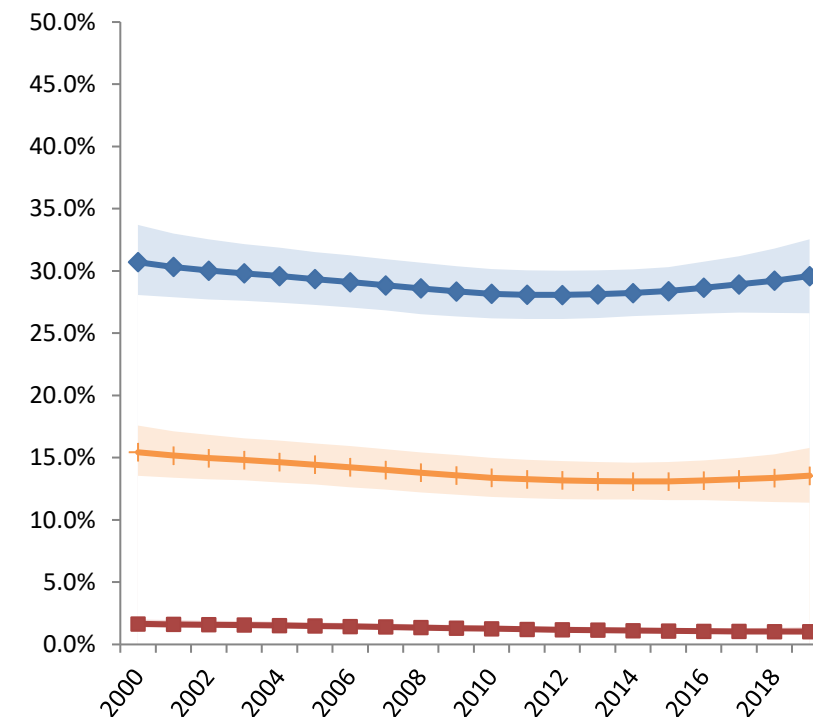# Global trends in the prevalence of anaemia
## 2000-2019



**Children 6-59 months of age**
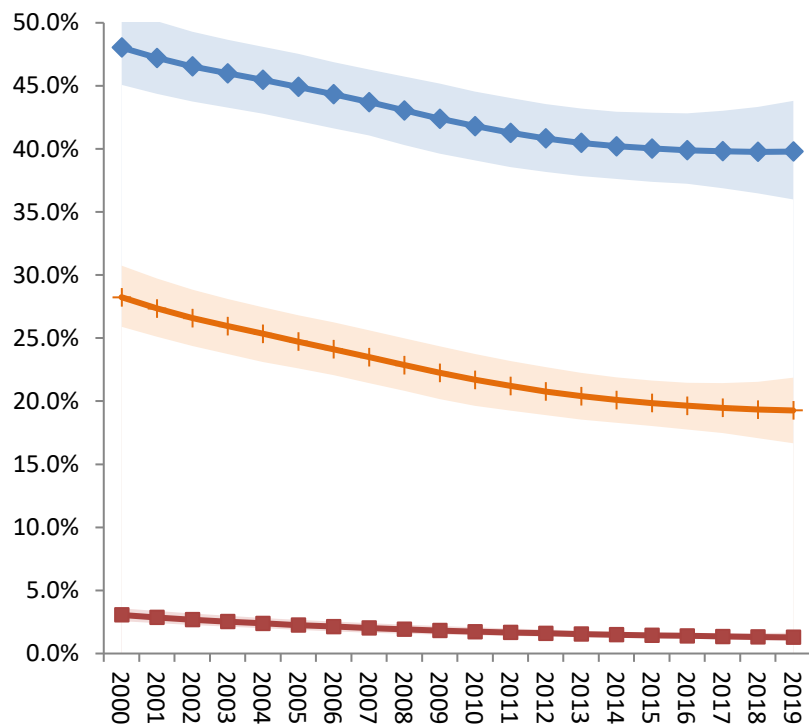
**Pregnant women**

**Non-pregnant women**

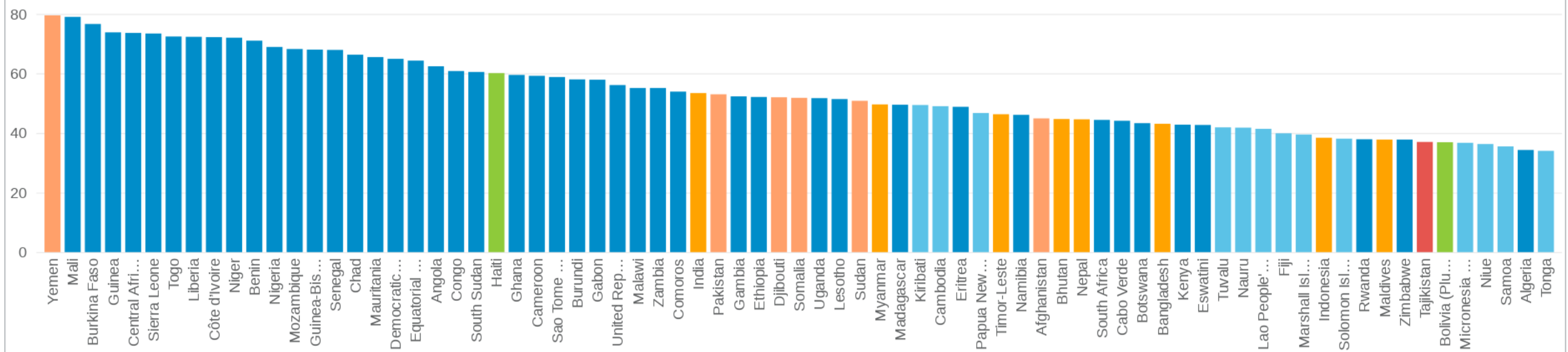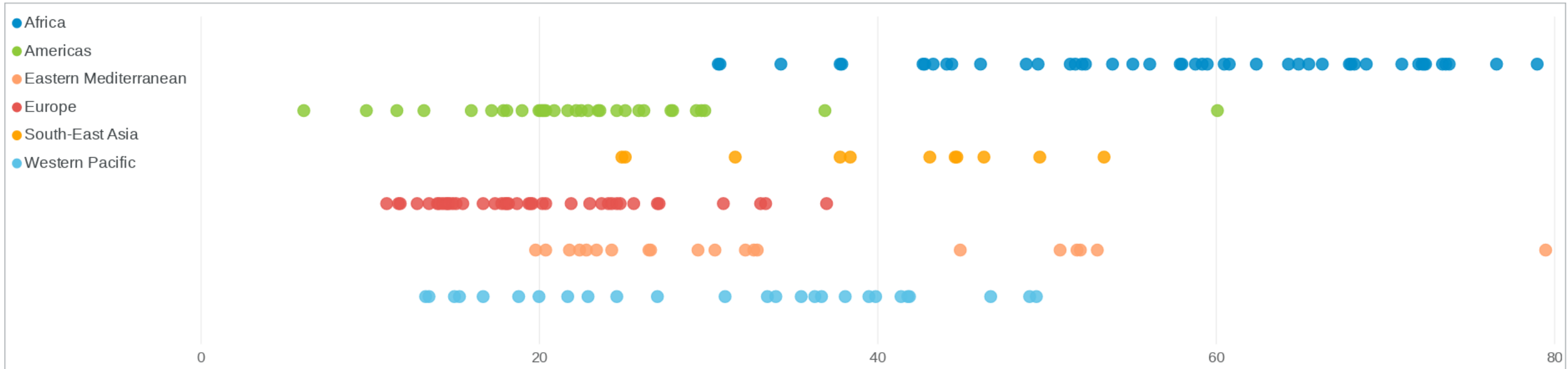Legend: Prevalence total anaemia — Prevalence moderate & severe anaemia — Prevalence severe anaemia
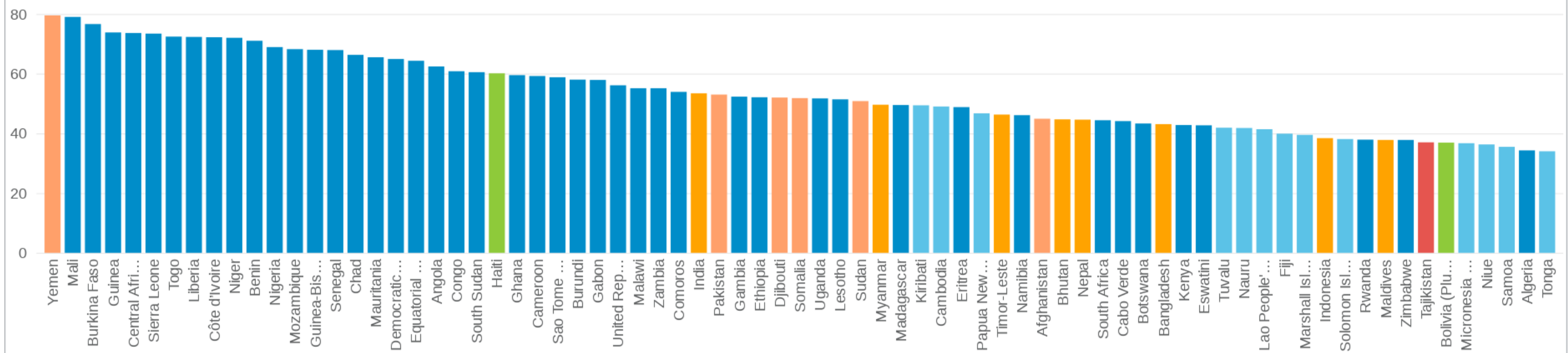
# Prevalence of anaemia in children aged 6–59 months (%)

Year: Latest     Sex: Both sexes



Legend:
- Africa
- Americas
- Eastern Mediterranean
- Europe
- South-East Asia
- Western Pacific

Country axis (bottom bar chart): Yemen, Mali, Burkina Faso, Guinea, Central Afri..., Sierra Leone, Togo, Liberia, Côte d'Ivoire, Niger, Benin, Nigeria, Mozambique, Guinea-Bis..., Senegal, Chad, Mauritania, Democratic..., Equatorial..., Angola, Congo, South Sudan, Haiti, Ghana, Cameroon, Sao Tome..., Burundi, Gabon, United Rep..., Malawi, Zambia, Comoros, India, Pakistan, Gambia, Ethiopia, Djibouti, Somalia, Uganda, Lesotho, Sudan, Myanmar, Madagascar, Kiribati, Cambodia, Eritrea, Papua New..., Timor-Leste, Namibia, Afghanistan, Bhutan, Nepal, South Africa, Cabo Verde, Botswana, Bangladesh, Kenya, Eswatini, Tuvalu, Nauru, Lao People'..., Fiji, Marshall Isl..., Indonesia, Solomon Isl..., Rwanda, Maldives, Zimbabwe, Tajikistan, Bolivia (Plu..., Micronesia..., Niue, Samoa, Algeria, Tonga
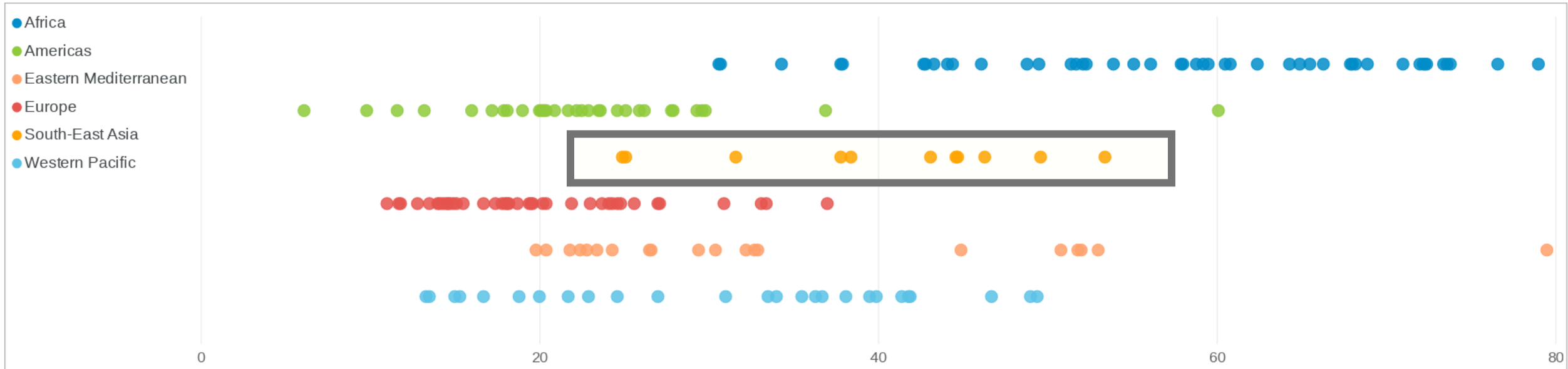
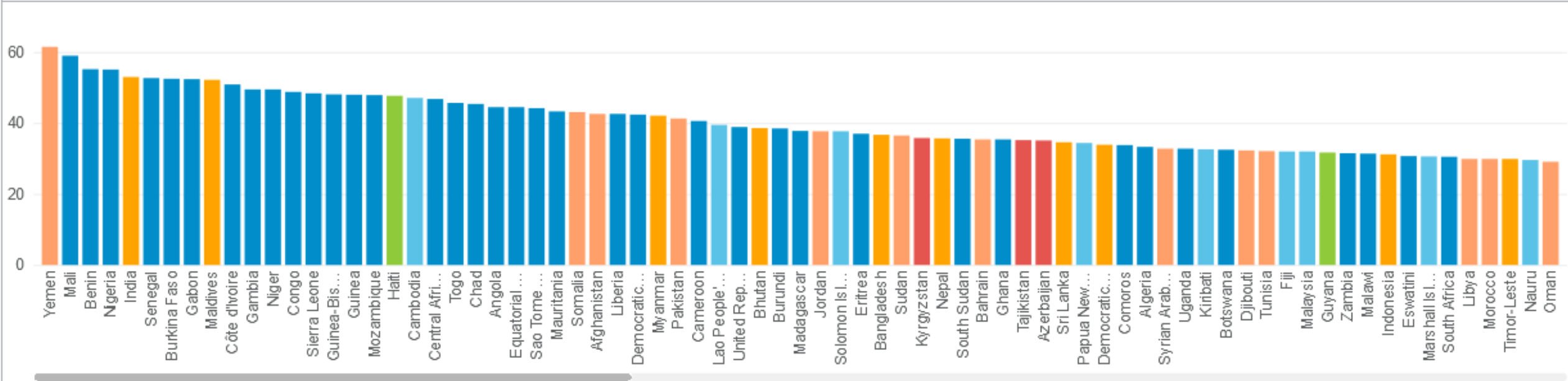# Prevalence of anaemia in children aged 6–59 months (%)
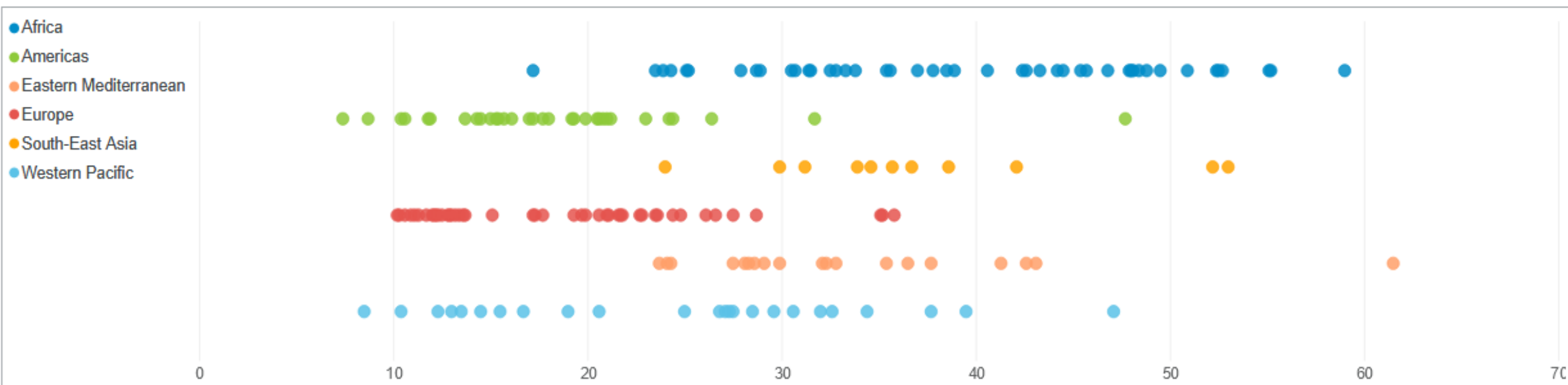
Year: Latest

Sex: Both sexes

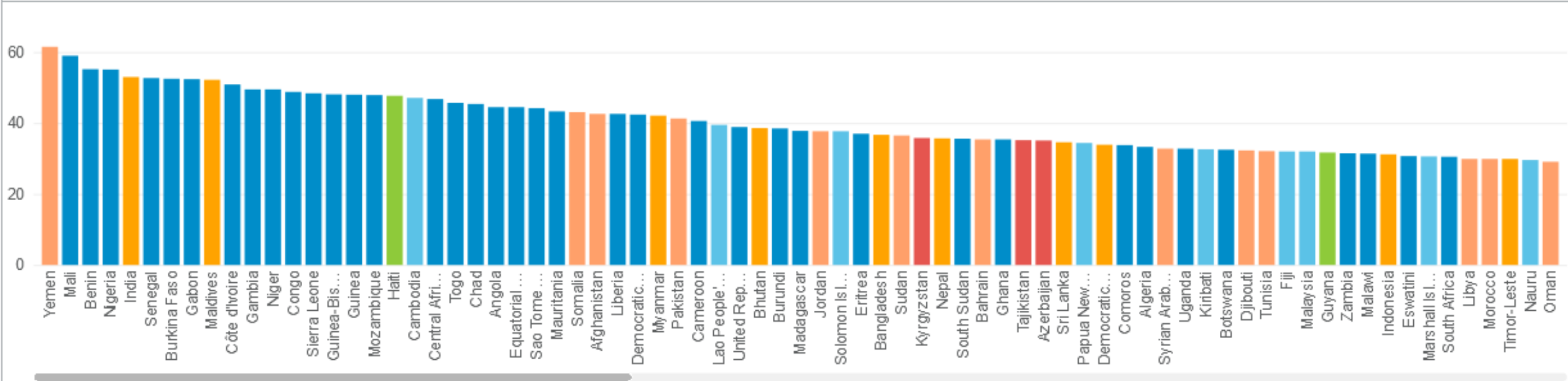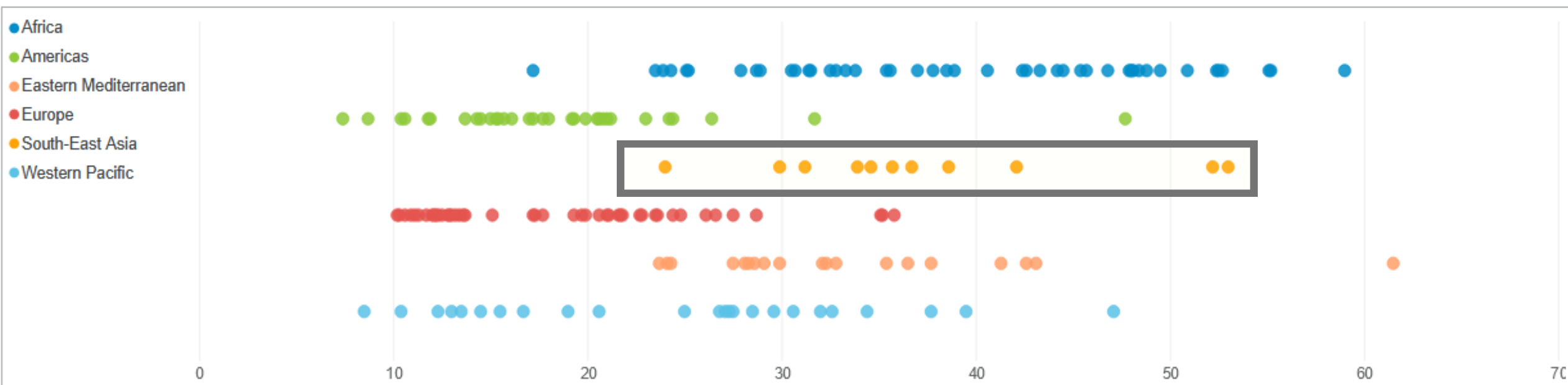# Prevalence of anaemia in women of reproductive age (aged 15-49) (%)

Year **Latest**  Sex **Female**

Prevalence of anaemia in women of reproductive age (aged 15-49) (%)
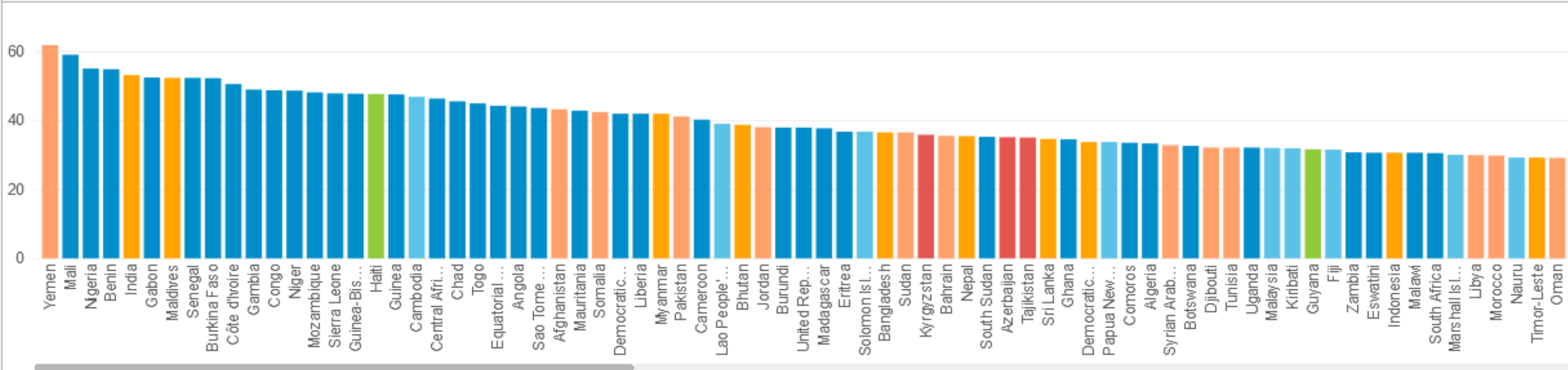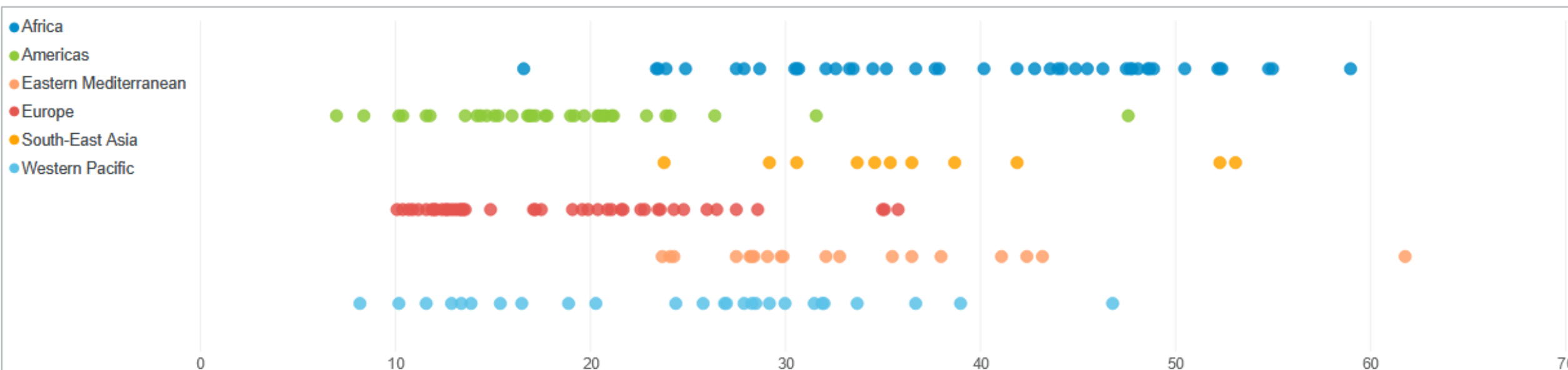
Year: Latest  Sex: Female

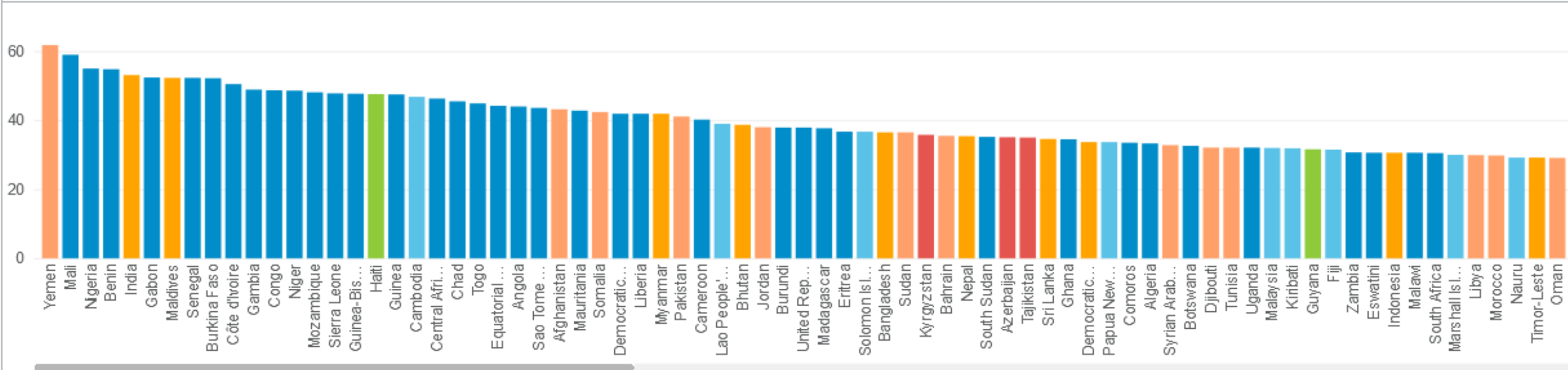Prevalence of anaemia in non-pregnant women (aged 15-49) (%)
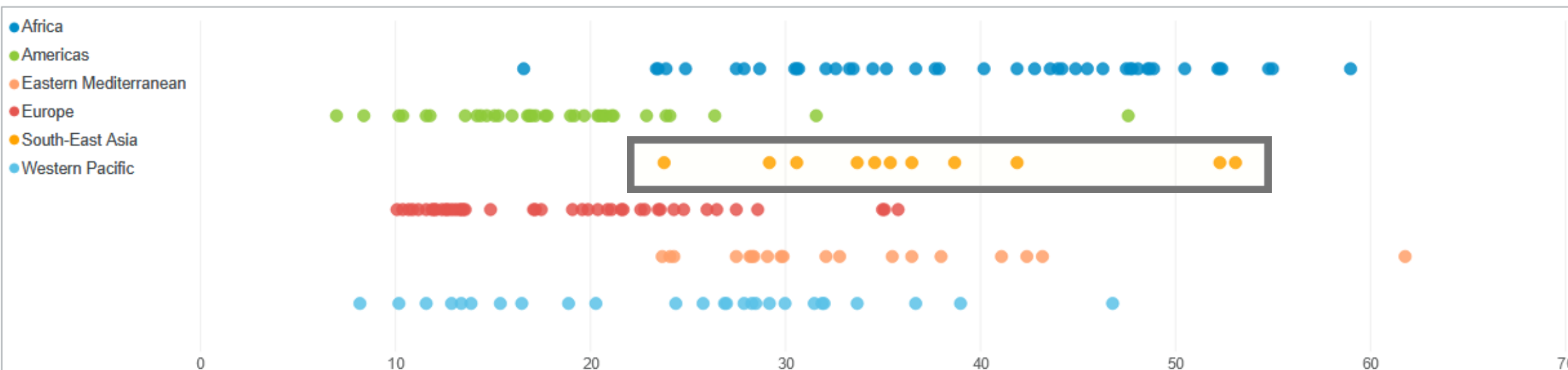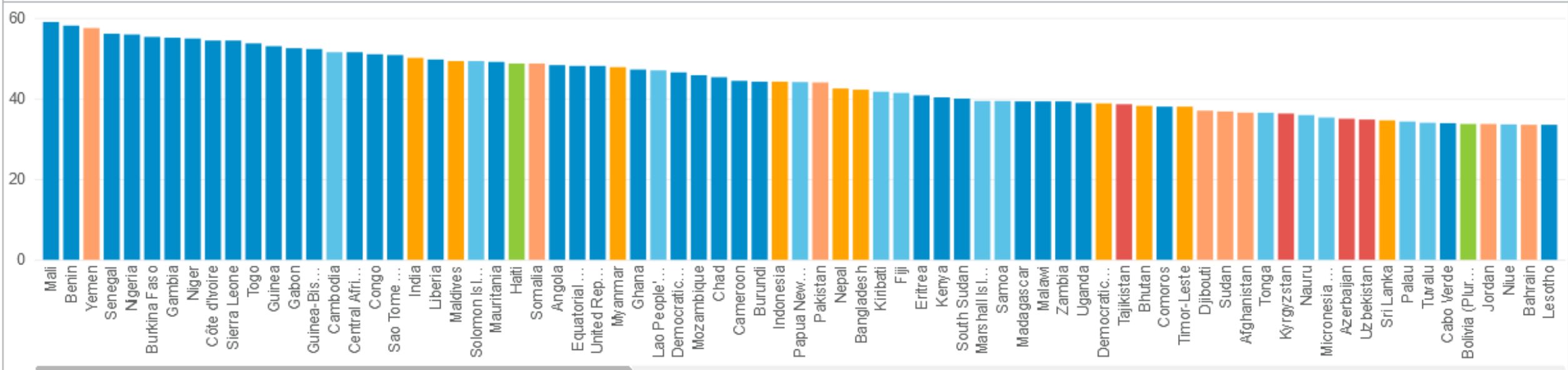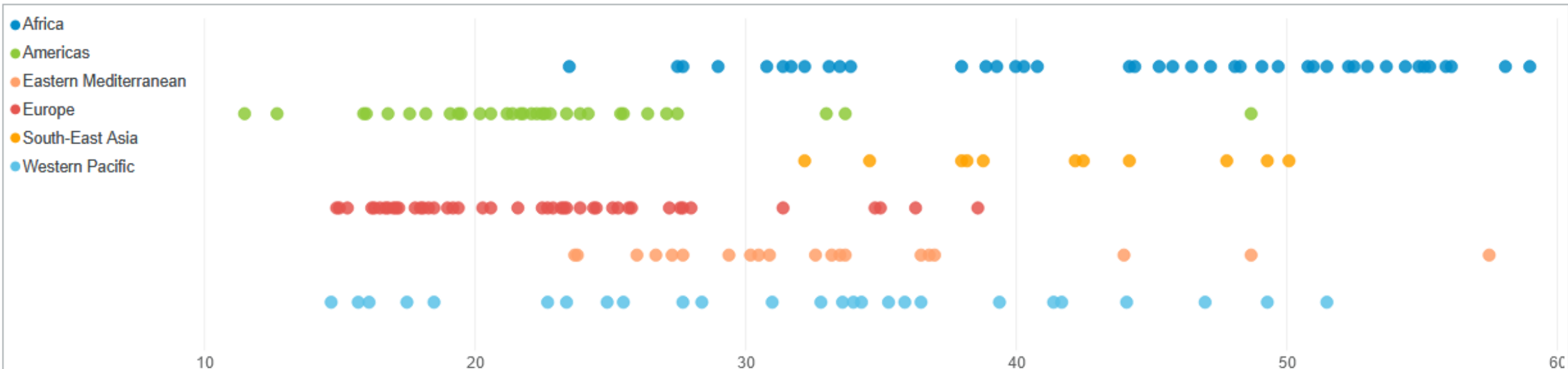
Year: Latest
Sex: Female

Prevalence of anaemia in non-pregnant women (aged 15-49) (%)

Year: Latest
Sex: Female

Prevalence of anaemia in pregnant women (aged 15-49) (%)

Year: Latest
Sex: Female

Legend:
- Africa
- Americas
- Eastern Mediterranean
- Europe
- South-East Asia
- Western Pacific

Bar chart countries (left to right): Mali, Benin, Yemen, Senegal, Nigeria, Burkina Faso, Gambia, Niger, Côte d'Ivoire, Sierra Leone, Togo, Guinea, Gabon, Guinea-Bis..., Cambodia, Central Afri..., Congo, Sao Tome..., India, Liberia, Maldives, Solomon Isl..., Mauritania, Haiti, Somalia, Angola, Equatorial..., United Rep..., Myanmar, Ghana, Lao People'..., Democratic..., Mozambique, Chad, Cameroon, Burundi, Indonesia, Papua New..., Pakistan, Nepal, Bangladesh, Kiribati, Fiji, Eritrea, Kenya, South Sudan, Marshall Isl..., Samoa, Madagascar, Malawi, Zambia, Uganda, Democratic..., Tajikistan, Bhutan, Comoros, Timor-Leste, Djibouti, Sudan, Afghanistan, Tonga, Kyrgyzstan, Nauru, Micronesia..., Azerbaijan, Uzbekistan, Sri Lanka, Palau, Tuvalu, Cabo Verde, Bolivia (Plur..., Jordan, Niue, Bahrain, Lesotho
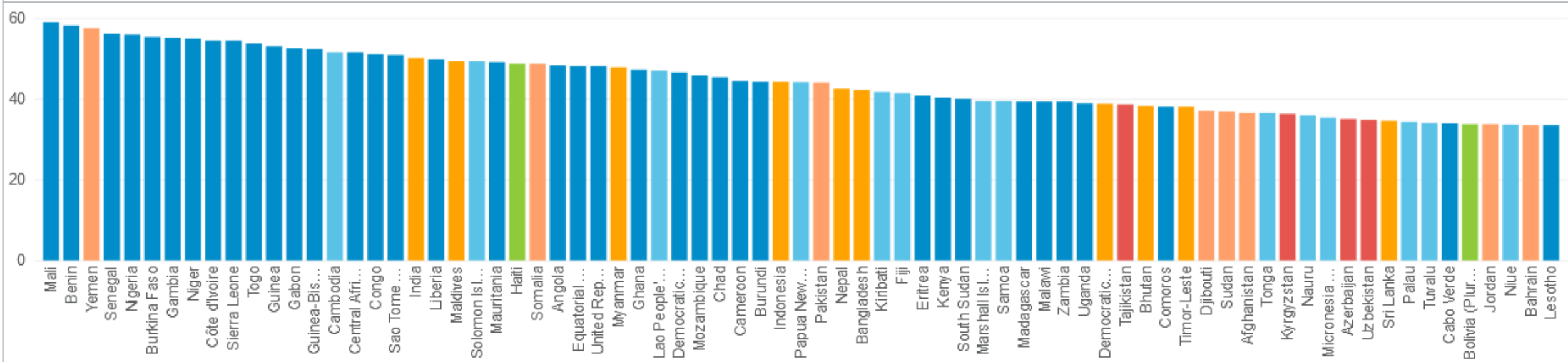
Prevalence of anaemia in pregnant women (aged 15-49) (%)

Year: Latest

Sex: Female

# Children 6-59 months of age

## Global anaemia prevalence estimates
2019

| WHO region | Anaemia percentage (95% CI) | Anaemia number (millions) (95% CI) | Severe anaemia percentage (95% CI) | Severe anaemia number (millions) (95% CI) |
|---|---|---|---|---|
| African | 60 (57-64) | 102.5 (96.3-108.5) | 2.7 (2.1-3.4) | 4.6 (3.6-5.8) |
| Americas | 17 (13-20) | 12.1 (9.8-14.7) | 0.2 (0.07-0.4) | 0.1 (0.06-0.3) |
| Eastern Mediterranean | 43 (36-50) | 36.4 (30.2-42.4) | 2.0 (0.9-3.3) | 1.7 (0.8-2.8) |
| European | 20 (15-27) | 11.5 (8.2-15.5) | 0.1 (0.06-0.4) | 0.1 (0.03-0.2) |
| South-East Asia | 49 (39-58) | 83.2 (66.4-98.2) | 1.1 (0.5-2.1) | 1.8 (0.8-3.5) |
| Western Pacific | 19 (11-32) | 23.3 (13.0-38.1) | 0.3 (0.1-0.7) | 0.3 (0.1-0.8) |
| **Global** | **40 (36-44)** | **269 (244-297)** | **1.3 (1.0-1.7)** | **8.7 (6.7-11.2)** |

# Anaemia prevalence estimates
Global trends for women: 2000-2019
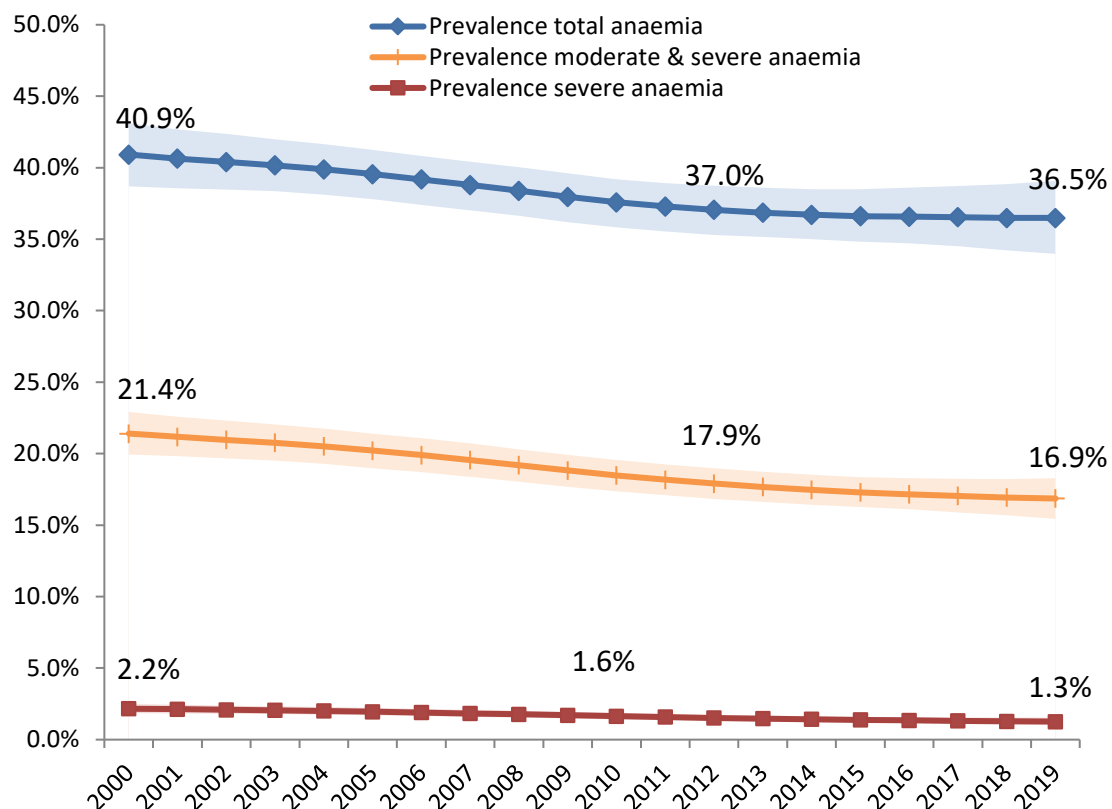
World Health Organization

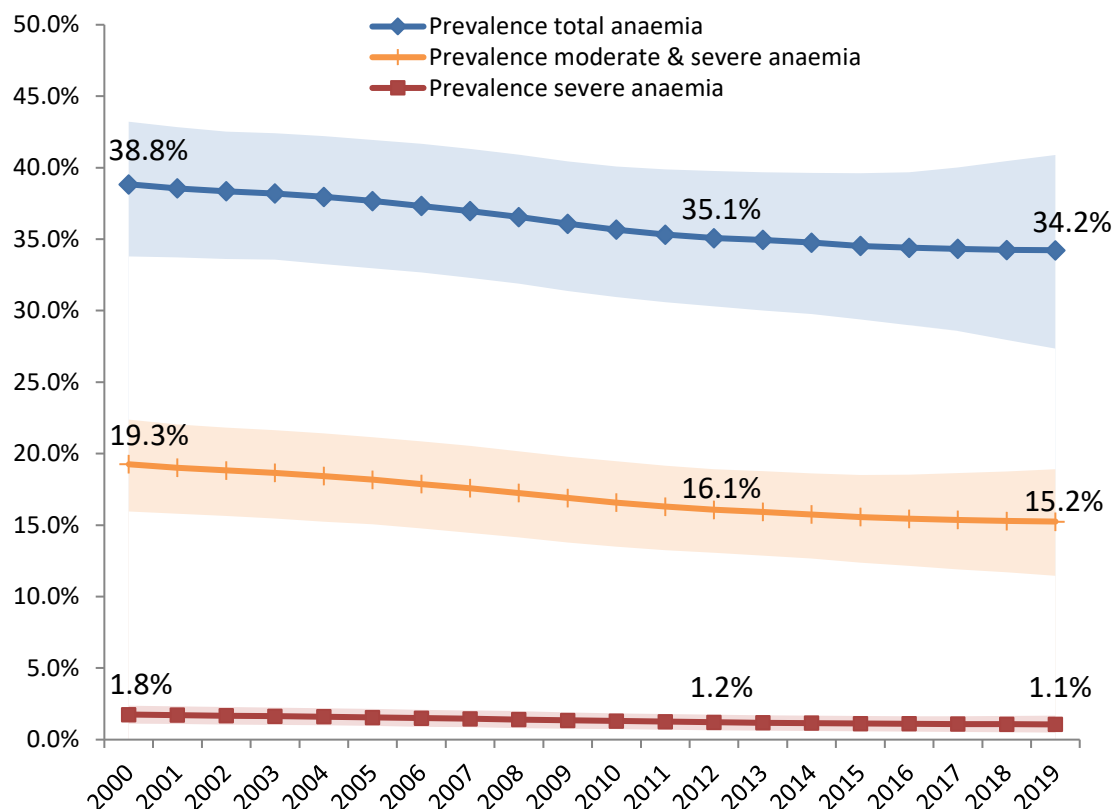**Pregnant women**



**Non-pregnant women 15-49 years of age**



1 Total anaemia defined as <110 g/L in pregnant women and children 6-59 months of age and <120 g/L in non-pregnant women
Moderate +severe anemia defined as <100 g/L in pregnant women and children 6-59 months of age and <110 g/L in non-pregnant women
Severe anaemia defined as <70 g/L in pregnant women and children 6-59 months age and <80 g/L in non-pregnant women

# Anaemia prevalence estimates
Trends for women in the ESCWA region: 2000-2019



**Pregnant women**

**Non-pregnant women 15-49 years of age**

1 Total anaemia defined as <110 g/L in pregnant women and children 6-59 months of age and <120 g/L in non-pregnant women
Moderate +severe anemia defined as <100 g/L in pregnant women and children 6-59 months of age and <110 g/L in non-pregnant women
Severe anaemia defined as <70 g/L in pregnant women and children 6-59 months age and <80 g/L in non-pregnant women
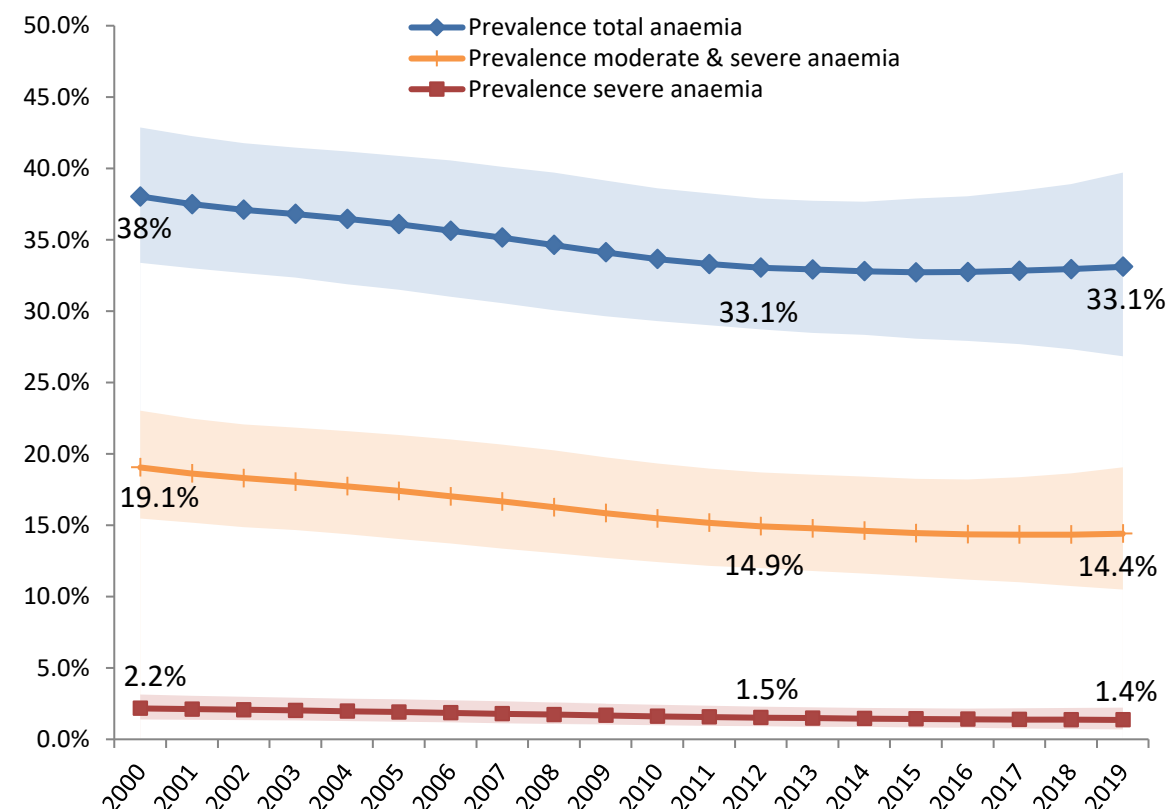
**Non pregnant women**

# Global anaemia prevalence estimates by EC regions
2019

| UN region | Anaemia percentage (95% CI) | Anaemia number (millions) (95% CI) | Severe anaemia percentage (95% CI) | Severe anaemia number (millions) (95% CI) |
|---|---|---|---|---|
| ESCWA | 33.1 (26.8,19.7) | 33.1 (26.8,39.7) | 1.4 (0.7,2.2) | 1.4 (0.7,2.2) |
| ECA (E,W,S,C,N Africa) | 38.4 (34.7,42.1) | 110.7 (100.2,121.3) | 1.3 (1,1.6) | 3.7 (2.8,4.7) |
| ECE (Europe) | 16.6 (13.2,20.8) | 47.7 (37.8,59.7) | 0.4 (0.2,0.8) | 1.3 (0.7,2.4) |
| ECLAC (LAC and Caribbean) | 17.1 (12.4,23) | 28.2 (20.5,38.1) | 0.5 (0.3,1) | 0.9 (0.4,1.6) |
| ESCAP (East and North Asia) | 15.8 (10,24.1) | 60.6 (38.2,92.2) | 0.3 (0.1,0.6) | 1 (0.5,2.3) |
| ESCAP (South East Asia) | 26.8 (20.9,33.4) | 44.8 (35.1,56) | 0.6 (0.4,1.1) | 1 (0.6,1.8) |
| ESCAP(South and South-West Asia) | 47.5 (40.3,54.3) | 236.5 (200.7,270.2) | 2 (1.2,3.2) | 10.1 (0.7,2.2) |
| **Global** | **29.6 (26.6-32.5)** | **538.8 (484.5,592.4)** | **1 (0.8-1.4)** | **18.7 (13.7-25.1)** |

## Global anaemia prevalence estimates by EC regions
2019

**Pregnant women**

| UN region | Anaemia percentage (95% CI) | Anaemia number (millions) (95% CI) | Severe anaemia percentage (95% CI) | Severe anaemia number (millions) (95% CI) |
|---|---|---|---|---|
| ESCWA | 34.2 (27.3-40.9) | 2.3 (1.8,2.7) | 1.1 (0.5-1.7) | 0.1 (0,0.1) |
| ECA (E,W,S,C,N Africa) | 44.1 (41.4-46.7) | 12 (11.3,12.7) | 1.9 (1.5-2.3) | 0.51 (0.41,0.62) |
| ECE (Europe) | 20.2 (15.5-25.9) | 1.9 (1.5,2.5) | 0.3 (0.1-0.6) | 0.03 (0.01,0.06) |
| ECLAC (LAC and Caribbean) | 21.9 (15.5-29.4) | 1.4 (1,1.9) | 0.4 (0.2-0.7) | 0.0 (0.0,0.0) |
| ESCAP (East and North Asia) | 19.1 (11,31.1) | 2.2 (1.2,3.5) | 0.3 (0.1,0.8) | 0.0 (0,0.1) |
| ESCAP (South East Asia) | 37.5 (32.1,42.2) | 2.6 (2.3,3) | 0.8 (0.4,1.5) | 0.1 (0.0,0.1) |
| ESCAP(South and South-West Asia) | 46.1 (41.1,49.8) | 11 (9.8,11.9) | 1.7 (1,2.4) | 0.40 (0.25,0.58) |
| **Global** | **37 (34-39)** | **32 (29.8-34.2)** | **1.3 (1.0-1.5)** | **1.1 (0.9-1.4)** |

# Anaemia prevalence estimates: 2019
## Women of reproductive age

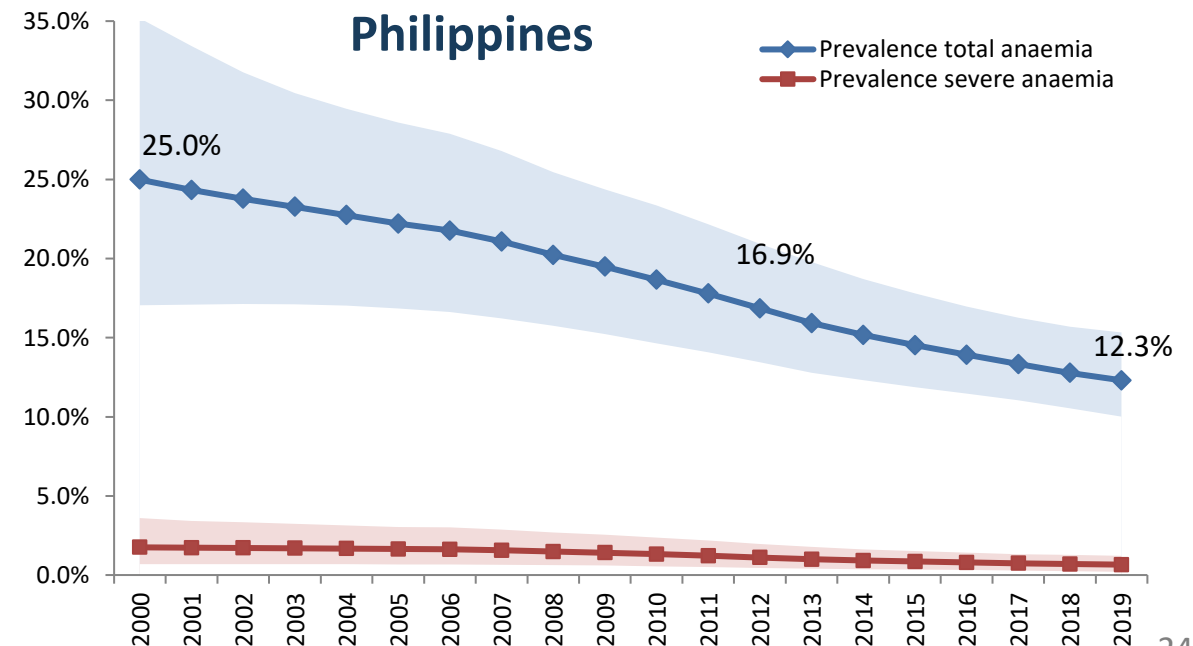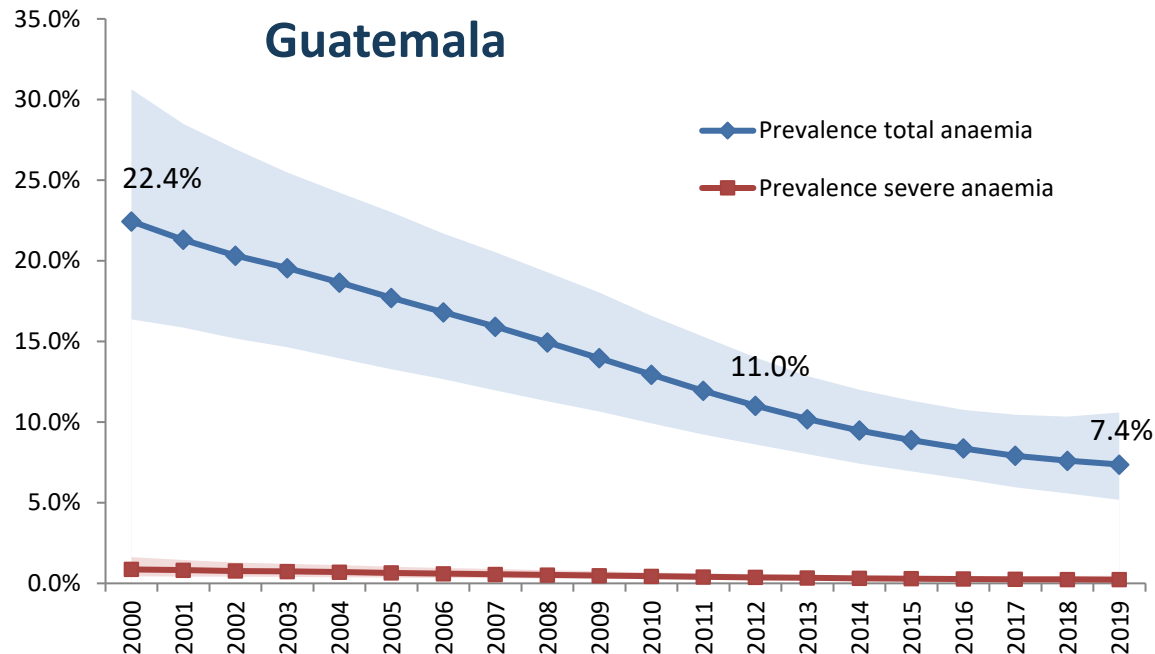Prevalence of anaemia in women of reproductive age (%)
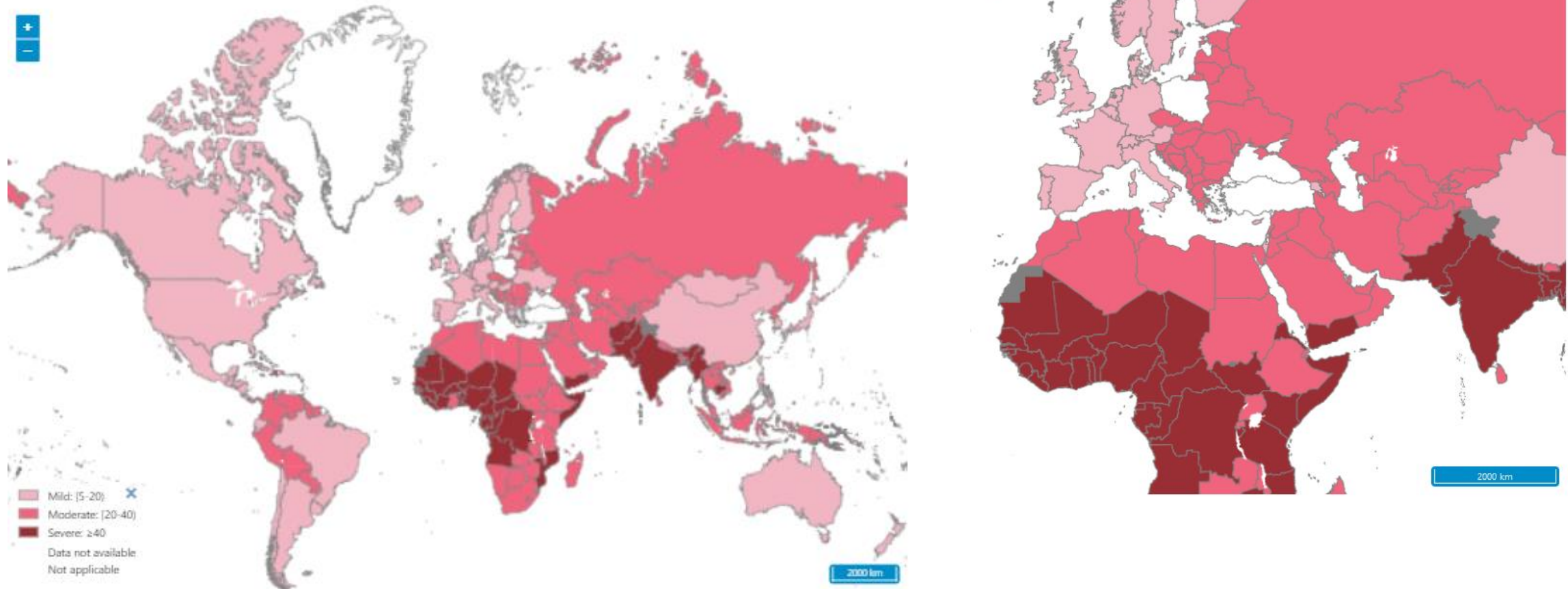


Source: https://www.who.int/data/gho/data/indicators/indicator-details/GHO/prevalence-of-anaemia-in-women-of-reproductive-age-(-)

- **Global nutrition target 2: reduce the prevalence of anaemia in women of reproductive age by 50% by 2025, using baseline of 2012**
  - Current round of estimates indicate 2012 baseline prevalence of 28.5% and 2019 estimate of 29.9%
    - Most countries appear off-track for a 50% reduction
    - Guatemala and Philippines had the most progress



**Guatemala**

Prevalence total anaemia
Prevalence severe anaemia

22.4%
11.0%
7.4%

**Philippines**

Prevalence total anaemia
Prevalence severe anaemia

25.0%
16.9%
12.3%

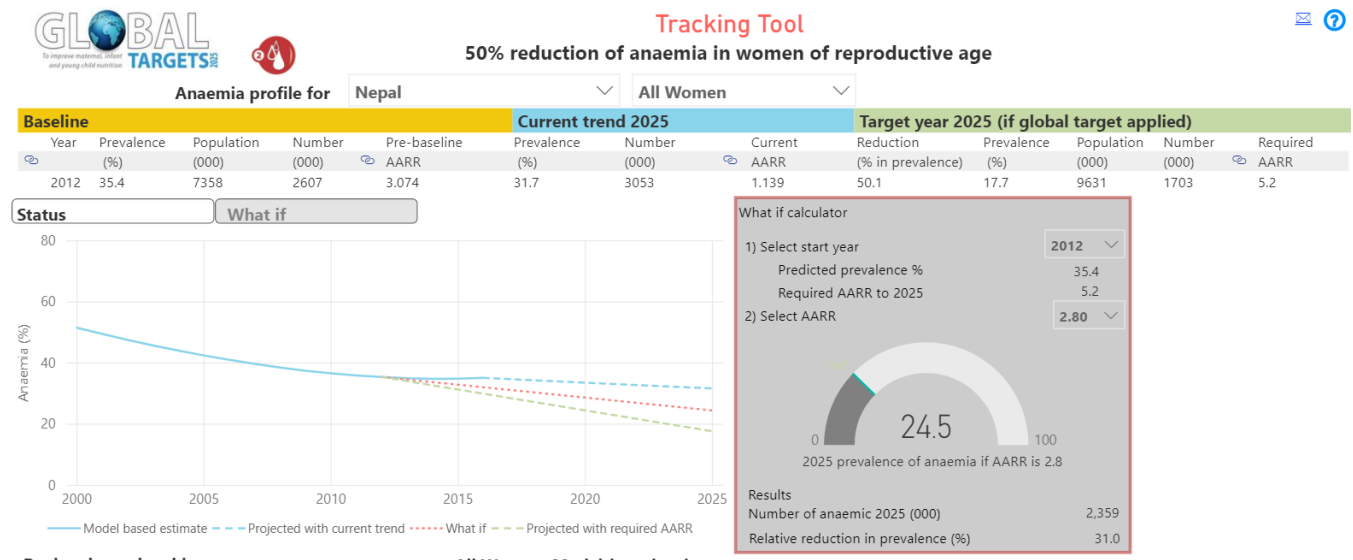# Acknowledgements

A talented team

- ## Dr Lisa Rogers
  - WHO Food and Nutrition Action in Health Systems Unit
- ## Dr Elaine Borghi
  - WHO Monitoring Nutritional Status & Food Safety Events Unit
- ## Dr Christopher Paciorek
  - Department of Statistics, UC Berkeley
- ## Dr Gretchen Stevens, consultant

**Micronutrient survey manual**

**Tracking Tool**

# Future plans for anaemia work

- WHO-UNICEF Technical Expert Advisory group on nutrition Monitoring (TEAM) to develop technical notes regarding data quality in anaemia assessment

- WHO to develop a Micronutrient survey analyser

- Enhance the Micronutrients database towards further equity disaggregations

Thank you