CHAPTER 2
ACCESS TO CLEAN FUELS AND TECHNOLOGIES FOR COOKING

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Main messages

- **Global trend.** In 2023, an estimated 74 (70–77)[7] percent of the global population relied primarily on clean cooking fuels and technologies. Although this represents notable progress since 2010, roughly a quarter of the world's population—around 2.1 (1.9–2.5) billion people—remains dependent on polluting fuels and technologies for cooking.
- **Target for 2030.** At current rates, only 78 (74–81) percent of the global population will have access to clean cooking by 2030. This shortfall would leave nearly 1.8 (1.6–2.2) billion people still without clean cooking solutions. Sub-Saharan Africa is projected to account for the largest portion of this gap, underscoring the urgent need for more targeted interventions in the region.
- **Regional highlights.** Access deficits have continued to shrink in Eastern Asia and South-eastern Asia, as well as in Central Asia and Southern Asia—thanks largely to policy measures and rising incomes. However, in Sub-Saharan Africa, the number of people lacking access is still growing at a level of 14 million people yearly, with gains in access overshadowed by rapid population growth.
- **The urban-rural divide.** Access rates in urban areas remain significantly higher than in rural areas. Urban access is around 89 (85–90) percent globally, while rural access is closer to 55 (50–60) percent. Sub-Saharan Africa continues to show a notably wider gap between urban and rural access, with 42 (37-46) percent of the urban population having access compared to just 7 (5-8) percent in rural areas, a difference of 35 percentage points. These lower access levels in Sub-Saharan Africa influence the global averages considerably. If excluded, the global access rate would increase to 95 (91-96) percent in urban areas and 67 (61-73) percent in rural areas.
- **The 20 countries with the largest access deficits.** Collectively, the "top 20" account for more than 70 percent of people without clean cooking globally, including several countries in Sub-Saharan Africa and Southern Asia. Many have seen only marginal progress over the last decade and require urgent policy and financing support to meet global goals.
- **Global and regional fuel trends.** In 2023, the dominant cooking fuels in low- and middle-income countries (LMICs) were liquefied petroleum gas (LPG), natural gas, and electricity. Solid biomass, such as wood, dung, and agricultural residues, remains significant in rural and peri-urban areas. Meanwhile, coal and kerosene use has shrunk and now accounts for less than 1 percent globally.
- **Clean cooking and equity.** The lack of access to clean cooking affects the poor and vulnerable disproportionately. Wealthier households consistently have greater access, especially in Sub-Saharan Africa. The lack of access places a particularly heavy burden on women and girls, who spend hours collecting fuel and cooking on inefficient stoves, exposing them to household air pollution and limiting their educational and economic opportunities.
- **Policy insights.** Urgent action is needed to achieve universal access to clean cooking by 2030. Governments and stakeholders across sectors must scale up investments, prioritize vulnerable populations, and integrate clean cooking into broader energy access efforts to ensure a just and inclusive energy transition that maximize health, equity, and climate benefits.

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7 Throughout the chapter, parenthetical figures appearing after estimates are 95 percent uncertainty intervals, as defined in annex 1. Clean fuels and technologies include stoves powered by electricity, LPG, natural gas, biogas, solar, and alcohol. Clean fuels and technologies are as defined by the normative technical recommendations by the World Health Organization (WHO 2014). Detailed datasets with country data for the SDG 7 indicator discussed in this chapter can be accessed at no charge at https://trackingsdg7.esmap.org/downloads.

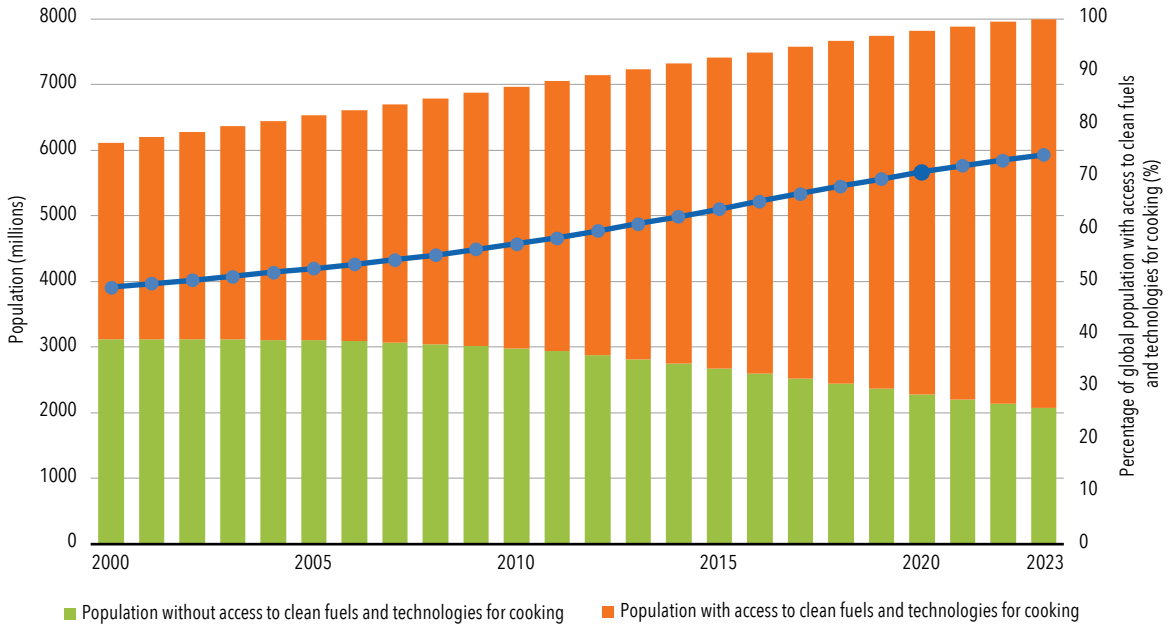
Are we on track?

In 2023, an estimated 74 (70–77) percent of the global population had access to clean cooking fuels and technologies such as electricity, LPG, natural gas, biogas, solar, and alcohol-based stoves. This figure represents an increase of 17 percentage points from 2010. Despite this steady progress, an estimated 2.1 (1.9–2.5) billion people continue to use polluting fuels—such as firewood, charcoal, crop waste, kerosene, and coal—for most of their cooking. The repercussions extend beyond household air pollution, putting women's and children's health, and people's livelihoods, at risk and undermining efforts to achieve global environmental goals.

The current trajectory suggests that only 78 (74–81) percent of the global population will have access to clean cooking by 2030, leaving 1.8 (1.6–2.2) billion people still dependent on polluting fuels—far short of the Sustainable Development Goal (SDG) 7 goal of universal access. This estimate would represent only a modest improvement in the aggregate numbers, as population growth, weak policy frameworks, inadequate infrastructure, lagging innovation, and limited affordability of clean cooking solutions in some regions continue to hinder progress and, in some areas, reverse prior gains.

Figure 2.1 illustrates these trends, showing that while global access to clean cooking climbed from around 57 (53–61) percent in 2010 to 74 (70–77) percent in 2023, the absolute access deficit remains stubbornly high globally, and the world is far from reaching the universal target in 2030.

FIGURE 2.1 • ABSOLUTE NUMBER OF PEOPLE (LEFT AXIS, BARS) AND PERCENTAGE OF THE GLOBAL POPULATION (RIGHT AXIS, LINE) WITH ACCESS TO CLEAN COOKING, 2000–23

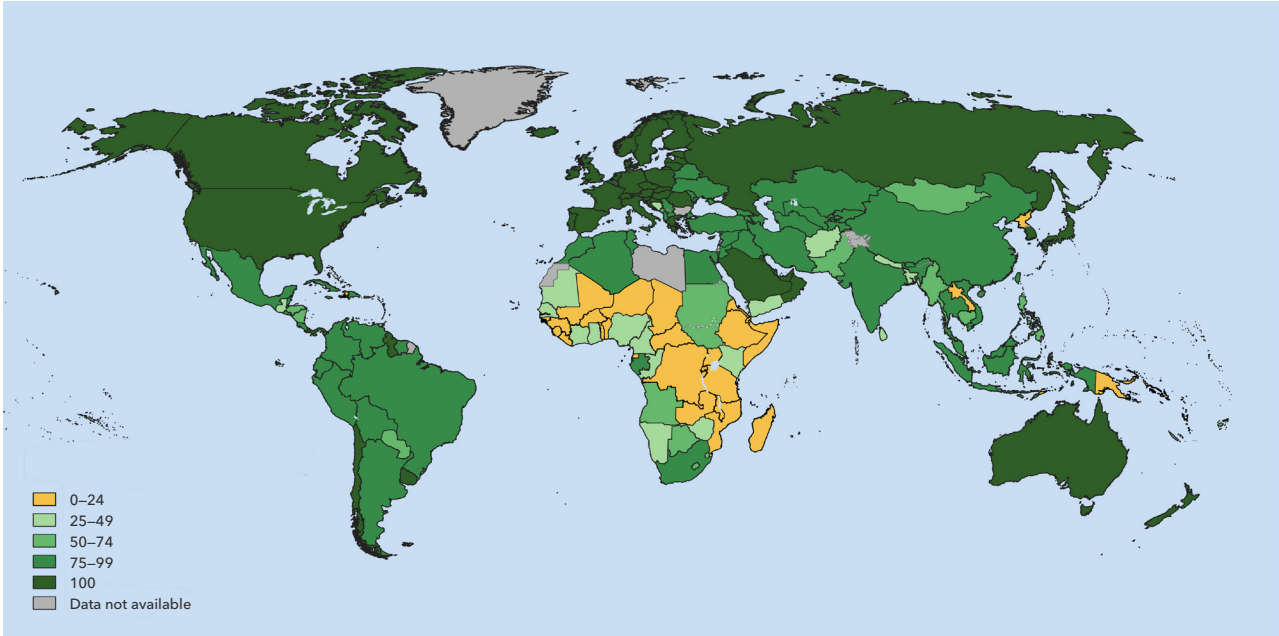


Source: WHO 2025.

The situation is especially urgent in Sub-Saharan Africa, which remains the only region where the absolute number of people without access continues to grow. In 2023, only 21 (19–24) percent of the region's people had access to clean cooking fuels and technologies (figure 2.2), leaving 955.3 (920.0–986.0) million people relying on polluting cooking fuels and technologies. Although some countries in the region have introduced policies to promote improved and clean fuels and technologies, overall progress continues to be outpaced by rapid population growth (0.87 percent annually, or around 70 million people[8]). Without accelerated action, the region risks falling further behind.

Moreover, population growth in Sub-Saharan Africa continues to outstrip incremental improvements in access, causing the number of people without clean cooking to rise by roughly 14 million each year. This further exacerbates the challenges faced by nearly 1 billion people already affected by polluting cooking, with severe consequences for their health, well-being, and quality of life. If this trend persists, it could slow or even reverse the global progress made so far.

FIGURE 2.2 • SHARE OF POPULATION WITH ACCESS TO CLEAN COOKING FUELS AND TECHNOLOGIES, 2023 (PERCENT)



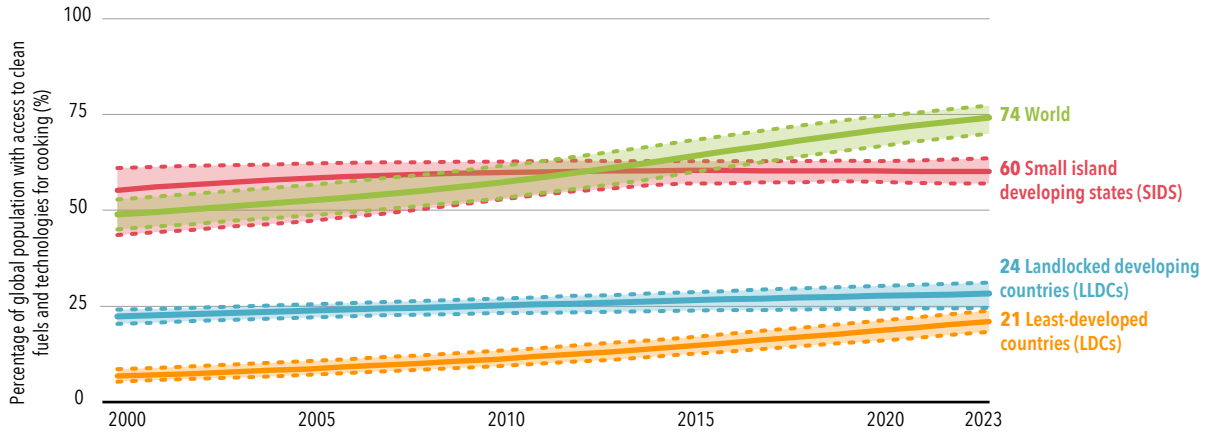
Source: WHO 2025.

Of equal concern is the picture in certain other country groupings. Least-developed countries (LDCs), landlocked developing countries (LLDCs), and small island developing states (SIDS) together comprise 92 countries, including 38 in Sub-Saharan Africa. Many of the countries in these groups are vulnerable and fragile. In 2023, only 21 (18–24) percent of LDCs, 28 (25–31) percent of LLDCs, and 60 (57–64) percent of SIDS had access to clean cooking fuels and technologies, figures that lag significantly behind the global average, as shown in figure 2.3.

In some cases, progress has slowed. In 2012, the share of the population in SIDS with access to clean cooking was close to the global average 60 (67-64) percent. That share has since stagnated, remaining unchanged through 2023. This stagnation underscores the urgent need for targeted efforts to help these countries meet global goals for clean energy access.

8 In line with UN Population Division (2024).

FIGURE 2.3 • ACCESS TO CLEAN COOKING FUELS AND TECHNOLOGIES IN LDCs, LLDCs, SIDS, AND WORLDWIDE, 2000–23



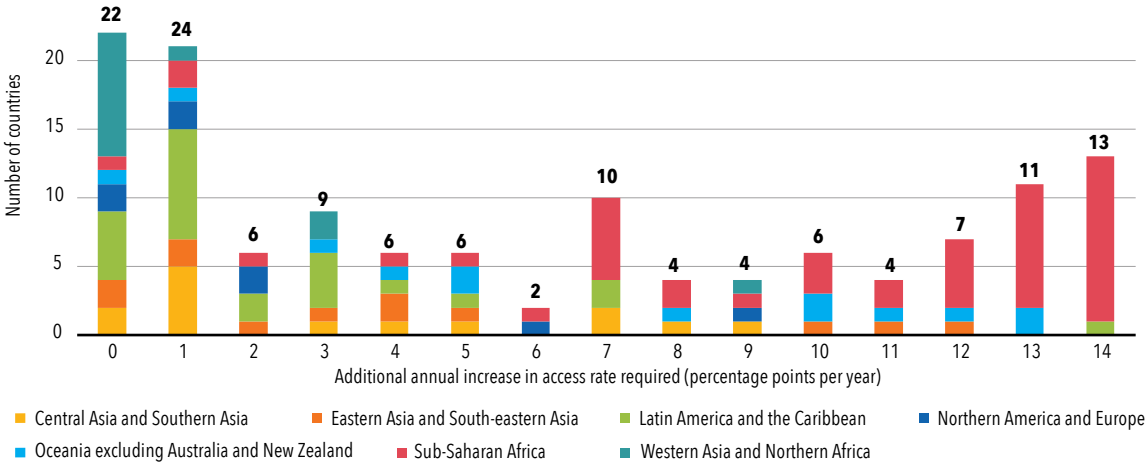
Source: WHO 2025.

Note: Dashed lines are 95 percent uncertainty intervals.

Substantial barriers still impede progress toward universal access to clean cooking, including rapid population growth in the areas facing the greatest deficits, insufficient financing to scale up clean cooking solutions, and gaps in policies and regulations that could otherwise promote equitable access.

Without stronger commitments and new policies, most LMICs will fall short of universal access by 2030. Over the past decade, global progress has averaged just 1.3 percentage points per year, slowing further to 1.2 points over the last five years—far too slow for SDG indicator 7.1.2. Achieving this goal required drastic acceleration, particularly in 41 countries—including 31 in Sub-Saharan Africa, where annual increases of 10–14 percentage points beyond current trends are needed between 2023 and 2030 (figure 2.4).

FIGURE 2.4 • NUMBER OF COUNTRIES REQUIRING STEEPER ANNUAL INCREASES IN ACCESS TO ACHIEVE UNIVERSAL ACCESS TO CLEAN COOKING BY 2030



Source: WHO 2025.

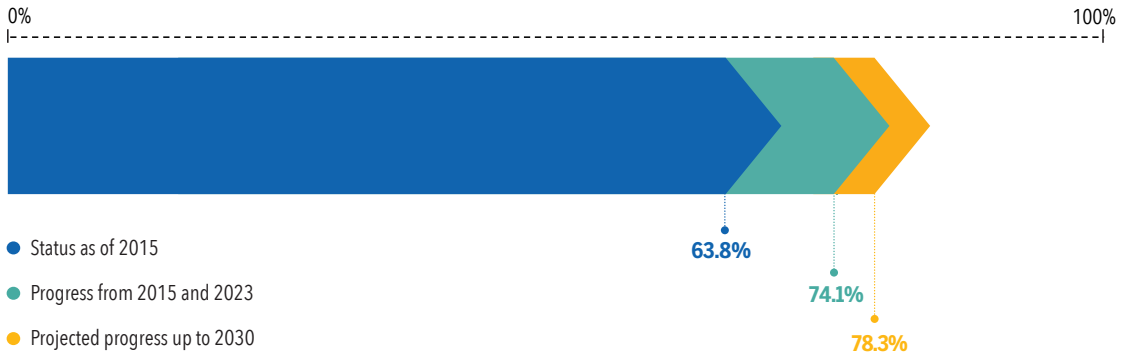
Note: The additional increases required to achieve universal access are calculated over the period 2023–30 and rounded to the nearest percentage point. The number displayed above each bar represents the count of countries.

Looking beyond the main indicators

In 2023, the global share of people relying primarily on clean cooking fuels reached 74 (70–77) percent. This represents a notable jump from just over 57 (53–61) percent in 2010. While the global progress over the last decade is considerable—lifting tens of millions of people annually out of reliance on polluting fuels—it masks the reality in smaller, less-developed countries, including LDCs, LLDCs, and SIDS, where adoption of clean cooking has stagnated. Most gains are heavily concentrated in a few populous countries (such as China, India, Indonesia, Nigeria, and Pakistan), while many smaller countries have seen only minimal improvements.

Urgent steps must be taken to close existing gaps, especially in areas with persistent deficits, if equitable access to clean cooking fuels and technologies is to be achieved by 2030 and beyond. Even with ongoing improvements, only about 78 (74–81) percent of the world's population is expected to have access by 2030, which means that around 22 (19–26) percent—which translates to approximately 1.8 (1.6–2.2) billion people—will not have access (figure 2.5).

FIGURE 2.5 • PROGRESS TOWARD UNIVERSAL ACCESS TO CLEAN COOKING, 2015-30



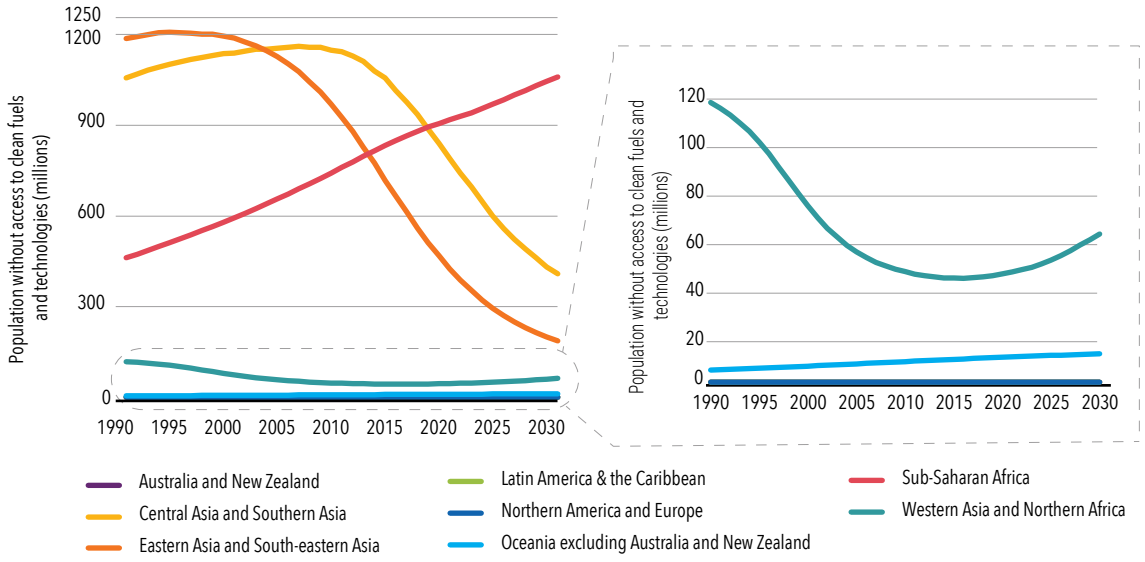
Source: WHO 2025.

The access deficit

Even as more people transition to clean cooking, some 2 billion still lack consistent access. Some regions—such as Eastern Asia, South-eastern Asia, and, more recently, Central Asia and Southern Asia—have made major strides and demonstrated how government-led programs, infrastructure investment, and economic growth can reduce deficits in a relatively short period. Conversely, in Sub-Saharan Africa, the convergence of rapid population growth, limited economic resources, and weak enforcement of energy policies continues to offset many local or national initiatives. This regional imbalance means that gains in some regions risk being offset by backsliding or stagnation in other parts of the world, jeopardizing overall progress toward SDG 7.

Despite substantial growth in some parts of the world, nearly 2.1 (1.9–2.5) billion people continue to cook primarily with polluting fuels, such as traditional biomass, charcoal, and kerosene. In Sub-Saharan Africa, the number of people lacking access continues to rise, potentially reaching 1 billion by 2030 if current trends persist and no action is taken (figure 2.6). Large national programs in several countries in Central Asia and Southern Asia have accelerated access in both urban and rural areas, although disparities persist within countries. Rapid urbanization and stable LPG and electricity supply in Eastern Asia and South-eastern Asia have driven a broad uptake of clean cooking in multiple countries.

FIGURE 2.6 • NUMBER OF PEOPLE WITHOUT ACCESS TO CLEAN FUELS AND TECHNOLOGIES, BY REGION, 1990-2030

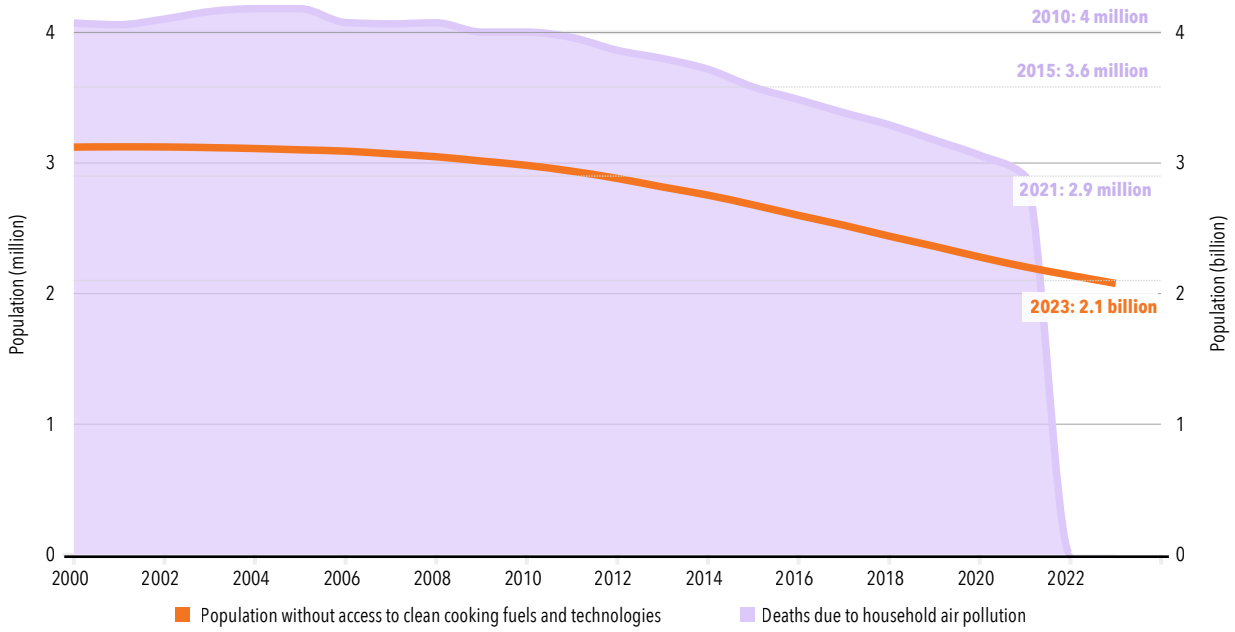


Source: WHO 2025.

While progress in clean cooking access continues, adoption and sustained use remain challenging, as households often engage in fuel and technology stacking—using multiple methods for cooking, heating, and lighting rather than switching entirely to a single clean option. This behavior is widespread and not inherently negative, occurring in both LMIC and high-income contexts. However, cost fluctuations and irregular fuel supply can lead to reliance on more polluting options within the stack, limiting the effectiveness of clean cooking solutions in reducing household air pollution. Supporting households transition toward the cleanest possible stack is essential to fully realize the associated benefits for health, social equality, gender equity, and climate change mitigation.

In an effort to measure the impact of household air pollution, the World Health Organization (WHO) estimated that, in 2021, household air pollution was linked to an estimated 2.9 million yearly deaths (figure 2.7), including more than 329,000 among children under the age of five (WHO 2025). When examining trends in deaths from household air pollution and the number of people relying on clean cooking fuels and technologies, we observe a steady decline in mortality over the past decade. However, as illustrated in the figure, many people continue to face serious health risks. In 2023, of the 2.1 (1.9–2.5) billion people who still lacked access to clean cooking, many were likely exposed to toxic cooking smoke. This exposure contributes to millions of premature deaths each year, particularly among women and children.

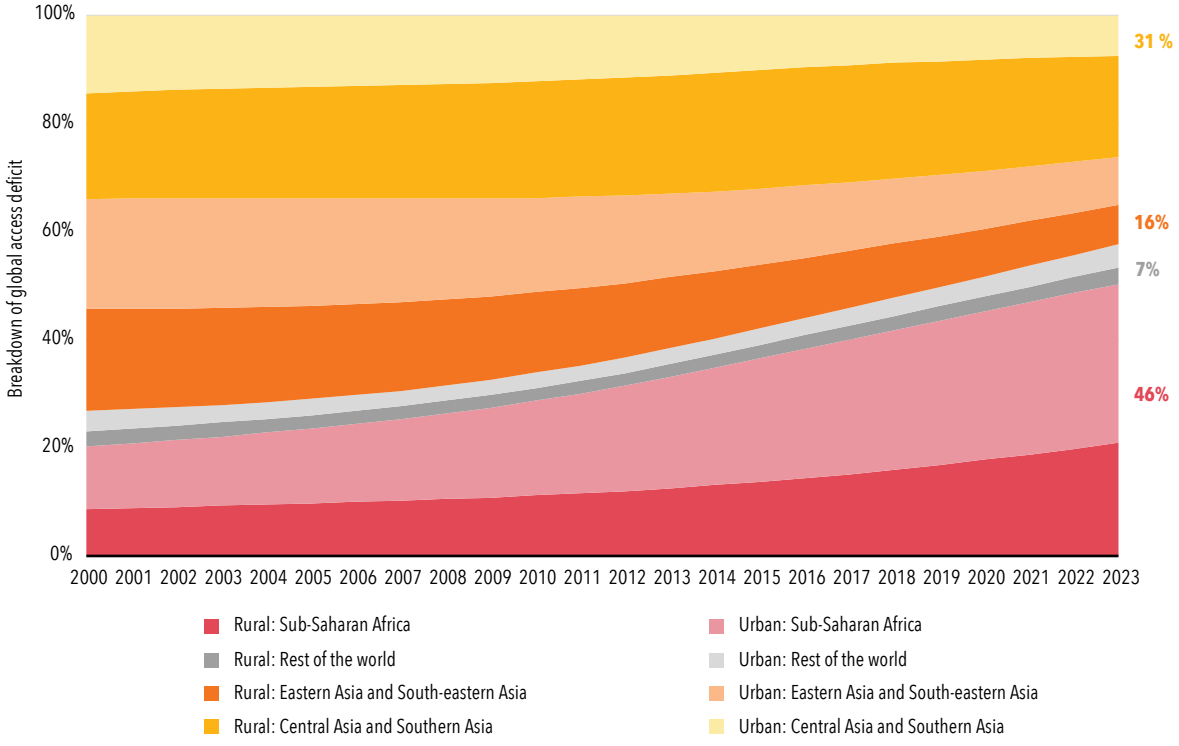
FIGURE 2.7 • TRENDLINE OF ESTIMATED DEATHS FROM HOUSEHOLD AIR POLLUTION, 2000–21; AND PEOPLE LACKING ACCESS TO CLEAN COOKING FUELS AND TECHNOLOGIES, 2000–23



Source: WHO 2025.

Figure 2.8 highlights how the regional makeup of people without access to clean cooking shifted from 2000 to 2023. In 2000, 40 percent were in Central and Southern Asia, 40 percent in Eastern Asia and South-eastern Asia, and 20 percent in Sub-Saharan Africa. By 2023, half of the global population without access lived in Sub-Saharan Africa, reflecting marked declines in the Asian deficits but a significant increase in the Sub-Saharan Africa region. If this pattern continues, nearly 60 percent of people lacking access will be found in Sub-Saharan Africa by 2030. Achieving progress in these settings requires calibrating efforts to local conditions, including levels of economic development, infrastructure, and the availability of clean household energy sources to ensure that solutions are both appropriate and sustainable.

FIGURE 2.8 • PROPORTION OF THE TOTAL GLOBAL ACCESS DEFICIT IN THE THREE LARGEST ACCESS-DEFICIT REGIONS AND THE REST OF THE WORLD, 2000–23



Source: WHO 2025.

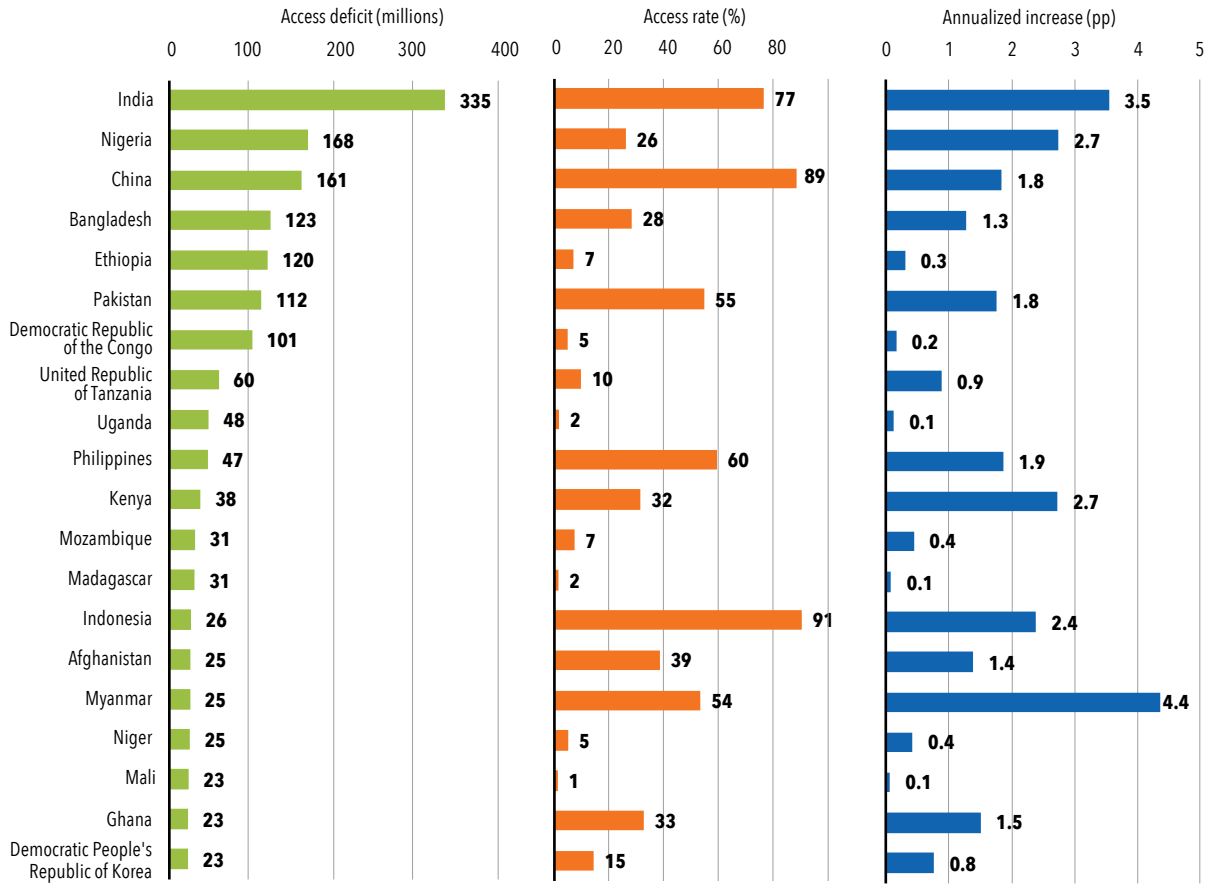
The top 20 access-deficit countries

Access deficit is an indicator that measures the total (absolute) number of people who rely primarily on polluting fuels and technologies to do their cooking. These populations are bearing the harmful health and socioeconomic consequences of such fuels and technologies.

Over the past decade the number of people lacking access declined from 2.8 (2.4–3.1) billion in 2014 to 2.1 (1.8–2.4) billion in 2023. Just 20 countries account for 70 percent of the global access deficit in absolute numbers, with most of them in Sub-Saharan Africa and the remainder scattered across Asia (figure 2.9).

In eight of these countries, all of them LDCs housing large numbers of displaced populations, fewer than 10 percent of households use clean fuels, reflecting severe infrastructure gaps that exacerbate socioeconomic effects and heighten the vulnerabilities of these populations. These countries are the Democratic Republic of the Congo, Ethiopia, Madagascar, Mali, Mozambique, Niger, Uganda, and the United Republic of Tanzania. Moreover, 14 of the top 20 show access rates below 50 percent, and only one—Indonesia—exceeds 90 percent, despite being the country with the 14th-highest access deficit by absolute population. India continues to have the largest absolute population without access, yet both India and Myanmar have recorded some of the most significant gains in overall clean cooking coverage over the past five years, with annualized increases of 4 and 5 percentage points, respectively.

FIGURE 2.9 • THE 20 COUNTRIES WITH THE LARGEST ACCESS DEFICIT BY ABSOLUTE POPULATION (BLUE), ACCESS RATE (ORANGE), AND ANNUALIZED INCREASE IN ACCESS (GREEN), BASED ON THE 2018–23 AVERAGE



Source: WHO 2025.

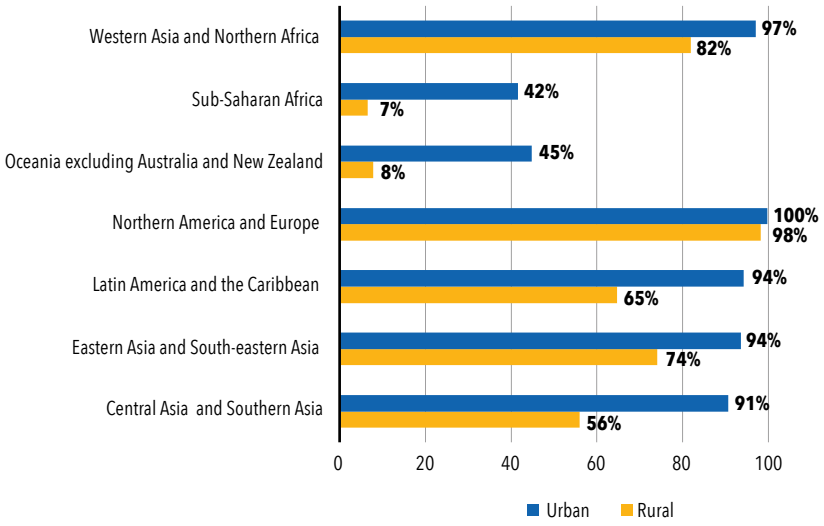
pp = percentage point.

The urban-rural divide

In 2023, 89 (85–90) percent of people in urban areas worldwide had access to clean cooking, compared with 55 (50–60) percent in rural areas (figure 2.10).

While incremental progress in rural areas has helped narrow the urban-rural gap since 2010, the difference in absolute numbers remains significant. An estimated 1.5 (1.4–1.7) billion people residing in rural areas still lack access to clean cooking, compared with 529 (455–675) million urban residents. Reducing inequalities requires decentralized approaches—for example, small LPG depots, household biogas plants, mini-grids that facilitate electric cooking, and financing models that accommodate variable incomes and vulnerability. Such strategies can help remove the barriers that leave rural communities spending time collecting fuel and urban communities that often rely on expensive, inefficient charcoal.

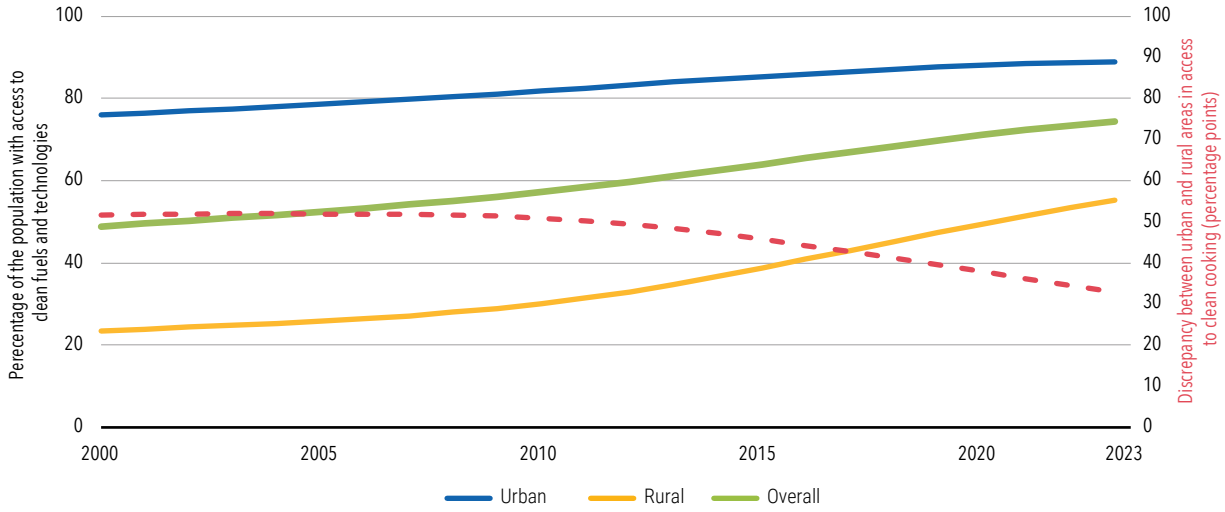
FIGURE 2.10 • POPULATION WITH ACCESS TO CLEAN FUELS AND TECHNOLOGIES FOR COOKING BY REGION (PERCENT)



Source: WHO 2025.

Urban households adopt clean cooking fuels and technologies at a higher rate than rural households, likely because of stronger infrastructure (such as roads), more reliable energy supplies, and higher incomes. Over the last decade, urban clean cooking coverage edged up from 84 (81–87) percent to 89 (85–90) percent, whereas coverage in rural areas jumped from 37 (33–41) percent to 55 (50–60) percent. The past five years have seen a significant shrinkage in the access gap between urban and rural areas, changing from 40 percentage points in 2019, to 33 in 2023, as shown in figure 2.11.

FIGURE 2.11 • PERCENTAGE OF PEOPLE WITH ACCESS TO CLEAN COOKING IN URBAN AREAS, RURAL AREAS, AND OVERALL (SOLID LINES), AND DISCREPANCY IN ACCESS BETWEEN URBAN AND RURAL AREAS (DASHED LINE), 2000–23



Source: WHO 2025.

Across most LMICs, urban households are more likely to own gas stoves and electric appliances, and to have more reliable access to fuels such as LPG. Even so, not all urban households benefit from these advances; low-income urban neighborhoods can struggle with unpredictable pricing or limited supply and distribution of specific cooking fuels.

In the meantime, rural communities, especially in Sub-Saharan Africa (where only 7 [5–8] percent of the population has access to clean cooking fuels and technologies), face even more formidable challenges: they often lack the infrastructure and market base for large-scale fuel distribution, and the installation costs of clean cooking technologies (e.g., stoves and appliances) remain prohibitive for many low-income households and other vulnerable populations such as refugees and internally displaced people.

Additionally, LDCs, LLDCs, and SIDS present a notable example of urban-rural inequality. In these country groups, urban residents are two to four times more likely to use clean cooking fuels and technologies than those in rural areas. In LDCs, just 10 (8–13) percent of the rural population uses clean cooking fuels and technologies, while that number rises to 40 (36–44) percent in urban areas—four times higher. In LLDCs, clean cooking access in urban areas—at 53 (45–57) percent—is more than triple that in rural areas (15 [12–18] percent). In SIDS, the share of urban residents relying on clean cooking fuels (76 [72–80] percent) is twice that of rural residents (35 [30–42] percent).

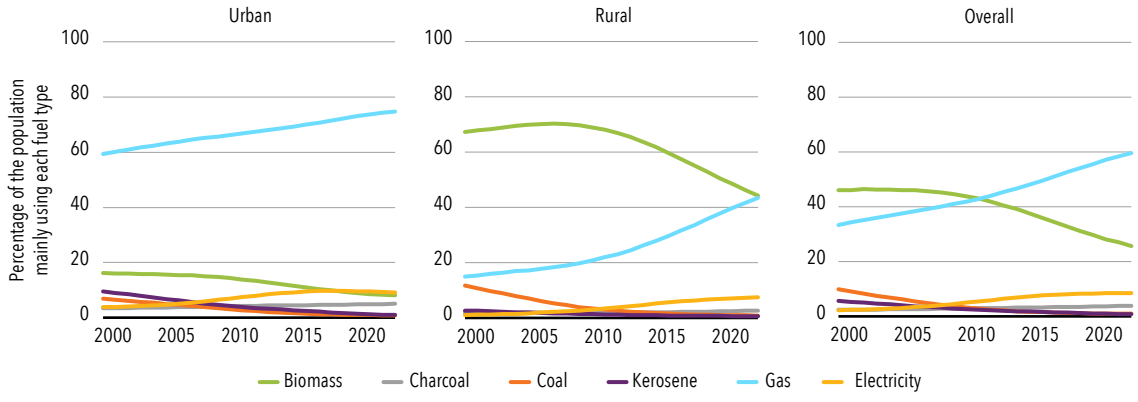
Changes in the fuel mix

A detailed look at fuels and technologies used in LMICs in 2023 shows that gaseous fuels—LPG, natural gas, and biogas—remained the primary energy source for 60 (54–66) percent of the population, accounting for nearly 4 billion people overall.

Although gaseous fuels command center stage overall (figure 2.12), biomass (wood, dung, agricultural waste) and charcoal remain highly prevalent in rural areas, where supply chains are more fragile. In 2023, biomass remained the primary cooking fuel for almost half of the population living in rural areas: 44 (39–49) percent; or 1.4 billion people, slightly exceeding gas (44 [38–49] percent).

With the use of unprocessed biomass declining in both urban and rural areas, the share of households using charcoal is growing, particularly in urban areas of Sub-Saharan Africa, where 30 (26–34) percent, or nearly 157 million people, depended on charcoal in 2023. A similar share of urban residents in the region used gaseous fuels (30 [26–35] percent), while 24 (21–28) percent continue to rely on biomass.

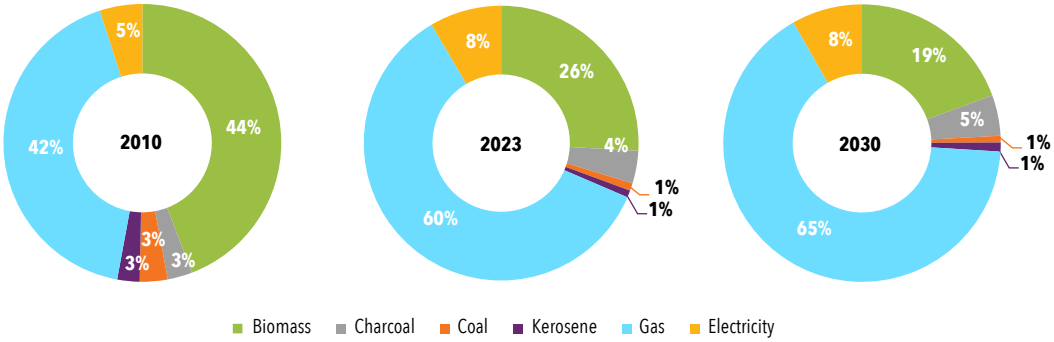
FIGURE 2.12 • PERCENTAGE OF PEOPLE IN LOW- AND MIDDLE-INCOME COUNTRIES RELYING PRIMARILY ON EACH TYPE OF COOKING FUEL: URBAN, RURAL, AND OVERALL



Source: WHO 2025.

Globally, electricity was the main fuel for 8 (6–12) percent of people (nearly 560 million), with little variation between urban (9 [6–14] percent) and rural (7 [4–12] percent) areas (figure 2.13). However, its use remained lowest in rural areas of Central and Southern Asia, where it accounted for less than 1 (0.5–2) percent of primary cooking fuels. Meanwhile, coal and kerosene use declined significantly, representing less than 1 percent of global primary cooking fuels in 2023, with 0.5–1.8 percent (58 million people) using coal and 0.4–1.8 percent (54 million people) using kerosene.

FIGURE 2.13 • COMPARISON OF THE PERCENTAGES OF PEOPLE IN LOW- AND MIDDLE-INCOME COUNTRIES USING VARIOUS FUEL TYPES IN 2010 AND 2023, WITH PROJECTIONS FOR 2030



Source: WHO 2025.

These evolving fuel trends highlight the need for cohesive policies and complementary measures. Expanding access to clean cooking fuels and technologies requires more than just stove distribution; it must be accompanied by a reliable fuel supply, public communication, user-centered solutions to stimulate demand and support adoption and sustained use, and complementary policies focusing on affordability. Approaches should also consider sociocultural contexts, job creation along the energy value chain, and the role of women as critical agents of change. Without such integrated efforts, clean cooking solutions may go underused, with families reverting to wood or charcoal.

Box 2.1 offers a closer look at the association between wealth and access to clean cooking fuels and technologies.

BOX 2.1 • COUNTRY AND REGIONAL DISPARITIES THROUGH THE LENS OF WEALTH

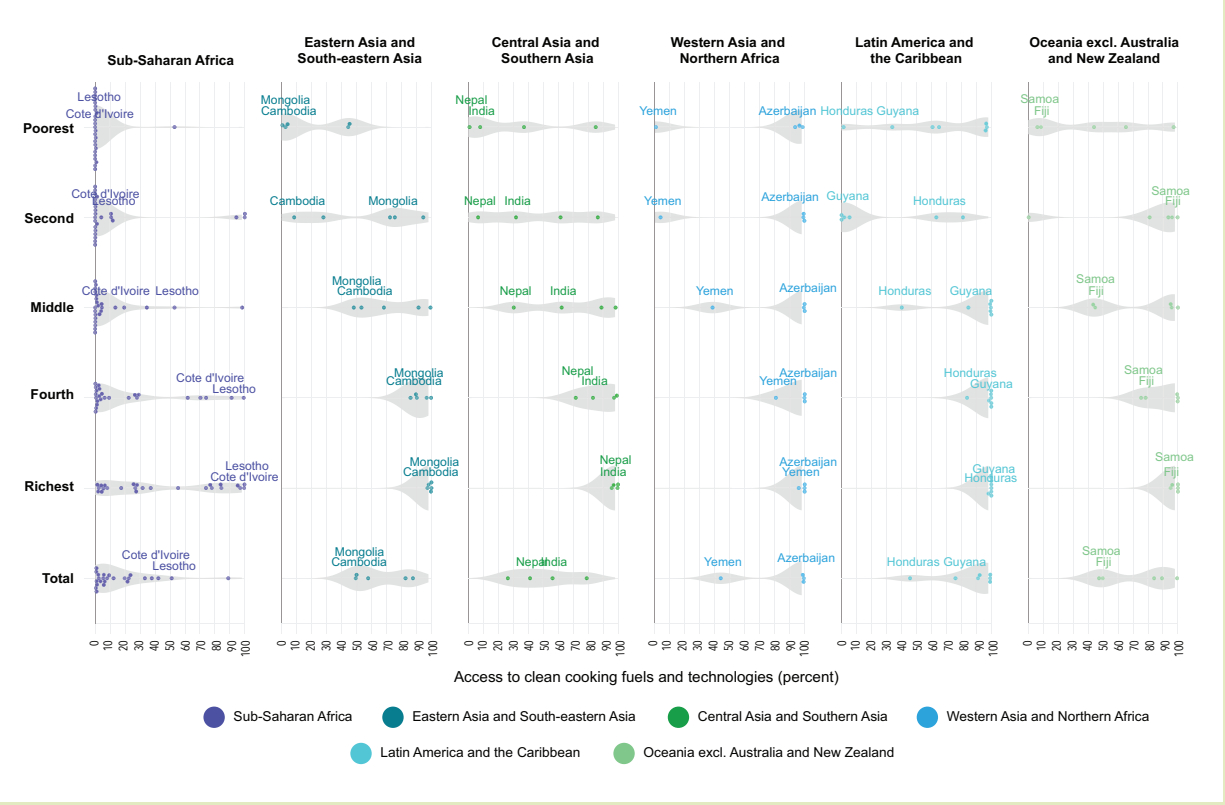
Disaggregating clean cooking data by wealth is vital for revealing economic barriers, devising equitable policies, and ensuring that improvements in energy access benefit every segment of society.

Examining data from two major household surveys—Demographic and Health Surveys (DHS) and the Multiple Indicator Cluster Survey (MICS)—disaggregated by wealth quintile and conducted recently (since 2018), sheds light on patterns across 51 LMICs and uncovers disparities and equity dimensions, revealing the patterns of potential impacts of wealth on access to clean cooking solutions, affordability more generally, and health outcomes.

The survey data reveal a clear positive association between wealth and access to clean cooking fuels and technologies (figure B2.1.1). In almost all countries represented, households in the richest wealth quintile consistently exhibit much greater access than those in the poorest quintile. This trend indicates that economic resources play a crucial role in determining the ability to adopt cleaner energy solutions, likely reflecting differences in infrastructure, affordability, and perhaps, policy focus on energy access.

BOX 2.1 • COUNTRY AND REGIONAL DISPARITIES THROUGH THE LENS OF WEALTH *(cont.)*

FIGURE B2.1.1 • COUNTRY ACCESS TO CLEAN COOKING FUELS AND TECHNOLOGIES, BY WEALTH QUINTILE AND REGION



Source: Data extracted from DHS and MICS.

Note: The figure presents country-level data, where each dot represents a single country value for each wealth quintile within a region. Grey-shaded areas indicate the distribution of all values. Two countries with the highest disparities (measured as the ratio of the richest to the poorest wealth quintile) in each region are labeled.

In Sub-Saharan Africa, the disparities in access to clean cooking fuels are often extreme. For example, in Kenya, the difference is pronounced, with poorer quintiles (poorest and second) showing less than 1 percent access and the wealthiest reaching 84 percent. Other countries in the region exhibit comparable patterns. In Lesotho and Côte d'Ivoire, the poorest quintile has access lower than 1 percent, while the richest can achieve access levels exceeding 90 percent, again indicating a significant disparity.

These examples from Sub-Saharan Africa underscore the urgent need for policies that address both economic and infrastructural barriers if inequities in access to clean cooking technology are to be reduced. Such policies should also consider context-specific barriers to the clean cooking transition and promote actions and investments in appropriate fuels and technologies suited to local needs.

Conversely, in the Western Asia and Northern Africa region, countries such as Jordan exhibit a more moderate wealth gradient. In Jordan, even the poorest households enjoy high access levels (above 98 percent), with the richest households showing only a modest increase over the rest of the wealth quintiles. This suggests that regional policies, infrastructure investments, and broader economic factors contribute to more uniform access to clean cooking fuels and technologies, reducing the disparity between wealth groups.

Policy insights

Clean cooking and its role in health and gender equality

Achieving universal access to clean cooking remains a critical challenge with profound implications for public health and gender equality, two SDGs to be reviewed at the High-Level Political Forum in 2025. While the proportion of the global population with access to clean cooking has steadily increased over the past few decades, progress remains insufficient. Our estimates indicate that by 2030, approximately 1.8 (1.6–2.2) billion people—most of whom live in Sub-Saharan Africa—will still be cooking with polluting fuels and technologies unless more ambitious actions are taken.

The health impacts of household air pollution from burning polluting fuels such as wood, charcoal, and agricultural residues are well documented. In 2021, exposure to household air pollution was estimated to contribute to 2.9 million premature deaths annually, including over 329,000 deaths of children under the age of five (WHO 2025). Long-term exposure to fine particulate matter (i.e., $PM2.5$[9]) emitted from inefficient combustion of these fuels is linked to noncommunicable diseases, such as stroke, ischemic heart disease, chronic obstructive pulmonary disease, and lung cancer. In children under five, exposure to household air pollution is responsible for nearly half of all pneumonia deaths. The burden of disease due to household air pollution is particularly high in rural and low-income communities, as well as among displaced populations such as refugees and internally displaced persons, where access to clean cooking alternatives is limited by economic constraints, inadequate infrastructure, and poor policy implementation.

Beyond health, the lack of access to clean cooking also poses a barrier to gender equality. In many communities, women and girls bear most of the responsibility for household cooking and fuel collection. They spend hours each day gathering wood, charcoal, or dung—time that could otherwise be spent on education, income-generating activities, or personal well-being. This burden frequently extends to children, particularly girls, who may miss school to assist with fuel collection or care for ill family members suffering from exposure to household air pollution. The burden of fuel collection over long distances also exposes women and girls to risks of physical injury and gender-based violence. These risks can be even greater in settings marked by fragility or displacement, where basic protections are limited and it may not be safe to move about freely. Cooking with biomass takes significantly longer, including time spent tending the fire. One study estimated the extra time needed for collecting and cooking with biomass at 650 hours per year per household (Troncoso and others, 2025, under review).[10] These two extra hours per day could make the difference for women's and girls' opportunities and quality of life. When children are involved, these lost hours can also limit their educational progress and long-term development, further reinforcing cycles of poverty and inequality.

Achieving universal access to clean cooking requires strong and inclusive policies, sustained financial commitments, and solutions that consider both health and gender equality. Governments need to make clean cooking affordable by providing subsidies, grants, and accessible credit programs, ensuring that these solutions are not only available but also financially feasible for low-income households. Women's participation in clean cooking businesses—from stove distribution to fuel supply chains—can create sustainable economic opportunities while driving wider adoption of clean cooking fuels and technologies. Inclusive approaches should also extend to vulnerable populations in humanitarian and fragile settings, where tailored solutions are needed to close persistent gaps in access to energy. Beyond national efforts, stronger global cooperation and expanded financing (made available through a wider range of mechanisms) are essential to accelerate progress. International climate finance, such as carbon markets and development aid, can

9 Fine particulate matter with a diameter of 2.5 micrometers or less.

10 For other estimates, see Jeuland, Tan Soo, and Shindell (2018); Das and others (2025); and Krishnapriva and others (2021).

be leveraged to scale up clean cooking initiatives, recognizing their far-reaching benefits for health, gender, equity, and climate mitigation.

Ensuring clean energy at home: Cooking, heating, and lighting

While clean cooking has been a major focus of the energy transition in many countries, other household uses of energy—notably heating and lighting—also play significant roles in health and climate outcomes. In many parts of the world, especially in cold-climate regions, inefficient heating systems that rely on coal, wood, or other solid fuels contribute to both household and ambient air pollution, increasing health risks and climate emissions (box 2.2). Many communities, particularly in Eastern Europe, Central and Eastern Asia, and parts of Northern America, still rely on polluting heating fuels, resulting in severe wintertime air pollution. In other parts of Europe, biomass heating has made a comeback, partly owing to subsidies for wood stoves and a growing trend for stoves and open fires—even in some big cities. To maximize health and climate co-benefits, policy makers must take an integrated approach to household energy transitions, addressing all forms of energy use.

BOX 2.2 • GLOBAL AND REGIONAL ESTIMATES FOR POLLUTING HEATING

Unlike household cooking, for which data over the past few decades is well documented, global and regional estimates for polluting heating have been lacking. The World Health Organization has now developed the first estimates of populations primarily using heating technologies producing high carbon emissions.

Using the WHO Global Household Energy Database and a custom statistical model, estimates were generated for the proportion and number of people relying on high-emission and low- to medium-emission heating at the global, regional, and national levels. High-emission fuels and technologies are defined as heaters/stoves burning solid fuels (including all types of wood), kerosene/paraffin, or gasoline/diesel. Low- to medium-emission fuels and technologies, by contrast, include all central heating systems, boilers, heat pumps, heat recovery systems, and stoves/heaters using electricity or gaseous or liquid fuels that meet WHO guidelines.

In 2022, an estimated 26 percent of the world's population (1.8 billion) relied primarily on high-emission heating, while 33 percent (2.5 billion) relied on low- to medium-emission fuels. The remaining 41 percent (3.1 billion) had no household heating. Although the global share of the population using high-emission heating had declined slightly from 2000, population growth offset this progress, resulting in stagnant or rising absolute numbers. Rural populations remained more reliant on high-emission heating, with 39 percent using it in 2022, compared with just 15 percent in urban areas.

The overlap between polluting cooking and high-emission heating has not yet been quantified at the household level. However, combining WHO's new heating estimates with cooking data suggests that at least 3.1 billion people relied on polluting household energy in 2022, with an upper estimate of 3.7 billion. While reliance on polluting cooking has been steadily declining, high-emission heating is on the rise. Sub-Saharan Africa has the highest reliance on polluting cooking; however, 72 percent of its population uses no household heating at all. In contrast, the number of people using high-emission heating in Eastern and South-eastern Asia nearly doubled between 2000 and 2022, despite significant transitions to clean cooking. High-income countries, where clean cooking is nearly universal, still face significant challenges with polluting heating.

Expanding tracking mechanisms to include heating is essential for accelerating the transition to clean household energy and reducing health and environmental risks.

Urgent policy and investment actions to accelerate the transition to clean household energy

With just five years left to achieve universal access to clean cooking under SDG 7, urgent action is needed to rapidly scale up investments, strengthen policies, and integrate clean household energy into national development strategies. Governments, international organizations, and other key stakeholders must significantly increase investments in clean household energy infrastructure and technologies, ensuring that solutions are widely accessible, affordable, and tailored to specific regional and local energy needs. Financing strategies can play a key role in supporting these efforts through greater public and private investment and international financial support where appropriate. Policies and actions must balance immediate health needs with longer-term environmental and climate goals.

A just and inclusive transition is essential, especially for women and girls, who disproportionately bear the burden of household air pollution. Their active involvement in decision-making and the implementation of clean energy solutions is crucial. Moreover, rural and low-income households—as well as refugees, internally displaced persons, and those living in fragile settings—must be prioritized to prevent further deepening of energy poverty. High-income countries, in addition to supporting global efforts, should also prioritize their own transitions to sustainable household energy—phasing down fossil-fuel-based cooking and heating systems through electrification, energy efficiency, and renewables-based solutions that align with net-zero targets.

Policy makers should also enhance public awareness and invest in user-centered approaches that promote the adoption and sustained use of clean cooking, heating, and lighting, helping households recognize the wide-ranging health, social, and economic benefits. The health sector can play a significant role in driving such change. Clean household energy is as much a health intervention as it is an energy solution. Health ministries and health-care workers, including clinical and public health professionals, must be equipped to recognize and communicate the health risks of household air pollution and prescribe clean household energy solutions. By identifying and promoting effective policy and intervention options to communities, the health sector can drive greater public awareness and demand for clean air at home and clean household energy solutions.

Beyond clean cooking, ensuring clean household energy access for heating and lighting is equally critical. Without addressing all forms of household energy use, millions will remain exposed to harmful pollutants, undermining progress in health, gender equality, and climate mitigation. This is particularly true for people in settings characterized by conflict and displacement, where energy access is often overlooked but urgently needed for safety and well-being.

The next five years will be pivotal. Governments must act decisively to increase investments, implement transformative policies, facilitate access to a range of financing options, and strengthen cross-sector collaboration to accelerate the clean household energy transition. The success of SDG 7 will not only determine energy access for billions but will also have lasting implications for global health, gender equality, child development, and climate resilience.