

Exposure to household air pollution for 2017

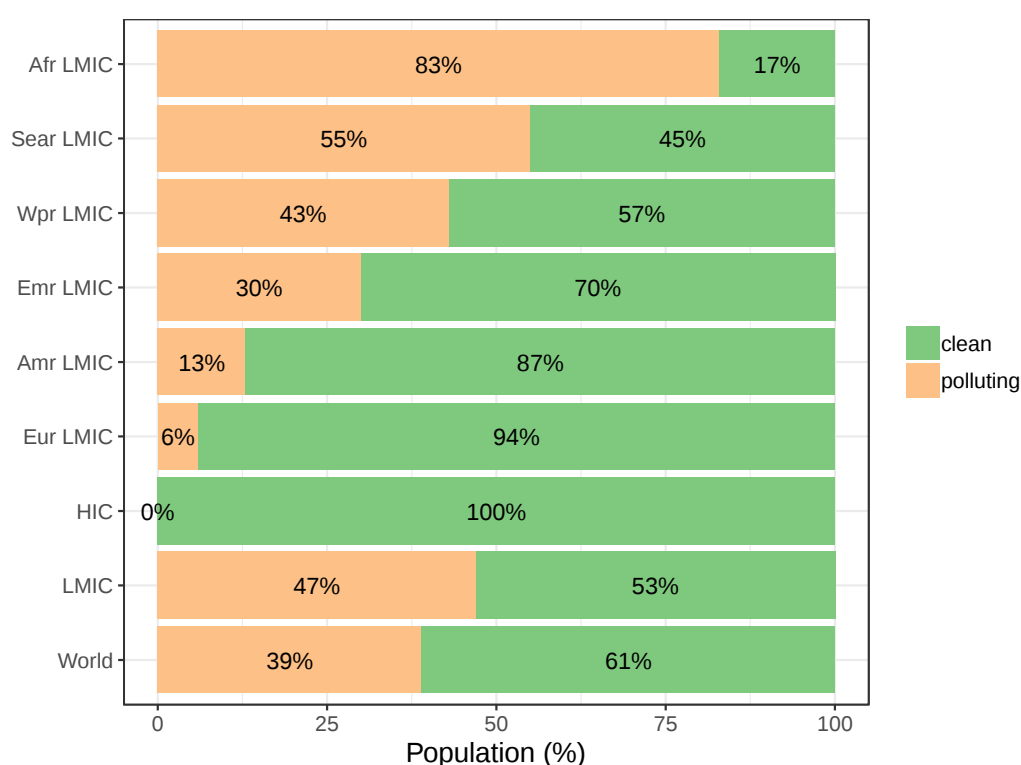
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Summary of results

The proportion of households in a country relying mainly on polluting fuels and technologies for cooking is currently used as a proxy indicator for estimating population exposure to household air pollution. Households mainly cooking with coal, wood, charcoal, dung, crop residues or kerosene are considered exposed.

Globally, 39% [33, 46]¹ of the world population is exposed to household air pollution resulting from cooking with polluting fuels and technologies in 2017. The use of polluting fuels and technologies for cooking is almost exclusively a problem in low- and middle-income countries, with 83% [81, 87] of the African region, 55% [41-68] of the South-East Asia region and 43% [22, 65] of the Western Pacific region primarily reliant on polluting cooking options. The Eastern Mediterranean region follows with 30% [24, 36] of its population relying primarily on polluting fuels, while the Americas and European regions follow with 13% [10, 16] and 6% [4, 10], respectively (Figure 1).

Figure 1. Population access to clean and polluting fuels for cooking in 2017, by region



Afr: Africa; Amr: America; Emr: Eastern Mediterranean; Eur: Europe; Sear: South-East Asia, Wpr: Western Pacific; LMIC: Low- and middle-income; HIC: High-income.

¹ 95% confidence interval

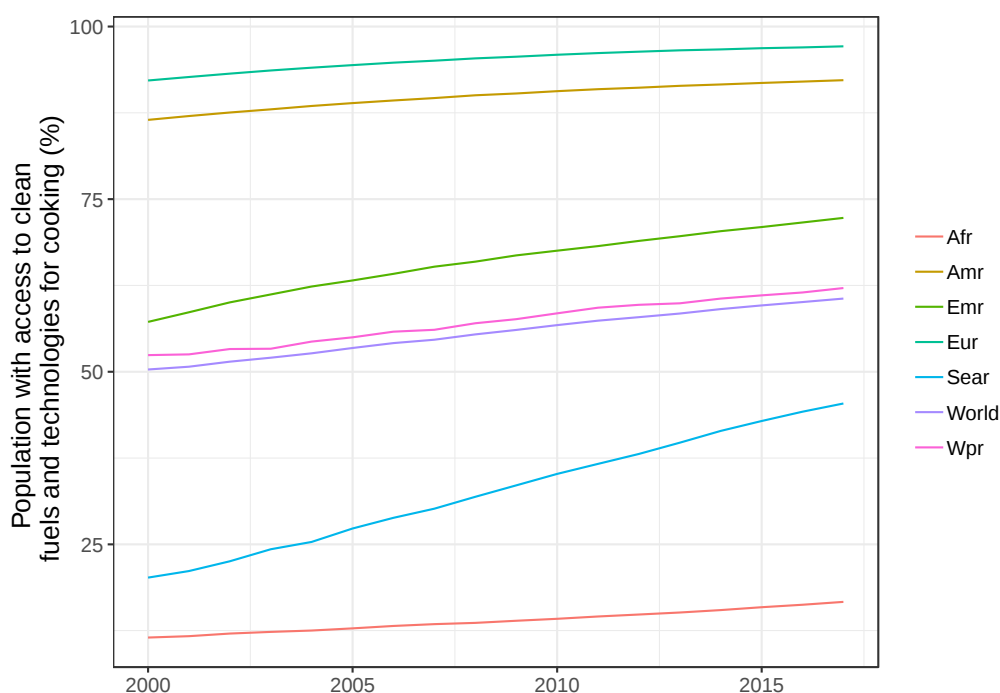
Linkages to the tracking of the Sustainable Development Goals

The percentage of the population primarily relying on clean fuels and technologies serves as one of the two main indicators (with electricity access) for monitoring progress towards the SDG 7 target on universal access to modern energy services. These estimates are also used in the calculation of the mortality rate attributed to the joint effects of ambient and household air pollution, SDG 3 indicator 3.9.1.

Since 2000, all regions have seen progress in household energy access but at varying rates. The South-East Asia region has outpaced other regions, doubling its share of population relying on clean fuels and technologies as shown in Figure 2 over the last two decades. The African region has shown the slowest progress, falling short of the global trend with less than a 6% increase in the population using clean cooking since 2000.

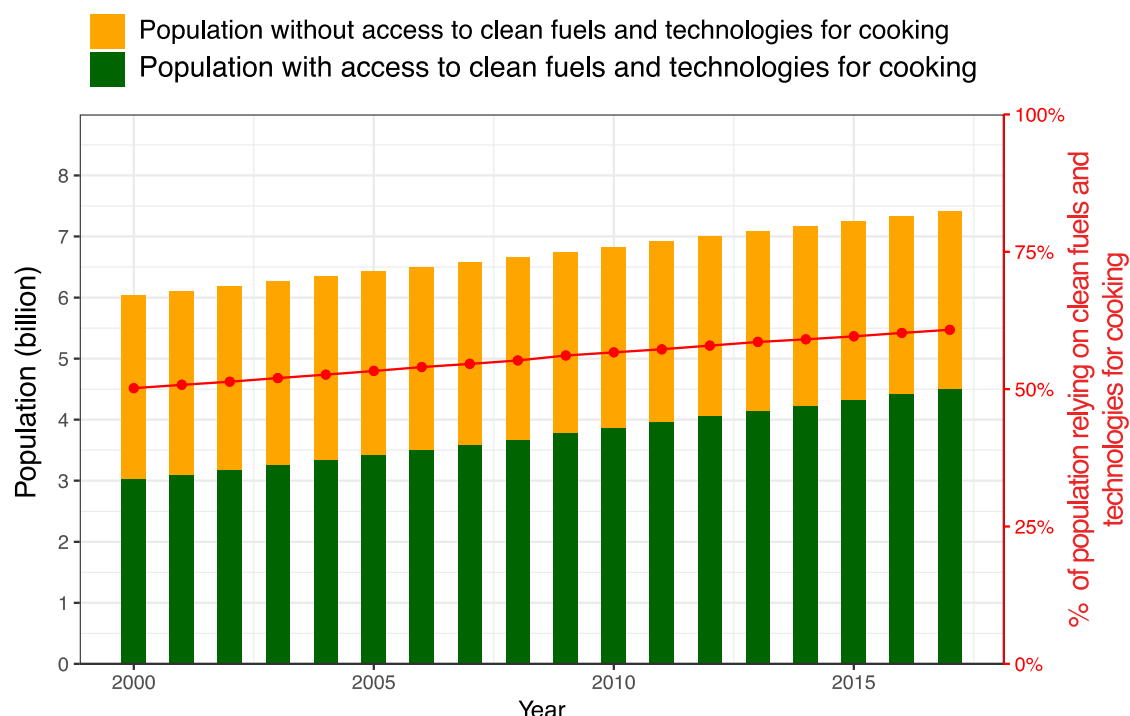
Despite the apparent increase in the percentage of the population using clean fuels and technologies for cooking, the absolute number of people without access to clean fuels and technologies has stayed fairly constant. Since 2000, the global figures have remained unchanged, with some 3 billion people still relying on polluting fuels and technologies for cooking (Figure 3).

Figure 2. Trends in access to clean fuels and technologies for cooking for the years 2000-2017, by region.



Afr: Africa; Amr: America; Emr: Eastern Mediterranean; Eur: Europe; Sear: South-East Asia, Wpr: Western Pacific; LMIC: Low- and middle-income; HIC: High-income.

Figure 3. Population with and without access to clean technologies and fuels for cooking, by year



Methods

Data source: Information on the types of technologies and fuels used by households for cooking is regularly collected on nationally-representative household surveys or censuses. WHO regularly collects and compiles such household energy data in the WHO Household energy database². The data housed in this database is then the input data for a statistical model used to derive point estimates for global monitoring of household energy use and health impacts. For 2017 estimates, a version of the WHO Household energy database containing over 1249 surveys with data from 168 countries for the years 1974 to 2016 was used as data inputs in the statistical model.

Modelling techniques: The percentage of households that mainly use fuels such as wood, charcoal, crop waste, coal, dung and kerosene for cooking were considered ‘exposed’. Currently there is a very little to no nationally representative data capturing the type of solid fuel cookstove. However, recognizing the importance of how the fuel and technology impact the level of household air pollution, in future updates, WHO will estimate exposure and disease burden attributed to both the fuel and solid fuel stove in combination (pending data availability). The percentage of households mainly using electricity, natural gas, liquefied petroleum gas, biogas, biofuels (e.g. ethanol), or solar energy for cooking were assumed to be ‘unexposed’.

² WHO Household energy database. Geneva, World Health Organization:
<http://www.who.int/airpollution/data/household-energy-database/en/>

Together with the University of Exeter, the WHO has developed a global hierarchical household energy model (GHHEM) for producing estimates of overall polluting (and clean) fuel and technology usage. Set within a Bayesian hierarchical modelling framework, trends in the proportions of the population mainly using “polluting” or “clean” fuels and technologies are estimated for each country, based on survey information for that country, and using time as the only covariate.

The GHHEM is implemented using Markov chain Monte Carlo (MCMC), a type of Bayesian analysis. Summaries of these distributions can be taken to provide both point estimates (e.g. means) and measures of uncertainty (e.g. 95% credible and 95% prediction intervals). The GHHEM is applied to the WHO household energy database to produce a comprehensive set of estimates, together with associated measures of uncertainty, of the use of polluting fuels and technologies from cooking, by country, for each year for which survey data was available (1990-2016).

Data analysis: Only survey data providing individual fuel breakdowns and with less than 15% of the population reporting “missing” and “no cooking” and “other fuels” were included in the analysis. Countries with no household fuel data but classified as high income according to the World Bank country classification³ (37 countries) were assumed to have fully transitioned to clean household energy and therefore are reported as >95% access to clean technologies and fuels. No estimates were reported for low- and middle-income countries without data (Lebanon, Libya).

Regional and global aggregates: Population data from the United Nations Population Division were used to derive the population-weighted regional and global aggregates⁴. Low- and middle-income countries without data were excluded from the aggregate calculations.

Confidence Intervals: Confidence intervals are associated to the model estimates and they give a sense of the certainty in the point estimate and can be used to understand the range in which the true values lie. Small annual changes may be due to statistical variability accounted by the model, together with survey variability, and may therefore not reflect a true statistically significant variation in the number of people relying on the different fuels between different years. The confidence intervals should therefore always be taken into account when considering annual changes in the access rate across multiple years.

For more information:

Household air pollution: www.who.int/airpollution/household

Maps and databases: www.who.int/airpollution/data

Global Health Observatory: [www.who.int/gho/phe/indoor air pollution](http://www.who.int/gho/phe/indoor_air_pollution)

SDG 7.1.2: apps.who.int/gho/data/node.sdg.7-1

³ World Bank Country classification, for the year 2016:

<https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>.

⁴ United Nations Population Division, the World Population Prospects, 2017 Revision, New York, 2017.

Acknowledgement

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