

# National spending on health by source for 184 countries between 2013 and 2040



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## Summary

**Background** A general consensus exists that as a country develops economically, health spending per capita rises and the share of that spending that is prepaid through government or private mechanisms also rises. However, the speed and magnitude of these changes vary substantially across countries, even at similar levels of development. In this study, we use past trends and relationships to estimate future health spending, disaggregated by the source of those funds, to identify the financing trajectories that are likely to occur if current policies and trajectories evolve as expected.

**Methods** We extracted data from WHO's Health Spending Observatory and the Institute for Health Metrics and Evaluation's *Financing Global Health 2015* report. We converted these data to a common purchasing power-adjusted and inflation-adjusted currency. We used a series of ensemble models and observed empirical norms to estimate future government out-of-pocket private prepaid health spending and development assistance for health. We aggregated each country's estimates to generate total health spending from 2013 to 2040 for 184 countries. We compared these estimates with each other and internationally recognised benchmarks.

**Findings** Global spending on health is expected to increase from US\$7·83 trillion in 2013 to \$18·28 (uncertainty interval 14·42–22·24) trillion in 2040 (in 2010 purchasing power parity-adjusted dollars). We expect per-capita health spending to increase annually by 2·7% (1·9–3·4) in high-income countries, 3·4% (2·4–4·2) in upper-middle-income countries, 3·0% (2·3–3·6) in lower-middle-income countries, and 2·4% (1·6–3·1) in low-income countries. Given the gaps in current health spending, these rates provide no evidence of increasing parity in health spending. In 1995 and 2015, low-income countries spent \$0·03 for every dollar spent in high-income countries, even after adjusting for purchasing power, and the same is projected for 2040. Most importantly, health spending in many low-income countries is expected to remain low. Estimates suggest that, by 2040, only one (3%) of 34 low-income countries and 36 (37%) of 98 middle-income countries will reach the Chatham House goal of 5% of gross domestic product consisting of government health spending.

**Interpretation** Despite remarkable health gains, past health financing trends and relationships suggest that many low-income and lower-middle-income countries will not meet internationally set health spending targets and that spending gaps between low-income and high-income countries are unlikely to narrow unless substantive policy interventions occur. Although gains in health system efficiency can be used to make progress, current trends suggest that meaningful increases in health system resources will require concerted action.

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## Introduction

Substantial health gains have been achieved over the last several decades. This progress has been used to argue that a grand convergence in health could be reached within a generation.<sup>1</sup> This term has been defined to mean that infectious diseases and reproductive and maternal mortality for all countries could reach the level set by a group of middle-income countries. Although estimates for the necessary investment in low-income and middle-income countries exist, little is known about the availability of resources to achieve this grand convergence in health. What is clear is that even when financial support from abroad is included, the countries that need the largest health advances are precisely those spending the least on health.<sup>2</sup> Underpinned by high child mortality and low life expectancy, spending on health amounted to just US\$24 per capita in 2013 in the Democratic Republic of the Congo and

\$26 in the Central African Republic (in 2010 purchasing power parity-adjusted dollars), for example.<sup>3,4</sup>

Existing literature suggests that gains in national income lead to increased health spending and that an increased amount of that expenditure is prepaid through government and private financing mechanisms.<sup>5</sup> This observation is known as the health financing transition. However, the speed and magnitude of these changes varies substantially across countries, even at similar levels of development. Although two international organisations produce long-range government health spending estimates, no long-range estimates for total or private health spending for all countries are available.<sup>6,7</sup>

The objective of this research was to fill this gap and estimate spending on health on the basis of past trends and relationships by source, for 184 countries, between 2013 and 2040. We used these estimates to measure

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### Research in context

#### Evidence before this study

Substantial effort by researchers and government agencies has been dedicated to estimation of future health spending. Forecasting inputs and methods vary dramatically from country to country, and study to study. These studies tend to focus on a single country or small set of countries. On Jan 8, 2016, and April 4, 2016, we searched Google, Google Scholar, and MEDLINE for articles published in English with the search terms “health expenditure” and “health spending forecast”. The two endeavours that focus on a broad set of countries are led by the Organisation for Economic Co-operation and Development and the International Monetary Fund. The Organisation for Economic Co-operation and Development has estimated government spending on health and total spending on long-term care in high-income countries and four major middle-income countries up to 2060. The International Monetary Fund has estimated the annual percentage change in government health spending for all countries up to 2020. Both assess only government spending, report spending estimates only as a share of gross domestic product, and do not provide uncertainty intervals.

#### Added value of this study

This is the first study to estimate total health spending for a large set of countries. We estimate health spending for 184 countries from 2013 to 2040. We disaggregate our estimates by source, providing annual estimates for government health spending, prepaid private health spending, out-of-pocket health spending, and development assistance for health received, for each country. One important contribution

of this study is that these four sources of health spending can be combined to measure total health spending. Previous studies focused on government health spending, excluding private spending and development assistance, which are crucial means to finance health spending for many countries, particularly low-income and middle-income countries. We report annual estimates as a share of gross domestic product and in purchasing power-adjusted, inflation-adjusted dollars, so that we can compare against notable health spending benchmarks. Furthermore, we compare the amount of health spending across income classifications and regions, assess progress in the health financing transition, and measure health financing inequality.

#### Implications of all the available evidence

This research highlights the persistence of health financing gaps and continued reliance on out-of-pocket health spending in some countries into the future. Even in 2040, 111 (60%) of the 184 countries are not meeting an international health financing target that 5% of gross domestic product be government health spending. Additionally, this research highlights global health spending inequality. These estimates indicate where change is most needed to bend health financing trajectories. In many cases, these countries are the world's poorest, with the largest disease burdens. This research emphasises that policy makers and global leaders need to work together to assess where more resources can be raised for health than at present and where existing resources can be squeezed to ensure essential health services are affordable for those most in need.

progress towards international financing goals and assess if a health financing convergence will occur, which we take pragmatically to be a narrowing of the gap in per-capita spending between low-income and high-income countries.

## Methods

### Data

We extracted health financing data from WHO's Global Health Observatory<sup>3</sup> and the Institute for Health Metrics and Evaluation (IHME)'s *Financing Global Health 2015* report.<sup>8,9</sup> The intersection of these two data sources is 184 countries from 1995 to 2013. WHO spending estimates by source are updated annually and draw on a diverse set of data from countries and international organisations. We adjusted these data by converting them into 2010 purchasing power parity-adjusted dollars. For these 184 countries, missingness ranged from 1.2% in government health spending data to 26.1% in prepaid private spending. We completed the series using multiple imputation. We took exchange and deflator rates from the International Monetary Fund's *World Economic Outlook*<sup>10</sup> and completed imputation in R using *Amelia* (version 1.74).<sup>11</sup>

As defined by the WHO and IHME databases, health spending is spending that has the primary purpose to maintain or improve health. This spending includes, for example, provision of preventive, curative, and palliative medicine, but not expenses related to water and sanitation, humanitarian aid, or distal health determinants. Using the WHO and IHME data, we identified and tracked health spending for four mutually exclusive and collectively exhaustive sources: government (resources originating domestically only), prepaid private (including private insurance), out of pocket, and development assistance for health (DAH; external funding). These series are constructed by removing from WHO's government and private spending estimates the portions that are provided from external sources as DAH.

Additional data used for this research were national population estimates provided by the UN and gross domestic product (GDP) up to and including 2040, produced by the IHME.<sup>9,12,13</sup> We considered other forecasts of GDP, but a comprehensive set of estimates did not extend beyond 2020.<sup>10</sup> Finally, we developed an indicator of sociodemographic development, also estimated between 2013 and 2040, using principal components

analysis of the total fertility rate, mean age, mean years of education, and lag-distributed income, all covariates from IHME's Global Burden of Disease (GBD) 2013 study.<sup>14</sup> Detailed information about these data and the methods used are provided in the appendix.

### Government, prepaid private, and out-of-pocket health spending between 2013 and 2040

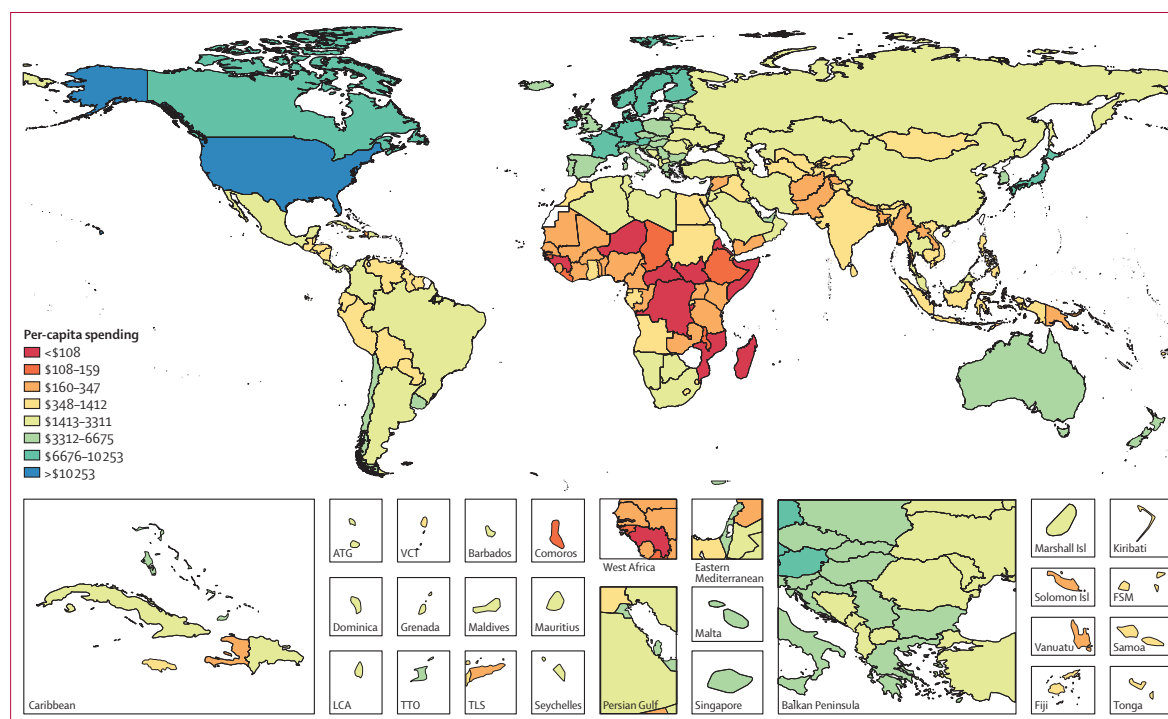
We assessed, measured, and extrapolated time trends among and relationships between economic development, demographic transition, and health financing indicators to estimate health spending by source between 2013 and 2040. Other health spending estimates made for high-income countries rely on additional covariates, such as variables measuring consumer behaviour, treatment practices, prices and productivity, health system organisation, and technological progress.<sup>15</sup> These drivers of health spending were not accounted for explicitly in our model but were included as unexplained health spending change. To include these factors, we estimated the country-specific distribution of unexplained changes (residuals). For each model, country, and year, we randomly drew from the country-specific distribution of unexplained changes and added this draw to the estimate.

We modelled government, prepaid private, and out-of-pocket health spending measured for each country as a share of the country's GDP. This transformation is common for those projecting health spending.<sup>6,16</sup>

Because preliminary analyses showed that estimates were dependent on model specification, we used an ensemble modelling approach. Ensemble models are increasingly considered a valuable method for prediction as they guard against the flaws of one particular model.<sup>17–22</sup> Our approach was to consider an expansive set of potential models. These models include dependent and independent variables that are year-over-year differences in addition to non-differenced variables. Additionally, the 1 year lag of each estimated value is included as a potential predictor of the other health financing variables being estimated. We also considered country-specific fixed and random intercepts.

We estimated and assessed all viable combinations of these models against three inclusion criteria. First, all covariates needed to be statistically significant ( $\alpha=0.1$ ) to be included. Second, no parameter estimates could contradict known health financing relationships. For example, a positive relationship between government spending and GDP was required. Third, we excluded models that fell outside the bounds of growth observed in the underlying data (1995–2013). For example, a country with government health spending equal to 3.0% of the GDP could not have more than a 24.7% increase or 24.4% decrease in spending over a single year. These bounds are constructed on the basis of the level of spending and observed patterns in the data. Bounds are source specific and are explained more fully

See Online for appendix



**Figure 1: Total projected health spending per capita in 2040**

ATG=Antigua and Barbuda. Isl=islands. FSM=Federated States of Micronesia. LCA=Saint Lucia. TLS=Timor-Leste. TTO=Trinidad and Tobago. VCT=Saint Vincent and the Grenadines.

|  | THE per capita (US\$) | Domestic GHE per THE (%) | Prepaid per THE (%) | OOP per THE (%)   | DAH per THE (%)   | 2013–40 growth in THE per capita (%) |
|--|-----------------------|--------------------------|---------------------|-------------------|-------------------|--------------------------------------|
| <b>Global</b>                                    |                       |                          |                     |                   |                   |                                      |
| Global   | 2167 (1707–2636)      | 66.5% (55.0–78.5)        | 12.0% (7.0–16.7)    | 20.6% (18.4–23.3) | 0.9% (0.3–2.9)    | 2.4% (1.6–3.1)                       |
| <b>Income group</b>                              |                       |                          |                     |                   |                   |                                      |
| High income                                      | 9019 (7165–10949)     | 56.9% (48.0–65.9)        | 30.4% (19.9–41.6)   | 12.6% (11.5–14.0) | 0                 | 2.7% (1.9–3.4)                       |
| Upper-middle income                              | 1935 (1482–2400)      | 56.4% (44.4–68.7)        | 16.5% (8.9–23.3)    | 27.0% (23.3–31.7) | 0.1% (0.0–0.3)    | 3.4% (2.4–4.2)                       |
| Lower-middle income                              | 507 (413–590)         | 36.6% (29.9–42.2)        | 13.2% (6.9–17.5)    | 49.0% (44.1–54.4) | 1.2% (0.5–2.2)    | 3.0% (2.3–3.6)                       |
| Low income                                       | 164 (131–202)         | 31.2% (25.7–37.2)        | 7.4% (4.0–10.4)     | 49.7% (44.7–55.0) | 11.7% (5.9–20.7)  | 2.4% (1.6–3.1)                       |
| <b>Global Burden of Disease super region</b>     |                       |                          |                     |                   |                   |                                      |
| High income                                      | 10 055 (7986–12 193)  | 56.7% (48.1–65.3)        | 31.9% (20.9–43.4)   | 11.4% (10.5–12.5) | 0                 | 2.6% (1.8–3.3)                       |
| Central Europe, eastern Europe, and central Asia | 2636 (2204–3068)      | 59.2% (49.3–68.5)        | 6.5% (3.7–9.2)      | 34.2% (30.6–38.2) | 0.1% (0.0–0.5)    | 3.1% (2.5–3.7)                       |
| Latin America and the Caribbean                  | 2050 (1571–2521)      | 51.4% (41.3–61.0)        | 19.7% (10.2–28.1)   | 28.6% (25.0–33.1) | 0.3% (0.1–0.8)    | 2.8% (1.9–3.6)                       |
| North Africa and the Middle East                 | 1321 (1041–1652)      | 59.2% (46.4–74.3)        | 8.1% (4.1–12.6)     | 32.4% (28.2–37.6) | 0.3% (0.1–0.7)    | 2.4% (1.6–3.2)                       |
| Southeast Asia, east Asia, and Oceania           | 1425 (1083–1781)      | 54.6% (42.0–67.5)        | 15.8% (8.7–22.3)    | 29.4% (25.3–34.8) | 0.2% (0.1–0.4)    | 3.7% (2.7–4.5)                       |
| Sub-Saharan Africa                               | 294 (227–361)         | 36.3% (30.4–43.5)        | 25.7% (14.4–33.6)   | 31.3% (29.0–33.6) | 6.7% (3.2–12.0)   | 1.9% (0.9–2.6)                       |
| South Asia                                       | 440 (355–507)         | 33.2% (27.1–37.6)        | 14.7% (7.4–19.4)    | 51.4% (46.0–57.2) | 0.7% (0.3–1.1)    | 3.5% (2.7–4.0)                       |
| <b>Country</b>                                   |                       |                          |                     |                   |                   |                                      |
| Afghanistan                                      | 265 (225–309)         | 13.4% (11.1–15.4)        | 0.5% (0.2–0.7)      | 78.7% (71.4–86.1) | 7.4% (2.4–14.4)   | 2.7% (2.1–3.2)                       |
| Albania  | 1534 (1282–1779)      | 52.6% (42.5–59.5)        | 0.2% (0.1–0.3)      | 46.7% (40.9–53.3) | 0.5% (0.0–3.0)    | 3.7% (3.0–4.2)                       |
| Algeria  | 1440 (1189–1664)      | 76.2% (62.1–87.9)        | 1.1% (0.6–1.5)      | 22.6% (19.8–26.0) | 0.0% (0.0–0.1)    | 2.5% (1.8–3.0)                       |
| Andorra  | 8162 (6827–9558)      | 74.8% (63.0–86.8)        | 8.9% (5.6–12.5)     | 16.3% (15.1–17.9) | 0                 | 1.9% (1.3–2.5)                       |
| Angola   | 360 (296–451)         | 64.3% (54.9–78.8)        | 11.7% (6.9–17.9)    | 21.3% (18.9–23.8) | 2.7% (1.4–4.9)    | 1.6% (0.9–2.4)                       |
| Antigua and Barbuda                              | 1883 (1481–2344)      | 64.1% (51.0–78.3)        | 12.7% (7.6–18.2)    | 23.1% (20.1–27.2) | 0.1% (0.0–0.7)    | 2.7% (1.9–3.5)                       |
| Argentina  | 2674 (2189–3235)      | 67.7% (57.5–81.4)        | 13.9% (7.7–18.4)    | 18.3% (16.6–19.9) | 0.1% (0.0–1.2)    | 2.5% (1.8–3.2)                       |
| Armenia  | 951 (757–1167)        | 41.3% (33.3–47.2)        | 7.0% (3.4–9.9)      | 49.1% (42.8–55.9) | 2.6% (0.0–9.7)    | 4.0% (3.2–4.8)                       |
| Australia  | 6529 (5392–7819)      | 64.4% (55.0–75.0)        | 19.2% (12.4–27.1)   | 16.3% (15.2–17.7) | 0                 | 1.9% (1.2–2.5)                       |
| Austria  | 8890 (7391–10 347)    | 74.7% (63.2–85.0)        | 11.7% (7.4–16.4)    | 13.7% (12.6–15.0) | 0                 | 2.4% (1.7–2.9)                       |
| Azerbaijan                                       | 1854 (1519–2249)      | 24.2% (18.5–29.3)        | 6.9% (4.0–9.7)      | 68.8% (59.5–81.4) | 0.1% (0.0–0.8)    | 3.2% (2.5–3.9)                       |
| Bahrain  | 3814 (2661–5533)      | 67.3% (49.3–95.1)        | 20.6% (10.6–34.1)   | 12.2% (9.8–15.9)  | 0                 | 2.6% (1.3–4.0)                       |
| Bangladesh                                       | 258 (210–307)         | 33.1% (26.6–38.6)        | 6.2% (3.0–9.6)      | 57.7% (50.3–65.7) | 3.0% (1.2–4.7)    | 3.6% (2.9–4.2)                       |
| Barbados   | 2648 (2176–3057)      | 62.1% (51.0–70.2)        | 10.2% (6.2–14.1)    | 27.7% (25.0–31.1) | 0                 | 3.0% (2.3–3.5)                       |
| Belarus  | 2703 (2269–3161)      | 68.5% (56.7–80.9)        | 4.3% (2.5–5.9)      | 27.3% (24.8–30.1) | 0.0% (0.0–0.1)    | 3.5% (2.9–4.1)                       |
| Belgium  | 7947 (6791–9208)      | 76.3% (65.3–88.2)        | 6.1% (3.9–8.6)      | 17.6% (16.3–19.0) | 0                 | 2.2% (1.7–2.8)                       |
| Belize   | 766 (577–1037)        | 54.1% (44.4–62.2)        | 11.4% (6.2–15.8)    | 25.2% (22.5–28.4) | 9.3% (2.2–29.0)   | 2.3% (1.3–3.4)                       |
| Benin  | 170 (138–208)         | 45.6% (39.0–53.3)        | 7.7% (4.1–11.9)     | 34.6% (32.2–36.8) | 12.1% (6.3–20.9)  | 2.4% (1.6–3.1)                       |
| Bhutan   | 634 (508–793)         | 75.4% (60.7–89.4)        | 0.4% (0.2–0.6)      | 22.8% (19.4–26.8) | 1.3% (0.0–8.3)    | 3.6% (2.8–4.4)                       |
| Bolivia  | 730 (615–839)         | 77.9% (66.2–88.2)        | 2.2% (1.1–2.8)      | 17.3% (15.7–19.0) | 2.6% (1.2–4.9)    | 2.8% (2.2–3.3)                       |
| Bosnia and Herzegovina                           | 2555 (2108–3016)      | 73.5% (59.8–83.8)        | 0.1% (0.0–0.1)      | 25.7% (22.7–29.3) | 0.7% (0.0–4.9)    | 4.0% (3.3–4.6)                       |
| Botswana   | 1988 (1360–2649)      | 46.8% (38.0–54.7)        | 47.8% (26.8–66.4)   | 4.2% (3.6–4.8)    | 1.2% (0.0–7.4)    | 3.0% (1.7–4.1)                       |
| Brazil   | 2989 (2184–3766)      | 44.6% (35.8–53.2)        | 31.2% (16.3–44.6)   | 24.2% (21.0–28.0) | 0.0% (0.0–0.2)    | 3.0% (1.9–3.8)                       |
| Brunei   | 2968 (2167–4228)      | 92.5% (67.4–132.2)       | 0.3% (0.1–0.5)      | 7.2% (5.4–9.8)    | 0                 | 1.8% (0.7–3.1)                       |
| Bulgaria   | 3353 (2887–3826)      | 63.7% (53.5–73.9)        | 1.3% (0.8–1.9)      | 34.9% (31.8–38.3) | 0                 | 3.8% (3.3–4.3)                       |
| Burkina Faso                                     | 161 (134–195)         | 51.4% (43.3–62.0)        | 6.1% (3.6–8.3)      | 33.0% (31.0–34.7) | 9.5% (5.4–16.2)   | 2.1% (1.5–2.8)                       |
| Burundi  | 61 (46–94)            | 36.7% (30.8–45.1)        | 3.4% (2.1–4.9)      | 30.0% (27.3–32.8) | 29.9% (15.1–71.6) | 1.4% (0.3–2.9)                       |
| Cambodia   | 435 (362–535)         | 20.3% (16.0–24.2)        | 0.5% (0.2–0.6)      | 71.4% (63.2–81.1) | 7.8% (3.9–17.2)   | 3.2% (2.5–3.9)                       |
| Cameroon   | 240 (210–273)         | 30.1% (25.9–36.3)        | 5.7% (3.1–7.5)      | 59.6% (56.5–62.4) | 4.7% (2.1–7.6)    | 2.1% (1.7–2.6)                       |
| Canada   | 7868 (6387–9334)      | 67.0% (56.5–76.3)        | 20.1% (12.9–28.1)   | 12.9% (11.8–14.2) | 0                 | 2.2% (1.4–2.8)                       |
| Cape Verde                                       | 653 (500–931)         | 61.8% (51.4–70.4)        | 4.4% (2.1–6.1)      | 18.0% (15.9–20.2) | 15.8% (7.1–45.8)  | 2.9% (1.9–4.2)                       |
| Central African Republic                         | 60 (46–108)           | 31.5% (26.8–38.3)        | 2.5% (1.3–3.2)      | 40.6% (38.2–43.2) | 25.4% (9.6–94.0)  | 3.0% (2.0–5.1)                       |
| Chad   | 137 (119–165)         | 29.3% (25.0–36.6)        | 0.3% (0.2–0.4)      | 61.8% (57.6–66.4) | 8.6% (4.3–16.4)   | 1.9% (1.4–2.5)                       |
| Chile  | 3458 (2582–4217)      | 44.0% (35.5–51.4)        | 30.3% (16.6–41.1)   | 25.7% (22.6–29.4) | 0                 | 2.9% (1.9–3.6)                       |
| China  | 1812 (1371–2282)      | 56.2% (43.0–70.0)        | 15.8% (8.6–22.4)    | 28.0% (24.0–33.5) | 0                 | 3.9% (2.9–4.7)                       |

(Table 1 continues on next page)

|                                  | THE per capita (US\$) | Domestic GHE per THE (%) | Prepaid per THE (%) | OOP per THE (%)   | DAH per THE (%)    | 2013-40 growth in THE per capita (%) |
|----------------------------------|-----------------------|--------------------------|---------------------|-------------------|--------------------|--------------------------------------|
| (Continued from previous page)   |                       |                          |                     |                   |                    |                                      |
| Colombia                         | 1930 (1439-2441)      | 72.7% (57.5-88.3)        | 15.2% (7.6-21.9)    | 11.7% (9.4-14.3)  | 0.4% (0.0-2.0)     | 3.3% (2.3-4.2)                       |
| Comoros                          | 132 (101-292)         | 23.6% (19.1-28.4)        | 0.2% (0.1-0.3)      | 49.9% (45.3-54.7) | 26.3% (11.9-138.4) | 2.3% (1.4-5.2)                       |
| Congo                            | 328 (278-406)         | 75.8% (64.2-93.3)        | 1.2% (0.8-1.7)      | 19.3% (18.0-20.6) | 3.6% (1.8-8.1)     | 1.7% (1.1-2.5)                       |
| Costa Rica                       | 2766 (2260-3261)      | 76.7% (62.6-89.9)        | 2.2% (1.2-3.2)      | 21.0% (18.0-24.5) | 0.0% (0.0-0.2)     | 2.9% (2.1-3.4)                       |
| Côte d'Ivoire                    | 301 (247-359)         | 28.5% (24.7-34.7)        | 21.3% (12.2-29.1)   | 45.4% (42.7-47.9) | 4.8% (2.5-7.5)     | 2.6% (1.9-3.2)                       |
| Croatia                          | 3598 (2961-4171)      | 77.6% (65.7-87.6)        | 12.0% (7.1-17.1)    | 10.4% (9.5-11.2)  | 0                  | 3.5% (2.8-4.0)                       |
| Cuba                             | 2980 (2354-3609)      | 93.6% (74.1-113.1)       | 1.7% (0.9-2.3)      | 4.6% (4.0-5.5)    | 0.0% (0.0-0.2)     | 3.5% (2.6-4.2)                       |
| Cyprus                           | 3601 (2980-4189)      | 46.8% (38.6-53.5)        | 11.6% (6.5-16.6)    | 41.6% (37.6-46.2) | 0                  | 2.2% (1.5-2.7)                       |
| Czech Republic                   | 4434 (3757-5023)      | 84.8% (71.5-96.1)        | 1.5% (0.9-2.2)      | 13.6% (12.3-15.0) | 0                  | 3.1% (2.5-3.5)                       |
| Democratic Republic of the Congo | 39 (29-51)            | 33.6% (27.9-41.4)        | 7.2% (3.9-9.6)      | 33.7% (30.1-37.5) | 25.5% (12.5-43.9)  | 1.6% (0.6-2.6)                       |
| Denmark                          | 7826 (6753-9096)      | 86.0% (74.0-100.4)       | 2.7% (1.7-3.8)      | 11.3% (10.7-12.1) | 0                  | 2.2% (1.7-2.8)                       |
| Djibouti                         | 709 (575-900)         | 60.6% (49.5-69.4)        | 0.1% (0.1-0.1)      | 34.6% (30.6-38.7) | 4.7% (1.0-18.8)    | 3.4% (2.6-4.2)                       |
| Dominica                         | 1473 (1218-1722)      | 73.6% (60.3-84.2)        | 1.3% (0.8-1.9)      | 24.2% (21.7-27.2) | 0.9% (0.0-3.7)     | 3.1% (2.5-3.7)                       |
| Dominican Republic               | 1471 (1159-1757)      | 51.8% (41.8-60.1)        | 13.9% (7.1-18.6)    | 33.8% (29.9-38.4) | 0.5% (0.0-2.2)     | 3.2% (2.4-3.9)                       |
| Ecuador                          | 1381 (1125-1619)      | 55.4% (44.3-64.7)        | 2.5% (1.4-3.4)      | 41.8% (35.7-48.3) | 0.3% (0.0-0.8)     | 2.4% (1.7-3.0)                       |
| Egypt                            | 785 (695-878)         | 43.5% (37.0-50.2)        | 2.0% (1.3-2.8)      | 54.3% (50.3-58.5) | 0.2% (0.0-0.4)     | 2.1% (1.7-2.5)                       |
| El Salvador                      | 1068 (857-1255)       | 65.0% (54.3-73.0)        | 8.2% (3.8-11.5)     | 24.5% (21.3-28.0) | 2.3% (0.9-5.0)     | 3.7% (2.9-4.3)                       |
| Equatorial Guinea                | 1283 (1009-1582)      | 78.0% (60.8-94.7)        | 4.1% (2.5-6.2)      | 17.7% (15.3-20.6) | 0.3% (0.0-1.8)     | 1.2% (0.3-1.9)                       |
| Eritrea                          | 62 (47-100)           | 18.0% (15.1-21.7)        | 0.3% (0.2-0.4)      | 50.5% (46.9-54.2) | 31.1% (13.4-84.3)  | 2.3% (1.3-4.0)                       |
| Estonia                          | 3556 (2993-4137)      | 78.8% (66.4-91.3)        | 5.2% (3.0-7.6)      | 16.1% (14.7-17.4) | 0                  | 3.4% (2.8-4.0)                       |
| Ethiopia                         | 121 (98-146)          | 38.3% (32.1-44.6)        | 4.0% (1.9-5.3)      | 42.9% (39.4-46.3) | 14.8% (7.4-23.6)   | 2.6% (1.8-3.2)                       |
| Federated States of Micronesia   | 1124 (826-2135)       | 74.6% (63.2-86.7)        | 0.1% (0.0-0.1)      | 6.9% (6.1-7.7)    | 18.5% (4.1-95.4)   | 3.4% (2.3-5.7)                       |
| Fiji                             | 858 (636-1065)        | 64.2% (51.3-73.5)        | 14.2% (7.7-18.6)    | 17.5% (15.2-20.2) | 4.1% (0.0-11.9)    | 3.9% (2.8-4.6)                       |
| Finland                          | 6781 (5771-7934)      | 74.9% (64.4-87.5)        | 9.0% (5.5-12.4)     | 16.1% (15.2-17.1) | 0                  | 2.5% (1.9-3.0)                       |
| France                           | 8298 (6778-9914)      | 73.4% (63.2-84.8)        | 20.4% (12.8-28.1)   | 6.2% (5.7-6.6)    | 0                  | 2.5% (1.8-3.1)                       |
| Gabon                            | 1179 (1010-1423)      | 55.3% (47.5-68.1)        | 9.3% (5.1-12.7)     | 35.1% (33.0-37.3) | 0.3% (0.0-2.5)     | 1.9% (1.3-2.5)                       |
| Georgia                          | 2064 (1651-2574)      | 22.5% (18.5-25.8)        | 23.6% (12.6-37.7)   | 53.0% (49.0-57.6) | 0.9% (0.0-3.6)     | 4.2% (3.4-5.0)                       |
| Germany                          | 9933 (8154-11546)     | 74.5% (63.2-84.5)        | 14.6% (8.9-19.9)    | 10.9% (10.0-11.8) | 0                  | 2.8% (2.1-3.4)                       |
| Ghana                            | 377 (315-443)         | 56.8% (47.1-67.6)        | 3.8% (2.2-5.1)      | 33.4% (30.8-36.0) | 6.0% (3.3-8.8)     | 2.3% (1.6-2.8)                       |
| Greece                           | 5243 (4421-5940)      | 69.8% (59.6-78.5)        | 6.9% (3.7-9.0)      | 23.3% (21.1-25.8) | 0                  | 3.0% (2.4-3.4)                       |
| Grenada                          | 1673 (1431-1904)      | 51.4% (42.8-58.3)        | 2.0% (1.0-2.7)      | 46.5% (41.8-51.3) | 0.2% (0.0-1.6)     | 3.4% (2.9-3.9)                       |
| Guatemala                        | 691 (582-793)         | 39.4% (33.3-45.1)        | 7.0% (3.7-9.1)      | 50.8% (45.5-55.9) | 2.9% (1.7-4.6)     | 2.3% (1.7-2.8)                       |
| Guinea                           | 93 (80-120)           | 33.1% (27.9-40.2)        | 1.6% (0.9-2.1)      | 56.1% (53.2-58.7) | 9.2% (3.5-27.3)    | 2.1% (1.5-2.9)                       |
| Guinea-Bissau                    | 126 (94-207)          | 12.6% (10.3-15.7)        | 0.2% (0.1-0.3)      | 50.2% (47.4-52.8) | 37.0% (17.3-96.3)  | 1.8% (0.8-3.6)                       |
| Guyana                           | 1049 (793-1327)       | 66.2% (52.4-78.2)        | 0.2% (0.1-0.2)      | 27.6% (23.1-33.2) | 6.0% (0.0-14.9)    | 3.7% (2.7-4.5)                       |
| Haiti                            | 179 (131-239)         | 11.7% (9.4-13.7)         | 2.1% (1.1-2.9)      | 54.7% (43.1-66.2) | 31.5% (19.5-50.5)  | 2.7% (1.5-3.7)                       |
| Honduras                         | 830 (664-997)         | 48.2% (39.5-56.0)        | 8.1% (3.8-11.9)     | 40.5% (35.0-46.6) | 3.2% (1.7-5.6)     | 3.1% (2.3-3.8)                       |
| Hungary                          | 4530 (3749-5390)      | 65.0% (55.3-74.5)        | 11.4% (5.7-18.8)    | 23.7% (21.7-25.7) | 0                  | 3.6% (2.9-4.2)                       |
| Iceland                          | 6658 (5630-7514)      | 81.5% (68.6-91.8)        | 2.2% (1.3-3.0)      | 16.2% (14.7-18.1) | 0                  | 2.3% (1.7-2.8)                       |
| India                            | 503 (405-580)         | 33.0% (26.9-37.3)        | 15.7% (7.8-20.4)    | 50.9% (45.6-56.8) | 0.4% (0.1-0.6)     | 3.6% (2.8-4.1)                       |
| Indonesia                        | 630 (483-752)         | 38.3% (30.6-44.5)        | 22.5% (12.1-29.7)   | 38.7% (33.9-44.2) | 0.5% (0.0-0.9)     | 3.4% (2.4-4.0)                       |
| Iran                             | 2348 (1838-2958)      | 41.2% (32.9-51.1)        | 12.8% (6.3-20.2)    | 46.0% (39.1-54.5) | 0.0% (0.0-0.1)     | 3.1% (2.3-4.0)                       |
| Iraq                             | 1213 (961-1510)       | 66.3% (51.1-84.4)        | 3.9% (2.3-5.7)      | 29.7% (25.8-33.8) | 0.2% (0.0-0.6)     | 2.5% (1.6-3.2)                       |
| Ireland                          | 7740 (6121-9091)      | 64.1% (53.5-72.2)        | 21.8% (13.0-29.4)   | 14.1% (12.6-15.8) | 0                  | 2.6% (1.7-3.1)                       |
| Israel                           | 3496 (2899-4178)      | 57.2% (49.1-67.4)        | 20.2% (12.7-27.9)   | 22.6% (21.1-24.2) | 0                  | 1.8% (1.2-2.5)                       |
| Italy                            | 5968 (5013-6804)      | 78.4% (65.9-88.7)        | 5.8% (3.5-8.0)      | 15.8% (14.5-17.3) | 0                  | 2.6% (2.0-3.1)                       |
| Jamaica                          | 1242 (911-1519)       | 51.8% (42.5-59.3)        | 26.2% (13.1-35.0)   | 20.0% (17.7-22.6) | 1.9% (0.0-5.4)     | 3.9% (2.8-4.6)                       |
| Japan                            | 8022 (6796-9156)      | 82.1% (70.0-93.6)        | 5.5% (3.2-7.3)      | 12.4% (11.5-13.3) | 0                  | 3.0% (2.4-3.5)                       |
| Jordan                           | 1464 (1133-1759)      | 63.6% (52.0-73.0)        | 14.5% (7.9-19.9)    | 20.2% (17.5-23.4) | 1.7% (0.0-4.0)     | 2.7% (1.8-3.4)                       |
| Kazakhstan                       | 1747 (1500-1999)      | 57.1% (46.8-67.0)        | 0.8% (0.5-1.1)      | 42.1% (38.6-46.2) | 0.0% (0.0-0.2)     | 2.5% (1.9-3.0)                       |

(Table 1 continues on next page)

|                                | THE per capita (US\$) | Domestic GHE per THE (%) | Prepaid per THE (%) | OOP per THE (%)   | DAH per THE (%)   | 2013-40 growth in THE per capita (%) |
|--------------------------------|-----------------------|--------------------------|---------------------|-------------------|-------------------|--------------------------------------|
| (Continued from previous page) |                       |                          |                     |                   |                   |                                      |
| Kenya                          | 204 (161-248)         | 25.6% (21.4-30.1)        | 12.9% (7.3-17.0)    | 42.9% (39.7-46.1) | 18.6% (10.5-28.5) | 1.9% (1.0-2.6)                       |
| Kiribati                       | 517 (313-1452)        | 62.0% (51.4-69.3)        | 0.1% (0.0-0.1)      | 1.3% (1.2-1.5)    | 36.6% (7.8-210.3) | 3.1% (1.3-6.8)                       |
| Kuwait                         | 3768 (2752-5236)      | 84.0% (60.7-117.4)       | 2.2% (1.2-3.6)      | 13.8% (11.2-17.9) | 0                 | 2.2% (1.0-3.3)                       |
| Kyrgyzstan                     | 441 (356-567)         | 60.0% (47.9-69.6)        | 0.1% (0.1-0.2)      | 33.7% (30.2-38.1) | 6.2% (2.4-20.5)   | 3.3% (2.5-4.2)                       |
| Laos                           | 163 (126-222)         | 35.8% (27.9-43.5)        | 2.3% (1.1-3.1)      | 44.5% (38.2-50.9) | 17.5% (9.5-38.4)  | 2.9% (1.9-4.0)                       |
| Latvia                         | 3036 (2648-3472)      | 65.4% (55.6-76.5)        | 2.7% (1.6-3.8)      | 31.9% (30.0-34.1) | 0                 | 3.6% (3.1-4.0)                       |
| Lebanon                        | 4003 (2933-4884)      | 48.7% (38.6-57.1)        | 24.4% (11.6-33.1)   | 26.9% (23.1-31.5) | 0.0% (0.0-0.3)    | 4.5% (3.4-5.2)                       |
| Lesotho                        | 650 (502-857)         | 68.6% (57.1-83.8)        | 0.1% (0.0-0.1)      | 13.8% (12.7-15.0) | 17.5% (7.4-32.9)  | 2.6% (1.6-3.6)                       |
| Liberia                        | 108 (69-177)          | 9.8% (8.0-11.9)          | 11.8% (6.3-17.0)    | 42.0% (38.2-45.7) | 36.5% (11.3-88.6) | 1.8% (0.2-3.6)                       |
| Libya                          | 1582 (1247-1966)      | 71.8% (56.5-88.6)        | 3.6% (1.9-5.3)      | 24.5% (20.5-29.6) | 0.1% (0.0-0.9)    | 3.0% (2.1-3.8)                       |
| Lithuania                      | 3554 (3081-4094)      | 70.2% (59.3-82.9)        | 1.2% (0.8-1.8)      | 28.5% (26.7-30.5) | 0                 | 3.4% (2.9-3.9)                       |
| Luxembourg                     | 9122 (7593-10 894)    | 83.1% (70.3-97.2)        | 7.4% (4.4-11.4)     | 9.5% (8.5-10.8)   | 0                 | 1.5% (0.9-2.2)                       |
| Macedonia                      | 1919 (1581-2215)      | 71.7% (58.3-81.2)        | 3.3% (1.8-4.4)      | 24.8% (22.3-27.7) | 0.2% (0.0-2.1)    | 3.6% (2.9-4.1)                       |
| Madagascar                     | 101 (81-127)          | 52.2% (43.8-61.4)        | 9.1% (5.4-12.5)     | 27.1% (25.1-29.4) | 11.5% (5.6-22.2)  | 2.3% (1.5-3.1)                       |
| Malawi                         | 131 (85-183)          | 15.1% (12.3-19.5)        | 40.5% (21.5-57.0)   | 11.9% (10.7-13.4) | 32.4% (20.5-49.6) | 1.9% (0.4-3.1)                       |
| Malaysia                       | 1805 (1427-2160)      | 54.9% (44.1-64.7)        | 13.7% (7.5-18.8)    | 31.3% (27.4-36.2) | 0                 | 2.6% (1.8-3.3)                       |
| Maldives                       | 2891 (2282-3542)      | 57.6% (46.9-68.3)        | 9.0% (4.3-14.0)     | 33.3% (27.8-39.7) | 0.1% (0.0-0.5)    | 2.9% (2.1-3.6)                       |
| Mali                           | 178 (154-210)         | 33.9% (29.7-41.8)        | 0.2% (0.1-0.3)      | 54.4% (51.3-57.6) | 11.4% (5.5-18.6)  | 1.7% (1.2-2.3)                       |
| Malta                          | 5307 (4550-6031)      | 68.5% (57.8-78.5)        | 3.7% (2.2-5.0)      | 27.9% (25.7-30.1) | 0                 | 2.8% (2.3-3.3)                       |
| Marshall Islands               | 1616 (1158-2751)      | 70.2% (58.8-79.1)        | 2.9% (1.7-3.8)      | 9.1% (8.4-10.0)   | 17.8% (2.8-77.3)  | 3.6% (2.4-5.5)                       |
| Mauritania                     | 252 (211-305)         | 47.0% (38.8-55.7)        | 4.6% (2.8-6.3)      | 44.1% (40.9-47.6) | 4.2% (1.2-11.5)   | 2.3% (1.7-3.0)                       |
| Mauritius                      | 1897 (1513-2277)      | 51.6% (40.9-61.8)        | 7.2% (3.7-10.1)     | 41.2% (35.2-48.2) | 0                 | 3.3% (2.5-4.0)                       |
| Mexico                         | 1950 (1590-2324)      | 53.6% (43.3-63.5)        | 6.5% (3.3-9.4)      | 39.9% (34.9-46.0) | 0.0% (0.0-0.3)    | 2.6% (1.9-3.3)                       |
| Moldova                        | 1496 (1219-1783)      | 52.9% (43.3-60.0)        | 1.1% (0.5-1.5)      | 44.0% (37.7-50.6) | 2.0% (0.0-7.1)    | 4.3% (3.6-5.0)                       |
| Mongolia                       | 1259 (942-1613)       | 62.0% (47.7-75.7)        | 1.6% (0.9-2.3)      | 34.8% (26.1-46.2) | 1.6% (0.0-3.8)    | 3.0% (2.0-3.9)                       |
| Montenegro                     | 2286 (1907-2628)      | 61.1% (50.1-70.6)        | 5.1% (2.7-6.7)      | 33.7% (30.7-36.7) | 0.1% (0.0-1.0)    | 3.6% (3.0-4.1)                       |
| Morocco                        | 940 (757-1108)        | 35.4% (28.3-41.4)        | 11.8% (6.3-15.8)    | 52.3% (45.9-59.7) | 0.5% (0.0-1.0)    | 3.3% (2.5-3.8)                       |
| Mozambique                     | 87 (58-119)           | 39.1% (31.8-49.7)        | 10.4% (5.6-14.2)    | 10.0% (9.3-10.8)  | 40.5% (20.7-62.1) | 1.4% (0.0-2.5)                       |
| Myanmar                        | 162 (133-193)         | 32.1% (25.6-36.9)        | 0.6% (0.3-0.7)      | 62.8% (55.6-71.1) | 4.5% (0.6-10.6)   | 3.6% (2.9-4.2)                       |
| Namibia                        | 1423 (987-1761)       | 52.8% (44.2-61.1)        | 34.9% (20.1-45.9)   | 5.8% (5.1-6.5)    | 6.6% (0.0-10.3)   | 2.7% (1.4-3.5)                       |
| Nepal                          | 271 (229-313)         | 44.7% (37.0-51.2)        | 0.2% (0.1-0.4)      | 50.4% (44.7-56.5) | 4.7% (2.8-7.5)    | 3.5% (2.9-4.0)                       |
| Netherlands                    | 10088 (8262-11 827)   | 83.8% (70.0-95.7)        | 11.2% (7.3-16.1)    | 5.0% (4.6-5.5)    | 0                 | 2.5% (1.8-3.1)                       |
| New Zealand                    | 5678 (4686-6537)      | 81.6% (68.6-92.4)        | 9.1% (5.5-12.4)     | 9.3% (8.5-10.3)   | 0                 | 2.3% (1.6-2.8)                       |
| Nicaragua                      | 823 (639-1027)        | 50.8% (40.4-61.3)        | 9.3% (4.6-14.6)     | 35.3% (30.6-40.7) | 4.6% (2.0-8.2)    | 3.5% (2.6-4.3)                       |
| Niger                          | 71 (60-94)            | 31.7% (26.7-40.8)        | 2.1% (1.3-3.4)      | 55.3% (51.9-58.5) | 10.9% (3.8-29.3)  | 1.2% (0.6-2.2)                       |
| Nigeria                        | 279 (244-320)         | 20.9% (17.7-25.9)        | 5.2% (3.1-7.3)      | 69.6% (65.2-73.9) | 4.3% (1.6-7.7)    | 1.7% (1.2-2.2)                       |
| Norway                         | 8909 (7723-10 318)    | 86.6% (74.4-101.0)       | 0.8% (0.5-1.2)      | 12.6% (11.7-13.6) | 0                 | 1.7% (1.2-2.2)                       |
| Oman                           | 2109 (1536-2867)      | 79.2% (58.6-106.8)       | 10.5% (5.7-16.2)    | 10.3% (8.6-13.0)  | 0                 | 2.7% (1.6-3.8)                       |
| Pakistan                       | 215 (181-249)         | 33.5% (28.4-38.9)        | 11.5% (6.5-16.4)    | 52.2% (47.9-56.4) | 2.8% (1.6-4.0)    | 2.7% (2.0-3.2)                       |
| Panama                         | 2504 (2006-2962)      | 69.3% (55.9-80.7)        | 9.0% (5.0-12.2)     | 21.6% (19.3-24.5) | 0.1% (0.0-1.0)    | 2.6% (1.8-3.2)                       |
| Papua New Guinea               | 263 (197-332)         | 66.7% (54.6-76.2)        | 2.3% (1.2-3.0)      | 9.1% (8.1-10.3)   | 21.8% (11.1-36.6) | 2.8% (1.8-3.6)                       |
| Paraguay                       | 1387 (1165-1569)      | 40.4% (33.7-45.3)        | 7.7% (4.0-10.0)     | 51.3% (46.2-56.4) | 0.6% (0.0-1.4)    | 2.9% (2.3-3.3)                       |
| Peru                           | 1236 (1006-1433)      | 60.6% (49.6-69.1)        | 7.7% (4.0-10.3)     | 31.2% (27.8-35.2) | 0.4% (0.0-1.4)    | 2.8% (2.1-3.3)                       |
| Philippines                    | 588 (477-679)         | 32.2% (26.5-36.3)        | 17.2% (9.5-22.6)    | 49.8% (44.8-55.3) | 0.7% (0.4-1.2)    | 3.0% (2.3-3.5)                       |
| Poland                         | 3959 (3183-4498)      | 68.3% (56.5-76.2)        | 12.6% (6.7-16.5)    | 19.0% (17.2-21.0) | 0                 | 3.6% (2.9-4.1)                       |
| Portugal                       | 5688 (4599-6513)      | 63.1% (53.0-70.8)        | 14.3% (7.5-18.5)    | 22.7% (20.4-25.2) | 0                 | 3.2% (2.4-3.7)                       |
| Qatar                          | 4219 (2698-6664)      | 83.4% (55.1-131.5)       | 8.8% (3.2-15.1)     | 7.8% (5.7-11.3)   | 0                 | 1.8% (0.2-3.4)                       |
| Romania                        | 2361 (1937-2813)      | 82.3% (66.2-99.4)        | 0.8% (0.5-1.1)      | 16.9% (15.3-18.6) | 0                 | 3.8% (3.1-4.5)                       |
| Russia                         | 3281 (2781-3823)      | 51.2% (42.9-59.9)        | 6.0% (3.8-8.7)      | 42.8% (38.1-47.9) | 0                 | 3.0% (2.4-3.6)                       |
| Rwanda                         | 357 (260-456)         | 52.5% (42.2-62.0)        | 11.3% (5.4-14.9)    | 21.9% (19.1-24.7) | 14.3% (6.0-26.3)  | 3.3% (2.2-4.2)                       |

(Table 1 continues on next page)

|                                  | THE per capita (US\$) | Domestic GHE per THE (%) | Prepaid per THE (%) | OOP per THE (%)   | DAH per THE (%)    | 2013–40 growth in THE per capita (%) |
|----------------------------------|-----------------------|--------------------------|---------------------|-------------------|--------------------|--------------------------------------|
| (Continued from previous page)   |                       |                          |                     |                   |                    |                                      |
| Saint Lucia                      | 1940 (1575–2341)      | 55.5% (45.4–64.0)        | 2.7% (1.4–3.9)      | 39.7% (34.4–45.3) | 2.2% (0.0–7.4)     | 2.9% (2.2–3.6)                       |
| Saint Vincent and the Grenadines | 1307 (1047–1580)      | 83.5% (67.4–98.4)        | 2.0% (1.0–2.8)      | 13.4% (11.7–15.4) | 1.1% (0.0–4.3)     | 3.5% (2.7–4.2)                       |
| Samoa                            | 918 (668–1419)        | 66.8% (54.8–75.3)        | 4.0% (2.4–5.4)      | 5.6% (4.8–6.5)    | 23.6% (10.8–67.5)  | 3.1% (2.0–4.7)                       |
| São Tomé and Príncipe            | 457 (348–865)         | 23.7% (18.8–29.5)        | 0.1% (0.1–0.1)      | 47.9% (44.8–50.8) | 28.3% (12.4–109.0) | 2.2% (1.2–4.4)                       |
| Saudi Arabia                     | 2599 (1853–3621)      | 61.8% (45.7–84.2)        | 21.6% (12.0–34.1)   | 16.6% (13.6–21.0) | 0                  | 2.3% (1.1–3.5)                       |
| Senegal                          | 168 (133–211)         | 41.0% (34.7–49.6)        | 14.5% (8.9–20.0)    | 30.8% (28.4–33.2) | 13.7% (7.1–22.7)   | 2.0% (1.2–2.8)                       |
| Serbia                           | 3400 (2894–3902)      | 64.1% (53.7–74.0)        | 2.5% (1.4–3.4)      | 33.3% (30.0–36.7) | 0.1% (0.0–0.6)     | 3.6% (3.1–4.1)                       |
| Seychelles                       | 2174 (1646–2703)      | 89.5% (69.2–108.9)       | 6.5% (3.3–10.4)     | 4.0% (3.2–5.0)    | 0                  | 3.3% (2.3–4.1)                       |
| Sierra Leone                     | 229 (203–280)         | 10.2% (8.2–12.8)         | 1.1% (0.6–1.5)      | 79.9% (75.1–84.9) | 8.8% (4.6–23.1)    | 1.5% (1.1–2.2)                       |
| Singapore                        | 5493 (4320–7010)      | 42.0% (32.0–54.5)        | 5.4% (3.0–8.4)      | 52.7% (43.6–64.7) | 0                  | 1.9% (1.0–2.7)                       |
| Slovakia                         | 5163 (4081–6157)      | 69.2% (57.2–77.5)        | 12.0% (6.7–18.6)    | 18.7% (15.2–23.2) | 0                  | 3.4% (2.5–4.0)                       |
| Slovenia                         | 5841 (4621–6866)      | 68.2% (56.6–76.5)        | 22.0% (13.5–30.1)   | 9.9% (9.1–10.9)   | 0                  | 3.2% (2.4–3.8)                       |
| Solomon Islands                  | 278 (172–573)         | 29.0% (23.0–35.2)        | 1.1% (0.6–1.4)      | 2.6% (2.4–2.9)    | 67.3% (35.7–166.5) | 1.9% (0.2–4.5)                       |
| Somalia                          | 34 (26–62)            | 38.1% (33.4–47.3)        | 0.2% (0.1–0.4)      | 35.8% (34.1–37.5) | 25.9% (10.8–99.0)  | 1.8% (1.0–4.0)                       |
| South Africa                     | 2910 (1986–3609)      | 40.1% (33.4–46.9)        | 54.6% (30.3–69.7)   | 5.1% (4.5–5.7)    | 0.3% (0.0–1.8)     | 3.6% (2.3–4.4)                       |
| South Korea                      | 4918 (3807–6171)      | 54.2% (41.5–67.4)        | 14.1% (8.4–20.3)    | 31.7% (27.5–37.8) | 0                  | 2.8% (1.9–3.6)                       |
| South Sudan                      | 103 (79–135)          | 23.6% (19.3–30.2)        | 5.8% (3.3–8.0)      | 54.6% (50.8–58.4) | 16.0% (3.0–33.8)   | 1.2% (0.2–2.1)                       |
| Spain                            | 6012 (4914–6875)      | 69.7% (58.0–78.5)        | 10.6% (5.9–13.9)    | 19.7% (17.8–22.0) | 0                  | 2.9% (2.2–3.4)                       |
| Sri Lanka                        | 806 (632–960)         | 45.7% (35.9–53.8)        | 13.4% (6.7–17.8)    | 40.6% (35.8–46.4) | 0.3% (0.0–1.0)     | 3.8% (3.0–4.5)                       |
| Sudan                            | 403 (348–462)         | 21.3% (17.5–25.5)        | 4.8% (2.7–6.4)      | 72.2% (65.1–80.1) | 1.7% (1.0–2.7)     | 2.0% (1.5–2.5)                       |
| Suriname                         | 1338 (1021–1676)      | 70.3% (56.9–81.1)        | 16.0% (8.7–22.0)    | 12.6% (10.7–14.9) | 1.1% (0.0–7.4)     | 3.2% (2.2–4.0)                       |
| Swaziland                        | 1302 (983–1645)       | 66.8% (57.7–80.3)        | 16.1% (8.1–21.2)    | 10.4% (9.7–11.0)  | 6.8% (0.0–13.9)    | 2.9% (1.9–3.7)                       |
| Sweden                           | 7058 (6154–8424)      | 82.3% (71.8–98.8)        | 3.2% (1.9–5.2)      | 14.4% (13.5–15.3) | 0                  | 2.1% (1.6–2.7)                       |
| Switzerland                      | 9752 (8217–11478)     | 66.1% (55.8–76.8)        | 11.0% (7.2–15.9)    | 22.9% (21.2–25.0) | 0                  | 1.9% (1.3–2.5)                       |
| Syria                            | 284 (236–335)         | 47.5% (39.2–55.0)        | 4.1% (2.1–5.9)      | 48.0% (41.7–55.6) | 0.4% (0.1–1.7)     | 2.1% (1.5–2.7)                       |
| Tajikistan                       | 363 (300–453)         | 34.4% (27.3–40.3)        | 0.3% (0.2–0.4)      | 61.0% (53.3–70.1) | 4.3% (1.7–13.9)    | 3.1% (2.4–3.9)                       |
| Tanzania                         | 175 (139–216)         | 25.4% (20.8–31.9)        | 11.1% (6.6–15.4)    | 46.7% (42.5–51.2) | 16.8% (9.7–25.3)   | 1.6% (0.8–2.4)                       |
| Thailand                         | 1659 (1239–2104)      | 78.5% (60.9–97.5)        | 12.2% (6.2–17.5)    | 9.3% (7.6–11.5)   | 0.0% (0.0–0.3)     | 3.6% (2.6–4.5)                       |
| The Bahamas                      | 3323 (2497–4199)      | 41.3% (33.0–49.4)        | 33.8% (20.6–47.7)   | 24.8% (21.5–29.2) | 0                  | 2.7% (1.7–3.5)                       |
| The Gambia                       | 127 (90–212)          | 30.3% (24.9–37.7)        | 7.8% (4.7–10.8)     | 24.1% (22.8–25.3) | 37.8% (18.7–93.3)  | 1.5% (0.2–3.3)                       |
| Timor-Leste                      | 174 (114–282)         | 67.9% (53.6–88.4)        | 0.6% (0.3–0.9)      | 12.1% (11.5–12.8) | 19.4% (0.0–60.0)   | 2.4% (0.9–4.1)                       |
| Togo                             | 218 (181–270)         | 50.4% (41.4–60.7)        | 3.8% (2.1–5.0)      | 39.9% (37.4–42.3) | 5.9% (1.9–15.9)    | 2.5% (1.8–3.3)                       |
| Tonga                            | 652 (422–1365)        | 53.6% (43.5–63.9)        | 4.1% (2.3–5.4)      | 8.4% (7.5–9.3)    | 33.9% (11.2–130.6) | 3.3% (1.7–5.9)                       |
| Trinidad and Tobago              | 3434 (2785–3954)      | 48.1% (39.7–54.6)        | 15.3% (8.4–19.9)    | 36.6% (33.0–40.6) | 0                  | 3.0% (2.3–3.6)                       |
| Tunisia                          | 1600 (1313–1849)      | 61.0% (49.8–69.8)        | 7.4% (4.1–9.9)      | 31.4% (28.1–35.5) | 0.1% (0.0–0.4)     | 2.9% (2.2–3.4)                       |
| Turkey                           | 1932 (1581–2248)      | 85.4% (69.2–99.5)        | 0.2% (0.1–0.2)      | 14.4% (12.6–16.5) | 0.0% (0.0–0.2)     | 2.8% (2.1–3.4)                       |
| Turkmenistan                     | 668 (522–816)         | 68.1% (52.6–82.9)        | 4.9% (2.6–6.8)      | 26.8% (22.9–31.3) | 0.2% (0.0–1.2)     | 3.4% (2.6–4.2)                       |
| Uganda                           | 217 (169–267)         | 16.9% (14.3–21.2)        | 23.4% (13.1–32.4)   | 46.3% (42.7–50.3) | 13.3% (7.8–19.4)   | 1.8% (0.9–2.5)                       |
| Ukraine                          | 1838 (1583–2126)      | 57.9% (48.6–68.3)        | 4.4% (2.5–6.0)      | 37.5% (35.0–40.3) | 0.2% (0.0–1.1)     | 3.6% (3.1–4.1)                       |
| United Arab Emirates             | 3561 (2099–6171)      | 71.4% (44.1–125.6)       | 12.9% (3.4–23.9)    | 15.7% (11.4–23.8) | 0                  | 2.6% (0.7–4.5)                       |
| UK                               | 6348 (5335–7498)      | 81.8% (70.2–95.4)        | 10.2% (6.3–14.2)    | 8.0% (7.5–8.5)    | 0                  | 2.4% (1.8–3.0)                       |
| USA                              | 16592 (12716–20692)   | 42.0% (35.6–48.3)        | 48.7% (32.4–66.3)   | 9.3% (8.6–10.1)   | 0                  | 2.5% (1.6–3.3)                       |
| Uruguay                          | 3853 (3090–4525)      | 65.9% (56.6–76.1)        | 20.4% (11.0–26.6)   | 13.7% (12.7–14.8) | 0                  | 3.3% (2.5–3.9)                       |
| Uzbekistan                       | 849 (699–993)         | 53.2% (42.9–61.0)        | 5.0% (2.5–7.8)      | 41.2% (36.6–46.5) | 0.5% (0.2–1.6)     | 3.4% (2.7–3.9)                       |
| Vanuatu                          | 343 (179–934)         | 17.6% (14.4–20.2)        | 3.0% (1.7–4.0)      | 3.7% (3.2–4.2)    | 75.8% (32.7–243.7) | 2.0% (–0.3 to 5.6)                   |
| Venezuela                        | 833 (698–981)         | 30.1% (23.9–36.0)        | 4.5% (2.6–6.4)      | 65.3% (57.3–75.2) | 0.0% (0.0–0.3)     | 1.6% (1.0–2.2)                       |
| Vietnam                          | 761 (601–924)         | 41.6% (32.5–50.3)        | 13.7% (7.7–18.8)    | 43.5% (38.2–50.4) | 1.2% (0.6–1.9)     | 3.6% (2.8–4.3)                       |
| Yemen                            | 204 (174–247)         | 19.8% (16.5–23.7)        | 0.2% (0.1–0.3)      | 74.0% (65.8–83.4) | 6.0% (2.8–13.5)    | 0.8% (0.2–1.4)                       |
| Zambia                           | 284 (221–367)         | 46.8% (39.7–59.1)        | 7.8% (4.6–11.8)     | 22.7% (21.4–24.0) | 22.7% (12.2–34.4)  | 1.1% (0.2–2.1)                       |

Data in parentheses are uncertainty intervals. THE=total health expenditure. GHE=government health expenditure. Prepaid=prepaid private health expenditure. OOP=out-of-pocket health expenditure. DAH=development assistance for health.

**Table 1: Health spending per capita by income group, region, country, and source in 2040**

in the appendix. We took random draws from the included models and collated them to create a distribution of 10 000 potential future scenarios. The mean of these future scenarios is the reported point estimate, whereas the 2.5th and 97.5th percentiles mark the lower and upper bounds of the uncertainty interval (UI).

#### DAH between 2013 and 2040

We used a three-step process to estimate the amount of DAH disbursed to each low-income or middle-income country. DAH has tremendous year-on-year fluctuation in the amount of assistance received by a country. Furthermore, the amount of DAH disbursed to each country is dependent on the characteristics of that country and of donors.<sup>23,24</sup> Therefore, we first extracted estimates reporting the total amount of DAH disbursed each year between 2013 and 2040.<sup>9</sup> These estimates were made by projection of DAH by donor for 24 major sources of DAH with use of an ensemble model. Second, we estimated the share of total DAH that is to be received by each country using a second ensemble model and characteristics of the recipient. These covariates were the same as those used for estimation of government, prepaid private, and out-of-pocket spending. Finally, we estimated the transition of countries from middle-income to high-income status on the basis of GDP per-capita estimates. This transition, identified when a country's GDP per capita reaches \$18 108 (in 2010 purchasing power parity-adjusted dollars), marks the point when most countries stop receiving development assistance and are excluded from the IHME development assistance database. For each year, we estimated DAH received for each country that had not transitioned to high-income status by multiplying total DAH by the share that the country was predicted to receive.

#### Uncertainty

We included four types of uncertainty for each estimate. First, we used the ensemble modelling approach to reflect the uncertainty in model specification. Second, we took draws from the variance-covariance matrix estimated for each model to reflect estimated parameter uncertainty. Third, we sampled randomly across imputed datasets (for 1995–2013) and GDP estimates to capture uncertainty in our underlying data. Fourth, for each country, model, and variance-covariance combination, we estimated the country-specific distribution of residuals. We added random draws from each distribution to each country and year of each estimate to capture fundamental model uncertainty. For each draw, we added government, prepaid private, and out-of-pocket health spending to DAH to derive our estimate for total health spending.

#### Context of future health spending estimates

To explore these health spending estimates in depth, we completed several additional analyses. First, we compared the amount of health spending among different income

classifications and regions. Second, we assessed the relationship between sociodemographic status and the shift away from out-of-pocket health financing. Third, we compared the amount of health spending in low-income countries with a set of international health financing targets.

#### Role of the funding source

The funder had no role in study design, data collection, data analysis, data interpretation, or writing of the report. The authors had full access to all the data in the study and had final responsibility to submit for publication.

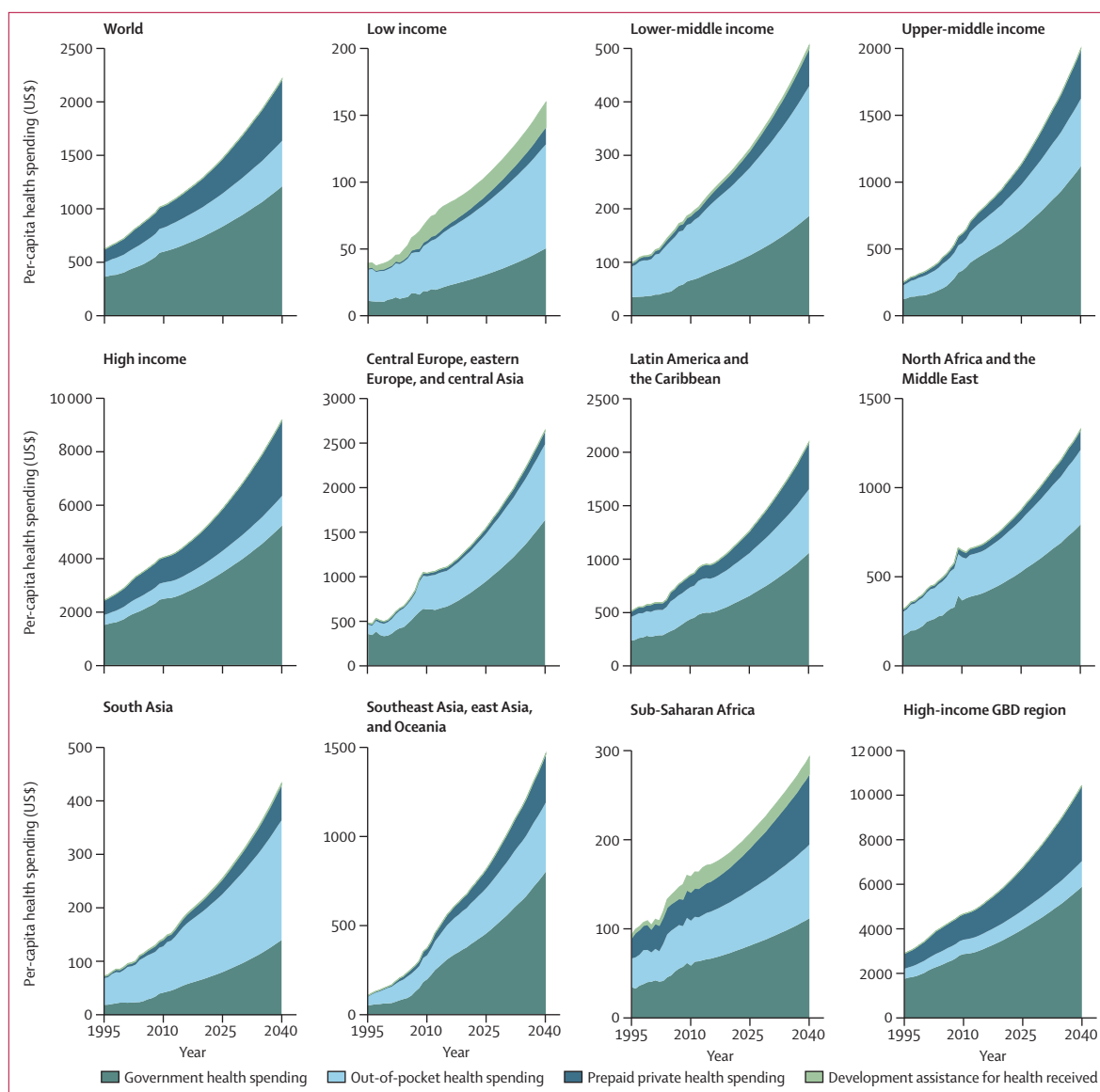
#### Results

In 2013, \$7.83 trillion was spent on health globally. By 2040, we expect health spending to expand to \$18.28 (UI 14.42–22.24) trillion worldwide. Figure 1 provides estimates of country-specific health spending per capita. Most striking is the persistent gap between health spending in high-income countries relative to other countries, particularly in sub-Saharan Africa (table 1). By contrast, past trends and relationships suggest that low-income countries will continue to spend much less on health than will high-income countries. Low-income countries spent \$0.03 on health per capita for every \$1 spent per capita by high-income countries in 1995 and 2013, and the same is projected for 2040. The lowest levels of total health spending will remain in sub-Saharan African countries, including the Democratic Republic of the Congo, Niger, Somalia, Mozambique, Madagascar, the Central African Republic, and South Sudan (table 1).

Figure 2 illustrates the evolution of health spending, measured in per-capita terms and disaggregated by World Bank income groups, GBD super region, and source (lists of which countries are included in these groupings are given in the appendix). All regions show substantial growth, although the level of actual spending varies dramatically. Health spending per capita is lowest in low-income and lower-middle-income countries, at \$84 per capita in low-income countries and \$217 per capita in lower-middle-income countries. This spending is expected to rise to \$164 (UI 132–202) per capita in low-income countries and \$507 (413–590) per capita in lower-middle-income countries. Spending in both income groups is well below the estimates of spending for high-income countries, which is \$9019 (7165–10 949) per capita. Across the regions, per-capita spending is lowest in sub-Saharan Africa, at \$294 (227–361), and south Asia, at \$440 (355–507). Table 1 provides estimates for the year 2040 for each income group, region, and country included in the study, and associated figures are in the appendix.

Table 1 also makes evident how the financing of health spending varies by income group and region. The share of total health spending financed through

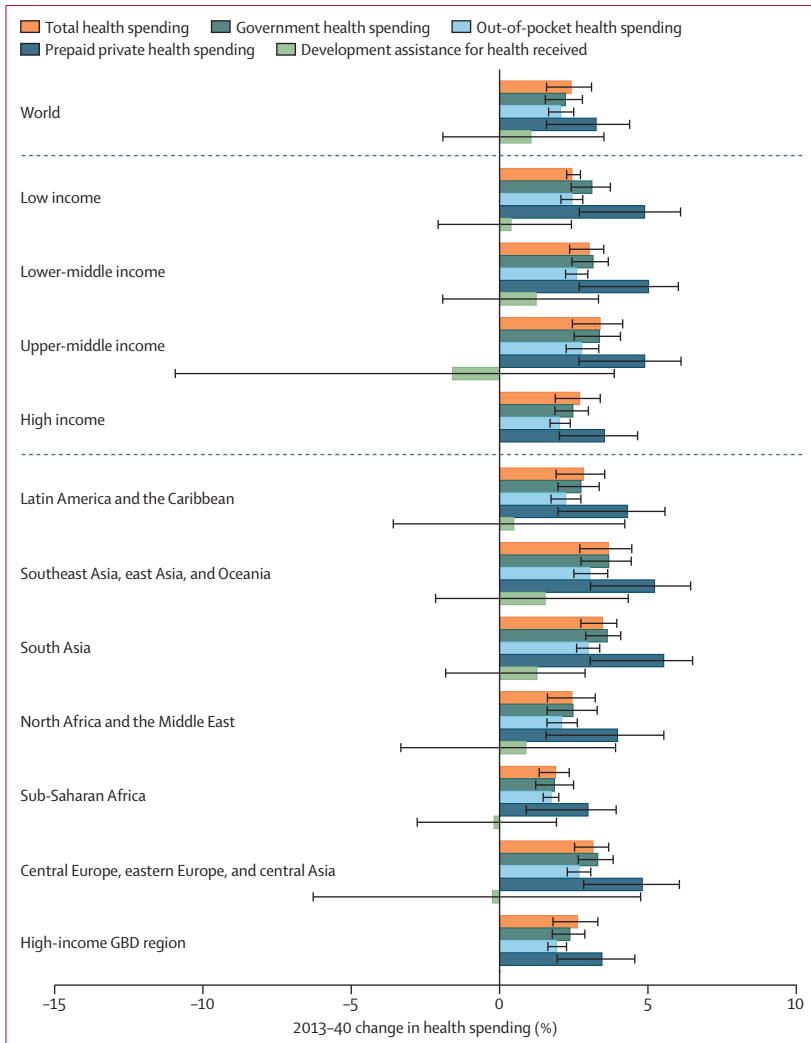




**Figure 2: Health spending per capita by income group and GBD super region**  
GBD=Global Burden of Disease.

out-of-pocket spending is highest in low-income settings and south Asia. In accordance with the health financing transition, out-of-pocket health spending is lowest in high-income countries. Government health spending tends to rise with income. It is lowest, as a share of total health spending, in south Asia and sub-Saharan Africa. By contrast, all other regions are estimated to finance more than 50% of their health spending via the government. The share of health spending that is prepaid private spending is estimated to be highest in high-income countries. Central Europe, eastern Europe, and central Asia, and north Africa and the Middle East have the lowest total spending using prepaid private mechanisms.

Figure 3 shows that, across most sources and all regions, health spending is increasing over time. Globally, total health spending per capita is expected to increase by 2.4% (UI 1.6–3.1) annually from 2013 to 2040, slightly greater than the 1.8% (1.1–2.6) in gains expected for GDP per capita. According to our estimates, spending will increase most rapidly in upper-middle-income countries (3.4% [UI 2.4–4.2]) and southeast Asia, east Asia, and Oceania (3.7% [2.7–4.5]). Health spending growth is estimated to be the lowest in sub-Saharan Africa, where we estimate 1.9% (0.9–2.6) annualised growth between 2013 and 2040. For all income groups and regions, prepaid private health spending is growing the fastest, whereas DAH is growing



**Figure 3: Annualised growth in per-capita health spending by source and Global Burden of Disease super region**  
 Error bars represent the uncertainty interval. GBD=Global Burden of Disease.

the least or even shrinking, although substantive uncertainty prevents these differences from being statistically significant. Table 2 reports 2040 estimates, but provides them as a share of GDP. As a share of GDP, health spending is highest in high-income countries, lower in upper-middle-income and lower-middle-income countries, and substantially lower in low-income countries.

Figure 4 illustrates the association between socio-demographic status and health financing transition—ie, the higher the sociodemographic status, the higher the health spending and the greater the share of health spending that is prepaid. This trend, in turn, marks a shift away from out-of-pocket health financing. Over the next 25 years, we predict that southeast Asia, east Asia, and Oceania will increase most substantially, transitioning from the 52nd sociodemographic percentile to the 86th, increasing the share of domestic health financing that is

prepaid from 64.9% (UI 61.9–68.9) to 70.6% (50.8–90.0). Latin America and the Caribbean will also show a considerably larger reliance on prepaid financing in 2040 than in 2013, growing from 65.9% (63.4–68.7) in 2013 to 71.3% (51.7–89.4) in 2040; its sociodemographic percentile is also expected to increase, starting at the 48th percentile in 2013 and reaching the 81st percentile in 2040. Although we expect a shift in all regions to a greater share of prepaid health financing in 2040 than in 2015, considerable variation is expected to remain, even in 2040. South Asia continues to spend a great deal out of pocket, with 48.3% (34.7–57.4) of domestic health financing prepaid. In comparison, the high-income GBD super region operates with 88.6% (86.8–89.9) of health spending originating with prepaid sources in the year 2040.

Table 3 compares countries' expected spending in 2040 against three health spending targets set by Chatham House. The first Chatham House benchmark is that \$86 per capita be spent on health. Chatham House found that \$86 was required to ensure access to primary health care.<sup>25</sup> The second benchmark is that this \$86 per capita should be financed by the government to provide universal access to services and protection against catastrophic health spending.<sup>26</sup> Finally, the third benchmark is that 5% of GDP should be spent on health by the government. Chatham House found that when government health spending was greater than 5% of GDP, few households faced financial difficulties related to health costs.<sup>25</sup>

All three benchmarks suggest that a health spending gap exists in some settings (table 3). Six (13%) of 45 low-income countries in sub-Saharan Africa are not estimated to spend \$86 per capita on health, even in 2040 (benchmark 1). 35 (44%) of 80 low-income and lower-middle-income countries are not estimated to have governments that spend that amount on health, per capita (benchmark 2). Finally, 111 (60%) of the 184 countries are not estimated to have governments that will spend 5% of national GDP on health in 2040 (benchmark 3). This includes nearly all low-income countries, many middle-income countries, and 16 high-income countries.

### Discussion

On the basis of past trends and relationships, we expect that the future will include more resources spent on health than in the past. This increased spending corresponds to the expectation of the health financing transition, which suggests that as countries develop, they spend more on health than they did before. This expected growth is driven by long-term trends showing that, over time, countries spend an increasing amount on health. Previous research suggests that these increases are due to long-term growth in national income and spending power, prices and medical inflation, and novel, but costly interventions that are on patent or simply more expensive than are the interventions that they replace.<sup>27</sup> Additionally,

|  | 1995<br>THE per<br>GDP (%) | 2013<br>THE per<br>GDP (%) | 2040 THE per GDP<br>(%) |
|--|----------------------------|----------------------------|-------------------------|
| <b>Global</b>                                    | 6.0%                       | 7.1%                       | 9.0% (7.2–10.9)         |
| <b>Income group</b>                              |                            |                            |                         |
| High income                                      | 6.4%                       | 7.5%                       | 9.8% (7.9–11.7)         |
| Upper-middle income                              | 5.4%                       | 6.2%                       | 7.9% (6.3–9.7)          |
| Lower-middle income                              | 4.7%                       | 6.0%                       | 7.2% (5.7–9.4)          |
| Low income                                       | 4.6%                       | 5.5%                       | 5.7% (4.6–7.4)          |
| <b>Global Burden of Disease super region</b>     |                            |                            |                         |
| High income                                      | 7.4%                       | 9.1%                       | 11.5% (9.4–13.5)        |
| Central Europe, eastern Europe, and central Asia | 6.2%                       | 6.7%                       | 8.2% (6.8–9.6)          |
| Latin America and the Caribbean                  | 5.4%                       | 6.5%                       | 8.3% (6.6–10.0)         |
| North Africa and the Middle East                 | 3.8%                       | 3.7%                       | 5.5% (4.0–7.5)          |
| Southeast Asia, east Asia, and Oceania           | 4.4%                       | 5.4%                       | 6.8% (5.1–9.6)          |
| Sub-Saharan Africa                               | 4.5%                       | 5.5%                       | 6.8% (5.2–8.8)          |
| South Asia                                       | 3.8%                       | 3.7%                       | 4.4% (3.6–5.3)          |
| <b>Country</b>                                   |                            |                            |                         |
| Afghanistan                                      | 7.5%                       | 8.3%                       | 8.1% (6.9–9.4)          |
| Albania  | 9.6%                       | 5.9%                       | 6.9% (5.8–8.1)          |
| Algeria  | 3.7%                       | 6.6%                       | 8.1% (6.7–9.4)          |
| Andorra  | 6.0%                       | 8.1%                       | 9.8% (8.2–11.5)         |
| Angola   | 4.5%                       | 3.8%                       | 4.5% (3.7–5.7)          |
| Antigua and Barbuda                              | 4.9%                       | 4.9%                       | 6.4% (5.0–7.9)          |
| Argentina  | 8.3%                       | 7.1%                       | 8.8% (7.2–10.6)         |
| Armenia  | 6.4%                       | 4.6%                       | 5.4% (4.3–6.6)          |
| Australia  | 7.3%                       | 9.4%                       | 11.7% (9.7–14.0)        |
| Austria  | 9.6%                       | 11.0%                      | 13.6% (11.3–15.8)       |
| Azerbaijan                                       | 5.4%                       | 5.4%                       | 6.3% (5.2–7.6)          |
| Bahrain  | 4.2%                       | 4.9%                       | 7.2% (5.0–10.4)         |
| Bangladesh                                       | 3.5%                       | 3.7%                       | 4.2% (3.4–5.0)          |
| Barbados   | 5.2%                       | 6.8%                       | 8.4% (6.9–9.7)          |
| Belarus  | 6.3%                       | 6.1%                       | 7.3% (6.1–8.5)          |
| Belgium  | 7.6%                       | 11.2%                      | 13.3% (11.4–15.4)       |
| Belize   | 4.0%                       | 5.3%                       | 6.2% (4.7–8.4)          |
| Benin  | 4.8%                       | 5.1%                       | 5.6% (4.6–6.9)          |
| Bhutan   | 3.8%                       | 3.6%                       | 4.4% (3.5–5.5)          |
| Bolivia  | 4.3%                       | 6.2%                       | 7.4% (6.2–8.4)          |
| Bosnia and Herzegovina                           | 9.0%                       | 9.6%                       | 11.7% (9.6–13.8)        |
| Botswana   | 3.2%                       | 5.5%                       | 7.7% (5.3–10.3)         |
| Brazil   | 6.6%                       | 9.6%                       | 13.6% (9.9–17.1)        |
| Brunei   | 2.9%                       | 2.5%                       | 3.5% (2.6–5.0)          |
| Bulgaria   | 5.2%                       | 7.6%                       | 8.7% (7.5–10.0)         |
| Burkina Faso                                     | 4.3%                       | 6.1%                       | 6.7% (5.6–8.1)          |
| Burundi  | 4.7%                       | 5.7%                       | 5.6% (4.2–8.6)          |
| Cambodia   | 6.9%                       | 6.2%                       | 6.8% (5.7–8.4)          |
| Cameroon   | 3.8%                       | 5.1%                       | 5.4% (4.7–6.2)          |
| Canada   | 8.9%                       | 10.9%                      | 13.8% (11.2–16.3)       |
| Cape Verde                                       | 5.3%                       | 5.3%                       | 6.1% (4.7–8.7)          |

(Table 2 continues in next column)

|                                  | 1995<br>THE per<br>GDP (%) | 2013<br>THE per<br>GDP (%) | 2040 THE per GDP<br>(%) |
|----------------------------------|----------------------------|----------------------------|-------------------------|
| (Continued from previous column) |                            |                            |                         |
| Central African Republic         | 4.0%                       | 4.7%                       | 4.4% (3.4–7.9)          |
| Chad                             | 5.8%                       | 3.5%                       | 3.6% (3.1–4.3)          |
| Chile                            | 6.0%                       | 7.7%                       | 10.6% (7.9–13.0)        |
| China                            | 3.5%                       | 5.6%                       | 7.5% (5.7–9.4)          |
| Colombia                         | 6.7%                       | 6.8%                       | 9.2% (6.9–11.7)         |
| Comoros                          | 5.2%                       | 5.2%                       | 5.5% (4.2–12.2)         |
| Congo                            | 3.3%                       | 4.2%                       | 4.8% (4.1–5.9)          |
| Costa Rica                       | 6.5%                       | 9.8%                       | 12.3% (10.0–14.5)       |
| Côte d'Ivoire                    | 6.3%                       | 5.7%                       | 6.5% (5.4–7.8)          |
| Croatia                          | 6.9%                       | 7.3%                       | 9.2% (7.6–10.7)         |
| Cuba                             | 5.1%                       | 8.8%                       | 11.5% (9.1–13.9)        |
| Cyprus                           | 4.7%                       | 7.4%                       | 9.1% (7.5–10.6)         |
| Czech Republic                   | 6.6%                       | 7.2%                       | 8.7% (7.4–9.9)          |
| Democratic Republic of the Congo | 3.3%                       | 4.3%                       | 3.4% (2.5–4.5)          |
| Denmark                          | 8.1%                       | 10.6%                      | 12.5% (10.8–14.6)       |
| Djibouti                         | 4.1%                       | 9.4%                       | 10.9% (8.8–13.8)        |
| Dominica                         | 5.8%                       | 5.9%                       | 7.2% (6.0–8.4)          |
| Dominican Republic               | 5.1%                       | 5.4%                       | 6.8% (5.3–8.1)          |
| Ecuador                          | 3.2%                       | 7.5%                       | 9.0% (7.3–10.5)         |
| Egypt                            | 3.8%                       | 5.1%                       | 5.7% (5.1–6.4)          |
| El Salvador                      | 6.5%                       | 7.0%                       | 8.7% (7.0–10.3)         |
| Equatorial Guinea                | 5.5%                       | 3.5%                       | 4.2% (3.3–5.2)          |
| Eritrea                          | 4.6%                       | 3.1%                       | 3.3% (2.5–5.4)          |
| Estonia                          | 6.3%                       | 5.7%                       | 6.9% (5.8–8.1)          |
| Ethiopia                         | 2.8%                       | 4.7%                       | 4.3% (3.5–5.2)          |
| Federated States of Micronesia   | 9.3%                       | 15.4%                      | 18.0% (13.2–34.1)       |
| Fiji                             | 3.1%                       | 4.2%                       | 5.3% (3.9–6.6)          |
| Finland                          | 7.8%                       | 9.4%                       | 11.3% (9.6–13.2)        |
| France                           | 10.4%                      | 11.7%                      | 14.7% (12.0–17.6)       |
| Gabon                            | 3.4%                       | 3.8%                       | 4.4% (3.8–5.3)          |
| Georgia                          | 5.4%                       | 9.3%                       | 11.3% (9.0–14.1)        |
| Germany                          | 10.1%                      | 11.3%                      | 14.2% (11.6–16.4)       |
| Ghana                            | 3.0%                       | 5.4%                       | 6.1% (5.1–7.1)          |
| Greece                           | 9.6%                       | 9.8%                       | 11.9% (10.0–13.4)       |
| Grenada                          | 6.8%                       | 6.3%                       | 7.4% (6.3–8.4)          |
| Guatemala                        | 4.0%                       | 6.0%                       | 7.0% (5.9–8.0)          |
| Guinea                           | 3.3%                       | 4.5%                       | 4.9% (4.2–6.3)          |
| Guinea-Bissau                    | 6.2%                       | 5.8%                       | 4.9% (3.6–8.0)          |
| Guyana                           | 5.1%                       | 6.7%                       | 8.1% (6.1–10.2)         |
| Haiti                            | 6.4%                       | 6.3%                       | 5.4% (4.0–7.2)          |
| Honduras                         | 5.3%                       | 8.8%                       | 10.8% (8.6–12.9)        |
| Hungary                          | 7.2%                       | 7.9%                       | 9.6% (7.9–11.4)         |
| Iceland                          | 8.2%                       | 9.1%                       | 11.0% (9.3–12.4)        |
| India                            | 4.0%                       | 3.9%                       | 4.9% (3.9–5.6)          |
| Indonesia                        | 1.9%                       | 3.0%                       | 4.0% (3.0–4.7)          |
| Iran                             | 3.8%                       | 6.7%                       | 8.7% (6.8–11.0)         |
| Iraq                             | 6.1%                       | 5.2%                       | 6.2% (4.9–7.7)          |
| Ireland                          | 6.6%                       | 8.9%                       | 11.6% (9.2–13.7)        |

(Table 2 continues in next column)

|                                  | 1995<br>THE per<br>GDP (%) | 2013<br>THE per<br>GDP (%) | 2040 THE per GDP<br>(%) |
|----------------------------------|----------------------------|----------------------------|-------------------------|
| (Continued from previous column) |                            |                            |                         |
| Israel                           | 7.3%                       | 7.2%                       | 8.9% (7.4–10.7)         |
| Italy                            | 7.1%                       | 9.1%                       | 11.1% (9.3–12.6)        |
| Jamaica                          | 4.1%                       | 5.8%                       | 8.0% (5.9–9.8)          |
| Japan                            | 6.8%                       | 10.3%                      | 12.4% (10.5–14.2)       |
| Jordan                           | 8.3%                       | 7.2%                       | 9.2% (7.1–11.1)         |
| Kazakhstan                       | 4.6%                       | 4.3%                       | 4.9% (4.2–5.7)          |
| Kenya                            | 4.0%                       | 5.0%                       | 4.9% (3.9–6.0)          |
| Kiribati                         | 9.9%                       | 14.4%                      | 15.8% (9.6–44.5)        |
| Kuwait                           | 3.8%                       | 2.9%                       | 4.0% (2.9–5.5)          |
| Kyrgyzstan                       | 5.6%                       | 6.5%                       | 7.7% (6.2–9.9)          |
| Laos                             | 4.0%                       | 1.8%                       | 1.9% (1.5–2.6)          |
| Latvia                           | 5.8%                       | 5.7%                       | 6.6% (5.8–7.6)          |
| Lebanon                          | 14.4%                      | 7.2%                       | 9.9% (7.3–12.1)         |
| Lesotho                          | 6.9%                       | 13.3%                      | 11.8% (9.1–15.5)        |
| Liberia                          | 5.0%                       | 8.4%                       | 6.3% (4.0–10.3)         |
| Libya                            | 3.3%                       | 4.3%                       | 5.5% (4.3–6.8)          |
| Lithuania                        | 5.2%                       | 6.2%                       | 7.2% (6.3–8.3)          |
| Luxembourg                       | 5.6%                       | 7.1%                       | 8.6% (7.2–10.3)         |
| Macedonia                        | 8.4%                       | 6.4%                       | 7.8% (6.5–9.1)          |
| Madagascar                       | 3.8%                       | 4.4%                       | 5.0% (4.0–6.2)          |
| Malawi                           | 4.2%                       | 8.3%                       | 8.3% (5.4–11.5)         |
| Malaysia                         | 2.8%                       | 4.0%                       | 5.2% (4.1–6.2)          |
| Maldives                         | 5.6%                       | 10.8%                      | 13.7% (10.9–16.8)       |
| Mali                             | 5.3%                       | 8.0%                       | 8.0% (7.0–9.5)          |
| Malta                            | 5.6%                       | 8.7%                       | 10.3% (8.8–11.7)        |
| Marshall Islands                 | 16.4%                      | 18.0%                      | 23.8% (17.0–40.5)       |
| Mauritania                       | 4.5%                       | 3.6%                       | 4.1% (3.5–5.0)          |
| Mauritius                        | 3.6%                       | 4.8%                       | 6.1% (4.8–7.3)          |
| Mexico                           | 5.1%                       | 6.2%                       | 7.8% (6.3–9.2)          |
| Moldova                          | 8.4%                       | 10.8%                      | 12.5% (10.2–14.9)       |
| Mongolia                         | 3.0%                       | 5.8%                       | 7.1% (5.3–9.1)          |
| Montenegro                       | 7.4%                       | 6.4%                       | 7.7% (6.4–8.8)          |
| Morocco                          | 3.9%                       | 6.0%                       | 7.3% (5.9–8.6)          |
| Mozambique                       | 5.0%                       | 5.6%                       | 4.3% (2.9–5.9)          |
| Myanmar                          | 2.2%                       | 1.9%                       | 2.1% (1.7–2.5)          |
| Namibia                          | 6.3%                       | 7.8%                       | 10.2% (7.1–12.6)        |
| Nepal                            | 5.2%                       | 5.4%                       | 5.9% (5.0–6.9)          |
| Netherlands                      | 8.3%                       | 12.0%                      | 14.9% (12.2–17.5)       |
| New Zealand                      | 7.0%                       | 9.7%                       | 12.1% (10.0–13.9)       |
| Nicaragua                        | 6.6%                       | 8.4%                       | 10.5% (8.2–13.2)        |
| Niger                            | 5.8%                       | 6.1%                       | 6.3% (5.3–8.4)          |
| Nigeria                          | 2.7%                       | 3.8%                       | 4.0% (3.5–4.6)          |
| Norway                           | 7.9%                       | 9.6%                       | 11.3% (9.8–13.0)        |
| Oman                             | 3.6%                       | 2.6%                       | 3.7% (2.7–5.0)          |
| Pakistan                         | 3.2%                       | 2.6%                       | 3.1% (2.6–3.5)          |
| Panama                           | 7.7%                       | 7.1%                       | 9.1% (7.3–10.8)         |
| Papua New Guinea                 | 3.5%                       | 5.6%                       | 5.7% (4.2–7.1)          |
| Paraguay                         | 5.9%                       | 9.0%                       | 10.6% (8.9–12.0)        |
| Peru                             | 4.5%                       | 5.2%                       | 6.5% (5.3–7.5)          |

(Table 2 continues in next column)

|                                     | 1995<br>THE per<br>GDP (%) | 2013<br>THE per<br>GDP (%) | 2040 THE per GDP<br>(%) |
|-------------------------------------|----------------------------|----------------------------|-------------------------|
| (Continued from previous column)    |                            |                            |                         |
| Philippines                         | 3.4%                       | 4.4%                       | 5.3% (4.3–6.1)          |
| Poland                              | 5.4%                       | 6.7%                       | 8.5% (6.9–9.7)          |
| Portugal                            | 7.5%                       | 9.7%                       | 12.3% (9.9–14.0)        |
| Qatar                               | 3.7%                       | 2.2%                       | 3.3% (2.1–5.3)          |
| Romania                             | 3.2%                       | 5.3%                       | 6.5% (5.3–7.7)          |
| Russia                              | 5.2%                       | 6.5%                       | 7.6% (6.4–8.8)          |
| Rwanda                              | 3.1%                       | 9.7%                       | 9.9% (7.2–12.7)         |
| Saint Lucia                         | 4.7%                       | 8.5%                       | 10.0% (8.1–12.1)        |
| Saint Vincent and the<br>Grenadines | 4.4%                       | 5.2%                       | 6.6% (5.3–7.9)          |
| Samoa                               | 5.2%                       | 8.3%                       | 9.4% (6.9–14.6)         |
| São Tomé and Príncipe               | 6.9%                       | 8.9%                       | 9.0% (6.8–17.0)         |
| Saudi Arabia                        | 2.9%                       | 3.2%                       | 4.5% (3.2–6.3)          |
| Senegal                             | 4.0%                       | 4.7%                       | 5.3% (4.2–6.6)          |
| Serbia                              | 6.7%                       | 10.6%                      | 12.4% (10.5–14.2)       |
| Seychelles                          | 5.2%                       | 4.1%                       | 5.6% (4.2–6.9)          |
| Sierra Leone                        | 10.5%                      | 8.9%                       | 9.5% (8.4–11.6)         |
| Singapore                           | 2.9%                       | 4.6%                       | 5.8% (4.5–7.4)          |
| Slovakia                            | 6.0%                       | 8.2%                       | 10.4% (8.2–12.4)        |
| Slovenia                            | 7.5%                       | 9.2%                       | 11.9% (9.5–14.0)        |
| Solomon Islands                     | 3.6%                       | 9.5%                       | 8.1% (5.0–16.7)         |
| Somalia                             | 2.7%                       | 3.9%                       | 3.8% (3.0–7.0)          |
| South Africa                        | 7.2%                       | 8.9%                       | 13.4% (9.1–16.6)        |
| South Korea                         | 3.8%                       | 7.2%                       | 9.4% (7.3–11.8)         |
| South Sudan                         | 2.0%                       | 2.8%                       | 2.5% (1.9–3.3)          |
| Spain                               | 7.4%                       | 8.9%                       | 11.2% (9.1–12.8)        |
| Sri Lanka                           | 3.4%                       | 3.2%                       | 4.0% (3.2–4.8)          |
| Sudan                               | 3.7%                       | 6.6%                       | 7.2% (6.2–8.3)          |
| Suriname                            | 5.6%                       | 4.4%                       | 5.7% (4.4–7.2)          |
| Swaziland                           | 4.2%                       | 7.7%                       | 8.8% (6.6–11.1)         |
| Sweden                              | 8.0%                       | 9.7%                       | 11.3% (9.9–13.5)        |
| Switzerland                         | 9.3%                       | 11.5%                      | 13.8% (11.6–16.3)       |
| Syria                               | 5.5%                       | 3.3%                       | 3.9% (3.2–4.6)          |
| Tajikistan                          | 3.0%                       | 6.3%                       | 7.1% (5.9–8.9)          |
| Tanzania                            | 3.4%                       | 5.5%                       | 5.3% (4.3–6.6)          |
| Thailand                            | 3.5%                       | 4.5%                       | 6.3% (4.7–7.9)          |
| The Bahamas                         | 6.9%                       | 7.3%                       | 10.0% (7.5–12.6)        |
| The Gambia                          | 2.4%                       | 5.4%                       | 5.4% (3.8–9.0)          |
| Timor-Leste                         | 1.9%                       | 1.6%                       | 1.6% (1.1–2.7)          |
| Togo                                | 4.4%                       | 8.4%                       | 9.0% (7.5–11.2)         |
| Tonga                               | 4.2%                       | 6.0%                       | 7.2% (4.7–15.2)         |
| Trinidad and Tobago                 | 4.7%                       | 5.5%                       | 6.9% (5.6–7.9)          |
| Tunisia                             | 5.8%                       | 7.0%                       | 8.7% (7.1–10.0)         |
| Turkey                              | 3.4%                       | 5.2%                       | 6.5% (5.3–7.5)          |
| Turkmenistan                        | 3.0%                       | 2.0%                       | 2.5% (2.0–3.1)          |
| Uganda                              | 5.2%                       | 8.4%                       | 9.0% (7.0–11.1)         |
| Ukraine                             | 7.7%                       | 7.8%                       | 9.0% (7.8–10.4)         |
| United Arab Emirates                | 2.6%                       | 3.2%                       | 5.2% (3.1–9.0)          |
| UK                                  | 6.7%                       | 9.1%                       | 11.1% (9.4–13.1)        |

(Table 2 continues in next column)

|                                  | 1995<br>THE per<br>GDP (%) | 2013<br>THE per<br>GDP (%) | 2040 THE per<br>GDP (%) |
|----------------------------------|----------------------------|----------------------------|-------------------------|
| (Continued from previous column) |                            |                            |                         |
| USA                              | 13.2%                      | 17.1%                      | 23.2% (17.8–28.9)       |
| Uruguay                          | 15.1%                      | 8.8%                       | 11.2% (9.0–13.2)        |
| Uzbekistan                       | 6.9%                       | 6.1%                       | 7.4% (6.1–8.6)          |
| Vanuatu                          | 2.8%                       | 7.5%                       | 8.1% (4.2–22.1)         |
| Venezuela                        | 4.1%                       | 3.4%                       | 4.1% (3.4–4.8)          |
| Vietnam                          | 5.2%                       | 5.9%                       | 7.4% (5.9–9.0)          |
| Yemen                            | 4.0%                       | 5.2%                       | 5.9% (5.0–7.1)          |
| Zambia                           | 4.3%                       | 6.2%                       | 6.3% (4.9–8.2)          |

Data in parentheses are uncertainty intervals. THE=total health expenditure. GDP=gross domestic product.

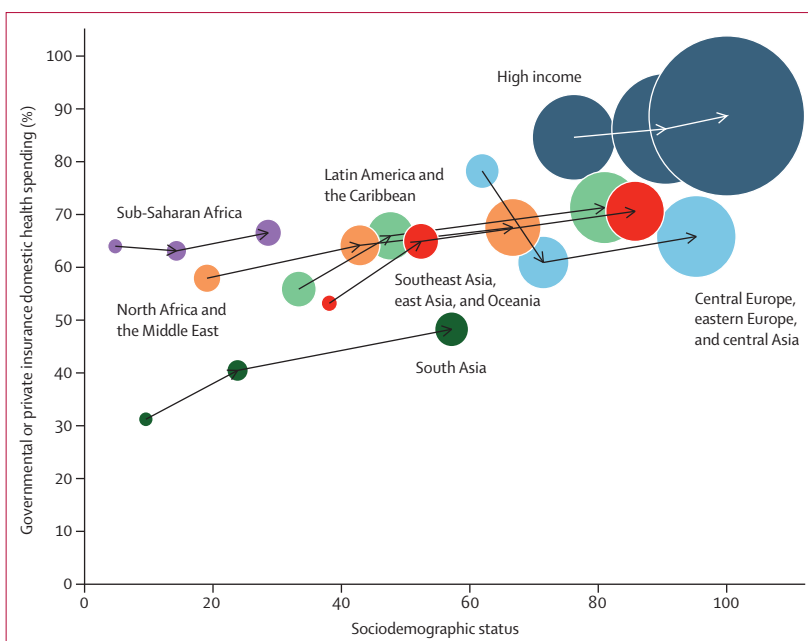
**Table 2: Health spending as a share of gross domestic product, by income group, region, country, and year**

populations in sub-Saharan Africa and south Asia are expected to continue to grow, whereas populations are expected to age in all regions. Larger and older populations generally require more health-care resources than do smaller and younger ones and are likely to continue to drive increases in health spending.<sup>27</sup>

In addition to increased health spending, we expect ongoing movement towards prepaid financing and away from out-of-pocket financing in all of the 184 countries. We estimate growth in government health spending in all countries, a key determinant in progress towards universal health coverage.<sup>28</sup> Prepaid private spending is estimated to increase most rapidly across sources and in all regions, although these estimates are surrounded by the most uncertainty. The projected growth is evidence of a transition away from out-of-pocket spending, an important driver of improved financial risk protection across regions.<sup>29</sup>

Despite the evidence of a global health financing transition, a close look highlights the sluggish nature of these transitions in some settings. Substantial variation exists in the amount of health spending across countries. Even within income groups, substantial variation exists. Although economic development is associated with high levels of health spending, this rule is not without exception. Within the lower-middle income group, 2040 total health spending per-capita estimates vary from \$163 (UI 126–222) in Laos to \$2064 (1651–2574) in Georgia. Total health spending per-capita estimates in 2040 in upper-middle income countries varies from \$360 (296–451) in Angola to \$4530 (3749–5390) in Hungary. These wide ranges highlight the role that policy can play in the catalysation of health spending.

In addition to low total health spending estimated for some countries, the share of out-of-pocket financing is expected to remain high in many countries. Like government and prepaid private spending, out-of-pocket spending is also expected to grow over the next 25 years. Although the growth estimates for out-of-pocket financing are lower than are those for



**Figure 4: Health financing transition by Global Burden of Disease super region**

Total health spending excluding development assistance for health. The size of the dot is scaled to reflect the amount of health spending per capita. Sociodemographic status is a function of lag-distributed income per capita, mean age, mean years of education, and total fertility rate. The dots from left to right represent 1995, 2013, and 2040.

government and prepaid private spending, these differences are not significant. A major portion of health financing is expected to remain out of pocket. This finding is especially true in south Asia, where more than half of health spending is expected to be out of pocket in 2040.

In addition to persistent dependence on out-of-pocket financing, tepid growth in health spending is expected in many of the places that need health investments the most. Annualised growth rates of total health spending are greatest for upper-middle-income countries, followed by lower-middle-income countries. Yet, many countries are not expected to reach some of the concrete financing targets set globally, even by 2040. Of 132 currently low-income and middle-income countries, only 37 are expected to reach the Chatham House goal of spending 5% of GDP on health.<sup>30</sup> Similarly, six countries in sub-Saharan Africa are not expected to reach the most basic target of \$86 per capita. Missing these targets suggests that some countries will not have sufficient resources to ensure access to essential health care. Moreover, we do not expect the spending gap between low-income and high-income countries to narrow. In 1995 and 2015, low-income countries spent \$0.03 for every dollar spent in high-income countries, even after adjusting for purchasing power, and the same is projected for 2040. For low-income and middle-income countries to reach international spending targets and close this gap, domestic and international health financing will need to increase beyond historical trends.

|  | Number of countries | Benchmark 1: THE $\geq$ US\$86 per capita (%) | Benchmark 2: Domestic GHE $\geq$ US\$86 per capita (%) | Benchmark 3: Domestic GHE $\geq$ 5% of GDP (%) |
|--|---------------------|---|--|--|
| <b>Income group</b>                          |                     |   |  |  |
| High income                                  | 52                  | 52 (100%)                                     | 52 (100%)  | 36 (69%)                                       |
| Upper-middle income                          | 52                  | 52 (100%)                                     | 52 (100%)  | 23 (44%)                                       |
| Lower-middle income                          | 46                  | 46 (100%)                                     | 38 (83%)   | 13 (28%)                                       |
| Low income                                   | 34                  | 28 (82%)                                      | 7 (21%)  | 1 (3%)   |
| <b>Global Burden of Disease super region</b> |                     |   |  |  |
| High income                                  | 33                  | 33 (100%)                                     | 33 (100%)  | 29 (88%)                                       |
| Central Europe                               | 29                  | 29 (100%)                                     | 29 (100%)  | 15 (52%)                                       |
| Latin America and the Caribbean              | 29                  | 29 (100%)                                     | 28 (97%)   | 14 (48%)                                       |
| Southeast Asia                               | 20                  | 20 (100%)                                     | 18 (90%)   | 4 (20%)  |
| North Africa and the Middle East             | 23                  | 23 (100%)                                     | 19 (83%)   | 5 (22%)  |
| Sub-Saharan Africa                           | 45                  | 39 (87%)                                      | 18 (40%)   | 6 (13%)  |
| South Asia                                   | 5                   | 5 (100%)                                      | 4 (80%)  | 0  |

Data are n (%). Benchmarks refer to Chatham House benchmarks. THE=total health expenditure. GHE=government health expenditure. GDP=gross domestic product.

**Table 3: Benchmarking country progress by 2040**

Historically, these financing gaps have been addressed in part by DAH. Over the last 25 years, remarkable growth has occurred in DAH, contributing to the provision of essential services for priority diseases, particularly in sub-Saharan Africa.<sup>31–33</sup> However, the future of how much health financing will be provided by donors and where those resources will be disbursed remains uncertain. Donor countries and development agencies are balancing an ever-increasing set of demands for their attention and resources, including the emerging migrant crisis and a heightened focus on climate change. The long-term effects of the global financial crisis are also at play. Yet, development assistance is likely to remain crucial to attain health goals, catalyse increases in domestic financing, and drive efficiency gains in low-income countries.

The primary limitations of this research revolve around data and the challenges of creation of long-term estimates on the basis of a short time series. For this research, we estimate up to 27 years of health spending on the basis of as little as 19 years of data. Long-run estimates are subject to large errors as repeated small errors in growth rates are compounded over the years. Given this uncertainty, results should be interpreted with caution. Additionally, this analysis uses observed trends and relationships to predict what health spending would look like without divergence from past trends. The estimates therefore assume no drastic changes to the ways in which these variables relate and assume that health-seeking behaviour, health insurance coverage, technology, and policy broadly evolve as they have in the past, associated with time, demographic changes, and economic development. In the future, we believe that

sophisticated models that consider diverse scenarios that include unexpected policy changes or changes to the demand for health care should be developed. Additionally, we know that the distribution of health spending varies widely within nearly all countries on the basis of income, status, and education. Therefore, our measurements of per-capita health spending are probably overestimates for the poorest and least educated groups within each country. Future research should also consider these within-country spending disparities. Nevertheless, we believe the value for decision makers of long-run estimates is high, especially for low-income countries' long-term growth or investment strategy and for advocacy purposes when a need exists to prioritise investment in health.

In addition to limitations related to estimation, numerous spending benchmarks have been recommended. This research focuses on three benchmarks produced by Chatham House.<sup>25</sup> Although these targets can serve as global benchmarks and provide inputs for estimation of global financing gaps, they are often not helpful for determination of appropriate levels of spending at the country level. Many countries spend more than these targets and have yet to provide a basic package of services to their population, whereas others spend less and achieve near-universal levels of population coverage. Instead of using global targets to assess what they should spend, governments should carefully assess what they can spend on improvement to the health sector. In many cases, how much a country can spend reflects the country's budgetary room to increase spending on health without crowding out investment in other sectors and impairing fiscal solvency over the medium and long term.

Past trends and relationships suggest that global health financing gaps will persist. However, gains in the amount spent on health and equitable distribution of funds for health is still possible. As pointed out by Evans and Pablos-Méndez,<sup>34</sup> a wide set of policy options can generate additional funds for health without adversely affecting other sectors. Many low-income country governments can raise health budgets by improving the capacity to raise tax revenue and prioritise health spending, and scope exists for better harnessing of private financing than in the past. Together, governments, the private sector, and international development partners can implement changes that can improve health system efficiency.

With this conclusion in mind, projections like these can be a catalyst for change. Broad variation in spending levels and composition suggests that much remains to be established about the future of health financing. Using estimates based on trends and relationships from the recent past, policy makers, health advocates, and others are better equipped than without these estimates to take action now to ensure sufficient resources are available for health.

## Contributors

JLD managed the research project and wrote the first draft of the report. NS and TT collected data, created databases, and completed all analyses. KF, TT, PR, NS, and JLD developed the methods. All authors interpreted results. All authors reviewed and contributed to the final draft.

## Declaration of interests

We declare no competing interests.

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