Universal health coverage in Indonesia: concept, progress, and challenges


Indonesia is a rapidly growing middle-income country with 262 million inhabitants from more than 300 ethnic and 730 language groups spread over 17,744 islands, and presents unique challenges for health systems and universal health coverage (UHC). From 1960 to 2001, the centralised health system of Indonesia made gains as medical care infrastructure grew from virtually no primary health centres to 20,900 centres. Life expectancy improved from 48 to 69 years, infant mortality decreased from 76 deaths per 1000 live births to 23 per 1000, and the total fertility rate decreased from 5.61 to 2.11. However, gains across the country were starkly uneven with major health gaps, such as the stagnant maternal mortality of around 300 deaths per 100,000 live births, and minimal change in neonatal mortality. The centralised one-size-fits-all approach did not address the complexity and diversity in population density and dispersion across islands, diets, diseases, local living styles, health beliefs, human development, and community participation. Decentralisation of governance to 354 districts in 2001, and currently 514 districts, further increased health system heterogeneity and exacerbated equity gaps. The novel UHC system introduced in 2014 focused on accommodating diversity with flexible and adaptive implementation features and rapid evidence-driven decisions based on changing needs. The UHC system grew rapidly and covers 203 million people, the single-largest payer scheme in the world, and has improved health equity and service coverage. With early success, challenges have emerged, such as the so-called missing-middle group, a term used to designate the smaller number of people who have enrolled in UHC in wealth quintiles Q2–Q3 than in other quintiles, and the low UHC coverage of children from birth to age 4 years. Moreover, high costs for non-communicable diseases warrant new features for prevention and promotion of healthy lifestyles, and investment in a robust integrated digital health-information system for frontline health workers is crucial for impact and sustainability. This Review describes the innovative UHC initiative of Indonesia along with the future roadmap required to meet sustainable development goals by 2030.

Introduction

Indonesia is a middle-income country with 262 million inhabitants spread over 17,744 islands. Over the past decade, its gross domestic product (GDP) grew 5–6% per year. The country also achieved a Gini coefficient of 0.41 and a human development index (HDI) of 0.69, placing Indonesia in the upper ranks of countries with a median human-development index, and among the best performers in the Asia-Pacific region. However, socioeconomic conditions vary widely across the country, and internal migration and urbanisation is high. Health indicators reveal a high burden [A: edit from ‘double burden’ for clarity] with high maternal mortality (359 deaths per 100,000 live births), childhood stunting (31% in children younger than 5 years), tuberculosis (1 million new cases per year), a steep rise in obesity from 10% in 2007 to 21% in 2016, and a rise in non-communicable diseases, including a 63% increase in the number of diabetes cases since 2005. Moreover, because of substantial variations in disease burden by wealth quintile and in rural versus urban residence, and because of a fragmented health financing and insurance system, by 2013, 121 million people (47% of the population) did not have access to adequate health care. A universal health coverage (UHC) scheme that was adaptable and could accommodate these diverse needs and conditions, assure financial risk protection, and assure access to safe, affordable, and effective health care for all as mandated by the sustainable development goals (SDGs) was needed. In response, by 2014, the Government of Indonesia launched a comprehensive UHC programme called the National Health Insurance System (NHIS; or Jamkesat Nasional)—a single-payer UHC system. With 203 million members in October, 2018, the Indonesian NHIS is the largest single-payer system in the world, and by 2017 was already managing 223.4 million consultations for both primary and advanced treatments, amounting to US$20–15 billion in advanced treatments, amounting to US$20–15 billion.
which abbreviations you would like to spell out]
of ethnic, linguistic, cultural, genetic, dietary, geographical, and natural diversity. Indonesian is the lingua franca spoken widely across the islands; however, Indonesia hosts more than 730 languages associated with more than 300 ethnic groups.5,9 Given the country’s location on the volcanic and tectonically unstable Pacific Ring of Fire, Indonesia has frequent earthquakes and volcanic eruptions. Located along the equator, Indonesia maintains a tropical rainforest climate. The mix of Asian and Australasian flora and fauna comprise the world’s third highest level of biodiversity.12 These conditions resulted in diverse agricultural practices that sustained the high population densities of the islands of Bali and Java, as well as the sparsely populated Kalimantan and Papua regions.13 This high-dimensional diversity can be traced to multiple geological, historical, and prehistoric events.

Over many centuries, multiple human migrations and interactions led to a plurality of ethnic identities and mixed cultural and religious practices influenced by Indian, Arabic, Chinese, and European traditions, and Hindu, Buddhist, Confucian, Islamic, and Christian beliefs.14 From 1800, the Dutch controlled much of the archipelago, and by the early 1900s had established the boundaries that would become Indonesia. Indonesia declared its independence on Aug 17, 1945, and is a democratic country with a presidential system consisting of executive and legislative branches. The national emblem of Indonesia is a勝利 and by the early 1900s had established the boundaries that would become Indonesia. Indonesia declared its independence on Aug 17, 1945, and is a democratic country with a presidential system consisting of executive and legislative branches. The national emblem of Indonesia is

### Rapid demographic transition

Although Indonesia’s population is spread across thousands of islands, with the largest being Java,
Kalimantan, Papua, Sulawesi, and Sumatera, more than 80% of the population is concentrated in Java and Sumatera (figure 2A). The urban population makes up 55% of the population of Indonesia, and is expected to increase to 63% by 2030. Population growth has been steadily declining over the past few decades, with a drop in total fertility rate from 5.61 in 1971 to 2.4 in 2017, and an annual growth rate of 1.2%. Only 19% of the population is older than 50 years, with 5% being older than 65 years, but these proportions are expected to increase sharply, reaching 25% older than 50 years and 10% older than 65 years by 2030. These dynamic shifts have important implications for the health system and UHC.

**National and regional socioeconomic development**

Indonesia is a member of the G20 major economies, and its GDP per capita has increased from $80 in 1970 to $3570 in 2016, placing it in the upper range of LMICs. Indonesia’s annual growth rate of 5.6% is the second fastest in Asia, after China, and the country is the largest economy in southeast Asia, and the eighth largest in the world based on GDP and PPP. The transition to democracy, progressive economic policy, and fair economic institutions have generated growth and transformed the economy, and the country will soon attain World Bank upper-middle income status.

The head-count ratio as measured with the national poverty line declined from 21.6% in 1984 to 10.6% in 2017, and the proportion of people who earn less than $1-90 per day in PPP decreased from 70-3% in 1984 to 8-2% in 2014 [A: as per the comment in your corrections, have you been able to check this figure?].

The economic recovery after the crisis led to both declining poverty and increasing income inequality, as seen in the Gini index increase from 0.36 to 0.41 from 2005 to 2014. Notably, the economic recovery has been steady, but accompanied by increasing economic and social disparities that are greater than most other east-Asian countries.

The inequities in health indicators, such as mortality rates, availability of health-care services, and people living below the poverty line are reflected in high variability across and within provinces and districts (figure 2B–D show provincial-level variability). Although the national head-count ratio was 10.6% in 2017, provinces in eastern Indonesia such as Maluku, Papua, and West Papua were three times greater than the national ratio, whereas DKI Jakarta, Bali, North Sulawesi, and Bangka Belitung were less than half the national ratio. Disparities include provinces with high poverty and high inequality (eg, Papua, West Papua, and

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**Figure 1: History and future direction of the Indonesian health insurance programme**

Reproduced from Dartanto and co-workers. [A: Did you create the figure from data in Dartanto et al? If not, and you instead adapted their figure, you will still need to obtain permission from them to reproduce the figure] GOI=Government of Indonesia. NHIS=National Health Insurance System. VOC=Vereenigde Oostindische Compagnie. [A: define ASABRI, JPS, BPDPK, and PKPKS]
Figure 2: Provincial differences in population density, socioeconomic index, health indicators (maternal mortality rate), and health-care services (ratio of medical doctors, midwives, nurses, and beds) in Indonesia [A: please clarify, (C) appears to show health infrastructure index and (D) infant mortality rate?]

(A) Population density in 2015. (B) Socioeconomic index (PDRB [A: define] per capita, fiscal capacity, poverty rates, and Gini index [A: are these the factors that are used to calculate the socioeconomic index? What are the units of this index?] in 2015. (C) Health infrastructure index (doctors, midwives, nurses, and hospital beds [A: were these used to calculate the index?] in 2015. (D) Infant mortality rate in 2015.
In addition, crises such as conflicts, acts of terrorism, natural disasters, monetary collapses, and sudden reductions of subsidies for core commodities are all seen in Indonesia and cause severe loss of household income and assets. Improvements in infrastructure, social mobilisation, national security, and a well-functioning local democracy buffer these effects and improve prosperity. Following several acts of terrorism, especially in 2000 and 2002, the Government of Indonesia initiated counter-terrorism measures. Progress was made as acts of terrorism decreased, and by 2015, Indonesia joined the other major economies in the G20 that were recognised for cooperation in the global fight against money laundering and terrorist financing. In this context, we note UHC has a substantial role in reducing inequality and risk of catastrophic financial burden among people living in poverty, and this social protection has been associated with decreased risk of extremism and acts of terrorism. These conditions indicate that UHC should be designed as an adaptive system that is robust to rapid increases in the need for services due to social and security instabilities and crises.

Increased income has led to population benefits. Secondary school enrolment increased from 34% in 1984 to 86% in 2014, the infant mortality ratio decreased from 76 deaths per 1000 live births in 1984 to 24 per 1000 in 2017, and the HDI increased from 0·528 in 1990 to 0·689 in 2015. Government policies that broaden access to education through scholarship and health services are expected to further improve the HDI.

Health situation

Indonesia is among the most rapidly transforming societies with respect to health and nutritional status, similar to China, India, Brazil, and Mexico. There are prominent burdens of infectious diseases and non-communicable diseases, of undernutrition and obesity. The top ten causes of death in most age groups are predominantly non-communicable diseases (appendix). The improvement in life expectancy from 48·6 years in 1960 to 71·7 years in 2017 has been accompanied by growth in the young and older population. The older population consisted of 9% of the total population in 2017 and is projected to reach 15% in 2035. This demographic shift is important for UHC because the proportion of elderly people who were ill reached 29% in 2015, with hypertension, arthritis, and stroke being the most prevalent problems. Unfortunately, nearly a third of these individuals did not seek medical help, one reason being the cost of treatment.

Maternal mortality and its determinants

Skilled attendance at birth increased from 49% in 1997 to 83% in 2012, and facility-based births increased from 26% to 63%. However, although the maternal mortality ratio (MMR) fell in other LMICs, in Indonesia the ratio remained high and stagnant, around 300 maternal deaths per 100 000 live births from 1994 to 2014 (figure 3). This high mortality rate has been linked to poor quality of care and delayed referral. These problems were highlighted in the 2011 National Survey of Health Facilities, which revealed that only 60% of districts and 85% of cities had functional basic emergency obstetrical and neonatal care centres (appendix). More than 21% of health centres had limited referral transportation, and 35% had limited 24 h clean water and electricity. Among government district and city hospitals, nearly 80% failed the required criteria for comprehensive emergency obstetrical and neonatal care centres (appendix), with 17% not having an obstetrician-gynaecologist, 51% not having an anaesthetist, and 47% with doctors not trained in comprehensive emergency obstetrical and neonatal care procedures. Furthermore,
50% of midwives had no comprehensive emergency obstetrical and neonatal care training. Although geographical constraints of Indonesia as an archipelago country hamper optimal distribution of health services, other factors have had a role, such as urban and rural location, and wealth and education. Nevertheless, overall utilisation of maternal health services has steadily increased. The proportion of pregnant women who visited a health provider for antenatal care in 1994 was already high at 82%, and by 2012 had increased to 90% (figure 3), echoing progress in other countries (appendix), although inequities across provinces and socioeconomic status are present. For example, skilled attendance at birth was 20% greater in wealth quintile Q1 than in quintile Q5, and more than 20% of overall deliveries were at home with an unskilled attendant or family member, especially for people living in poverty.

With regard to contraception, after the Government of Indonesia established the National Population and Family Planning Agency in 1987, large gains were made until 1997, when 58% of couples used modern contraception, and with only a small gap in use between high and low income groups. However, this gap remained unchanged through 2013, despite the Health Law of 2009 mandating availability of modern contraception in all primary health-care facilities. These conditions highlight the need for UHC to address the challenges of maternal health and safe delivery, and reproductive services in general.

Neonatal, infant, and under-5 child mortality rates and determinants
Reducing overall child mortality is a high priority because declines tend to precede a decrease in the fertility rate and population growth, both key determinants of development. However, the neonatal mortality rate has remained relatively unchanged at about 15 deaths per 1000 live births for the past decade, much like the maternal mortality rate (appendix), and these mortality rates share common health-system and biomedical-risk factors. Neonatal mortality rate is influenced by antenatal care and factors such as maternal nutrition and the quality of delivery and newborn care. By contrast, the infant mortality ratio did decline from 46 deaths per 1000 live births in 1997 to 24 deaths per 1000 live births in 2017, with similar trends for under-5 child mortality rates, which declined from 58 deaths per 1000 live births in 1997 to 32 per 1000 in 2017 [A: please ensure all numbers are now correct] (appendix). This decrease indicates the success of vaccination programmes, and to some extent community-based treatment of infections. Although substantial, these decreases in mortality did not match reductions seen in other middle-income countries, such as Thailand, Turkey, and Brazil (appendix), and this slower decrease was due to the slower declines in mortality after 2002, indicating emergent challenges associated with heterogeneous health systems and conditions following decentralisation.

Large geographical variation in key indicators, such as mortality rates, is a primary challenge for Indonesia and for any UHC system, because geographical variation can indicate systemic factors at the regional level requiring more tailored solutions. Neonatal mortality rate, infant mortality rate, and under-5 child mortality rate differ between provinces (appendix), along with differences in causes of death, such as diarrhoea and acute respiratory infection, and more distal factors, such as immunisation, maternal education, wealth, and urban–rural location. To be effective, UHC would therefore need to coordinate with efforts to improve health systems and service delivery standards. A broader role for UHC in the health system, strengthening and improving access to care, is therefore indicated [A: sentence edited correctly?].

Equity in health programme coverage and status
Equity in access to health services is crucial, and although the coverage of essential child and maternal health services has increased (figure 3; appendix), inequities persist (figure 2D). Coverage of complete diphtheria-tetanus-pertussis vaccination in 2012 was more than 75% for the three wealthiest quintiles, but less than 53% for the two poorest quintiles. Gaps are also seen between people with high incomes and those with low incomes with respect to low maternal education, early marriage, frequent migration, and further segregation can be seen by religion, language spoken, and geography. In general, these gaps have remained steady over the past decade, indicating persistent inequity in service delivery (figure 2B, C), again underscoring the need for UHC to ensure adequate access to needed services for all, and to adapt to varying conditions across the country.

Nutritional problems
Over the past decade, the national dietary quality has declined along with the reduction of physical activity. Dietary factors account for the greatest share of death and disability. A national survey in 2014 reported that 46% of the population consumed less than 70% of the recommended dietary allowance in energy, whereas 20% had more than 100% of the allowance. Average consumption of refined sugar, salt, and fat exceeded the recommended daily upper limit. Moreover, average daily intake was only 43 g for animal protein, 57 g for vegetables, and 34 g for fruits. All these intakes fall short of the Ministry of Health recommendations for a balanced daily diet of 70–140 g of animal protein, 250 g of vegetables, and 150 g of fruits, with an especially wide gap between the recommended and average daily intake for fruits and vegetables. These patterns underline, in part, the persistent and emerging nutritional problems and rise in non-communicable diseases.

Among the nutritional indicators, stunting has become a key measure of childhood undernutrition because of its high prevalence globally and its importance for health and...
other developmental outcomes.14 Stunting in children younger than 5 years has remained high at above 30% over the past decade (appendix),22,23,69 with multiple contributing factors including low socioeconomic status, low maternal education and health, short maternal stature due to prior stunted growth, low birth weight, poor sanitation, childhood infections, poor dietary quantity and quality, poor parenting skills, and parental stress.14 Low birth weight, a key risk factor for stunting, has remained at 11% over the past decade, until a decline to 7% in 2016 (appendix). Iron deficiency also remains high, leading to a 37% prevalence of anaemia in pregnant women,13 and associated foetal growth restriction contributing to low birth weight and stunting. Maternal deficiencies of multiple micronutrients are prevalent, and maternal multiple micronutrient supplementation in Indonesia has been shown in the large-scale SUMMIT trial46 to improve birth weight and reduce mortality in children, especially for girls and infants of mothers who were anaemic in pregnancy, and led to improved long-term cognitive development in children.15 Stunting in girls has special relevance because it leads to women of short stature who are more likely to have children who are stunted. Inequities are apparent for stunting and low birth weight between the poorest and richest quintiles (appendix). In 2013, about 49% of children younger than 5 years in the poorest quintile were stunted, almost double the 29% in the richest quintile. A narrower gap is seen for low birth weight than for stunting, with a prevalence of 13% in the poorest quintile compared with 8% in the richest quintile. Childhood stunting is associated with increased risk for elevated body-mass index, hypertension, and diabetes, which therefore increase long-term health claims for UHC.48,49 For example, 23% of UHC claims that are estimated to be related to hypertension may be attributed to stunting.35 Recognising this, the Government of Indonesia joined 55 other countries in the Scaling Up Nutrition movement, and established a national programme in 2013 to accelerate improvement of nutritional status with a focus on the first 1000 days of life.50,51 The movement aimed for success similar to Peru, which halved stunting prevalence in a decade from 31% in 2000 to 18% in 2012.52 However, the National Health Indicator Survey 201660 reported that stunting prevalence remained at 33-6%, prompting in 2017 a $4·4 billion allocation from the Government of Indonesia to reduce stunting in 100 priority districts with a high prevalence of poverty and stunting.53

Another crucial and rapidly emerging issue is obesity. Prevalence of obesity among adults older than 18 years doubled from 10% in 2007 to 21% in 2016. This epidemic is a major risk factor for non-communicable diseases,14 with a three times greater prevalence of 21% in the richest quintile compared with 7% in the poorest quintile. These statistics parallel the rise in non-communicable diseases, and underscore the need for UHC to address lifestyle issues, and the need to prevent upstream nutritional causes of non-communicable diseases at the level of maternal care and child health and in adolescent years to promote wellness and healthy living.

Non-communicable diseases and determinants

Like many other LMICs in Southeast Asia, over the past decade the disease burden in Indonesia has shifted towards non-communicable diseases (appendix).33 These diseases are projected to escalate more than 20% in the coming years with ageing of the population.33 Data show an increased prevalence of hypertension, diabetes, and stroke (appendix).33 The proportion of deaths caused by diabetes increased by 63% from 2005 to 2016, the highest increase among all non-communicable diseases.29 Hypertension and diabetes are primary risk factors for stroke, which increased 46% nationally from 8-3 strokes per 1000 individuals in 2007 to 12-1 strokes per 1000 individuals in 2013, and accounted for about 15% of total deaths in 2014,35 among the highest proportion in the world. These statistics highlight the changing epidemiology of non-communicable diseases (appendix). Elderly disability due to Alzheimer’s disease also increased by 46% from 2005 to 2016, and Alzheimer’s disease is the seventh leading cause of death.29

In relation to non-communicable diseases, smoking warrants special attention in Indonesia because the country has among the highest prevalence of smoking in the world, with 34% overall prevalence in adults, and 65% in adult men.23,26,27,28 Higher prevalence of smoking is seen in people living in poverty, thereby increasing their vulnerability. Tobacco use in Indonesia, as shown elsewhere, is highly associated with chronic diseases, including cancer, lung disease, and cardiovascular disease,29 and can affect the risk of tuberculosis infection and mortality. On average, Indonesian smokers spend 11% of their income on tobacco,30 which further burdens family welfare. Apart from direct increased costs to the health sector and UHC claims, smoking burdens society and the economy through premature death. Deterrents to smoking, and raising the price of tobacco, are therefore very important and relevant to UHC costs in the future.

Non-communicable diseases generally have slow progression and long durations, thereby incurring substantial hardships, multiple contacts with health services, and higher costs. Diabetes and stroke are predicted to have the largest proportional increase in UHC cost burden by 2020, at 56% for diabetes and 57% for stroke, followed by a 46% increase in costs for hypertension, and 34% increase in heart-disease costs.33 Overall, these extra costs will impose an additional burden of $5-80 billion on the UHC system. Moreover, these non-communicable diseases account for 8% of Indonesia’s direct out-of-pocket-health-care expenditure, and are expected to increase to 12% by 2020.33 As such, non-communicable diseases are more likely to result in catastrophic spending, placing households at risk of poverty.28 Globally, approximately 100 million people are pushed into poverty and 150 million people face financial hardship due to out-of-pocket payments for health
services for non-communicable diseases. Therefore, strategic investments to reduce non-communicable diseases are required for both the population and for the sustainability and health impact of UHC. Additionally, these measures need to account for the diversity of causes and treatment options across the country and need to be robust to the emergent epidemic of non-communicable diseases.

Communicable diseases and determinants

Communicable diseases continue to cause high morbidity and mortality in Indonesia.61 Pneumonia, with a prevalence of 2·7%, is one of the leading causes of death among children younger than 5 years in 2013 (appendix).62 Diarrhoeal disease, with a 3·5% prevalence,62,63 is the second cause of death in this age group.64 Malaria, due to both Plasmodium falciparum and Plasmodium vivax, causes several million infections and approximately 40 000 deaths each year, predominantly in children but also in adults. In children, these conditions contribute to stunting and cognitive deficits.65 In adults, tuberculosis remains prominent, with Indonesia being classified by WHO as a country with high tuberculosis burden, ranked second globally, with 1 million new cases annually and a prevalence of nearly 400 cases per 100 000 individuals.66 Indonesia also has the fastest growing HIV epidemic in southeast Asia, with an HIV prevalence of 0·4% among adults, with the number of newly diagnosed HIV cases being comparable to the number of newly diagnosed cases of tuberculosis in the USA.67 In addition, HIV poses a major concern given that 87·2% of patients with HIV are aged 20–49 years, which is considered to be the productive age group.68 Arboviruses and emergent viral infections also pose a persistent threat as local farming, lifestyle, and environmental issues in Indonesia have proven to be particularly conducive to pathogens, including dengue fever virus, chikungunya virus, nipa virus, avian influenza virus, and most recently Zika virus. Implications for UHC relate to fostering effective treatment of chronic infectious illnesses, such as tuberculosis and HIV, at affordable costs in the context of the burden caused by the large number of people with these infections entering care, and active strategies for compliance for effective treatment and to reduce transmission. Moreover, investments in promotive and preventive actions are needed. Again, these goals must be met with implementation of UHC in heterogeneous conditions of health infrastructure and governance.

Mental health

Depressive disorders in Indonesia were the seventh largest contributor to years lived with disability in 2016. In 2013, about 0·17% or 400 000 people aged 15 years or more had a severe mental disorder, with 14·3% of these people subjected to restraint, even though such treatment was banned in 1977.69 Additionally, 46 537 cases of drug abuse were formally recorded in 2017, which involved 4·3% of men aged 15–24 years, indicating the substantial effects of drug abuse on society.70,71 In response, the Government of Indonesia launched the National Mental Health Action Plan 2015–19 to foster mental health and provide integrated, affordable, comprehensive, and sustained mental health services for mental disorders and for drug abuse. The goal is to achieve by 2019 at least 280 districts with public health centres delivering mental health services, 60% of referral hospitals with services and psychiatric wards, and 50% participation for health facilities reporting and treating drug abuse.72 Mental health remains a challenge for UHC globally, and particularly in Indonesia because of stigma, the shortages of professionals, and the need for long-term treatment and engagement with the health system.

Environment, sanitation, and access to clean water

Clean water and sanitation have a primary role in illness prevention and health promotion. In Indonesia, about 82% of the population has access to improved drinking water (appendix).73 Most gains in the past decade were in rural areas, with urban areas seeing no increase for two decades because high urban growth has outpaced supply.74 Only 67·89% live with adequate sanitation, and 12·45% of the population practiced open defecation as of 2015.75 Urban areas have greater access to improved services than rural areas, but similarly to water supply, the number of people without access remains high because of rapid urbanisation.76 Climate change is a top environmental concern because Indonesia is the third largest greenhouse gas emitter.77 Between June, 2015 and October, 2015, 2·6 million hectares of rainforest were burned for land conversion and mining, and from forest fires, leading to high CO₂ emissions.78,79 Climate change affects the availability of clean water, changes in vector-borne and water-borne disease, and food security, thereby influencing the environment, economy, and health.80,81 In addition, Indonesia’s geographic location along the Pacific Ring of Fire makes the country prone to natural disasters. After the Aceh earthquake and tsunami of 2004, several disasters, volcanic eruptions, earthquakes and tsunamis have struck the country. For example, a study of the year 2004 indicated that 294 floods, 54 landslides, 11 earthquakes, two tsunamis, and five volcanic eruptions were recorded, accounting for 10·2% of total deaths in 2004, and being the number one cause of injury and disability.82,83 Furthermore, between 1990 and 2015, 4586 health facilities were damaged due to disasters.84 Most recently, an earthquake of a magnitude of 6·4 in Lombok, West Nusa Tenggara in July, 2018, and an earthquake of a magnitude of 7·4 and tsunami in Palu, Central Sulawesi in September, 2018, resulted in at least 2256 deaths, 1309 missing people, 41 005 [A: 41005 what?], and 223 751 displaced. Approximately 50 health centers and one public hospital were destroyed or damaged and unable to provide health services.
However, supportive services including disease control and environmental health, nutrition, reproductive health, mental health, health informatics, and logistical services (including drugs and vaccines) responded to this crisis. Prior to UHC, disaster preparedness in villages was more limited. Only 6·4% of villages had an early warning system and only 24% had sufficient food stores. Climate change and disasters can affect health risks and worsen health inequalities, underlying the need of UHC to encourage preventive and preparedness steps, and emergency response systems to reduce the effects of hazards. Moreover, the social and household instabilities that accompany these events present a challenge for UHC with respect to resource planning to accommodate unexpected events and changes in health status at a population level.

Health system
Human resources for health

Decentralisation in governance from the national to district level in 2001 gave districts the autonomy to prioritise sectors for development. Unfortunately, health and its human resource needs have received uneven attention, low funding, and few incentives for equity. From 2004 to 2015, the health worker to population ratio increased slightly or remained static, with 16 physicians, five dentists, 88 nurses, and 44 midwives being deployed per 100 000 people, considerably less than 50% of the intended goal, and distribution was not aligned with population growth and migration (figure 2C). In 2015, only 53% of health centres had sufficient numbers of dentists, 75% had sufficient numbers of general practitioners, and 62% had sufficient numbers of midwives. The number of staff was lower in the eastern provinces than in other provinces, creating a large gap between western and eastern regions, with Papua and West Papua having the lowest health personnel coverage, at 40% less than the national average. The Government of Indonesia target for 2019 is 45 physicians, 13 dentists, 180 nurses, and 120 midwives per 100 000 people. Some provinces might meet the targets for nurses and midwives, but the overall projected number of health professionals from both private and public schools will fall short. Moreover, as in most nations, doctors and midwives tend to concentrate in the cities. The geographic spread, isolated islands, and undeveloped facilities decrease willingness to work beyond Java and more developed areas. Despite improved policies and incentives for placement, less than 10% of physicians practice in rural communities, which comprise 51% of Indonesia’s population. Overall, these factors have caused inequalities in service delivery and decreased quality of care, and would require policies for investments in health infrastructure to optimise UHC.

To mitigate adverse effects of this shortage and promote community health, in 1983 the Ministry of Health initiated community health outreach activities known as integrated health posts (or posyandu), wherein a team comprising a midwife, nurse assistant, and vaccinator visit each hamlet, or village subdivision, each month to provide basic reproductive, maternal, neonatal, and child health services. Nationwide, nearly 300 000 posyandu are held monthly, facilitated by community health volunteers (or kaders), selected by the village. Although these individuals are not professionals, and serve as volunteers, albeit with a modest allowance and with limited accountability, they can have a substantial positive effect if well recruited and supervised. From the UHC perspective, strong engagement with posyandu, the front-most level of care, can be especially useful if linked with an active mobile digital health-information system to track needs and service provision.

Health facilities

Community health centres (or puskesmas) are the primary frontline health-care facilities and are supported by tertiary-care hospitals and other facilities through referral. Service delivery and supply-side readiness have improved over the past two decades, with the number of community health centres increasing from 7669 in 2005 to 9754 in 2015, and with placement of these centres in 92% of subdistricts, along with the number of hospitals nearly doubling from 1268 to 2488 (appendix). Still, as of 2015, subdistricts in the eastern regions did not have a
community health centre, with the lowest coverage being in Papua, at 64%. Beyond these numbers is quality, wherein only 74% of community health centres met preparedness requirements, although somewhat better in urban areas than in rural areas.5 The UHC system would therefore need to offer a variety of care options in specific locations to incentivise coverage and use of services.

Public health development index
In the wake of rapid decentralisation in 2001, the 514 districts and city governments across 34 provinces introduced different and unstandardised public health systems. This absence of standardisation creates challenges for UHC, because provision of a standardised package of essential health services is a core component of adequate care, as is tracking of services, and these services became highly heterogeneous in cost and delivery.

To track service delivery and health, the Ministry of Health constructed a composite indicator known as the Public Health Development Index (PHDI), which integrates coverage, inequity in health services, and health status.6 The PHDI is used to rank districts by percentage of public health development progress,6,7 and for advocacy to accelerate district development. A joint WHO and Ministry of Health report on health inequalities showed a wide range for PHDI, with provinces such as Bali, DKI Jakarta, and Lampung having high PHDIs, and Papua, South Kalimantan, Central Kalimantan, and Gorontalo having among the lowest. Differences between groups were as high as 60% for some indicators, such as the non-communicable diseases subindex.8 Overall, the 2013 PHDI had a narrower equity gap across provinces, but a wider range in average index by province than the 2007 PHDI (figure 4). The PHDI also revealed inequality between districts in the same province, especially in the eastern region of Indonesia, where the PHDI gaps between the lowest and highest district within a province were greatest.

Health expenditure
Government health expenditures tend to rise with per-capita income, although public health expenditures increased from 2004 to 2014, they remained at only 1% of the GDP.9 This proportion was inadequate and well below other countries with UHC systems, including Brazil, Thailand, and Turkey (appendix). These three countries, with higher public health expenditure and successful implementation of UHC, had lower out-of-pocket health expenditures than Indonesia (appendix). By contrast, from 2004–14, the out-of-pocket health expenditure in Nigeria, which does not have UHC, increased by almost 7-5%, whereas Indonesia saw a 2·2% increase, probably because of the launch of UHC, but ideally this health expenditure should have been even lower.

The Government of Indonesia therefore passed the Health Law of 2015 mandating that 5% of the national budget must go to the health sector, and this was achieved in 2016. In addition, district governments were mandated to allocate 10% of their budget to health. Despite these actions, Indonesia’s health expenditure of 3% of the GDP remains the lowest among LMICs and those in the Association of Southeast Asian Nations. For comparison, Vietnam allocates 5% of its GDP to health expenditures.

Given the Government of Indonesia’s low investment, around 60% of total health-care spending is in the private sector. To achieve high impact with UHC, the government needs to increase resources to three areas, including the number and quality of health facilities, the number of health professionals, and the so-called missing middle of uninsured informal sector workers between wealth quintiles Q2 and Q4.

To track expenditures, in 2005 the Government of Indonesia initiated the annual National Health Account report, and in 2010 created the standardised System Health Account that enabled calculation of Total Health Expenditures (THE). In 2014, the THE was $28 billion, equivalent to $129 per capita per year, an increase of 59% compared with 2010, and an increase from 31% to 41% for the government proportion of THE (table 2). However, the THE as a proportion of GDP remained at 3·6% and did not meet the needs for financial risk protection because out-of-pocket household health spending was 45%, although this proportion has since declined after introduction of UHC.

Analysis of THE for 2014 by service provider (table 2) showed that 54·6% of expenditure was on hospital care,
Review

Panel 1: The NHIS cascade of policies and practice

The prospective payments of the NHIS have two models that are unique to Indonesia’s universal health coverage system and are not yet practised elsewhere in the world.

1 The capitation payment to PCPs includes medical consultation and procedure fees, basic medical diagnostics, and basic pharmaceuticals. Other benefits include family planning services and some preventive services.

2 PCPs include public health facilities of national and local governments, military clinics, independent and individual GPs, and private clinics with two or more GPs in group practice.

3 The services in PCPs are provided by a GP serving as a gatekeeper. Self-referral—ie, direct access from a client to a specialist—is not covered.

4 The implementation of the capitation payment has been deployed nationwide, and in 2016 was nearly US$1 billion, covering 21,196 facilities that serve 203 million NHIS members, the largest capitation payment in the world.

5 The scope of services covered by capitation payments is established by the Indonesian Medical Council, which sets 155 medical conditions that GPs must be able to provide care for. Beyond these 155 conditions, the GP must refer the patient to a secondary hospital. The capitation payment also includes basic dental services by a general dentist.

6 Patients seeking specialist services in tertiary hospitals—ie, top-tier national referral hospitals—must be referred by secondary hospitals. This referral reduces NHIS costs and improves efficiency.

7 CBG payment to hospitals covers both outpatient and inpatient services and includes medical consultation and procedure fees, laboratory work, radiology, drugs, and medical supplies. The CBG payment scheme has been applied nationwide covering all diagnoses. The CBG has 289 groups of outpatient care and 786 groups of inpatient care, the largest in the world, and these groups apply to more than 2000 public and private hospitals.

8 The prospective payments of NHIS in the past 4 years have changed the way doctors provide services and hospitals manage health care. The cost demands for hospitals has promoted efficiency. The fee-for-service framework of medical care has continued to diminish.

9 To assist PCPs and hospitals to procure cheaper medicines, the government established the e-catalogue, an electronic tender platform in which all pharmaceutical companies submit competitive bids for drug prices. Overall drug prices have therefore reduced.

Universal health coverage

Evolution of the Indonesian National Health Insurance System

The design of Indonesia’s national system required careful consideration of the diverse health and social conditions. The goal was to create a system that accommodated and adapted to highly variable and heterogeneous conditions, and that enabled health-care reach and impact that was not possible under previous one-size-fits-all systems. This novel perspective recognised the need for a resilient UHC despite rapidly changing conditions of health, development, and unanticipated events such as natural and economic crises. As such, a step-by-step implementation included innovations not previously deployed in other countries. A layered approach was taken wherein foundational administrative structures were established, leading to a cascade of adaptive features culminating in 2014 with the creation of the NHIS (panel 1).

Before 2014 and dating back to 1957, health insurance systems in Indonesia were numerous and fragmented (figure 1). After the Asian financial crisis of 1997, the Government of Indonesia provided a social safety net for people on the lowest incomes via a community health insurance called Jaminan Pemeliharaan Kesehatan Masyarakat, which was modelled on the health maintenance organisations of the USA, and with several features that would later inform creation of the NHIS. In 2002, the right to health care and social security was amended into the new Constitution, and in 2004 the National Social Security Law was enacted, mandating health care and social security for all people. This law required all wage earners to contribute a portion of their earnings to the NHIS.

To administer these reforms, the National Social Security Council was established and launched two social security corporations, one known as the Social Security Agency for Health (SSAH; or Badan Penyelenggara Jaminan Sosial Kesehatan [BPJS]), which would administer the NHIS, and the other known as BPJS (BPJS Ketenagakerjaan), which would oversee programmes for occupational injuries, ahttp://doi.org/10.1016/S0140-6736(18)31647-7

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that had provided social and health insurance for civil servants (Askes), military personnel (Asabri), private employees (Jamsostek), and people living in poverty (Jamkesmas, Jamkesda). Among the key reforms was the elimination of the opt-out clause for employers. The NHIS and SSAH began operation in January, 2014, and by October, 2018, had enrolled 203 million people, about 75·88% of the Indonesian population (figure 5), and became the largest UHC programme in the world in terms of population covered with a single-payer insurance system.

**Sociopolitical aspects of UHC**

Most countries adopting UHC start with a focus on people living in poverty, and expand with the goal of ensuring everyone gains access to the health care without financial hardship. Countries often deploy UHC in conjunction with major social, economic, or political change. In Indonesia, the pathway towards UHC was marked by a combination of political opportunism, local experimentation, compromise, and sheer coincidence. The initiative was largely influenced by politics, because different groups obtained access to health care when their sociopolitical importance grew. For instance, health insurance for military and civil servants expanded in 1968 to foster national stability under the new Suharto administration, whereas health insurance for workers in the formal sector expanded in the mid-1980s when this group obtained greater political influence. However, the move towards large-scale health insurance for people living in poverty occurred following the 1997 Asian financial crisis and subsequent major political transition that deposed the Suharto regime in 1998. The political transition initiated a path that led to key policy choices and laws. In 2001, social security reform was prioritised during the appointment of Megawati as President. However, only after 3 years of debate and a purported 56 versions of the bill were all interest groups in agreement on a final social security bill submitted to parliament. In 2004, during the era of the next President, Yudhoyono, social security reform was replaced by other focuses, and another ten years passed until a comprehensive social security system was enacted.

Meanwhile, decentralisation of the government to the district level in 2001 coincided with the end of the national community health-insurance safety net for people living in poverty, and led to experimentation with various district-level replacement health-insurance schemes, known as jamkesda. The jamkesda became a key issue for political campaigns seeking success at the election polls, especially after 2005, with the onset of direct election of district leaders. The number of jamkesda expanded from around 60 in 2008 to at least 245 by 2012. These schemes, although heterogeneous, were mandated by law to be integrated into the NHIS by the end of 2016, and with transition of district schemes toward health promotion and preventive activities. Although this goal has been partially achieved, many district governments still retain jamkesda support for service provision because of political and budgetary reasons. Expansion of NHIS and absorbing these district systems is a high priority, and is linked with sustainable health financing for accomplishing UHC goals.

**The NHIS**

**Structure and governance**

The NHIS was established to achieve UHC for all people in Indonesia, including foreigners, by 2019. To administer
the NHIS, the National Social Security Council created the SSAH as a public quasi-governmental corporation (figure 6A) with governance by an eight-member board of directors and seven-member board of supervisors openly selected by a committee appointed by the President of Indonesia. The SSAH must have a public duty but their management and staff are not civil servants but private-sector employees, thereby enabling flexibility in hiring and firing. The SSAH has the legal authority to collect and manage NHIS funds (figure 6B) and enforce contributions from employers and employees. Notably, the SSAH can directly contract primary care providers (PCPs) and hospitals, and provide capitation payments and diagnosis-related group (DRG) payments on the basis of the Indonesian case-based group (CBG) tariffs, set by the Ministry of Health. The SSAH and its structures enable a flexible and adaptive system at scale that embrace Indonesia’s heterogeneity and manage anticipated and unanticipated rapid changes across the country from year to year.

Sources of revenue
As part of the implementation of the NHIS, all residents of Indonesia are required to register with the SSAH, regardless of pre-existing health conditions or risks. The SSAH includes two types of memberships with different benefits and costs.
Benefit coverage and processes for members
The NHIS covers medical benefits provided by the public sector and registered private providers. The SSAH manages the services covered, ranging from treatment of simple illnesses and symptoms to open-heart surgery, renal dialysis, and cancer therapies. Reproductive, maternal, neonatal, and child health services are fully covered, as are emergency services. Medicines and medical supplies are covered without co-payment or co-insurance, as long as patients follow required procedures. All subsidised members are entitled to a first-class hospital room. Self-employed members can be entitled to first-class, second-class, or third-class rooms depending on their choice and payment plan. Wage earners who earn above $300 per month are automatically entitled to a first-class hospital room. Members can upgrade to higher-tier rooms by paying out of pocket or through private insurance. Cosmetic procedures and consultations, self-inflicted injuries, and out-of-network services are not covered, except for emergency service. Occupational injuries are covered under a separate programme.

As service providers, PCPs and health facilities are eligible to qualify to receive NHIS or SSAH payments. These facilities include governmental community health centres, solo medical or dental practices, and private clinics and hospitals. By August, 2017, more than 20 000 PCPs, 907 public hospitals, and 1106 private hospitals were contracted, as were pharmacists or dispensers, laboratories, and radiology centres. This approach enabled the NHIS to maintain the needed flexibility across the country by fostering local participation of PCPs that had succeeded as sustainable entities the country. CBG tariffs were subsequently refined three times on the basis of costing data from governmental and private hospitals and claims data collected by the Ministry of Health (appendix). This refinement was done to enable more flexibility and payment accuracy given the variance across regions and PCPs, thereby enabling mass customisation.

Payment systems for providers
The NHIS payment system for PCPs includes two mechanisms, including capitation, an advance payment for PCPs, and claim, for services falling outside capitation coverage. For hospital providers, the payment system is based on approved tariffs for services set by the CBGs. All contracted PCPs receive a monthly capitation per SSAH member per month (figure 6B). The capitation includes consultation, simple laboratory tests, and drugs for acute care. Drugs for chronic diseases are covered separately. Some services are reimbursed to providers on the basis of pre-set payments for a defined package of services, such as antenatal care or maternity services. Although initially accepted and in use by PCPs, capitation and claim payments are considered too low given the required competency and service standards. Payments are based solely on members covered and resource availability without considering total facility burden and performance. A move toward pay for performance for primary care facilities would be warranted, and could take into account the number of patients seen, referrals, and attendance to chronic disease management programmes, referral ratio, and attendance to chronic disease-management programmes. For hospitals, claims are based on CBG tariffs, and these tariffs accommodate diagnoses and procedures with similar clinical characteristics, resources, and treatment costs. The DRG and CBG system was developed in the USA in 1983 for Medicare patients, and modified in Indonesia to include additional medical procedures and conditions, with the unique addition of covering both outpatient and inpatient care, and to accommodate the heterogeneity across the country. The first CBG tariffs for Indonesia were developed in 2006 from a small number of claims from 15 hospitals. CBG tariffs were subsequently refined three times on the basis of costing data from governmental and private hospitals and claims data collected by the Ministry of Health (appendix). This refinement was done to enable more flexibility and payment accuracy given the variance across regions and PCPs, thereby enabling mass customisation.

NHIS governance and oversight
The National Health Law number 36/2009 defines the roles of the government, NHIS, and SSAH. The Government of Indonesia and district governments are responsible for the health services, and the SSAH is responsible for the financial aspects of the health services. The NHIS is responsible for the administration of the health services, including the selection of service providers, the payment of service providers, and the monitoring of the health services. The role of the NHIS is to ensure that the health services are provided in a timely and effective manner, and to ensure that the health services are used by the public in a fair and equitable manner. The NHIS is also responsible for the development of the health services, including the development of new services, the expansion of existing services, and the evaluation of the effectiveness of the health services.
Review

responsible for public health programmes and services that include beneficiaries who are in the community at large, whereas the NHIS are responsible for personal medical care (ie, diagnosis and treatment). In addition, via the NHIS, the Government of Indonesia regulates essential aspects of the SSAH, such as the contribution fees, changes in benefits, licensing of health-care providers, and paid contributions for people on low incomes. Under the regulations, local governments are responsible for public health programmes and services, such as health promotion, environmental health, licensing of health-care providers, and assuring quality of care.

Progress and achievements of the NHIS

Population coverage

The overall coverage of health insurance increased substantially from 2012, when many district governments provided various ad-hoc jamkesda schemes. At their inception in 2014, the NHIS immediately covered 117 million people, more than the previous social health insurance and medical care schemes (figure 1). Membership has initially been dominated by the subsidised groups, both from the Government of Indonesia and district governments, amounting to 106 million people, almost 60% of membership in 2017. Consequently, the NHIS is still heavily dependent on governmental budgets.

In the first year of implementation, NHIS membership reached 134 million, a growth rate of 14%. Coverage increased by 46% in 2014 and 76% in 2018 (figure 5A). The largest source of members was the formal sector and people on a high income. The proportion of the population contributing increased by income quintile (figure 5B). Enrolment in the lower quintiles and middle-income quintiles was more difficult to enforce, due in part to the larger proportion of informal workers in these quintiles than in higher quintiles. The low contribution of lower-income and middle-income countries also illustrates that newly launched UHC programmes can create both expected and unexpected fluctuations in demand, especially from groups of people at high risk for illness. People who received chronic diseases previously were often rejected or had to pay high premiums from private insurance providers, and so were especially eager to enrol in UHC programmes. This highlights the advantage of the NHIS in ensuring everyone receives coverage.

WHO guidelines consider three indicators for provision of UHC, including the population covered, needed services covered, and direct costs covered, projected using the WHO UHC cube diagram. By 2017, the NHIS had covered 70% of the population. The remaining 30% of the population is not necessarily uninsured, because some people might be covered by private health insurance, yielding an estimated adjusted coverage of 84% of the Indonesian population. However, total coverage of services remains too low at 18%, and out-of-pocket expenses remain too high at 48-3%. The goal is for 100% of the population to be covered, with more than 90% of required services covered and overall out-of-pocket expenses being no greater than 20%.

Beyond these numbers are practical considerations of access to services. There is evidence of perceived long waiting times and low quality of care. An evaluation conducted by the Centre for Health Financing of the Ministry of Health concluded that about half of the people who are covered did not use the benefits for outpatient care, and 20% did not use entitlements for inpatient care. In addition, many providers charged NHIS or SSAH members for drugs or procedures, arguing that the particular drugs or procedures were not covered, and evidence for illegal out-of-pocket payments has been documented. Measures to ameliorate these barriers and abuses are a top priority.

Improving the equity of access to health-care services

One of the objectives of the NHIS is to improve equity in access to health care. Before the NHIS, most people in low-income and vulnerable groups had less access to health care than middle-income and high-income groups. Improved access of low-income and middle-income groups to inpatient health-care services has been documented (figure 6A). This improved access is the result of subsidies from the Government of Indonesia towards the NHIS for low-income and vulnerable-income groups, and district government subsidies for people who are not covered by the national programme (figure 6B). A simulation of NHIS implementation using the National Socioeconomic Survey in 2013 yields a hypothetical Gini Index for health expenditure of 0.504, indicating the positive effect of UHC on reducing inequalities.

Other studies revealed the impact of the NHIS on improving health-care equity. A multivariate analysis of data from 1.1 million people from the National Socioeconomic Survey of 2015 revealed that the NHIS increased use of inpatient care. A study based on the Indonesian Family Life Survey data examined the overall number of inpatients for both public and private hospitals among NHIS and non-NHIS members, and found an improved equity in access to inpatient care for those who were NHIS members (figure 7).

Other groups found that NHIS improved access to care in lower-income groups and in rural areas more than in urban populations, and increased hospital use to a greater extent in the poorer eastern regions of Indonesia than in other regions. Although most analyses examined gaps in health-care service use across different regions, more detailed analyses focused on changes in equity for various groups before and after the implementation of NHIS, and revealed clear trends of improving equity. The most consistent findings are that effects on access and use of services were greater among people on low incomes and those in rural areas than among people on high incomes. Therefore, the NHIS enabled low-income,
vulnerable groups and the informal sector to have improved access to health care as originally intended.

There is also evidence for enhanced access to higher quality of care after implementation of NHIS. An observational study in the neurology ward of Dr Cipto Mangunkusumo General Hospital in Jakarta, Indonesia, showed that case fatality for stroke had previously fluctuated between 20–30% of all strokes, but decreased to 15% after NHIS implementation. Given that most patients in the neurology ward were from lower-middle and upper-middle income groups, the NHIS might have allowed them to access advanced care more quickly. In comparison, little change was observed in the case fatality of 5% of all strokes in the advanced stroke unit, in which patients were predominantly from upper-middle income or higher economic groups, and already had access to care (figure 8). This result suggests that rapid realisation of expected benefits can be obtained. However, for private hospitals overall, key indices did not yet show any substantial improvement.

Networks of providers

The recruitment of PCPs is necessary to reach efficient and effective UHC by ensuring the accessibility and

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Figure 7: Age-specific concentration curves of admissions (inpatient admissions for both public and private hospitals) from 2007 to 2014, based on the Indonesian Family Life Survey. NHIS—National Health Insurance System.
availability of PCPs as the gatekeepers to health services. By law, public providers are mandated to join the SSAH and become part of the NHIS. Public providers comprise public hospitals and health centres. Private providers may join the NHIS subject to review and qualification. This sector is important because private clinics and hospitals outnumber public providers. Overall service availability gaps remain because of shortages in public sector providers, especially for specialists and hospital beds, thereby making private engagement a necessity. However, many private providers are reluctant to join the NHIS because the CBG tariffs are perceived to be too low. To date, only 42% of private clinics, 60% of private hospitals, and 14% of solo-practicing doctors have joined. Attracting private providers would increase service availability and foster competition on quality of care.

**Use and claim costs**

Evidence of the growing benefit to NHIS members is seen in the increase in payments to PCPs. However, despite PCPs being the gateway for advanced services, higher growth in payments was seen for secondary and tertiary hospital costs for outpatients and inpatient care than for PCPs (table 1). This higher growth is partially attributable to specialist care from increased coverage of non-communicable diseases, with prolonged and expensive care and treatments that were previously unattainable for many people (table 3). For example, by paying a relatively small monthly contribution (eg, $6), a person with kidney failure could receive dialysis in a first-class room with average costs of about $600 per month, or 100 times more than the amount they contributed. This example illustrates the unmet need provided by the NHIS, especially for people who were previously unable to access medical treatment.

**Payment system for providers**

The prospective payment system of capitation and CBGs have had crucial roles in maximising affordability and benefits for all NHIS members (table 1). The nationwide reach and uniform processes under a single-payer system helps people to understand the required procedures for their health care.

The evaluation of PCP performance in terms of visit and referral ratio is linked to performance-based capitation. A study of the effectiveness of PCPs found that private PCPs were more effective and efficient than public PCPs (appendix). The average visit rates to private clinics of 154 visits per 1000 members per month was much higher than for public providers, at 72 visits per 1000 members per month. Moreover, the average referral ratio per month from private clinics was 11% of all patients per month compared with 15% for public providers. In addition, for private clinics, 42% of referrals were for follow-up visits that did not result in an increased capitation claim, again suggesting better quality of care by private providers than public providers.

**Payments for hospitals**

For other health system attributes, hospital capability, quality, and costs are variable. The CBG tariffs have focused on recognising this variability with differential fees. Hospitals are paid according to the class of hospital (class A, B, C, or D). Tariffs for class A hospitals are the highest, and national class A referral hospitals are paid with special CBG tariffs that are higher than for other class A hospitals, and academic hospitals have higher tariffs than general hospitals. In addition, the CBG tariffs are differentiated into five regional tariffs based on the consumer price index. Overall, tariffs for private hospitals tend to be 3% higher for inpatients and 5% higher for outpatients than for public hospitals, which receive additional operational funds from the government. This approach of heterogeneous hospital CBG tariffs, although cumbersome, accelerates onboarding of hospitals to the NHIS network as major care providers, and is especially important in protecting NHIS members from economically catastrophic effects of severe illness. The dynamic approach of frequent updating of the CBG tariffs, and recognising heterogeneity, is therefore an essential pillar of the NHIS that expands the network and optimises coverage.
Medicines and medical supplies
Efficient medicine and supply procurement are crucial.\textsuperscript{106} As with other aspects of the NHIS, the need to accommodate diversity is especially given the multiple vendors with different and overlapping products and pricing throughout the country. The increase in the number of NHIS members and costs led to enhancement of the medicine and medical supplies tender process by introduction of the e-catalogue electronic bidding platform. The e-catalogue is managed by the Ministry of Health and the National Procurement Agency. A first step was restricting the number of active pharmaceutical ingredients in the national formulary to reduce overall drug expenditures and use of less cost-effective drugs.\textsuperscript{107} A drug or medical supply can be included in the national formulary to reduce overall drug expenditures and use of less cost-effective drugs.

Challenges for UHC
Financial sustainability
In 2014, the NHIS and SSAH reported 92.3 million consultations, consisting of 4.2 million inpatient and 88.1 million outpatient consultations, with a total expense of $10·5 billion (2011 PPP; table 1). In 2015, the claim ratio of average medical cost to average premium collection was 115%, and is projected to reach 124% by 2019 in the absence of contribution adjustment and cost containment.\textsuperscript{99} These initial high claim ratios were predicted given the initial rapid self-enrolment of mostly non-wage earners or people in the informal sector, who were previously excluded from health insurance schemes. Nevertheless, sustainability relies heavily on contributions from members, and projections show an increase in the SSAH deficit over time.

Closer review reveals that 23% of self-enrolled members register when ill, and almost 28% did not routinely pay their contribution.\textsuperscript{108} Furthermore, people experiencing financial hardship have a 7·7% higher probability of being a non-routine payer than those who are on higher incomes. By contrast, people who had more knowledge of the NHIS’ curative, preventive, and other services tended to have a 5% higher probability of being a routine payer than those who were not aware of these services.\textsuperscript{99} This 2014 study also reported that for members of the informal sector, the health cost claim ratio of the contribution paid reached 645% and use ratio reached 32% (the use ratio being the number of health visits per total population covered), whereas those of the formal sector were 116% and 19%, respectively, with the use ratio being the number of health visits per total population covered. These ratios

<table>
<thead>
<tr>
<th>Table 3: Number of cases of catastrophic diseases and cost of treatment</th>
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<tbody>
<tr>
<td><strong>2014</strong></td>
</tr>
<tr>
<td>Cases\textsuperscript{[A1]}</td>
</tr>
<tr>
<td>Ischaemic heart disease</td>
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<tr>
<td>Cancer</td>
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<tr>
<td>Chronic kidney disease</td>
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<tr>
<td>Cerebrovascular disease</td>
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<tr>
<td>Thalassaemia</td>
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<tr>
<td>Cirrhosis and hepatitis</td>
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<tr>
<td>Leukaemia</td>
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<tr>
<td>Haemophilia</td>
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<tr>
<td>Total burden of catastrophic diseases</td>
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<tr>
<td>Total cost of health-care services ($)</td>
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Percentage of total cost was calculated from cost of medical treatment divided by total cost of health-care services. This table was created on the basis of our calculations from the Social Security Agency for Health database. \textsuperscript{[A1]}Note that the number of cases is approximate.\textsuperscript{[A1]} addition of $7
are very high compared with the subsidised group, which have a claim ratio of 47% and use ratio of 3.8%. Internal monitoring and evaluation of the NHIS shows that many subsidised members did not know how to access services or lived too far from PCPs, resulting in much lower claim ratios and use ratio than contributing members.\textsuperscript{108} Despite initial costs, expansion of the number of PCPs and enrolled members is crucial for both the positive impact and long-term sustainability of the NHIS, and multiple analyses suggest this increase would enhance productivity and provide a substantial return on investment.

To overcome financial issues affecting overall UHC sustainability, four policy options have been suggested: first, increase fees for contributing members, given that current contributions are lower than the costs of medical treatment; second, embrace cost-containment measures, such as soft caps on service volumes; third, improve the health-care reimbursement process by more rigorous medical claim reviews; and fourth, promote efficiency of health-care reimbursement process by more rigorous such as soft caps on service volumes; third, improve the health-care reimbursement process by more rigorous medical claim reviews; and fourth, promote efficiency of health-care reimbursement process by more rigorous

**Challenges of the missing middle for the NHIS**

The so-called missing middle remains a problem wherein people who work in the informal sector and who are not living in poverty are not covered by the NHIS because of low self-enrolment (figure 5A and B). In 2014, the Central Statistics Agency reported that the informal sector employed approximately 60% of Indonesia’s labour force.\textsuperscript{106} These people who work in the informal sector are required to pay the insurance premium. The problem of the missing middle is a consequence of current policies (figure 5B). The lower-middle-income group has the highest number of uninsured people, whereas the high-income group has the lowest. Moreover, even though the government is fully subsidising the premium of people who are living in poverty and those who are just above the poverty line, around 34-4 million people remain uncovered by the NHIS because of rapid changes in household welfare and eligibility.\textsuperscript{89}

The sizable missing middle poses a major obstacle to achieving UHC by 2019, as required by law. Based on enrolment numbers, the NHIS will reach 100% coverage between 2034 and 2044.\textsuperscript{83} Some studies indicate that the insurance premium is not the primary impediment, but rather availability of services and a poor understanding of health insurance. Therefore, expanding universal coverage needs increased investment in health-care facilities and campaigns to educate the public about the importance of health insurance.\textsuperscript{89}

Specific options to address the missing middle are as follows: first, extend the Government of Indonesia’s payment of health-care coverage to the rest of the workers in the informal sector (ie, the non-contributor option), and second, request that families working in the informal sector who are not living in poverty contribute towards their health coverage (ie, the contributor option). The non-contributor option is faster than the contributor

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**Figure 9: Age and wealth equity gaps in NHIS coverage**

(A) Insurance coverage by age group. (B) Dartanto plot showing the equity gap in insurance coverage by age group. Graphs were created from calculations based on the National Socioeconomic Survey 2016 and National Health Insurance System dataset. BPS=Badan Pusat Statistics.
option, but creates a trade-off between equity and sustainability that could require future tax and health reforms. The contributor path is slower than the non-contributor option, because this option requires front-loading reforms, but creates a more stable and sustainable solution. A blended approach based on detailed quantitative modelling might be warranted.

Equity gap in insurance coverage
Across all age groups, the NHIS has achieved a population coverage of 70%. However, important gaps and heterogeneity exist across age groups and socioeconomic status (figure 9). Lower coverage overall is seen for children aged less than 9 years, especially those younger than 4 years, for whom coverage is less than 25% for the poorest groups. In addition, for people aged 20 to 50 years, coverage is generally lower for the poorer socioeconomic groups than for the wealthier ones. By contrast, the wealthiest quintile has an inverse pattern with the greatest coverage for people aged 20 to 45 years. Coverage is also high for all groups older than 70 years. Male coverage was higher than female coverage (figure 10), although higher claims for women of reproductive age are seen between age 20–35 years, as would be expected. We note the overall gender gap was only 3.8%, which is small compared with some other Asian countries (appendix).111

Challenges in service preparedness
The challenges in service preparedness increase with the rapid growth of the population covered by the NHIS. Even incremental increases in patient loads will strain the carrying capacity of existing providers to ensure timely and quality service delivery. Inadequate medical facilities remain an issue, especially for public hospitals and community health centres. In 2017, 82% of public hospitals received a passing grade for preparedness; however, only 67% of community health centres passed.112 Because the aim of NHIS is to strengthen the role of primary health care, the scarcity of health providers, facilities, drugs, and medical supplies, especially at the primary frontline level, could increase unnecessary referral numbers, which might not be followed by an increased number of back referrals, thereby increasing NHIS and out-of-pocket costs, and compromising care quality.

The poor quality of care at community health centres and hospitals is especially serious. Many public hospitals have gaps in 24 h preparedness in blood supply, and do not have a paediatrician, obstetrician, or gynaecologist.113 Antenatal care coverage, as one of the service parameters, ranged from 40% in remote provinces such as Maluku and Papua to 85% or more in developed areas and urban centres such as Bali and DI Yogyakarta. Low socioeconomic status, poor education, and rural residence characterised areas with the lowest antenatal care coverage.114

In general, the NHIS still suffers from an absence of integrated clinical and frontline health-worker data, and the suboptimal health information system. A report by the World Bank identified Indonesia as one of the countries with minimal use of data and information systems, including for monitoring and evaluation.115 Poor data and health information systems contribute to ineffective and inefficient service delivery, and higher risk of medical misconduct and claim fraud.116 For the NHIS, a scalable system is needed that links information from frontline workers at the community level and posyandu with clinical data from hospitals and health centres such as puskesmas, with the aim of active use of data to efficiently estimate needs and improve care delivery. The ability to link care with outcomes is crucial for cost effectiveness and high impact on health, especially for the management of health conditions requiring ongoing engagement.

Engagement with the private sector
The role of the private sector is very important for the NHIS, because the government health-care resources are scarce. Despite the increase of enrolled PCPs, only 42% of private clinics and 14% of private practitioners have joined the NHIS (appendix).117 Some strategies to address these low proportions include allocation of resources to conditions and regions where private providers have not engaged. Additionally, CBG tariffs for the private sector should be evaluated and revised, because they might be too low, and more innovative schemes are needed to support new investment in private health facilities.118

Canada and the UK have become key venues to study implementation of public–private partnerships in developed countries, whereas the Philippines serve as a model for developing countries. The key to successful public–private partnerships in the Philippines was careful construction of regulatory arrangements to
ensure universal access, quality of care, efficiency, and financial viability. In this context, recent Indonesian laws regarding infrastructure provision are particularly relevant because they include the private health sector as eligible for partnership with the Government of Indonesia. One scheme, known as Design-Build-Finance-Operate, is particularly relevant, as are similar scenarios in which the Government of Indonesia subsidises the private sector to attract health facility construction and operation.

**Lessons learned**

The NHIS aims to improve health care for all by creating an adaptive system that accommodates the diversity of Indonesia both now and in the future. The goals of the NHIS include reducing inequity and preventing households from going bankrupt because of severe illness. In addition, mobilising funds from mandatory contributions, health financing in Indonesia is expected to increase substantially. Although the population coverage and spending by the NHIS increased greatly, the increase in THE as the proportion to GDP was only 3.6% in 2016, which is lower than in Thailand, Cambodia, and Vietnam. Persistently high out-of-pocket expenses, with only a small decline in expenses since the beginning of the NHIS, indicate that the Government of Indonesia has not implemented comprehensive health investments and enforcement of the mandatory allocations.

The much higher proportion of NHIS funding going towards personal medical care is in line with the NHIS role to finance diagnosis and treatment, whereas the provincial and district governments are responsible for financing public health, mainly through health promotion and prevention. In decentralised systems, coordination between national and district-level implementation is therefore crucial, because different funding sources need to be appropriately channelled in complementary ways to optimise impact on health.

The increased public spending for the NHIS has raised concerns, because many people contend that the country will not be able to finance health care. This view has often pushed financing to the private sector, which leads to problems of inequity and social justice. Other parts of society state that the NHIS will prevent economic growth because of the higher burden of public spending on health care than if this system was not implemented. In response to these concerns, national indicators were analysed among developed countries that had previously achieved UHC. First, data from the World Bank showed that higher public expenditures for health were correlated with a lower Gini Coefficient, indicating that a higher proportion of public funds for health care leads to better distribution of income and social security taxes. In Indonesia, over the past 5 years the average public-sector share of health expenditure was only 37% and the average Gini Coefficient was 0.395. These figures suggest that Indonesia should continue to rapidly roll-out the NHIS and optimise its components.

Another lesson that Indonesia and other LMICs should learn from higher-income countries is that UHC correlates with increasing per-capita GDP in all countries where the system was implemented. The Netherlands achieved UHC in 1966, and thereafter showed higher GDP per capita than before UHC was implemented. France reached UHC in 1974 and Italy in 1978, and both countries showed increased GDP per capita with UHC. Lastly, South Korea quickly achieved UHC after 12 years of implementing social health-insurance schemes, and also showed increased GDP per capita (appendix) once UHC was in place. Although UHC was not the sole determinant of this increase in GDP, no evidence suggests that UHC caused decreased economic growth. The lesson for developing countries is clear, do not assume that UHC will place an economic burden on the country.

Other LMICs can learn from Indonesia that enthusiasm for the new system has resulted in unexpectedly rapid high demand for health care, especially for non-wage earners in the informal sector, and those previously not receiving coverage. This high demand occurred because of the comprehensive benefit package that covers high-cost medical procedures such as open-heart surgery, dialysis, and cancer treatments. Collecting contributions from informal-sector wage earners is a tremendous challenge. In addition, people in the informal sector who were mostly in lower-middle-income groups were under enrolled, resulting in the so-called missing middle. As the main principle of mandatory insurance, no underwriting and no exclusion for pre-existing conditions is permitted because everyone has a constitutional right to financial protection. Countries need to carefully estimate their number of enrolments to establish contributions and other support needed.

For Indonesia, inappropriate decisions regarding the amount of contributions resulted in NHIS deficits for 3 consecutive years. Fortunately, under the Indonesian Social Security Law, the government was mandated to finance any deficit, thereby enabling services to continue. Certainly, some parts of society argued that the deficits might be attributable to moral hazard or fraud by members and health-care providers. The NHIS system was designed to reduce, but might not eliminate, moral hazard and fraud by paying providers with payments based on the CBGs. An evaluation indicated that the deficits were mainly due to inappropriate decisions on the amount of contributions. In 2016, the average total contribution was only about $30 per capita per year; this contribution is much lower than the average THE of $129 per capita in 2014.

The risk of fraud might also decrease with more comprehensive, transparent, reliable, and accountable health data and reporting. Indonesian data on health are comprehensive, transparent, reliable, and accountable.
scarce and fragmented, which is caused by the absence of the standardisation of clinical processes and poor health-information systems. If improved, health databases and analyses could be used to evaluate the NHIS system, support improved referrals, and present opportunities for better research and overall system improvement.

Discussions on tackling the missing-middle problem include extending the Government of Indonesia’s subsidy to the remaining workers in the informal sector. This strategy has the benefit of being a quick solution but requires higher government expenditures from taxes. Moreover, expanding the NHIS requires increased investment in health-care facilitates and campaigns to educate the public about the importance of health insurance.

**Future directions**

The planning and roll-out of the NHIS was driven by provision of curative care and a desire to create a flexible yet accountable health insurance system at scale that would link efficiently with the heterogeneous conditions and resources of the country. As such, efforts focused on adapting to a diverse environment of public and private providers and establishing an infrastructure to administer the NHIS, such as creating and updating the CBGs and drug and supply procurement processes. Clearly, with complete coverage for curative services and the ageing population, along with the continuing trend towards non-communicable diseases, a very large increase in costs can be expected. Pre-emptive action is therefore crucial with the dual goals of managing UHC costs and fostering a thriving population.

The next phase of UHC would therefore require investments in reducing primary risk factors of adverse health outcomes to prevent or delay high-burden diseases such as cardiovascular disease, diabetes, and hypertension (appendix). This UHC phase would comprise URC, wherein the NHIS would cover costs to reduce proximal risks at the individual and family levels (figure 1).

Investments in proper maternal care to enhance foetal growth and development would reduce the burden of neonatal and infant mortality and long-term risk for non-communicable diseases. Improved maternal care, including management of hypertension in pregnancy and diabetes and protein–calorie deficits would be important. Moreover, transition to maternal multiple micronutrient supplementation would be an improvement over the iron folate supplement to improve infant birth weight and survival, especially for women who are anaemic and for infant girls, and to enhance child cognition.

With respect to child cognition and early childhood development, URC investments would include parenting courses and nurturing and care interventions to promote personal psychosocial wellness from an early age.

Investments in proper sanitation, especially in rural and remote areas, and healthy lifestyle including stress reduction, better diet, and exercise would reduce similar high-burden claims from communicable diseases and non-communicable diseases, including cancer. In this context, smoking would need to be specifically targeted, because reductions in smoking are likely to yield very high dividends for societal productivity and reduced NHIS costs.

Beyond UHC and URC, we propose a third phase known as UCC, focused on health promotion at the policy and structural level (figure 1). UCC would, for example, involve policies at the workplace for healthy lifestyle, reduction in outdoor and indoor air pollution, incentives for agricultural production of affordable and healthy foods, and fostering a built environment conducive to walking and cycling. To promote healthier foods, the Government of Indonesia needs to reach beyond stakeholders in health systems and engage stakeholders in food systems, and empower microenterprise and small-enterprise or community-based production of healthy foods, snacks, and supplements.

A system of curative UHC, preventive URC, and promotive UCC is transformative because this system focuses on achieving thriving populations. Almost 25% of all health-care costs are incurred in the last 10 years of life. Investment in URC in childhood and adolescence and in UCC is likely to reduce costs in the long run and enhance the affordability of UHC. The preventive and promotive framework was, in part, already a planned feature of the NHIS because districts were to target their non-NHIS health investments to lifestyle interventions (figure 1). In an effort to address this issue, in 2016 the Government of Indonesia launched the national Movement for a Healthy Lifestyle Programme (or Gerakan Masyarakat Hidup Sehat). The programme is a blend of primarily URC activities with some aspects of UCC and is intended to be implemented at the community or village level and to receive additional district-level funding. To support this programme, the Government of Indonesia enacted a minimum service standard for district governments that includes 12 areas of health-care, preventive, and promotive services. The services include health screening for children, adolescents, adults, and elderly people and counselling for healthy habits and lifestyle. The standards also provide indicators for district governors to assess performance, thereby encouraging UHC, URC, and UCC implementation.

Another key aspect needed for successful implementation of UHC as well as URC and UCC would be a fully functional frontline digital health-information system and integrated health-cohort data, as planned in the future health strategy of the Ministry of Health by 2019. Frontline clinics and providers, including doctors, midwives, vaccinators, nutrition workers and community health volunteers fill out paper registers with individual patient or client data. These data are not actively used to track services or target preventive care, and useful patient-level analyses are precluded by routine reporting of aggregate monthly case data to the district, provincial, and national level.
Frontline digital health platforms that enable real-time use of routine data on the basis of individual patient-level and client-level analyses would facilitate rapid identification of gaps in service and coverage that would optimise care, especially for maternal and newborn health services. Interoperability of data systems and adherence to open digital standards would be advocated in this context, and include open-source digital health platforms for frontline workers (eg, the Open Smart Register Platform [OpenSRP]), clinics (eg, the Open Medical Record System [OpenMRS]), and national-level aggregation platforms (eg, the District Health Information Software), as well as adherence to standards of Open Health Information and Exchange.

High antenatal factors that also result in low birth weight and stunting. The enhancement of primary care at the community level and for referral is therefore needed. Data on service coverage and outcomes would help refine the capitation at the community level and enhance the effects of NHIS on primary care. In addition, frontline digital health systems would facilitate capitation to be distributed beyond clinics and directly to the large workforce of frontline midwives who face extensive paperwork requirements to receive payment for antenatal care, delivery services, and post-natal care. These improvements would be expected to improve coverage and quality of antenatal care and delivery services, and facilitate entry of clients into NHIS from birth, especially for children who are under enrolled. The short-term effects of improved antenatal care and post-natal care would be expected to reduce long-term costs for non-communicable diseases in line with the developmental origins of health and disease phenomenon. Lastly, in addition to approved drugs, approved low-cost point-of-care diagnostic tests would need to be added to the formulary and e-catalogue as eligible devices that could be used by frontline workers, and integrated with frontline and clinical information systems (eg, OpenSRP and OpenMRS). These tests would enhance early screening and diagnostic of diseases and reduce costs for both non-communicable diseases and communicable diseases such as malaria, tuberculosis, dengue fever, chikungunya, and other common illnesses, many of which are emergent in Indonesia.

Better health-information systems and data also support the growing number of research and medical audits needed to support the customisation and efficiency of UHC, especially in designing the preventive programme at the community level and to establish an evidence-based policy-making culture. Health data, especially for health cost analyses in Indonesia, are still scarce. Increasing the frequency and depth of analyses and evidence might help improve Indonesia’s UHC and its progress toward URC and UCC. Engaging specific research teams at the national and subnational level would be needed.

Another important reform for improved future impact of UHC is stronger coordination between national-level and district-level UHC initiatives. Districts should focus on integrating their local budget allocations for direct provision of health insurance (ie, jamkesda) in the context of increasing NHIS enrolment by including the existing members and missing-middle groups and supporting transition to more preventive and promotive care.

Summary and conclusions

Indonesia is a rapidly transforming and diverse society that presents unique challenges for health systems and UHC. An initially centralised system improved infrastructure and reduced the mortality rate for children younger than 5 years along with the infant mortality rate, and increased life expectancy. But gains across the country and socioeconomic groups were uneven. Moreover, the maternal mortality rate and neonatal mortality rate remained stagnant, and despite early progress in family planning, little change has been seen in the past decade. Child malnutrition has persisted, and the prevalence of stunting is among the highest in the world. More recently, a rapid increase in obesity and non-communicable diseases has been observed, again with widespread heterogeneity. Therefore, a new health-system approach, supported by UHC, aimed to create a more adaptive, effective, and equitable system in a complex environment.

The NHIS was established in 2014 with planning and deployment focused on accommodating diversity and achieving UHC by 2019. In 3 years the NHIS became the largest single-payer health-insurance scheme in the world. The NHIS improved access to care and equity, and enhanced treatment of non-communicable diseases. However, a missing-middle group emerged with only about 52% enrolment of people aged 20 to 35 years in the middle wealth quintiles, along with gaps in care for children from birth to age 4 years. Moreover, only 18% of estimated total health costs are covered, indicating out-of-pocket expenses are still too high, and NHIS payment collection remains at 80% of that expected from those enrolled. Optimising population health while balancing costs is a high priority, and will require going beyond curative services toward early investments in healthy pregnancy and early childhood development, and incentives for healthier lifestyles, including reductions in smoking, healthier food choices, physical activity, and psychosocial wellness. To this end, we introduce a roadmap for a phased-in NHIS-driven URC programme by 2025 or earlier to promote healthy eating and lifestyle changes that reduce risk for chronic disease later in life, and a UCC programme by 2030 or earlier to more broadly promote better population-based health through policies for public-sector and private-sector support of healthy and sustainable lifestyles. Ongoing successful deployment of UHC, and phasing in of URC and UCC, will require strengthened community-level frontline and clinical
digital health-information systems, and data-driven optimisations for high impact and sustainability. An integrated dynamic UHC system that is adaptable to a rapidly developing society can provide an affordable and sustainable path toward health for all, and achievement of the underlying principles and targets of the SDGs.

Contributors
RA, TD, KAS, S, AHS, and HT conceptualised the content and analyses, analysed the data, and drafted the manuscript with the support of RS, ELA, AT, SS, and PS. All authors contributed to manuscript revisions. FW helped RA, TD, and AHS to streamline the content and provided feedback. RA coordinated the work together with AHS, and along with TD and HT drafted the final version of the manuscript.

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We declare no competing interests.

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