

## Women and Health: the key for sustainable development



Ana Langer, Afaf Meleis, Felicia M Knaul, Rifat Atun, Meltem Aran, Héctor Arreola-Ornelas, Zulfiqar A Bhutta, Agnes Binagwaho, Ruth Bonita, Jacquelyn M Caglia, Mariam Claeson, Justine Davies, France A Donnay, Jewel M Gausman, Caroline Glickman, Annie D Kearns, Tamil Kendall, Rafael Lozano, Naomi Seboni, Gita Sen, Siriorn Sindhu, Miriam Temin, Julio Frenk

### Executive summary

Girls' and women's health is in transition and, although some aspects of it have improved substantially in the past few decades, there are still important unmet needs. Population ageing and transformations in the social determinants of health have increased the coexistence of disease burdens related to reproductive health, nutrition, and infections, and the emerging epidemic of chronic and non-communicable diseases (NCDs). Simultaneously, worldwide priorities in women's health have themselves been changing from a narrow focus on maternal and child health to the broader framework of sexual and reproductive health and to the encompassing concept of women's health, which is founded on a life-course approach. This expanded vision incorporates health challenges that affect women beyond their reproductive years and those that they share with men, but with manifestations and results that affect women disproportionately owing to biological, gender, and other social determinants.

The complexity of the challenges faced by women throughout the life course needs an increased focus on health systems, which heavily rely on the many contributions of women to care as members of the health workforce, in which their numbers are rapidly increasing, and in their traditional roles as primary caregivers at home and in communities.

Women and Health—the focus of this Commission—is a novel concept that refers to the multifaceted pathways through which women and health interact, moving beyond the traditional and exclusive focus on women's health to address the roles of women as both users and providers of health care, and highlighting the potential for synergy between them. We envision a virtuous cycle that builds on the premise that women who are healthy throughout their lives experience gender equality and are enabled, empowered, and valued in their societies, including in their roles as caregivers, are well prepared to achieve their potential and make substantial contributions to their own health and wellbeing, to that of their families and communities, and, ultimately, to sustainable development.

Such thinking needs an interdisciplinary, cross-sectoral perspective to identify women-centred solutions to the unique obstacles that girls and women face as both consumers and providers of health care.

In this Commission, we analyse existing and original evidence about the complex relations between women and health. We examine the major economic, environmental, social, political, demographic, and epidemiological transitions happening worldwide, their implications on the health system, and their effects on women and health. The health status of girls and women is analysed using a

life-course approach to show the breadth of women's health beyond the reproductive role. We estimate the financial value of the paid and unpaid health-care-related duties that women undertake in health systems and in their homes and communities, which are a hidden subsidy to health systems and societies. We conclude that gender-transformative policies are needed to enable women to integrate their social, biological, and occupational roles and function to their full capacity, and that healthy, valued, enabled, and empowered women will make substantial contributions to sustainable development (key messages). In view of these issues, we propose crucial actions for development partners, governments, civil society, advocates, academics, and professional associations that are needed to advance the women and health agenda (panel 1).

### Introduction

In the context of dramatic economic, environmental, social, political, and demographic transitions, the present scope of women's health is the result of a long

Published Online  
June 5, 2015  
[http://dx.doi.org/10.1016/S0140-6736\(15\)60497-4](http://dx.doi.org/10.1016/S0140-6736(15)60497-4)

**Women and Health Initiative, Harvard T H Chan School of Public Health, Boston, MA, USA** (A Langer MD, J M Caglia MPH, J M Gausman MHS, A D Kearns MS, T Kendall PhD); **University of Pennsylvania School of Nursing, Philadelphia, PA, USA** (A Meleis PhD, C Glickman MIM); **Harvard Global Equity Initiative, Harvard Medical School, Boston, MA, USA** (F M Knaul PhD); **Harvard T H Chan School of Public Health, Boston, MA, USA** (R Atun MBBS, J Frenk MD); **Development Analytics, Istanbul, Turkey** (M Aran PhD); **Fundación Mexicana para la Salud, Tlalpan, Mexico** (H Arreola-Ornelas MS);

### Key messages

- Economic, environmental, social, political, and demographic transitions affect women's health and their rights and roles in society, leading to a complex epidemiological transition and increased caregiving needs and demands
- To ensure that women's comprehensive health needs are met throughout life, health systems and societies should simultaneously and effectively address the unfinished reproductive health, nutrition, and infectious disease agendas and the emerging epidemic of chronic and non-communicable diseases
- The response to non-communicable diseases so far is not commensurate with their burden among women, who are especially vulnerable because of biology, gender, and other social determinants
- Poor women typically receive care from the most disenfranchised members of the health system, leading to ill health and perpetuation of inequities among population groups; for the health of all to be improved, this cycle needs to be broken
- Women's contributions in the health-care labour force and their crucial roles in the health care of families and communities are drivers of the wealth and health of nations, but are still underappreciated; on the basis of an analysis of 32 countries accounting for 52% of the world's population, we estimated that the financial value of women's contributions in the health system in 2010 was 2.35% of global gross domestic product (GDP) for unpaid work and 2.47% of GDP for paid work—the equivalent of US\$3.052 trillion
- Few gender-sensitive policies exist that enable women to integrate their social, biological, and occupational roles, function to their full capacity, and realise their fundamental human rights
- Sustainable development needs women's social, economic, and environmental contributions, which will increase when women are healthy, valued, enabled, and empowered to reach their full potential in all aspects of their lives, including in their roles as providers of health care

Centre for Global Child Health,  
Hospital for Sick Children,  
Toronto, ON, Canada  
(Z A Bhutta PhD); Ministry of  
Health, Kigali, Rwanda  
(A Binagwaho MMed [Ped]);  
University of Auckland,  
Auckland, New Zealand  
(R Bonita PhD); The Bill &  
Melinda Gates Foundation,  
Seattle, WA, USA  
(M Claeson MD, F A Donnan MD);  
The Lancet, London, UK  
(J Davies MD); National  
Institute of Public Health,  
Cuernavaca, Mexico  
(R Lozano MD); International  
Planned Parenthood  
Federation Governing Council,  
London, UK (N Seboni PhD);  
Indian Institute of  
Management, Bangalore, India  
(G Sen PhD); Mahidol  
University, Salaya, Thailand  
(S Sindhu DNSc); and Center for  
Global Development,  
Washington, DC, USA  
(M Temin MS)

Correspondence to:  
Dr Ana Langer, Women and  
Health Initiative, Harvard  
T H Chan School of Public Health,  
Boston, MA, USA  
alanger@hsph.harvard.edu

## Panel 1: Recommendations

### Value women

- Ensure women's universal access to health care that is responsive to gender and the life course; states should use the maximum available resources to ensure availability, accessibility, and quality of health services to address women's comprehensive needs
- Recognise women's paid and unpaid contributions as health-care providers
- Develop, implement, and enforce gender-responsive policies to support women in their diverse roles and enable them to integrate their social, biological, and occupational contributions

### Compensate women

- Estimate the value of women's paid and unpaid contributions to health care and recompense their invisible subsidy to health systems and societies
- Ensure that men and women receive equal compensation for equal work in health and other sectors

### Count women

- Ensure that women are accounted for in quantification of the health workforce
- Guarantee that sex-disaggregated civil, vital, and health statistics and survey data are obtained through national systems
- Mandate that research studies enrol women and publish findings disaggregated by sex

### Be accountable to women

- Develop and implement an accountability framework and indicators for women and health
- Establish independent mechanisms at global and country levels to support, catalyse, and ensure accountability for global, regional, and national action for women and health

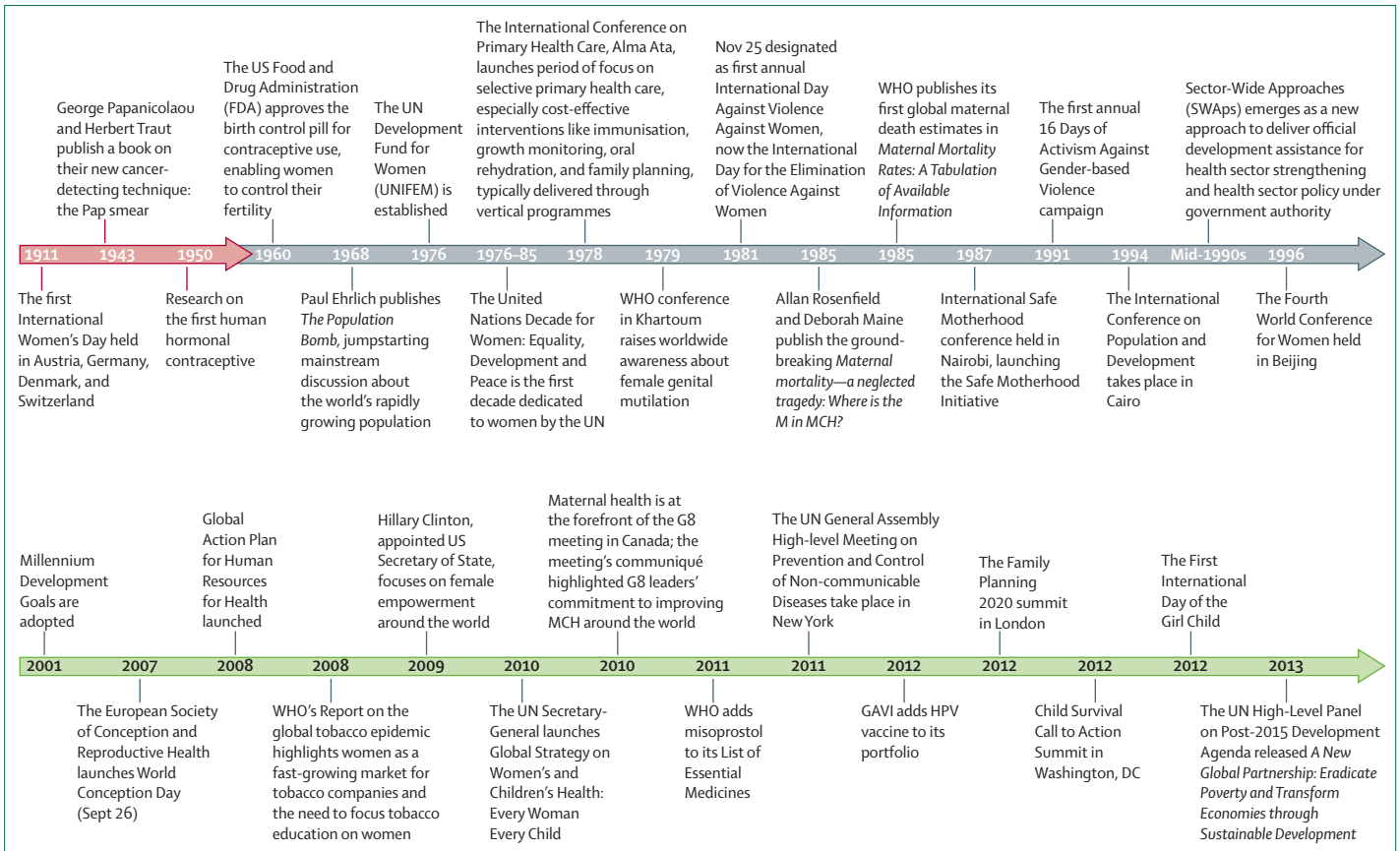
and protracted epidemiological transition characterised by overlapping unmet needs in sexual and reproductive health, nutrition, and infectious diseases, and a growing epidemic of non-communicable diseases (NCDs). Simultaneously, worldwide priorities in women's health have been changing. Until 20 years ago, the dominant vision was that of maternal and child health, in which the health and wellbeing of women were mostly considered means to improve children's health, instead of legitimate aims in themselves. In 1985, Rosenfield and Maine<sup>1</sup> contested the invisibility of the maternal health component in maternal and child health programmes. A few years later, UNFPA, WHO, and the World Bank, along with two international non-governmental organisations (NGOs), the Population Council and Family Care International, launched the Safe Motherhood Initiative,<sup>2</sup> which was the first worldwide effort to focus attention on maternal health (figure 1).

While maternal health was slowly gaining visibility, the global health community gathered in Cairo, Egypt, in 1994 to change the focus from the demographic and population targets that had prevailed until then to the comprehensive concept of sexual and reproductive health and rights (SRHR).<sup>3</sup> 1 year later, at the Fourth World Conference for Women in Beijing, most countries committed to a broader vision for women's health and human development.<sup>4</sup>

During the following years, among the many health challenges included in the sexual and reproductive health agenda, substantial policy and programmatic efforts were directed towards reduction of maternal mortality, a highly preventable problem and the most inequitably distributed health indicator in the world.<sup>5</sup> The unacceptable persistence of maternal mortality and its association with poverty prompted the global community to dedicate one of the eight Millennium Development Goals (MDG 5) to its reduction, committing to reducing maternal mortality by two-thirds by 2015.<sup>6</sup>

In the past decade, the global health community shifted its attention to women's health (figure 1). This expanded vision is, to a large extent, due to the growing acceptance of the life-course approach, which emphasises links between women's health at different stages of the life course<sup>7</sup> and evidence of the growing contribution of NCDs to women's morbidity and mortality worldwide.<sup>8</sup> The expanded women's health concept incorporates health challenges that affect women beyond their reproductive years and those that they share with men (such as NCDs), but with manifestations and effects that are especially severe for women owing to biological, gender, and other social determinants that affect women disproportionately.

This new vision highlights the complexity of the health challenges faced by women. Broad approaches to women's health have been promoted, with an increased focus on health systems and the changes necessary to prepare them to address women's health needs.<sup>9</sup> Health systems are often unresponsive to the needs of women despite the fact that such systems rely heavily on women's contributions to health care, whether paid or unpaid. Worldwide, most health-care providers are women.<sup>10</sup> Although women continue to have traditional roles, such as primary caregivers at home and in communities, their numbers are rapidly increasing in the health-care workforce.<sup>11</sup> However, female health-care providers are not working to their full potential because they are undervalued and undersupported by the systems in which they work. In the health-care system, women tend to have lower-skilled, lower-paid jobs than men.<sup>11</sup> Poor employment conditions hinder the quality and effectiveness of women's contributions to health care. Although they are the backbone of the health-care system, women are rarely represented in executive or management-level positions in global health and are often exposed to gender-related occupational health risks.<sup>12</sup> In their roles as informal

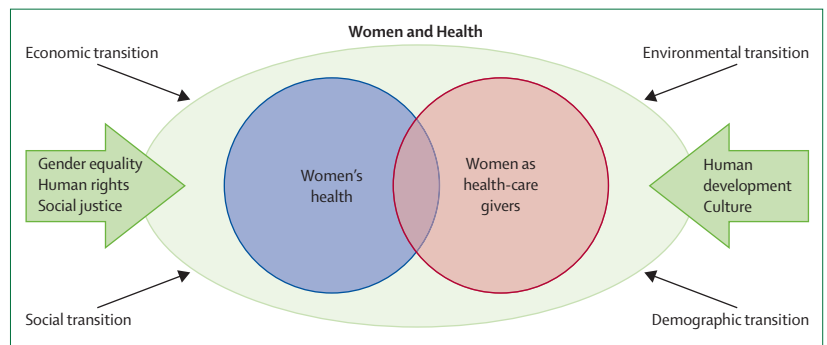


**Figure 1: Important milestones for women and health**  
HPV=human papillomavirus.

health-care providers at home or in the community, women are generally not supported by higher levels of the health-care system, their contributions are not recognised, and their work is not remunerated.<sup>13</sup>

Girls' and women's health, and their experiences as caregivers, are unique, and are strongly affected by key social determinants such as gender equality, human rights, social justice, human development, and culture (figure 2). Furthermore, women's roles as both consumers and providers of health care are often linked, represented by the area of overlap between women's health and women as caregivers in the women and health conceptual framework (figure 2).

The case of maternal health, among many others, illustrates this point: minimally trained and unsupported women working at the lowest level of the health system typically care for women in the poorest sectors of the population. That is, the most vulnerable women receive care from the most disenfranchised members of the health-care system—community health workers (CHWs), traditional birth attendants, or untrained relatives—who are likely to be women.<sup>14</sup> These caregivers are frequently under-resourced, underpaid or unpaid, undertrained, and often not formally recognised by the health system, which is one of the most problematic ways by which inequities



**Figure 2: Women and health—a conceptual framework**

are perpetuated. Value, training, compensation, and support of these caregivers would prepare them to offer adequate health care and would eventually reduce maternal and perinatal morbidity and mortality.

New strategic approaches are needed to advance the increasingly complex women's health agenda. Responding to this urgent need, the Harvard T H Chan School of Public Health, Boston, MA, USA, launched the Women and Health Initiative (W&HI) in 2010, on the basis of a construct initially conceived in Mexico in 2000,<sup>15</sup> where it was used as a framework for key policies and

programmes (figure 2). WHO embraced the concept a few years later.<sup>13</sup> The approach now guides research and education efforts that conceptualise women as both targets of health-care interventions and crucial components of the social response to health needs.<sup>16</sup> The central principle of the W&HI is that, because of persistent social and gender inequality, violations of human rights (including the right to health care), and cultural backgrounds that perpetuate social injustice and limit women's human development, girls and women are at increased risk of ill health and have a low status in the health system, in which they have dual roles as both consumers and providers of health care (figure 2). The W&HI looks at these complex issues from an interdisciplinary perspective and recommends women-centred solutions to the unique challenges of women and girls in terms of supply and demand in health care. A key principle of the W&HI is that gender equality and women's empowerment should be essential underpinnings of policies and interventions aimed to strengthen health-care systems to address women's needs.

Although much is known about certain aspects of the broad women and health construct, many gaps exist in knowledge of these multifaceted and unique processes and the responses needed to empower women as both consumers and providers of health care. An improved understanding of problems and solutions will contribute to a policy and programmatic environment that increases opportunities for women to prosper in their many health, work, and social roles, including in their role as caregivers. With this objective, W&HI partnered with *The Lancet* and the University of Pennsylvania School of Nursing, PA, USA, to form the Women and Health Commission<sup>17</sup> in November, 2012. The Commission brought together leading thinkers, programme leaders, and activists from around the world to comprehensively analyse—from multidisciplinary and multisectoral perspectives—the complex relations between women and health in a rapidly changing environment.

With a life-course approach to women's health and caregiving, we have fostered a broad and deep understanding of the links between biological and social factors in the identification of, and responses to, the most neglected women's health needs in childhood, adolescence, young adulthood and beyond, and across generations. Additionally, the Commission focused its efforts to document women's contributions as primary caregivers in the family and as health-care providers in the health sector. This new evidence led to calls for global and national action to ensure that effective responses to women's health needs along the life course are designed and implemented, and that women become centrally involved in leadership, design, management, and delivery of health care.

On the basis of an informed and thorough analysis of needs and opportunities, the Commission can help to inform, leverage, and mobilise worldwide partnerships and collaborations to address and drive resources to the

women and health agenda. We strongly believe that 2015—a landmark year in which new sustainable development and global health priorities will be embraced by the international community<sup>18</sup>—is the time to highlight the importance of appropriate and timely investments in girls and women to enhance their status, strengthen health systems, and improve health outcomes.

Many of the factors we describe mainly affect women in the most vulnerable population groups in any country—those who are most disempowered owing to poverty, ethnicity, and other conditions. We emphasise the factors that influence the health and wellbeing of girls and women worldwide, and recommend policies and actions to advance gender equity and support sustainable development in all contexts. Although interactions between men and health are also crucial and multifaceted, we focus primarily on women, with limited references to men for comparative purposes.

### Women and Health and sustainable development

We propose a comprehensive model for sustainable development that takes account of women's roles in production and reproduction and their dual roles as consumers and providers of health care, which affect all domains of sustainable development—societal, environmental, and economical. Our premise is twofold: when women are valued, enabled, and empowered in each of these domains, gender equality and health can be achieved; and when women are healthy and have equity in all aspects of life, sustainable development will be possible.

Women's fertility has been recognised as a factor that substantially affects the three domains of sustainable development.<sup>19</sup> Fertility contributes to the burgeoning world population. Together with patterns of consumption, high population growth affects environmental sustainability. Additionally, the profound economic, social, and health effects of high fertility can perpetuate exclusion of women and limit their opportunities to build and realise their human capital—effects that extend to the next generation.<sup>20,21</sup>

To ensure women's choice in the context of SRHR is fundamental to sustainable development. To give women more control of their fertility and to challenge entrenched gender-based discrimination will support women's autonomy and increase access to educational and employment opportunities.<sup>3,22</sup> To empower women to make choices about family size will help to achieve more appropriate birth rates for societies, reduce population growth, change consumption patterns, and mitigate degradation of natural resources, thereby promoting environmental conservation.<sup>19</sup> Furthermore, evidence shows that low fertility and appropriately timed pregnancies contribute to improved women's health later in life.<sup>23</sup> Additionally, decreased family sizes increase women's ability to participate in the workforce,<sup>22</sup> resulting in a demographic dividend as changes to population

structure boost economic progress.<sup>24</sup> The extent to which states and societies ensure availability, accessibility, and quality of health services for women's reproductive and other health needs at each phase of the life course defines opportunities for women and girls to survive and thrive. This attention is effective: the 2013 Global Investment Framework for Women's and Children's Health<sup>25</sup> quantifies the massive social and economic benefits that would be obtained by increased investment in targeted interventions to improve women's health, wellbeing, and productivity.

Healthy, educated, and empowered women are well positioned for the many roles they have as mothers, caregivers, workers, volunteers, and leaders, affecting the structure of societies and advancing sustainable development—"development that meets the needs of the present without compromising the ability of future generations to meet their own needs".<sup>26</sup> The fundamental roles that women have in biological and social reproduction make them key to these intergenerational effects.<sup>27</sup> Improvement of the status, and fulfilment of the potential, of women and girls by elimination of gender discrimination at all levels of society are moral and sustainable development imperatives.<sup>25</sup>

### Women and Health in a changing world

Women are agents of change, affecting the world around them, but they are affected by global and local transitions.

#### Economic transition

Globalisation, defined by Al-Rodhan and Stoudmann<sup>28</sup> as "a process that encompasses the causes, course, and consequences of transnational and transcultural integration of human and non-human activities" is the main feature of economic transition. Globalisation expands the world economy, generates jobs and opportunities, creates opportunities for upward mobility, promotes sharing of technology and commodities, improves access to information and health resources, enables worker migration across jobs and countries,<sup>29</sup> but also makes countries linked and interdependent.<sup>30</sup>

Globalisation generates new challenges, its benefits have not been uniformly distributed, and effects on women have been mixed. Globalisation has increased inequality between and within countries, polarised societies by income and economic status,<sup>31</sup> and accelerated disease migration—including widespread adoption of an unhealthy lifestyle and diet—contributing to the increase in NCDs and women's changing disease burden.

The economic transition has likewise had mixed effects on poverty reduction, the overall target of the MDGs and the framework to the health MDGs. Although this transition has enabled the global extreme poverty rate to be halved, progress has been mostly limited to China, Brazil, and India—the most populous countries in the world. Overall gains in many countries have failed

to reach impoverished individuals, creating large disparities.<sup>32</sup> Poverty and inequality disproportionately affect women, and the so-called feminisation of poverty is well recognised.<sup>33</sup> Gender inequality and poverty are synergistic: gender inequality exacerbates the effects of poverty and is more pronounced among the poor than among wealthier individuals. One study of 16 countries and five regions suggests that households headed by women are less likely to own farmland than those headed by men.<sup>34</sup> In many areas of sub-Saharan Africa and Asia, poor girls are less likely to attend school than poor boys.<sup>35</sup> During natural disasters in Bangladesh, being a girl in a landless household is more detrimental to nutritional status than simply being a girl or simply belonging to a landless household.<sup>36</sup>

The global economic transition, however, has decreased the gender gap in employment because more women have entered the paid labour market.<sup>34</sup> Specifically, women's participation in the paid health workforce has steadily grown. Most formal health-care workers are women in many countries.<sup>37</sup> In 2009, about 75% of the health and welfare graduates (including medicine, pharmacy, and nursing) in EU member states were women.<sup>38</sup> The feminisation of the medicine is especially important because the profession has historically been dominated by men.<sup>39</sup> An increasing number of countries are training and deploying large numbers of CHWs who are mostly women.<sup>10</sup> Women now comprise an increasing number of international migrants looking for employment—often in the health sector (Siantz M, Moyce S, Salisbury R, University of California, Davis Betty Irene Moore School of Nursing, personal communication).

Globalisation, rapid growth of market economies, and entry of women into the workforce provide an opportunity to transform inequitable gender roles, but employment possibilities are not distributed equally. Women receive lower pay, face more job insecurity, and are less likely to be unionised than men.<sup>40–42</sup>

Furthermore, women's growing participation in the labour market, while continuing to undertake most domestic work and caregiving, is a potential burden and threat to women's health and wellbeing; little time is left for rest and leisure, resulting in a double burden of work.<sup>43</sup>

As the workforce becomes increasingly feminised, improvement of girls' and women's health becomes not only a moral, but also an economic imperative because healthy workers have more energy, improved mental health, and are less likely to be absent from work than unhealthy ones.<sup>44</sup> In fact, female health status has an increasing effect on economic productivity and growth, which in turn affect progress towards development.<sup>45</sup>

#### Environmental transition

Effects of climate change, environmental degradation, and natural disasters manifest worldwide, and unsustainable consumption and production patterns accelerate environmental change, with adverse effects



on sustainable development.<sup>31,46</sup> In some regions of the world, high birth rates and population growth continue to increase demand for agricultural and other natural resources, challenging the conservation imperative. Environmental change affects health, altering patterns of mortality, disease, and population movement.<sup>47</sup> Disasters and environmental degradation threaten especially the poor and marginalised populations who live in unstable housing and neighbourhoods and rely on the environment for their livelihood.

The effect of environmental change is not gender-neutral because, worldwide, women and girls undertake most domestic responsibilities.<sup>48</sup> Location of fuel for cooking and water for consumption, sanitation, and hygiene is an increasing challenge where forests are degraded and water is polluted. Inadequate access to safe water and sanitation is a major contributor to the burden of disease in Africa, Asia, and parts of the Americas. Nearly half of people in low-income and middle-income countries (LMICs) have one or more of the major diseases associated with inadequate water and sanitation.<sup>49</sup> Unequal distribution of domestic responsibilities makes this environmental transition a women's issue. Girls and women spent more than 700 h a year on water provision in Ghana, more than 500 h in Tanzania, and more than 200 h in Zambia.<sup>50</sup> This task starts at an early age, and girls spend more time on provision of water than boys: results of a study<sup>51</sup> in rural Benin showed that girls spend 1 h per day on collection of water compared with 25 min for boys. Girls living far from water sources transport heavy water containers on their heads, leading to head, neck, and back injuries in the long term.<sup>52</sup> Absence of a nearby water source increases the burden of caregiving for sick or disabled people.<sup>53</sup>

Nearly 40% of the world's population and about 90% of rural households in LMICs rely on solid fuel, such as wood, coal, charcoal, or animal waste for cooking. In areas in which desertification is widespread, forests are denuded and girls and women spend increasing amounts of time for the collection of wood to meet household needs. For example, women in Zambia spend more than 800 h a year on collection of wood for fuel.<sup>51</sup>

Use of these traditional biofuels jeopardises the health of women and children especially, who spend substantial periods of time close to heat sources in rural areas and overcrowded slums.<sup>54</sup> The unequal burden of cooking responsibilities means that indoor air pollution disproportionately affects women's health. Prolonged exposure to smoke from traditional stoves that use biofuel severely damages lungs and eyes and increases risk of adverse pregnancy outcomes such as stillbirths and low birthweight.<sup>54</sup> Indoor cooking over open fires can cause chronic obstructive pulmonary disease, one of the major causes of death and disability for women.<sup>55</sup>

Environmental change has effects on women's health and their caregiving role in both rural and urban settings. Resource degradation can impoverish women because

location of basic resources takes increased time and effort, while reducing women's ability to provide care for their families.

Another example of the gendered effects of environmental change is women's increased risk of death in natural disasters. 55–70% of the tsunami-related deaths in Indonesia in 2004 were women.<sup>56</sup> Warning information might not reach women who are not allowed to leave home without a male escort, and, in some settings, women do not learn how to swim.<sup>57</sup> Evidence exists of rescue efforts prioritising men and relief systems not responding to women's health needs.<sup>58</sup>

Environmental change likewise affects women in high-income countries (HICs). In 2003, one of the hottest summers on record in Europe led to 80 000 excess deaths in 12 countries. Women's disproportionate representation among the elderly, who are more susceptible to disorders resulting from extreme temperatures, meant that 70% of the 15 000 who died during the 2003 heatwave in France were women.<sup>59</sup>

In LMICs, the time needed to fulfil domestic, agricultural, and care responsibilities prevents girls and women from pursuit of educational and economic opportunities, increasing the threat posed by environmental change to sustainable development. Informed and empowered women are able to mitigate the effect of environmental transitions on their health and their families' health, and better fulfil their productive roles in society.

### Social transition

Women's changed roles throughout the past century have affected social processes and, in turn, social transitions have altered women's health, status, and wellbeing. Urbanisation and migration in the past several decades provide good examples of these substantial transformations.

The combined effects of population growth and migration mean that, worldwide, more people live in urban areas than in rural areas.<sup>60</sup> Urbanisation is an important aspect of social transitions for women and health because it affects family structures, social norms, education, employment, consumption patterns, health-related behaviours, and access to services—all of which directly affect women's health status and the circumstances of their caregiving.

Worldwide, urban growth is rapid and mostly unplanned. As a result, many urban dwellers do not have access to the basic infrastructure and resources that attracted them to cities. Poorly planned urban environments, unhealthy lifestyles, unsafe neighbourhoods, hazardous informal settlements, and poor housing quality pose health risks to girls and women.<sup>61</sup> Overcrowding, street insecurity, limited facilities, and gender norms inhibit women's opportunities for physical activity, and urbanisation shifts dietary norms and is associated with decreased fruit and vegetable intake, contributing to increased incidence of chronic illness

and NCDs.<sup>62</sup> These factors contribute to the health transition in many urban areas in LMICs, which now have a double burden of disease.<sup>63</sup> Worldwide, traditional social norms often break down in cities, and overcrowded urban neighbourhoods reduce social cohesion, meaning that, for example, neighbours refrain from intervention in domestic affairs, which can increase intimate partner violence among urban women.<sup>64</sup>

However, city life can emancipate girls and women, giving them more educational opportunities, autonomy, and access to resources than in rural settings. Despite constrained employment chances, many urban women benefit from increased economic independence, empowering them and improving their socioeconomic status.<sup>65</sup> Urbanisation, which can shift gender norms and reduce gender inequality, is among the most important factors contributing to progress in girls' education, together with globalisation and economic growth.<sup>66</sup>

Additionally, urbanisation can provide direct opportunities to improve women's health, because health services are geographically closer. For example, urban women in Tanzania have increased access to reproductive health care and tend to marry later and have fewer children than their rural counterparts, contributing to improved maternal health outcomes.<sup>67</sup> However, for these advantages to be achieved, implementation of gender-responsive urban policies and planning are needed. In fact, averages mask substantial heterogeneity in the benefits of living in cities for women. Disaggregation of results by socioeconomic status shows that the widely accepted so-called urban advantage of reproductive health does not exist for some women.<sup>68</sup>

Lessons can be learnt from urban communities with safe physical environments, strong connectivity, and accessible resources that have contributed to the health and wellbeing of women, their families, and communities. City design can accommodate different modes of transportation by creation of wide, well lit streets, bicycle paths, and mass transit. To improve safety for women, eight commuter trains exclusively for female passengers, known as Ladies' Specials, were introduced in India's four largest cities.<sup>69</sup> Other creative measures can protect women and girls from street violence. In Nairobi, Kenya, women led an initiative called Adopt-a-Light-Limited to encourage businesses to adopt and maintain streetlights in exchange for free advertising, making streets safer for women.<sup>70</sup> Partnering with police can likewise decrease violence for women. For example, in Mumbai, India, women's savings groups collaborated with police to establish community police stations in informal settlements. One of their tasks is to close down illegal drinking places, which has helped to reduce alcohol abuse and domestic violence.<sup>71</sup>

Safe outdoor gyms can increase exercise levels, decreasing obesity and hypertension. China, as part of the government's national fitness campaign, has built

more than 220 million square feet of outdoor gyms across the country, providing a free and easily accessible space for its population to exercise.

Gender-responsive policies and programmes for delivery of essential health services can benefit women in urban settings. In Mexico, health reforms included social protection for all Mexican citizens, including 50 million poor people who historically did not have access to social security. Although it focuses on universal health coverage, Seguro Popular has a strong gender focus and prioritises social determinants and health disorders that especially affect women. As such, this health sector reform programme emphasises prevention, detection, and treatment of gender-based violence, cervical and breast cancer, and HIV/AIDS among women, and reduction of maternal mortality. Furthermore, special efforts are made to include female heads of households, and evidence shows that they have enrolled at an accelerated pace.<sup>72</sup>

For more on **Seguro Popular** see [http://www.salud.df.gob.mx/ssdf/seguro\\_popular/](http://www.salud.df.gob.mx/ssdf/seguro_popular/)

### Political transition

Women's health is a highly politicised field. Many socially conservative societies and governments, especially in LMICs, have consistently limited women's reproductive rights and choices and, as a result, severely affected their health.<sup>73</sup> The legal frameworks that regulate women's access to contraception and safe abortion services in many countries clearly show the effects of ideology and politics on women's sexual and reproductive rights and health.<sup>74</sup>

Conditions are especially challenging for women during and after conflicts, when women and girls are highly vulnerable to become refugees or internally displaced people or are trying to rebuild their lives and families. War's direct effects on girls and women include rape and sexual harassment, intimate partner violence, and stress.<sup>75</sup> Health systems cannot function when clinics and hospitals become military targets and health-care workers are forced to flee their jobs or move to the front lines. During Rwanda's genocide, more than half of the country's health-care workers were killed and the health infrastructure was disrupted.<sup>76</sup> Conflicts likewise cause long-term mental health problems for populations, especially women, who have to cope with anxiety, anguish, fear, and the burden and stress of provision for their family's needs.

Additionally, women's reproductive health is affected in war. During the Iraq–Kuwait conflict, infant and maternal mortality more than doubled in Iraq between 1990 and 1996.<sup>77</sup> Eight of ten countries with the highest maternal mortality ratios are affected by political fragility and conflict.<sup>78</sup> Antenatal and delivery services and essential supplies, such as safe birth kits and contraception, are often unavailable during conflicts and humanitarian disasters.<sup>79</sup>

Political transitions have also benefited women. Numbers of women in decision-making positions in international organisations, and in country-level public

and private sectors are increasing.<sup>12</sup> Hypothetically, female leaders are strongly positioned to promote gender equality and improve women's health and status in society and the health sector. Unfortunately, evidence for this hypothesis is limited. However, some specific examples exist of female heads of state who have made women's SRHR prominent in their political agenda. Former President Joyce Banda of Malawi and President Michele Bachelet of Chile are outstanding examples.<sup>80,81</sup> Female leaders' performance in advancement of the women and health agenda compared with their male counterparts should be further studied.

### Demographic transition

Decreased fertility and increased life expectancy have resulted in a substantial demographic transition in most LMICs.<sup>82</sup> This process is usually accompanied by industrialisation and economic growth to some extent.

In the context of a lengthy demographic transition, most LMICs are experiencing a large population bulge—ie, the largest proportion of people under the age of 30 years in the world's history, constituting two-thirds of the population<sup>83</sup>—as a result of the so-called population momentum.<sup>84</sup> This period presents both challenges and opportunities. National policies and programmes need to ensure that this generation of girls (and boys) has full access to education, sexual health counselling, and reproductive health services—particularly contraceptives—and job opportunities.<sup>20</sup> However, as this generation of adolescents enters the productive labour force, fertility continues to decline, and the older generations have longer life expectancies, the dependency ratio (ie, the ratio of children and older people to the working age population) is declining substantially. When public policies respond effectively to these changes, a period of rapid economic growth and decreased strain on families can occur.<sup>24</sup>

Furthermore, reduced fertility has important potential economic benefits, as estimated by the 2013 Global Investment Framework for Women's and Children's Health.<sup>25</sup> In 74 countries, the demographic dividend resulting from a reduction in unintended pregnancies will contribute 1% of gross domestic product (GDP) by 2035, increasing to 3% of GDP by 2035 if Brazil, China, Indonesia, and Vietnam—large countries with fairly low fertility—are excluded.<sup>25</sup> The estimated dividend of an enhanced response to unmet contraceptive need is much larger in 27 high-fertility countries, with returns estimated to exceed 8% of GDP by 2035.<sup>25</sup>

Improvement of adolescents' SRHR will contribute not only to these economic benefits, but also to a healthier cohort of women at later stages of the life course. To maximise benefits of the demographic dividend and advance the women and health and sustainable development agendas, the needs of the largest generation of adolescents and the growing older population should be simultaneously addressed.

### Epidemiological transition

The epidemiological transition is inextricably linked to the demographic transition and characterised by reductions in infectious diseases, malnutrition, and maternal and child mortality, with increasing rates of NCDs.<sup>85</sup> In some LMICs, the epidemiological transition is protracted, leading to a so-called double burden of disease.<sup>86</sup> In LMICs, the epidemiological transition affects women especially, who carry the burden of reproductive health complications, are overly affected by the feminised AIDS epidemic, and are disproportionately affected by NCDs later in life. The epidemiological transition likewise results in an increasingly heavy burden for women in their domestic roles as health-care providers, since they care for the needs of families that include young children and elderly relatives with competing and increasingly complex health needs. Weak health systems cannot effectively and simultaneously address the unfinished SRHR agenda and the growing burden of NCDs. Worldwide, not enough fiscal resilience exists to meet the economic and social burden of the epidemiological transition, which poses risks to sustainable development.<sup>87</sup> Health systems in LMICs and in some industrialised countries often do not respond to changing demographic and epidemiological realities, and do not guarantee equitable access to quality health care for all. In fact, the direct health-care payments that substantial sectors of the population make can become catastrophic expenses that push millions of people below the poverty line every year.<sup>88</sup> Analysis of data from 12 Latin-American countries suggests that catastrophic health expenses ranged from 0.4% of household income in Costa Rica to 7–11% in Argentina, the Dominican Republic, Ecuador, Guatemala, and Nicaragua, with an increased percentage among poor households in all countries in the region, except in Chile.<sup>89</sup> An analysis<sup>90</sup> of data from the early 2000s documented that about 25% of households in 40 LMICs resorted to borrowing or selling assets to cover health-care costs in the previous year. Health-related costs for people living with HIV, for example, can amount to more than 20% of available income.<sup>91</sup> These costs are an issue for rapidly ageing populations with high prevalence of chronic disease and increasing medical costs. In some countries, households headed by women have higher risk of catastrophic out-of-pocket health expenditure than those headed by men.<sup>92</sup>

Universal health coverage (UHC) financed by domestic public sources—defined as universal access to needed health services without financial hardship resulting from payment<sup>93</sup>—can help to address catastrophic health-care expenditure and enable equitable distribution of health service access within and across countries.<sup>94</sup> As further described in this Commission, well-functioning health systems are a prerequisite for UHC, enabling increased health-care access, providing social protection, contributing to economic growth, and thereby enhancing development, with benefits for women.<sup>95</sup>



Successful health system reforms in Brazil,<sup>96</sup> China,<sup>97</sup> Mexico,<sup>98</sup> Thailand,<sup>99</sup> and Turkey<sup>100</sup> have improved access to health-care services—especially for poor populations and women and children—improved health outcomes, and provided financial protection from catastrophic health expenditures. UHC has the potential to substantially improve women's health worldwide, if included as part of the post-2015 development agenda.<sup>101</sup>

Worldwide transitions occur across economic, environmental, and social domains affecting women and health, which, in turn, affect these complex processes and, ultimately, the pace of sustainable development. From their increasingly important role in the workforce, to their management of natural resources and involvement in political movements, women's contributions are profound.

### The health of girls and women

Women's health is a combination of health risks and disorders that they share with men and issues that exclusively affect women because they relate to their biology, both of which are strongly affected by gender, ideology, and politics. The changing scope of the worldwide burden of disease shows important advances in some of women's foremost health priorities, but considerable challenges and inequalities exist. While the achievement of SRHR is still an unmet goal,<sup>102</sup> chronic diseases, NCDs such as cardiovascular disorders, stroke, cancer, diabetes, chronic obstructive pulmonary disease, and mental health disorders are now the leading causes of death and disability for women in almost all countries.

MDG 4, MDG 5, and MDG 6 directed international attention to the disproportionate burden of ill health on women and children, especially those in the most vulnerable population groups. This increased focus has had substantial effects, and deaths from communicable diseases and maternal, perinatal, and nutritional disorders decreased by about 20% between 2000 and 2013.<sup>103</sup> However, poor access to health services and poor quality of care are pervasive in many LMICs, and in many disadvantaged communities in HICs.<sup>104</sup>

The SRHR goals that the worldwide community embraced at the International Conference on Population and Development (ICPD) in Cairo in 1994 represented an ambitious women's health agenda (figure 1). The ICPD Beyond 2014 review, which tracked the ICPD goals, shows that many have not been achieved.<sup>20</sup> For example, modern contraception, a key preventive measure and reproductive right, is still out of reach for millions of girls, women, and couples worldwide. Furthermore, despite the progress achieved worldwide in reduction of maternal mortality, maternal deaths are still too frequent and are an unacceptable public health and ethical problem, since they mostly occur among the poorest women who do not have access to the available and generally affordable life-saving interventions they need.<sup>105</sup>

Although reproductive and maternal health need sustained attention, recognition that the health risks and disorders that girls and women encounter throughout the life course have shifted substantially during the past two decades is crucial, reinforcing the importance to address comprehensive women's health beyond their reproductive capacity. A broader vision, which the Beijing Platform for Action of the World Conference on Women laid out as early as 1995 (figure 1), recognises that health systems need to cover all aspects of women's health during the life course, with a focus on the high-impact interventions that meet women's needs at each stage. The response, however, must go beyond the health sector and address structural inequalities and social determinants of health.

### Inequalities and social determinants of women's health

The conditions in which men and women are born, grow, live, work, and age affect health outcomes, along with distribution of money, resources, and power. Worldwide, women's economic vulnerability, low level of education, reduced social status, and gender discrimination result in increased exposure to hazards of unsafe sex, risky work, poor housing conditions, poverty, and violence. Beyond the biological reasons that explain some of the observed differences between men's and women's health, power dynamics, distribution of resources, entitlements, norms, and values disadvantage women in fulfilment of their reproductive intentions and access to health services to meet their needs.<sup>106</sup>

In fact, unfavourable social conditions limit women's autonomy to seek health care, even when services are available. These circumstances especially affect women and girls in vulnerable subpopulations such as migrants, people living with disabilities, and ethnic minorities, who face specific challenges as a result of language barriers, cultural attitudes, provider bias, and discrimination, among other factors.<sup>107</sup> Gender-based misconceptions among providers likewise affect women's access to health care for disorders that they share with men. Results of studies from HICs show that, in some settings, men are more often referred to a specialist provider for cardiac arrhythmias, cerebrovascular disease, vascular surgery, hip replacement, and heart transplantation than women.<sup>108</sup>

National health policy likewise often shows and reinforces normative power dynamics within relationships. For example, studies in countries such as Ghana and Egypt have documented the necessity of male partner permission for a woman to receive contraception, a practice that reinforces male dominance.<sup>109</sup> To address gender inequality and promote women's SRHR are crucial to improve health and reduce disparities across health outcomes. As stated in article 96 in the United Nations Fourth World Conference on Women platform for action<sup>7</sup> only when women are empowered enough to exercise their right to make decisions about their

sexuality free from coercion, discrimination, and violence will they be able to fulfil their reproductive intentions and meet other health needs.

Geography and wealth are important determinants of inequality in access to quality health services, although the effects are poorly understood owing to simplistic analyses that do not take into account the complex reality. In fact, subnational reproductive health indicators are often portrayed as urban and rural averages, masking substantial variation across socioeconomic groups.<sup>68</sup> For example, the reproductive health status of poor women in urban and rural settings is similar in many countries, and the health gap between wealthy and poor individuals can be wider in some urban areas than in rural ones.<sup>110</sup> Analysis of Demographic and Health Surveys data from Ghana, Kenya, Madagascar, Nigeria, and Zambia, shows that poor women have lower rates of health-care use than rich women, irrespective of their location.<sup>111–115</sup>

Inadequate data collection has been detrimental to the health of women and girls for far too long, especially for those in the lowest socioeconomic groups, minorities, and those living in inaccessible and remote areas. Furthermore, the data recorded, which are in many cases incomplete and imprecise, mainly focus on reproductive function and fail to provide information about other women's health needs, such as with NCDs.<sup>116</sup> Poor (or absence of) measurement of these issues results in further invisibility and neglect of comprehensive women's health issues.

#### A shifting profile: women's burden of disease

As a result of improved living conditions, public health improvements, and medical technologies that have had a substantial effect on survival in the past century, life expectancy has substantially increased for both women and men. Between 1990 and 2013, the worldwide average life expectancy at birth increased by 6·6 years for women and 5·8 years for men.<sup>103</sup> Worldwide, women live longer than men (average 74 years for women vs 69 years for men), but life expectancy and burden of disease show increasing health inequalities between countries and socioeconomic groups. Although women in Japan live for an average of 86 years, women in Central African Republic only live for an average of 54 years.<sup>103,117</sup>

Biological, social, structural, and behavioural characteristics and conditions that benefit women explain their higher life expectancy than men. For example, female infants have better survival than male infants owing to higher rates of infections and congenital anomalies in male infants.<sup>118</sup> In Belarus and Russia, women's average life expectancy at birth is 11–12 years higher than men's, owing to a large extent to high levels of alcohol use and abuse by men in those countries.<sup>119</sup>

#### Major causes of death and disability

The shifts in the leading causes of death in women between 1990 and 2010 are shown in table 1. The modified positions in 2010 compared with 1990 show real changes

in the burden of some health disorders and their relative importance compared with other causes of death and disability. Overall, maternal disorders as a cause of death moved from 11th in 1990 to 23rd in 2010, showing positive changes in social determinants of maternal health (such as schooling and family income) and the effects of the targeted and sustained efforts made worldwide and nationally to decrease maternal mortality.<sup>122</sup>

Despite large-scale efforts designed to increase coverage of antiretroviral therapy (ART),<sup>123</sup> especially in eastern and southern Africa since 2004, HIV/AIDS among women still increased in rank as a cause of death from 37th most common cause of death in 1990 to the 7th most common cause of death in 2010.<sup>120,121</sup> The disease burden of HIV/AIDS likewise shifted among men, from 34th place in 1990 to 7th in 2010.<sup>120,121</sup> In many cases, ART is offered to pregnant women to prevent vertical transmission of HIV and is often inaccessible to women for long-term use.<sup>124,125</sup> Emergence of HIV/AIDS as a leading cause of death among women in 2010 confirms the feminisation of the epidemic; 60% of people living with HIV/AIDS in sub-Saharan Africa and the Caribbean are women.<sup>126</sup>

The increase in death and disability caused by NCDs during the same period (1990–2010) is striking. The differences recorded in the burden of disease of men and women are reflective of the diverse factors that affect men's and women's health. For example, lung cancer increased from 15th leading cause of death in 1990 to 9th in 2010 (table 1), killing an estimated 457 000 women that year. However, for men, the increase was not as large, with lung cancer moving from 7th to 5th between 1990 and 2010.<sup>121</sup>

Injuries were responsible for a much smaller proportion of disabilities and deaths in women (7%) than in men (12%), probably because women in some parts of the world spend less time than men in transit on dangerous roads, and automobile accidents are a leading cause of injury. Although mental health and behavioural disorders accounted for only about 63 000 deaths in women, they account for a disproportionate amount of disability-adjusted life-years (DALYs) (8·3%); by contrast, injury causes about 169 000 deaths and 6·7% of DALYs in men.<sup>84</sup>

Despite evidence about the magnitude of NCD-related burden among women worldwide, several misconceptions exist, leading to persistent inaction.<sup>127</sup> NCDs, especially cardiovascular disease, are often considered to be diseases that mostly affect men in wealthy countries. However, the probability of dying from cardiovascular diseases, chronic respiratory diseases, cancers, and diabetes is much lower in HICs (0·12) than in LMICs (0·22), and NCDs account for a substantial number of deaths and disabilities among women.<sup>128</sup> Age-standardised NCD death rates in women in Uganda and Ethiopia, for example, are four times higher than in Australia. Furthermore, these disorders affect women in LMICs at younger ages than in HICs. In Australia only 18·6% of deaths from NCDs among women

1990		2010		Median % change (95% UI)	
Disorder	Mean rank (95% UI)	Disorder	Mean rank (95% UI)		
1	Stroke	1.4 (1-2)	Ischaemic heart disease	1.1 (1-2)	30% (23-35%)
2	Ischaemic heart disease	1.6 (1-2)	Stroke	1.9 (1-2)	19% (4 to -25%)
3	Lower respiratory infections	3.0 (3-3)	Lower respiratory infections	3.1 (3-4)	-17% (-25 to -29%)
4	Chronic obstructive pulmonary disease	4.0 (4-4)	Chronic obstructive pulmonary disease	3.9 (3-4)	-14% (-20 to -8%)
5	Diarrhoeal diseases	5.0 (5-5)	Diarrhoeal diseases	5.4 (5-7)	41% (-48 to -31%)
6	Tuberculosis	6.4 (6-8)	Diabetes	6.1 (5-8)	86% (52-94)
7	Preterm birth complications	7.6 (6-11)	HIV/AIDS	6.9 (5-8)	466% (376-561)
8	Malaria	8.7 (6-13)	Malaria	8.7 (5-13)	16% (-16-62)
9	Protein-energy malnutrition	9.0 (7-15)	Hypertensive heart disease	10.1 (7-17)	40% (27-49)
10	Diabetes	10.9 (9-14)	Lung cancer	10.7 (8-22)	71% (7-89)
11	Maternal disorders	11.8 (9-15)	Breast cancer	10.9 (9-13)	38% (30-43)
12	Hypertensive heart disease	13.0 (8-23)	Tuberculosis	12.0 (9-19)	-24% (-41 to -9)
13	Breast cancer	13.6 (12-16)	Preterm birth complications	14.7 (10-21)	-26% (-41 to -9)
14	Congenital anomalies	15.7 (10-24)	Chronic kidney disease	14.9 (12-23)	90% (56-109)
15	Stomach cancer	16.1 (8-28)	Other cardiovascular and circulatory disorders	15.3 (13-18)	44% (35-60)
16	Lung cancer	17.5 (9-25)	Colorectal cancer	16.8 (11-22)	38% (21-59)
17	Cirrhosis	17.9 (14-25)	Cirrhosis	16.9 (13-21)	23% (14-38)
18	Rheumatic heart disease	19.0 (16-22)	Road injury	18.0 (10-22)	39% (13-86)
19	Measles	20.1 (6-42)	Alzheimer's disease	19.1 (12-33)	262% (83-366)
20	Self-harm	20.3 (12-29)	Protein-energy malnutrition	19.2 (13-27)	-30% (-42 to -14)
21	..	..	Self-harm	20.0 (13-29)	18% (-8-51)
22	Colorectal cancer	21.8 (16-28)	Stomach cancer	21.8 (11-32)	-7% (-14-10)
23	Other cardiovascular and circulatory disorders	22.4 (19-26)	Maternal disorders	23.4 (20-28)	-29% (-37 to -20)
24	Road injury	23.0 (18-27)	Congenital anomalies	25.3 (20-32)	-22% (-42-18)
27	Chronic kidney disease	26.9 (22-30)	..	..	..
30	..	..	Rheumatic heart disease	29.8 (27-32)	-28% (-34 to -22)
37	HIV/AIDS	26.9 (22-30)	..	..	..
43	Alzheimer's disease	42.0 (30-50)	..	..	..
58	..	..	Measles	58.3 (36-85)	-80% (-85 to -73)

Causes of death are ranked by the Institute for Health Metrics and Evaluation.<sup>120,121</sup> UI=uncertainty interval.

**Table 1: Most common causes of death in women in 1990 and 2010**

occur in women younger than 70 years; however, more than half of all deaths from NCDs happen in women in this age group in Nigeria (62%) and Ethiopia (65%).<sup>129</sup>

Figure 3 compares patterns of mortality among men and women in different regions and by country income categories. Apart from in sub-Saharan Africa, NCDs are the main causes of death and disability—with cardiovascular disease (heart disease and stroke) as the main cause of death and disability in all regions.<sup>121</sup> Across all regions, death rates are higher in men than in women, and injuries consistently cause a larger proportion of deaths in men than in women. Chronic respiratory diseases are most common among women in South Asia, mostly as a result of their exposure to second-hand smoke and air pollution from indoor cooking. Communicable, perinatal, and nutritional diseases are still among the

main causes of death and disability in sub-Saharan Africa and to a lesser extent in south Asia. Much of this regional burden of communicable, perinatal, and nutritional disorders is driven by ten mostly fragile countries, accounting for two-thirds of the 3 million neonatal deaths and almost 60% of all maternal deaths.<sup>130</sup>

#### Major risk factors for death and disability

Shifting trends of the worldwide burden of disease show the demographic transition and changes in distribution of risk factors during the past 2 decades. Interestingly, women and men had the same top three risk factors for mortality in 2013: dietary risks, high blood pressure, and smoking,<sup>121</sup> with dietary risks as the leading cause of mortality between 1990 and 2013. Smoking increased from the 4th to the 3rd most important risk factor for

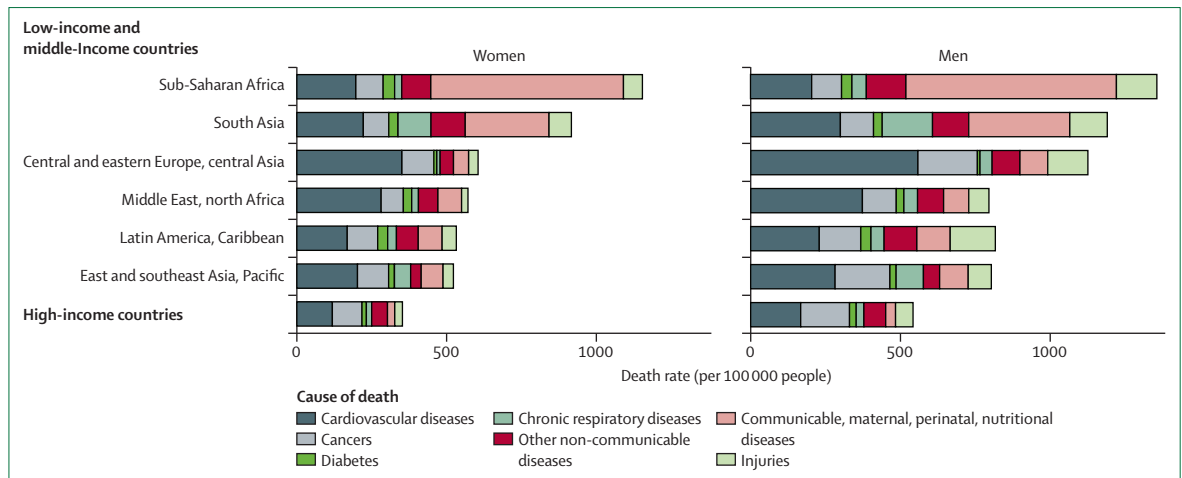


Figure 3: Mortality causes, by region and country income groups, 2010  
Data from Institute for Health Metrics and Evaluation.<sup>120</sup>

women during this time period. High blood pressure, high body-mass index (BMI), and high fasting blood glucose increased in importance as risk factors for DALYs, whereas being underweight in childhood decreased in importance. Household air pollution from solid fuels, tobacco use, physical inactivity, and dietary risks were in the top ten causes of DALYs for women in 2013.<sup>121</sup>

Tobacco use is one of the most serious avoidable risk factors for premature death and disease. Patterns of use in women are changing owing to globalisation of tobacco products and new forms of marketing directly targeting girls and women.<sup>131</sup> WHO estimates that, worldwide, the proportion of women who use tobacco will increase from 12% in 2010 to 20% by 2025.<sup>132</sup> Additionally, exposure to second-hand smoke from male smokers affects women's health, even when they do not smoke.

Gender-based violence affects many women worldwide, making this a major public health challenge that has only received the attention it deserves in the past 20 years. Almost one-third of women experience intimate partner violence in their lifetimes.<sup>133</sup> Forms of violence against women and girls include physical, sexual, and psychological abuse, with rape, sexual harassment, denied access to safe abortion, trafficking, so-called honour killings, and female infanticide as some of its most common and severe manifestations. Additionally, gender-based violence affects women's productivity directly—for example, when threats of violence affect women at work or when abusers hinder women's access to employment—and indirectly by affecting women's health, including unwanted pregnancy, mental health disorders, pelvic inflammatory disease, urinary tract infections, and sexual dysfunction.<sup>134</sup> Girls and women who experience gender-based violence are at increased risk of unhealthy behaviours such as alcohol and drug abuse, eating and sleep disorders, physical inactivity, low self-esteem, post-traumatic stress disorder, smoking, self-harm, and unsafe sexual behaviour.<sup>135</sup>

Gender-based violence occurs across all nations and socioeconomic levels, but is more common when women lack economic and decision-making power and education. Occurrence in all countries and population groups, direct and indirect effects on all aspects of victims' lives, effects across generations, and implications for health systems make gender-based violence an important consideration for women and health, and for sustainable development.

#### Girls' and women's health across the life course

Study of girls' and women's health with a life-course approach, which investigates combined effects of early and late life factors on health and disease risk, offers an enriched understanding of how biological and social factors interact and affect women's health. Each phase of life has age-specific and gender-specific health risks, needing different interventions to reduce morbidity and promote survival until the next phase, when new interventions are needed. Life-course categories often overlap as individuals follow different timelines based on variations related to age of puberty, entry into the labour force, and starting of a family. Further, combination of the life-course perspective with an emphasis on the social determinants of health shows how health risks and benefits accumulate throughout the life course to interact with crucial risk windows and prevention opportunities that emerge at different times throughout a woman's life.<sup>136</sup> In the next sections, we briefly describe the main health conditions and interventions that characterise each stage of the life course although the distinctions are sometimes artificial, because conditions and potential solutions pertain to more than one phase.

#### The early years: fetal, infant, and child health

The fetal, infant, and child stages are pivotal periods during which people receive several social, biological, and behavioural imprints, protective or otherwise, that affect vulnerability throughout childhood, the

reproductive years, and later in life. For example, poor living conditions during pregnancy, maternal morbidity, malnutrition, and other harmful exposures affect rates of stillbirth, premature birth, and low birthweight, and might affect development of chronic diseases that threaten physical and mental health throughout the life course.<sup>137,138</sup> In the past 20 years, interest has been growing in effects of fetal programming and developmental origins of disease on later health outcomes, especially for chronic conditions, and studies have attempted to investigate the hypothesised inverse association between birthweight and risk of heart disease, stroke, and hypertension in women and men.<sup>139,140</sup>

Social patterns have a profound effect on fetal health and development. For example, gender discrimination disadvantages some girls before or immediately after birth. Sex-selective abortion of female fetuses and female infanticide are severe expressions of gender-based discrimination. Coercive policies, such as the one child policy in China, culturally determined preferences for male descendants, reduced fertility demand, and technological developments that enable parents to learn the sex of the fetus collectively exacerbate these practices. Sex ratios at birth are skewed from the standard biological ratio of approximately 105 boys per 100 girls born, and have led to a worldwide average of 107 boys per 100 girls.<sup>141</sup> In parts of Asia, this phenomenon has led to an estimated 117 million so-called missing females since the 1980s, with serious social and economic effects beyond immediate injustice.<sup>142</sup>

During the past two decades, programmes have made remarkable progress in reduction of both incidence and mortality associated with the major infant and childhood risks, such as diarrhoea and pneumonia. Overall, infant mortality ratios tend to favour girls, showing their biological advantage and boys' increased susceptibility to childhood diseases compared with girls. In Africa, 114 boys under the age of 5 years die for every 103 girls.<sup>143</sup>

However, in countries with strong gender discrimination, infant mortality rates can show son preference. In India, for example, infant mortality is higher for girls than for boys, and survival disadvantage further increases for girls aged 1–4 years.<sup>144</sup> The female-to-male mortality ratio for children aged less than 5 years is estimated to be 1.36 in India's poorest states and 1.17 in India's wealthiest states.<sup>144</sup> The high mortality of girls is associated with differential treatment for preventive and curative health care by gender—including vaccination—and feeding, nutrition, and other investments. The magnitude of the sex differentials in India varies by factors such as the girl's birth order, mother's literacy status, region, and religion.<sup>145</sup>

Although substantial improvements have been made with children's nutritional status, undernutrition is an important cause of infant and child mortality.<sup>146</sup> Stunting is decreasing worldwide, but affects an estimated 34% of children under the age of 5 years in

LMICs; worldwide prevalence is slightly higher for boys than for girls.<sup>147</sup> Although mechanisms are unclear, results of some studies show that, compared with stunted boys, stunted girls have higher risk of obesity and are more likely to develop metabolic syndrome and type 2 diabetes as adults.<sup>148,149</sup>

Most priority health interventions for children are not gender-specific, but benefits for girls can extend to the next generation. Proven interventions for this age group include prevention of mother-to-child HIV transmission, vitamin and mineral supplementation, immunisation, management of malnutrition and diarrhoea, malaria prevention and treatment, and deworming. Additionally, effective social and policy measures to reduce gender inequality and eliminate gender discrimination against female fetuses, newborns, and girls are essential.

The worldwide community's focus on child survival and MDG 4 has brought much attention to the health of children aged less than 5 years, thus having a substantial effect on health within this age group. However, stillbirth and neonatal morbidity and mortality have not shown similar levels of improvement.<sup>150</sup> Special efforts are underway to address these neglected issues.<sup>151</sup>

Little data exist for the health status and needs of school-age children and young adolescents aged 5–14 years. Causes of death begin to differ between boys and girls after the age of 10 years, with HIV/AIDS being the leading cause of death among girls aged 10–14 years in 2013, followed by lower respiratory infections and malaria. Among boys in this age group, road traffic injuries were the leading cause of death, followed by HIV/AIDS and drowning.<sup>103</sup>

### Adolescence

Most girls and boys enter adolescence in fairly good health, and mortality is lower during this period than at other stages of the life course. However, adolescents encounter some important health challenges. Many of the health risks of adolescent girls relate to their SRHR, which are strongly affected by gender differences that become more pronounced during this stage. Unintended pregnancy and HIV infection occurring during adolescence limit girls' educational and economic potential later in life and often cause social stigma and isolation when supportive social policies and programmes are not in place.<sup>152</sup>

Leading causes of adolescent death and disability show gender differences. Among girls aged 15–19 years, the leading causes of death are (in order of highest prevalence) self-harm, maternal disorders, and road injuries, whereas for boys, leading causes of death are road injuries, interpersonal violence, and self-harm.<sup>121</sup> Alcohol use is the most important risk factor for mortality for boys aged 15–19 years, followed by occupational risks, and drug use; in girls, the most important risk factors are intimate partner violence, alcohol use, iron-deficiency anaemia, and childhood



Women		Men		
Cause	DALYs	Cause	DALYs	
1	Major depressive disorders	8.3	Road injury	8.0
2	Low back pain	5.3	Low back pain	5.7
3	Iron deficiency	5.1	Major depressive disorders	4.6
4	Anxiety	5.4	Iron deficiency	3.8
5	Road injury	3.4	Interpersonal violence	3.0
6	Self-harm	3.4	Conduct disorder	3.0
7	Asthma	3.2	Asthma	2.8
8	Migraine	3.0	Drowning	2.8
9	Neck pain	2.9	Self-harm	2.8
10	Malaria	2.8	Malaria	2.5

Data are from the Institute for Health Metrics and Evaluation.<sup>122</sup> Total number of DALYs for all causes was 78 609 504 in women and 89 483 028 in men.

**Table 2: Top ten causes of disability-adjusted life-years (DALYs) for people aged 10–19 years, 2010**

sexual abuse.<sup>153</sup> Major depressive disorders (including self-harm and anxiety), low back pain, and iron deficiency cause the greatest number of DALYs among girls, whereas road injuries, low back pain, and major depressive disorders cause the most DALYs among adolescent boys.<sup>120</sup> Table 2 shows the top ten causes of DALYs for 10–19 year-old adolescents in 2010.<sup>121</sup>

Many of the harmful behaviours and risk factors that contribute to development of NCDs (such as tobacco and alcohol use, obesity, and limited physical activity) begin, and become patterned, during adolescence.<sup>154</sup> People who begin drinking in adolescence are more likely to experience alcohol dependence than individuals who begin drinking at an older age.<sup>155</sup> Alcohol consumption by a woman, her partner, or both is frequently related to a woman's experience of intimate partner violence and abuse—another leading cause of death among adolescent girls.<sup>156</sup>

Good nutrition improves adolescent girls' health status and might benefit the health and nutritional status of their future children.<sup>157</sup> Iron-deficiency anaemia accounts for a substantial portion of DALYs among girls aged 15–19 years through its contribution to cognitive impairment, susceptibility to infection, and limited work capacity. Additionally, iron-deficiency anaemia is a major factor in more than 115 000 maternal deaths and 591 000 perinatal deaths worldwide every year.<sup>158</sup> The prevalence of low BMI and stunting among adolescent girls, for example, is estimated to be 1.73% in east Africa, 1.57% in central Africa, and 2.0% in southern Africa; in Bangladesh, 4.37% of girls are stunted, and in Cambodia 2.55% of girls are stunted.<sup>146</sup> Girls who enter adolescence stunted are unlikely to make substantial gains in growth—partly for biological reasons, but also because many of them continue to live in the same adverse socioeconomic conditions that they lived in as children.<sup>159</sup>

Although malnutrition and stunting are extremely serious health problems in some countries, nutritional problems are now becoming less a result of deficiency and

more a result of energy imbalance. Obesity, an important health concern worldwide, is frequently associated with low socioeconomic status, is increasingly common in LMICs, and affects more women than men.<sup>160</sup>

Additionally, eating disorders are an important public health concern among adolescents. Anorexia nervosa is the most common eating disorder, has the highest mortality rate associated with any mental health disorder, and is most prevalent among adolescent girls.<sup>161</sup> Concern is growing that the prevalence of eating disorders is increasing in LMICs as a result of rapid cultural transition, globalisation, urbanisation, and widespread exposure to Western media.<sup>162</sup>

Many women become sexually active during adolescence, within and outside of marriage, exposing them to potential risks of childbearing and acquisition of sexually transmitted infections. Obstetric complications were the second most common cause of death for girls aged 15–19 years worldwide in 2010,<sup>163</sup> and in some cases, existing evidence shows that adolescent women experience poorer sexual and reproductive health than women in their 20s. Results of a multicountry study showed that, compared with women aged 20–24 years, girls aged 19 years or younger experienced increased risks of some adverse maternal health outcomes such as eclampsia, puerperal endometritis, systemic infections, and preterm birth, and were less likely to receive some essential maternal health interventions.<sup>164</sup> Analyses have likewise shown that girls aged 15–19 years have a slightly increased risk of maternal mortality compared with women aged 20–24 years, but the increased risk is smaller than previously thought.<sup>165,166</sup> Furthermore, although limited data for maternal mortality among girls aged 15 years or younger are available, results of one Latin American study showed that girls in this age group were four times more likely to die during childbirth than women aged 20–24 years.<sup>167</sup> In sub-Saharan Africa, HIV is another major concern, since 3.1% of young women aged 15–24 years live with HIV, versus 1.3% of young men.<sup>168</sup> These findings highlight the importance of disaggregation of adolescence into more specific age groups to understand specific needs and prioritise actions.

Interventions to address immediate and long-term causes of adolescent girls' burden of disease need to take place both within and outside the health sector and should focus on provision of information to girls about how to lead healthy lifestyles, improvement of their practical skills and social capital, and construction of an enabling social, legal, and regulatory environment that responds to their health needs and protects their rights.

Promotion of adolescent girls' school attendance and education, together with development of comprehensive sexual health education curricula that focus on sexual health education curricula and reproductive rights, fertility, puberty, and behaviour is important to encourage development of positive and equitable gender norms and self-esteem. To ensure girls have full access to the

complete range of reproductive health services, including effective contraception and safe and legal termination of pregnancy, is a crucial priority. Finally, increased access to the human papillomavirus vaccine for adolescents to prevent cervical cancer could prevent a substantial number of deaths later in life in both HICs and LMICs.<sup>169</sup>

### Adulthood

During adulthood, women's health involves both reproductive health disorders and health problems that are not sex-specific but that often show differences between sexes. Between the ages of 15 and 49 years, HIV/AIDS is the main cause of death for women, followed by maternal complications.<sup>153</sup> However, renewed international commitment to reduce maternal mortality has resulted in worldwide maternal deaths being almost halved since 2005.<sup>105</sup> Self-harm is ranked as the third most common cause of death among women aged 15–49 years, whereas road injuries have increased from 8th in 1990 to 5th in 2010, followed by heart disease, stroke, and major depressive disorders.<sup>121</sup> Among men in this age group, HIV/AIDS is the leading cause of death, followed by road injury, heart disease, and self-harm.

Chronic diseases make a striking contribution to DALYs among adult women, with HIV/AIDS as the leading contributor, followed by major depressive disorders and low back pain. Ischaemic heart disease, low back pain, and road injury all ranked in the top ten causes of DALYs in 2010.<sup>85</sup> Although still important, maternal disorders, iron-deficiency anaemia, and tuberculosis are less common causes of DALYs between 1990 and 2010 than previously, showing some of the shifting burden of disease.<sup>153</sup> For men aged 20–49 years, the profile of causes of DALYs is substantially different from that of women. Road injury, HIV/AIDS, and low back pain are the top three causes, and heart disease, self-harm, drug use, violence, and chronic obstructive pulmonary disease are all in the top ten contributors to DALYs.<sup>153</sup>

The most important risk factors for death and disability for women have changed since the early 1990s, and factors related to diet and exercise are increasingly important.<sup>170</sup> Undernutrition is a concern. Iron-deficiency anaemia is the second most common cause of DALYs for women aged 15–49 years worldwide, with the greatest burden reported in Africa and Asia.<sup>171</sup> By contrast, many women have excess nutrition. Obesity is an important risk factor for metabolic syndrome, cardiovascular disease, and type 2 diabetes.<sup>172</sup> Preconception obesity and excessive weight during pregnancy likewise have transgenerational effects because they cause long-term risk factors for offspring—ie, increased risk of early cardiovascular events, metabolic syndrome, and decreased life expectancy as adults.<sup>173</sup>

Ensuring access to SRHR is an unfinished agenda among adult women. Uneven contraceptive access means that an estimated 225 million women have an

unmet need for family planning, and every year, an estimated 75 million unintended pregnancies put women at risk of unsafe abortion.<sup>174</sup> If the unmet need for family planning were met, the number of unintended pregnancies would be reduced to 22 million per year, and women's exposure to unsafe abortion, obstetric complications, and maternal death would be substantially reduced. Progress in addressing women's reproductive health has been uneven, and inequalities abound. For example, the lifetime risk of maternal death is one in 16 in Somalia, one in 29 in Nigeria, one in 2400 in the USA, and one in 25 500 in Greece.<sup>175</sup> Women in HICs have a maternal mortality ratio of 16 deaths per 100 000 livebirths, whereas the average for women in LMICs is 240 deaths per 100 000 livebirths.<sup>175</sup> Indirect causes of maternal deaths, defined as mortality that occurs as a result of a disease or disorder aggravated by pregnancy, are increasing worldwide as targeted efforts reduce direct obstetric causes and the prevalence of NCDs increases. Additionally, unsafe abortion, responsible for 47 000 maternal deaths and 5 million maternal disabilities each year, is highly stigmatised and overlooked.<sup>174,176,177</sup> Repercussions of maternal deaths, however, go beyond the individual to substantially affect the health, survival, and wellbeing of children and families.<sup>178,179</sup> In a study in Matlab, Bangladesh, a mother's death was associated with a ten-fold increase in her children's odds of dying before the age of 10 years, whereas the death of a father had negligible effects on children's chances of survival.<sup>179</sup>

However, to focus on reduction of maternal mortality alone masks other poor maternal health outcomes that cause substantial suffering and disability among women worldwide. For every woman who dies as a result of maternal causes, an estimated 20 women face serious morbidity, which can have effects across generations, because the children of these women are likewise at increased risk of serious morbidity or mortality. Obstetric fistula, for example, has serious biological and social repercussions, including illness and premature death from social isolation, poverty, and malnutrition.<sup>180</sup>

Some complications during pregnancy increase risk of NCDs later in life. For example, results of studies suggest that pregnancy-induced hypertension increases risk of cardiovascular disease.<sup>181</sup> Studies are beginning to investigate the association between post-partum depression and depression later in life, estimating a 25% increased risk of development of major depression after one episode of post-partum depression.<sup>182</sup>

Infertility is another important reproductive health challenge that has yet to become a worldwide priority. The prevalence of primary infertility in 26 countries is 0·6–3·4%, whereas the prevalence of secondary infertility is 8·7–32·6%.<sup>183</sup> In countries with limited access to health services, common causes of infertility include post-partum and post-abortion infections, tuberculosis, and untreated sexually transmitted infections;

additionally, female genital mutilation can cause infertility. Despite the fact that about half of infertility cases result from male factors, women are held disproportionately responsible, with potentially devastating results, especially in traditional cultures.<sup>184</sup> In a study of Rwandan couples, domestic violence, union dissolutions, and sexual dysfunction were more common among the 312 infertile couples than among fertile controls.<sup>185</sup> Infertile women in Jordan described the following effects of infertility: feeling of incompleteness, experience of pressure to conceive by their social network, fear that their husband would take another wife, and experience of marital problems.<sup>186</sup> When social security in old age is dependent on support from children, infertility can have far-reaching economic effects. Infertility is linked to poverty in Bangladesh as a result of deprivation of children's earnings, devaluation of the marriage by the husband, and denial of microcredit.<sup>187</sup>

Some women express the personal choice not to have children. For these women, their decision might be motivated by a desire to focus on professional goals and aspirations, concern about economic effects of having a child, or other personal reasons.<sup>188</sup> A study in the USA, for example, estimates that for each year a woman delays motherhood, she receives an additional 10% in earnings.<sup>189</sup> A review of personality characteristics among voluntarily childless adults in the USA showed that their decision is often rooted in desires for increased independence and freedom; additionally, many women expressed concern about unequal sharing of child-care duties.<sup>190</sup>

Irrespective of reasons for childlessness, possible health effects associated with nulliparity include increased risk of breast cancer and mortality from uterine, ovarian, and cervical cancers, and decreased overall health status.<sup>191</sup> In some settings, maternal and reproductive health services are the most frequent points of contact for women and

the health system for all types of disorders,<sup>192</sup> and women without children often miss these opportunities. Work is needed to ensure that all women, irrespective of their reproductive choices, have access to comprehensive health care.

Interventions to address adult women's health should take into account the changing burden of disease and effectively respond to disorders that women share with men. For example, in HICs, smoking cessation programmes that address specific concerns of women show the most promise and might reduce obstacles to entry;<sup>193</sup> however, limited research exists for gender-specific programmes generally, and studies are mostly unavailable in LMICs.

Effective policies and programmes focused on disorders that are uniquely experienced by women should be more widespread. Interventions designed to reduce maternal mortality and morbidity remain crucial for women's health, including measures to ensure equitable access to high-quality maternal health care. The need to increase access to, and use of, contraception in a quality reproductive rights framework is a persistent challenge that has received increased attention since the launch of the Family Planning 2020 Initiative.<sup>194</sup> However, reproductive health interventions should not be isolated from the holistic needs of women's health. An innovative approach to bridge the artificial divide between reproductive health and NCDs could include counselling of women about NCD risk factors at family planning or antenatal care services, to enable them to prevent and manage NCDs for themselves and their children. A comprehensive life-course perspective is necessary to effectively target causes of disorders that women face later in life.

*Late adulthood and old age*

With increasing population ageing, major NCDs are the leading causes of women's death and disability. Chronic disorders such as low back pain, ischaemic heart disease, stroke, and major depressive disorders are the leading causes of DALYs in women and men aged 45–59 years (table 3). Similar trends are noted among women at older ages: more than one-third (37%) of all DALYs in women aged 60 years or older are from cardiac and circulatory disease, diabetes, or chronic respiratory disease.<sup>121</sup>

In developed countries, increasing prevalence of breast cancer is associated with ageing populations. In LMICs, however, 66% of breast cancer cases, are diagnosed before the age of 54 years, compared with 33% in HICs.<sup>195</sup> Reproductive health factors affect a woman's risk of breast cancer and show connections between stages of the life course: early age at menarche, nulliparity, a first full-term pregnancy late in life, no (or short duration of) breastfeeding, and late age at menopause tend to increase risk, whereas giving two or more births and prolonging of breastfeeding tend to be protective.<sup>196</sup> Early detection

Women			Men	
	Cause	DALYs	Cause	DALYs
1	Lower back pain	5.6	Ischaemic heart disease	10.2
2	Ischaemic heart disease	5.5	Stroke	5.8
3	Stroke	5.0	Lower back pain	4.7
4	Major depressive disorders	4.7	Chronic obstructive pulmonary disease	3.9
5	Chronic obstructive pulmonary disease	3.9	Road injury	3.8
6	Diabetes	3.8	Cirrhosis	3.6
7	Neck pain	3.0	Tuberculosis	3.5
8	Breast cancer	3.0	Trachea, bronchus, and lung cancers	3.3
9	Musculoskeletal disorders	2.8	Diabetes	3.0
10	Osteoarthritis	2.7	HIV/AIDS	2.9

Data are from the Institute for Health Metrics and Evaluation.<sup>153</sup> Total number of DALYs for all causes was 9 730 245 in women and 14 211 933 in men.

**Table 3: Top ten causes of disability-adjusted life-years (DALYs) for people aged 45–59 years, 2010**

through screening and timely treatment seem to have had a major role in the 2% decrease in breast cancer mortality each year since 1990 in the USA,<sup>197</sup> although some controversy exists about the true effects of these widespread interventions.<sup>198</sup>

The median age at menopause in women in HICs is about 50–52 years, later than the average age of 48 years in women in LMICs, with a socioeconomic gradient: women of low socioeconomic status begin menopause at an earlier age than women from more privileged backgrounds.<sup>199,200</sup> In addition to possible genetic factors, cumulative effects throughout the life course, such as childhood nutrition, stress, not having given birth, being overweight, a sedentary lifestyle, and cigarette smoking are associated with early menopause.<sup>199</sup> Early menopause, in turn, is associated with increased risk of osteoporosis, genital tract infections, and cardiovascular disease.<sup>201</sup> Symptoms of menopause are often thought to be mostly biological; however, women's experience with menopause varies worldwide, and might be affected by cultural expectations and individual perceptions.<sup>202</sup>

Ageing and high parity are associated with development of pelvic floor disorders, pelvic organ prolapse, and faecal or urinary incontinence,<sup>203</sup> which are health risks and important sources of discomfort that might lead to embarrassment, social isolation, and, as a result, mental health disorders.<sup>204</sup> These common and often stigmatised disorders are an important area for further research and clinical attention.

Sexual health among ageing populations is often overlooked, and most research has been done in HICs. Results of a study in the USA showed that sexual activity and quality of sexual life correlate with health at 60 years and beyond, and that men reported better sexual health than did women.<sup>205</sup> Results of a study in Israel among women aged 55 years or older showed that most women continued to be sexually active, and that sexual gratification, and current sexual activity were associated with overall life satisfaction.<sup>206</sup>

Although mental health problems exist throughout the life course, dementia is mostly seen in individuals 80 years of age or older, and is more common in women than in men.<sup>207</sup> An estimated 35 million people worldwide have dementia.<sup>208</sup> This number is thought to be increasing rapidly, and caring for people with dementia is a challenge for domestic caregivers, who are mostly women. Poor awareness and understanding of dementia in most countries result in stigma and barriers to diagnosis and care.

Interventions designed to target most effectively the health problems faced by older women age 60 years and older include prevention and management of injuries and chronic NCDs, and maintenance of an overall healthy and rewarding lifestyle. Injuries related to falls are of major concern as women age and as the prevalence of osteoporosis increases. Proven interventions, such as home safety measures, are essential.<sup>209</sup> Physical fitness

programmes can reduce falls and their associated injuries, reduce overall risk for coronary heart disease, preserve cognitive function, and reduce depression and anxiety.<sup>210</sup> Risk factors common to the major NCDs can be tackled with core interventions that are cost effective (ie, cost less than three times the GDP per person for every DALY prevented), low-cost (ie, cost less than US\$0.50 per person per year), and highly feasible in primary health-care settings.<sup>211</sup> Achievement of targets set for just six NCD risk factors (smoking, alcohol abuse, diet, physical activity, human papilloma virus [HPV] infection, and hepatitis B) could delay or prevent more than 17 million deaths in women and 20 million deaths in men from cardiovascular disease, diabetes, cancer, and respiratory disease between 2010 and 2025 (table 4).<sup>212</sup>

Increased attention to pain management for women with chronic disorders is likewise essential. Death from NCDs is often slow and painful after long periods of disability.<sup>213</sup> The major causes of pain include cancer, osteoarthritis, rheumatoid arthritis, surgeries, injuries, and spinal problems, all of which are important causes of death and disability among women worldwide. Pain can lead to depression, limited ability to participate in work and social life, and suicide. Palliative care is essential to reduce pain and suffering; however, poor political will, policy restrictions, weak health systems, and limited financial capacity make effective palliation mostly unavailable in many LMICs.<sup>213</sup>

Improvement of girls' and women's health status is an essential strategy to value, empower, and enable them to be agents of change and advance sustainable development. Provision of the necessary conditions for women to realise their health rights is an important goal in itself, and a crucial way to catalyse women's ability to contribute to economic growth, social development, and environmental protection.

#### **Inequalities in women's access to health care**

Inequalities exist in girls' and women's access to health care for their comprehensive needs across the life course. These disparities have many complex sources, including poverty, poor education, disempowerment, weak health systems, and gender discrimination.<sup>104</sup> Coverage of antenatal care, access to skilled birth attendance for delivery, and family planning are the reproductive health services most unequally distributed among women of different socioeconomic status, ethnicity, and age.<sup>104</sup> Poor technical and interpersonal quality of care for all women has been highlighted as a frequent problem.<sup>214</sup>

In many places, cultural and religious norms are an important barrier to access to health services. For example, social and cultural taboos make medical care from male health providers difficult for women to seek; this issue further limits women's access to care in locations where few female health professionals are available, especially in rural areas.<sup>215</sup> For example, in

	Intervention or action	Avoidable burden (DALYs averted)
Tobacco use (>50 million DALYs, 3·7% of global burden)	Protect people from tobacco smoke*; warn about the dangers of tobacco*; enforce bans on tobacco advertising*; raise taxes on tobacco*; offer counselling to smokers	Combined effect: 25–30 million DALYs (>50% of tobacco burden)
Harmful use of alcohol (>50 million DALYs, 4·5% of global burden)	Restrict access to retail alcohol*; enforce bans on alcohol advertising*; raise taxes on alcohol*; enforce drink-driving laws (breath testing); offer free advice for hazardous drinking	Combined effect: 5–10 million DALYs (10–20% of alcohol burden)
Unhealthy diet (15–30 million DALYs, 1–2% of global burden)	Reduce salt intake*; replace trans fat with polyunsaturated fats*; promote public awareness about diet*; restrict marketing of food and sugary drinks to children; replace saturated fat with unsaturated fat; manage food taxes and subsidies; offer counselling in primary care; provide health education in worksites; promote healthy eating in schools	Effect of salt reduction: 5 million DALYs; other interventions not yet assessed globally
Physical inactivity (>30 million DALYs, 2·1% of global burden)	Promote physical activity through mass media*; promote physical activity through the community; support active transport strategies; offer counselling in primary care; promote physical activity in worksites; promote physical activity in schools	Not yet assessed globally
Infection†	Prevent liver cancer via hepatitis B vaccination	Not yet assessed globally
Cardiovascular disease and diabetes (170 million DALYs, 11·3% of global burden)	Counselling and multidrug therapy for people aged 30 years and older with a 10-year risk of a cardiovascular disease event of >30%* or >20%; aspirin therapy for acute myocardial infarction*	Counselling and multidrug therapy, risk >30%: 60 million DALYs (35% of cardiovascular disease burden); counselling and multidrug therapy, risk >20%: 70 million DALYs (40% of cardiovascular disease burden); aspirin therapy: 4 million DALYs (2% cardiovascular disease burden)
Cancer (78 million DALYs, 5·1% of global burden)	Cervical cancer screening and treatment of pre-cancerous lesions to prevent cervical cancer*; treatment of stage 1 breast cancer, early identification of breast cancer by mammography (50–70 years), and treatment of all stages; screening for colorectal cancer at age 50 years and treatment; early detection and treatment of oral cancer	Cervical cancer screening and treatment: 5 million DALYs (6% of cancer burden); treatment of stage 1 breast cancer: 3 million DALYs (4% of cancer burden); early identification of breast cancer: 15 million DALYs (19% of cancer burden); screening for colorectal cancer and treatment: 7 million DALYs (9% of cancer burden); early detection and treatment of oral cancer: not yet assessed globally
Respiratory disease (60 million DALYs, 3·9% of global burden)	Treatment of persistent asthma with inhaled corticosteroids and $\beta_2$ agonists	Not yet assessed globally

DALY=disability-adjusted life-year. \*Part of a core set of so-called best buys that are highly cost effective, inexpensive, and feasible. †Data on DALYs and percentage burden are not available.

**Table 4: Risk factors for non-communicable diseases and cost-effective interventions**

Afghanistan, many women are unable or unwilling to receive tetanus toxoid vaccinations because to expose their arm to a male vaccinator can be shameful.<sup>216</sup> Some groups of the population, such as sexual minority women, are especially disadvantaged (panel 2; Hughes TL, University of Illinois at Chicago, College of Nursing, and Sommers MS, University of Pennsylvania, School of Nursing, personal communication).

To reduce inequalities, particular focus is needed on the needs of girls and women in high-burden countries and the poorest sectors of the population everywhere,<sup>101</sup> in the context of universal social protection and health coverage. To ensure that health systems respond to women's comprehensive health needs is equally crucial. An enabling global policy environment is essential to achieve such a goal. Although reproductive, maternal, and child health need to be priorities in the post-2015 era, attention on the large burden of non-communicable diseases (NCDs) and their social and economic effects should be expanded and sustained. The concrete goals and targets for reduction of premature NCD mortality

and risk factors were compellingly articulated at the UN High-Level Meeting on NCDs in 2011, and provide an excellent roadmap.<sup>224</sup> Acceptance by WHO member states of the global target of a 25% reduction in premature NCD mortality rates by 2025 (25x25) offers some promise for prevention and treatment of major causes of death in women. To translate rhetoric into action, investments to raise awareness among policy makers, providers, and the public, health education, prevention, and health systems' capacity to diagnose and treat NCDs are essential.

Trends in death, disability, and risk patterns from the 2013 Global Burden of Disease study<sup>103</sup> provide a baseline against which future change could be measured. The data show unequivocally that a broader approach to the health of women that takes into account women's health both relating to and beyond their reproductive capacity is needed. A balance of prevention and treatment interventions is needed throughout the life course. Widespread application of proven population-based interventions would result in healthy girls and women,



**Panel 2: Health disparities among sexual minority women**

Women in minority groups, such as immigrants and women with disabilities, can experience stigma and discrimination that lead to disadvantages in health. Sexual orientation is a source of discrimination that is linked to several health risks; when not heterosexual, women might experience considerable stigma, prejudice, discrimination, or even violence and injury that can lead to health disparities compared with heterosexual women.<sup>217–219</sup>

Disparate health risks and outcomes are a shared experience of sexual minority women, although the extent of health disparity seems to vary by age, ancestry, culture, society, economics, and nationality, and no epidemiological data exist for the health of sexual minority women worldwide. Fairly little is known about the health concerns of sexual minority women, especially in low-income and middle-income countries or in very religious countries, in which only a small minority of people accept homosexuality.

Violence against, and victimisation of, sexual minorities begin at an early age. Childhood sexual and physical abuse are more frequently experienced by sexual minority women than by heterosexual women, which might be due to gender-atypical behaviour, substance misuse, and running away from home.<sup>220</sup>

In addition to HIV and other sexually transmitted infections, the most well researched health concerns of sexual minority women are those related to mental health, especially depression, anxiety, suicide, and substance abuse. A systematic review and meta-analysis<sup>221</sup> of the prevalence of mental

disorder, substance misuse, and suicide among lesbian, gay, and bisexual people in Europe, North America, and Australia showed that lesbian, gay, and bisexual people had 1.5 times the risk of depression and anxiety disorders, twice the risk of lifetime suicide attempt, and four times the risk of alcohol dependence than heterosexual people.

In the USA, lesbians are 1.5–2 times more likely than heterosexual women to smoke cigarettes, a difference that is highest among young sexual minority women.<sup>222</sup> In view of their high prevalence of alcohol use and smoking, sexual minority women are thought to be at increased risk of cardiovascular disease, respiratory disease, and some cancers. Factors such as nulliparity and reduced contraceptive pill use increase their risk of breast cancer and uterine cancer. Furthermore, research in Australia, Canada, and the USA suggests that lesbian and bisexual women are less likely to receive breast and cervical cancer screening than heterosexual women, and more likely to receive HIV testing.<sup>223</sup> These patterns are linked to stigmatisation, victimisation, and stress, which are compounded by poverty and gender disparity.

Development and testing of interventions that promote the health of sexual minority women and address gender issues such as power, stigma, and victimisation are urgently needed. Positive strategies such as strengthening of resilience and promotion of family, community, and workplace acceptance have the potential to contribute to long-term health benefits for sexual minority women, and other women will likewise benefit.

children, and families. To address neglected needs with evidence-based interventions will necessitate a large and skilled health-care workforce.

**Women's economic contributions through health care**

A virtuous cycle exists: health contributes to economic growth and wellbeing, which results in improved health and leads to increased resources for better, widespread health care.<sup>225</sup> The health-care roles of women—both within and outside the paid health labour force—are core to improvement of the quality and availability of health care. Indeed, women's large scale contribution to health—in addition to its intrinsic and ethical value—is a core argument for investment in the health, education, and empowerment of girls and women.<sup>226</sup>

Women's contributions to health care have a multiplier effect because health is an investment that drives productivity and economic and human development at individual and national levels. Healthy children are able to learn and become productive adults.<sup>227</sup> Similarly, healthy adults are more productive workers than are unhealthy workers. Several studies—historical, microeconomic, and macroeconomic—have not only traced these links, but also quantified their value.<sup>225</sup> Improvements in health and

nutrition account for up to 30% of the GDP growth in Britain between 1780 and 1979.<sup>228</sup> 11% of economic growth in LMICs between 1970 and 2000 can be attributed to reduced adult mortality.<sup>229</sup>

Women's participation in the paid health-care workforce—as nurses, midwives, doctors, and CHWs, among other roles—and in other sectors results in improved health not only by generation of wealth, but also by contribution of earnings to health-promoting investments. Worldwide, women invest on average 90% of their earnings towards their families' wellbeing compared with only 30–40% invested by men.<sup>230</sup> More earnings by women mean increased expenditures on daily nutritional and health-care needs and investment in children's education—an important driver of economic growth<sup>231</sup>—especially when women gain increased control of family finances.

Despite women's crucial role in driving of the cycle of health and wealth, their workforce potential is mostly underused in most economies.<sup>232</sup> However, examples exist of policies that have promoted women's labour force participation and considered family needs effectively, redressing the inequitable distribution of domestic caregiving. The Nordic countries—Denmark, Finland, Iceland, Norway, and Sweden—have the

**Panel 3: Migration and remittances—economic and gender considerations**

Between 1960 and 2005, almost 190 million people emigrated to other countries for work. By 2010, the number of international migrants reached 215 million; almost half of these migrants were women.<sup>236</sup> Gender affects the extent of migrants' involvement in social networks, remittance patterns, and migration experiences.<sup>237</sup> Additionally, migration of women has human and social costs, especially when they leave their children behind, but remittances are a tangible and quantifiable aspect of migration that can be used as a proxy to indicate migrant women's contribution to economic development and health improvement in their countries of origin.<sup>238</sup> Remittances by women who have emigrated to work—a large proportion of whom migrate for work in the health sector, especially nursing—have an important but undervalued role in improvement of health, wellbeing, and economic development of communities in their new country and in their country of origin. Worldwide, remittances have increased substantially from roughly US\$80 billion in 1990 to \$489 billion in 2011; low-income and middle-income countries (LMICs) receive about 75% of the world's total remittances.<sup>239</sup> Remittances are the second-largest source of external funding for LMICs, increasing from \$68.5 billion in 1990 to \$440.1 billion in 2010.<sup>239</sup>

At the microeconomic level, remittances provide financial security for households, having an important role in community poverty reduction and social development.<sup>240</sup> Children from households receiving remittances are more likely to be enrolled in school—a crucial determinant of their health, the health of future generations, and long-term national economic growth.<sup>241</sup>

Women and men behave differently regarding remittances. Women migrants remit to improve their family's wellbeing<sup>242</sup> and are more reliable remitters than men<sup>243</sup>—they transfer funds more frequently, support a wider range of family members, and remit a higher percentage of their income than male migrants.<sup>244</sup>

Women provide increased support to households during times of economic crisis, counteracting household income.<sup>243</sup> Migrant nurses particularly have long been recognised as so-called faithful senders of remittances who make important contributions to the economies of their home countries.<sup>236</sup>

Women migrants are more likely to send remittances to other female relatives in the household,<sup>237</sup> creating a feminised transnational network that channels resources directly between women.<sup>245</sup> Migration can alter gender relations and family dynamics in originating households, because female recipients are enabled to have prominent roles as heads of households, managing spending of remittances. Women's increased contribution to household financial and social wellbeing improves gender roles and relationships, enables them to have increased responsibility in the household, increases their participation in community decision making, and generates increased awareness of their status and conditions in the community.<sup>246</sup>

In addition to financial remittances, social remittances are a natural product of migration.<sup>245</sup> Social remittances are a form of cultural diffusion that occurs through transfer of normative beliefs, values, and ideas that shape systems of practice, including gender roles in the household and participation in social and political groups, systems of practice, and social capital. Social remittances are especially relevant to gender issues; they transform political and social environments in countries of origin and countries of residence by encouragement of entrepreneurship, change of family structures, and generation of awareness of different political and religious ideologies. Additionally, social remittances might help to improve health because migrants tend to become more health-conscious when they are exposed to different health-care opportunities, and then share modern medical knowledge, such as information about contraceptives, with family and friends at home through transnational networks.<sup>244</sup>

highest employment rates for women among European countries, as a result of public policies that advance women's educational opportunities and support their family-care activities. Norway, which ranks first in the UN Human Development Index<sup>233</sup> (a measure of health, education, and living standards) and has been declared a model for gender equality by the UN Committee on the Elimination of Discrimination Against Women,<sup>234</sup> shows how gender-neutral, family-centred policies have promoted health and participation of women in paid employment. Norway has one of the highest labour participation rates of women in the world, with 77.3% of women employed.

Norway has pioneered and implemented a set of policies to encourage women's higher education, to improve division of family-care responsibilities, which enables mothers to balance work and home life more effectively, and to promote and empower women.<sup>235</sup>

Specifically, policies have emphasised three major areas: subsidised child care; shared parenthood; and women in positions of leadership.

Publicly funded child-care services are key to family policies and integral to Norway's social welfare system. Women's traditional caregiving role in the family often limits their full participation in the labour market. In Norway, as in all Nordic states, universal access to child-care services is considered a citizen's right, grounded in principles of social justice and gender equality.

Additionally, Norway increased parental benefits to encourage women's workforce participation, promote shared parenthood, and achieve a more balanced work life for its citizens. Mothers have to work for 6 of the 10 months before birth to qualify for the benefit, and the size of payment depends on their previous income.<sup>234</sup> These stipulations strongly incentivise women's employment before childbirth and enable mothers to preserve

their connection with the labour market throughout their childbearing years. In 1993, the Norwegian government introduced a 4 month paternity leave.<sup>234</sup> This policy encourages parents to share leave of absence and family care.

Measurement of the value of all contributions of women to economies—directly and through health and the health sector—and their multiplier effects is beyond the scope of this Commission. We show their importance, however, through analysis of migration and remittances (panel 3).

Although most women emigrate to improve life prospects for themselves and their families, migrants with limited human capital who do not have legal status are at risk of exploitation and abuse, including human trafficking. These risks are more prominent when migrants move to escape a crisis in originating countries or households.<sup>65</sup> Development and implementation of mechanisms to support and protect migrant women is essential to reduce the risks they face, unlock their full potential, and enable them to enjoy their human rights.

#### Women in the global health-care workforce: paid health-care contributions

Health systems strongly rely on women in the health-care workforce to function effectively. Worldwide, as nurses, midwives, doctors, and CHWs, women are at the front line of institutional health care.<sup>10</sup> However, differences exist in gender distribution among and within health professional roles, and women are less likely than men to reach senior positions in health systems. Nurses comprise about 80% of the health-care workforce worldwide—in some countries, more than 90% of nurses are female,<sup>10</sup> as are CHWs and midwives. In the medical profession, traditionally dominated by men, women's participation is rapidly increasing.<sup>11</sup>

The gender balance among doctors is changing and women now predominate in medical school student bodies in countries at all income levels. In the UK, about 70% of medical school intakes are now women.<sup>247</sup> However, women are less likely than men to practise medicine once trained, owing to the obstacles they face to lead balanced lives once they start work.<sup>248</sup> With the exception of a few countries, practising male doctors far outnumber women across WHO regions.<sup>11</sup> Only in the Nordic countries, the UK, and some eastern European countries are more women than men practising medicine.<sup>11</sup> Health sector reform programmes, like the one introduced in 2010 in the USA, can substantially affect women's roles in the health system (panel 4; Johnson PA, Luk C, Chai J, Mary Horrigan Connors Center for Women's Health & Gender Biology, Brigham and Women's Hospital, personal communication).

Workplace and education practices for doctors worldwide have been criticised for scarcity of attention to women's needs both while in training and after graduation. Organisational structures and policies in health care are often incompatible with family life, forcing

#### Panel 4: Women in the US health professions

The passage and implementation of the Patient Protection and Affordable Care Act (ACA) is an important step in US health-care reform, and provides an opportunity for consideration and analysis of women's roles in US health professions. The ageing demographic of the US population, increasing prevalence of chronic diseases, pressure to slow the increasing cost of care, the need to create more robust primary care, home care, and community health systems have important implications for women in the health-care workforce and for the public's health. As health-care reform under the ACA advances, the roles of women in US health professions will be affected by, and will affect, present and future demands on the health-care system.

Historical evidence, present data, and projections based on reform under the ACA regarding the health-care professions and trends in the USA highlight challenges for women in the US health-care workforce; major ACA initiatives that affect the US health-care workforce; and global health-sector reform initiatives that can inform US health reform implementation for women in the US health-care workforce.

Health reform under the ACA provides several opportunities to improve the health-care workforce through increased financial initiatives, expanded educational, training, and career development opportunities, and implementation of new health-care financing and delivery systems. To maximise the potential of these initiatives, use of a gender perspective is essential to understand health-care challenges and proposed solutions.

The US health-care workforce faces unique challenges in representation, compensation, and equity. Women have the potential to be disproportionately affected by health-care reform because of their overwhelming majority in the US health-care workforce. Women are under-represented in health-care leadership roles, which has major implications for adequately addressing their needs.

Efforts to advance the status of women in the US health-care workforce will need to occur within, in conjunction with, and outside ongoing ACA initiatives. Monitoring programme implementation and affecting policy making at local, state, and national levels, and across several sectors, are necessary to address women's challenges in the health-care workforce. A strong commitment and upfront investments across sectors are also necessary to improve conditions for women in the health-care workforce and reach long-term goals to cut costs, improve efficiency, and increase the breadth and quality of care across populations.

many women, including those in high-income countries, to choose between further education or professional advancement and part-time work or career breaks. In fact, professional and societal norms that undervalue women's contributions throughout the labour market generate a so-called glass ceiling. For example, fewer women than men complete medical residencies, work full-time, or take leadership positions.<sup>247</sup>

This situation has been documented in low-income and high-income countries. Results of a study showed that Sudanese women doctors experienced pervasive discrimination in promotions, which they attributed to an assumption by men in senior positions that women do not have the desire or capacity to advance their careers because of family responsibilities.<sup>249</sup> In Norway and the UK, women doctors are likewise substantially under-represented in medical leadership,<sup>250,251</sup> whereas women doctors in the USA are more likely to take clinical and teaching roles than research roles, reducing their chances of promotion in academic medicine.<sup>252</sup> In the UK, female clinical scientists receive less infectious

**Panel 5: Financial incentives—an urban community health worker model in Bangladesh**

In 2007, Bangladesh Rural Advancement Committee (BRAC) launched the Manoshi Project in Dhaka slums, where community health workers (CHWs) visit homes to disseminate health messages, identify pregnancies, accompany mothers to delivery centres, attend to mothers and newborns at delivery, and provide essential newborn care.<sup>260</sup> However, many Manoshi workers performed suboptimally, and many dropped out. Researchers investigated reasons for high attrition rates and showed that financial incentives were the main factor affecting CHWs' experiences. Unlike rural dwellers, women were not wholly dependent on CHWs for their health care in urban areas, which they could attain from several sources. The reduced demand meant that each Manoshi CHW earned little additional income from patient treatment and sale of health commodities. Instead, CHWs were attracted to other higher-paying jobs in the fairly diverse urban labour market—jobs that do not exist for women in rural areas. Social factors were likewise important: CHWs in Dhaka slums did not acquire the social status of their rural counterparts, which is an important CHW motivator. Urban CHWs had less social prestige than rural CHWs because they tended to work in transient communities in which they were not known.

Most urban growth is unplanned, and many poor urban women do not have access to basic services. Expansion of the ranks of supported and appropriately compensated CHWs is a promising strategy to expand universal health care to poor, excluded city dwellers. The Manoshi project shows some existing challenges, but more research is needed in a range of settings to understand how incentives can motivate urban CHWs.

disease research funding than their male counterparts.<sup>253</sup> The trend continues in other roles in the health sector. In the USA, female nurses earn less than male nurses even in the same nursing discipline.<sup>254</sup> Nurses, more of whom are women than men, lament their consistently low pay and status in the medical workforce<sup>255</sup> and typically do not get leadership positions despite their importance in health-care provision.<sup>256</sup>

Gender-based discrimination and low wages have likewise been documented among community health workers (CHWs), most of whom are women, affecting the effectiveness and quality of the health services that they provide in communities. For example, Lady Health Workers in Pakistan supply contraceptives to women in their homes, overcoming a major obstacle to essential services for women living in purdah.<sup>257</sup> Although CHWs often receive a salary or stipend, the amounts are small, inconsistent, and insufficient. Even worse, CHWs are volunteers in many settings; in a multicountry study in sub-Saharan Africa, only 7% of CHWs received a stipend.<sup>258</sup> No compensation, or low and inconsistent income, contributes to high rates of attrition, which undermines the overall effectiveness of community-based programmes, even when programmes are successful.<sup>259</sup> CHWs have been traditionally used in rural settings, but the need is growing for health systems to expand the ranks of CHWs and compensate them fairly, including in urban areas. A programme in Bangladesh provides a good example of community health work in cities (panel 5).

In addition to compensation issues, CHWs have low status and unsatisfactory working conditions in LMICs, which prevent them from fulfilment of their potential as

health-care providers. CHWs rely on active links with the health sector for referrals, drugs, equipment, training, and supervision, but they often do not have support when health systems are weak.<sup>259</sup> Additionally, CHWs do not have a career structure—a source of job dissatisfaction and an important cause of attrition. In sub-Saharan Africa, home-based care providers who work in their communities to mitigate effects of AIDS—typically as part of a community-based organisation—often do not have adequate supplies and are professionally isolated.<sup>53</sup> In Pakistan, Lady Health Workers also report not consistently having medical supplies, which limits their effectiveness.<sup>261</sup>

Midwives who support and care for women and newborns, delivering sexual and reproductive health care, especially for pregnancy, labour, and postnatal needs, are predominantly female.<sup>262</sup> The midwifery workforce comprises various roles ranging from nurse-midwives to traditional birth attendants.<sup>262</sup> Within the health-care system, midwives are likewise affected by a scarcity of recognition and support from higher levels of the health system, despite their well documented contributions to improved maternal health in several countries. For example, midwifery training and education, support, and regulation have made a major contribution to maternal mortality reduction in Thailand and Sri Lanka.<sup>263</sup> Midwives have likewise contributed substantially to Malaysia's success in maternal health, owing to the government's early recognition and legitimisation of their role.<sup>264</sup> The experiences of these countries show how empowerment of health workers improves their performance, reduces attrition rates, and improves women's health.

Policies to redress undervaluation of female health-care providers are crucial to improve health-sector effectiveness at all levels and, as a result, the health status of the population. Initiatives that support nurses and create family-friendly work environments have improved efficiency and quality of health services in some countries. In Finland, for example, the nurses' union introduced changes to the structure of shifts, including predictable hours, guaranteed time off between shifts, and consecutive days off. These policies have increased motivation and retention of nurses, leading to improved quality of nursing and effective use of resources.<sup>265</sup> In countries at all income levels, governments have used financial incentives in the form of bonus payments, subsidised housing, hardship allowances, and in-kind rewards such as scholarships to attract and retain nurses, especially in rural areas. In LMICs, financial and educational incentives have likewise been combined with compulsory service in rural areas to attract and retain nurses. Although evidence is limited in low-income countries for effective policies to recruit and retain nurses, especially in rural areas, results of some studies suggest that the incentives valued by nurses vary across countries;<sup>356</sup> an innovative approach in Thailand is described in panel 6 (Sindhu S, Jirawatrakul S, Faculty of Nursing, Mahidol University, personal communication).



The health sector in many countries should learn from other sectors in which organisations have used policy to address the ways that work environments disadvantage women and hinder their progression to leadership positions. Flexible work schedules, leadership development programmes targeting women, organised mentoring programmes, and corporate women's networks improve retention, increase promotion of talented women, and help to improve organisational performance.<sup>271</sup>

The *Lancet* Commission on Health Professionals for a New Century recommended a “new era of professional education that advances transformative learning and harnesses the power of interdependence in education”.<sup>272</sup> This new era must include explicit measures to improve education of women who want to enter the health-care workforce, and prepare women in the health-care workforce to better integrate personal and professional roles. These measures will enable female health-care providers to advance to leadership positions. As leaders, women in the health sector can shape policy and improve the gender-responsiveness of the health-sector workforce.<sup>251</sup>

### Unpaid health-care contributions

In most societies, families view caregiving as a normal part of women's domestic role. This widespread acceptance means that substantial caregiving contributions for girls and women are taken for granted and mostly unrecognised and unpaid.<sup>273</sup> Although men contribute unpaid work to health and the health sector, they provide proportionally less informal health care than women.<sup>274</sup>

Worldwide, as a result of demographic and epidemiological transitions, populations are ageing and more people are living with chronic disease—increasing demand for long-term home care, especially when health services and support systems are weak. According to the World Report on Disability,<sup>275</sup> more than one billion people have disabilities, which is roughly 15% of the world's population. Increasing costs of hospital admittance and institutional care make home-based unpaid family care the most feasible option for an increasing number of families.<sup>276</sup>

Worldwide, girls and women provide home health care for family members, friends, and neighbours who are acutely or chronically ill or disabled, cannot or will not access health services, or are elderly or dying.<sup>276</sup> These health-promoting activities might include provision of good nutrition and a clean living environment and teaching of healthy habits, which are aspects of health-care provision that are essential to maintain health, realise the right to health, and prevent disease, but are poorly defined and often unrecognised.

Unpaid contributions to health and the health sector are typically made by individuals who are not professionally trained in health care. These unpaid contributions most often take place in the home or community, but can include public good activities such as charitable work for an institution or advocacy to promote rights to health care.<sup>25</sup> Most of this care is provided by

### Panel 6: Empowerment of nurses and improvement of patient care in Thailand

More than 3000 Thai nurses were included in a study about their quality of life, happiness, and factors affecting their health. The nurses were pleased with their role in provision of daily care, but were dissatisfied with their workload, which needed them to undertake non-professional roles and non-nursing tasks, and existing inequity in payment, remuneration, and welfare benefits.<sup>267</sup> Nurses' roles, however, are severely constrained by a health-care system that prioritises the authority of medical doctors and relegates nurses to assistance tasks. Furthermore, nurses do not receive sufficient training and educational opportunities after their initial training. Scarcity of educational opportunities prevents nurses from having a voice, a strong sense of agency, identity, and control. Education of nurses, who are often the front-line care providers, is key to empower them to practise to their full capacity and enhance quality of care.<sup>268</sup>

In recognition of the importance of education for nurses, a 4-month chronic care expert training programme was established for nurses in Thailand. 248 nurses from more than 170 public hospitals have participated in the training programme, focusing on diabetes and hypertension. The training has enabled nurses to undertake advanced health assessments, including screening for comorbidities and complications, and has prepared them to engage in integrated treatment plans and behaviour modification of their patients. These changes have improved patient access to diagnosis and intervention. Importantly, with advanced assessment and communication skills, the trained nurses discuss and negotiate with patients and physicians, modify behaviours, and adjust medications, through which they gain prestige and self-esteem. The most important change in nursing practice is that patients have grown to view their nurses as their primary health-care providers rather than doctors.<sup>269,270</sup>

girls and women who do not have access to education, employment, recreation, and socialising because of caregiving.<sup>277</sup> For example, an International Labour Organization (ILO) study<sup>278</sup> in 23 countries reported that girls who spend 28 h or more on domestic chores a week attend school 25% less often than girls who do less than 14 h per week. This inability to access education disempowers women in many ways and contributes to long-term gender discrimination and suffering, which hinders women's capacity to advance development.

When it detracts from paid employment, caregiving creates economic problems beyond the burden of health-care expenditures. For example, many caregivers in India stop working or reduce their hours because of domestic needs.<sup>276</sup> Furthermore, women who provide health care at home tend to experience isolation, burnout, and many health problems.<sup>279</sup> Because they tend to internalise their caregiving responsibilities, women seek help less frequently than men.<sup>274</sup> Additionally, women wait longer than men to request assistance from the health system when they are close to the limit of their endurance.<sup>273</sup> These factors might explain why health problems pose a greater risk for female caregivers than for their male counterparts.<sup>274</sup>

Although most countries do not recognise or remunerate providers of domestic health care, some exceptions exist. Turkey, Costa Rica, and the UK, among others, have introduced laws and regulations to financially remunerate home-based caregivers, provide unpaid leave, or pay allowances to the person being



cared for and the carer, irrespective of gender. These cases give an order of magnitude for valuation of the time spent by carers, most of whom are women, on home-based care.

The Turkish Government launched a programme wherein the government pays a salary to individuals who take care of the disabled in their homes. This programme was based on a law initially passed in 1976, which provided for remuneration of home-based care for the disabled. According to this regulation, carers of disabled children or spouses, grandchildren, parents, and extended family members are eligible for remuneration for their efforts and time spent on care of an elderly or disabled person. The programme was launched in 2007, but for many years functioned with a low annual budget of about \$27 million, reaching slightly more than 30 000 home-based disabled individuals. The programme was expanded to reach almost 400 000 individuals in 2012, with a budget of \$1.6 billion. The compensation benefits of the programme have increased over time, with per capita allocation increasing from \$887 per year per beneficiary in 2007 to \$4123 per year per beneficiary in 2012. In 2012, the programme was transferred to the Ministry of Family and Social Policy, and the Ministry plans to scale the programme to merge the assistance packages extended to home-based care with other existing social assistance programmes supporting the disabled.

Costa Rica, an upper-MIC, remunerates some domestic health-care workers as part of its successful UHC programme. More than 92% of the population has publicly financed health insurance through a national social security system, which covers palliative care. The palliative care platform is considered both advanced and integrated on the basis of international comparisons.<sup>280</sup> Coverage includes health services, medications, and hospitalisation or long-term institutional care. Around 20 000 individuals receive benefits from this UHC programme. What makes the Costa Rican case truly unusual is that family members of patients with terminal illness have the right to paid leave to care for sick relatives, and can receive psychological support and guidance from social workers.<sup>281</sup> By law, since 2007, any insured worker with at least 6 months of affiliation to the social security programme is entitled to a leave of absence to care for a terminally ill family member. Subsidies to caregivers are provided on a monthly basis, dependent on the salaries held in recent jobs, and with authorisation from a physician.<sup>282</sup>

In the UK, the government has introduced a range of allowances payable to citizens needing attendance and care, and to remunerate carers and those attending to individuals with substantial caring needs. The Carers' Allowance is payable to caregivers, and provides about UK£60 a week to help them look after someone with substantial caring needs. The caregiver does not need to be related to, or live with, the person he or she cares

for, but needs to be aged 16 years or older and spend at least 35 h a week caring for them. Additionally, the Disability Living Allowance for children provides £20–130 per week to help families with the extra costs of looking after a child aged less than 16 years, has difficulty walking, or needs more caregiving than other children of the same age. Furthermore, the Personal Independence Payment is designed to help with some of the extra costs resulting from long-term ill health or disability for persons aged 16–64 years. The size of payment depends not on the disorder, but on how the disorder affects the person.

#### Value of women's contributions to health care

Several studies have estimated the financial value of unpaid care, including broad valuations that include five elements: domestic care, personal care, and support with mobility, administrative tasks, and socialising. The broad concept of caregiving, especially in the informal sector, however, has created measurement challenges, with differing views on nature, location, coproduction, and boundaries.<sup>274</sup>

Results of a study<sup>283</sup> by the US American Association of Retired Persons (AARP) showed that, at any given point in time during 2009, 42 million family caregivers were taking care of an adult whose limitations prevented them from undertaking their daily activities; more than 61.5 million provided care at some time during the year. These unpaid contributions were valued at about US\$450 billion in 2009, increasing from an estimated \$375 billion in 2007, which is more than Medicaid spending in the USA and the annual sales of the largest retailer Walmart (\$408 billion) combined that year.<sup>283</sup> About two-thirds of caregivers were women with a job outside the home, who spent nearly 20 h a week caring informally for a relative or close friend aged more than 50 years. The number of caregivers had increased by 23% in 2009 compared with 2007.<sup>284</sup>

In Europe, an analysis<sup>285</sup> of the Harmonised European Time Use Survey (2007) and the Statistics on Income and Living Conditions Survey (2009) estimated the value of unpaid domestic care—including normal housework chores, personal care, support with mobility, and administrative tasks—to be 17–31.6% of total European GDP. Women provided informal care more frequently than men.<sup>286</sup> However, men benefited more from informal care than women after adjustment for level of disability, marital status, and living arrangements.<sup>287</sup>

Studies analysing time spent in unpaid work in the household with time-use surveys of 26 OECD countries and three emerging economies estimated the value of unpaid work to be between one-third and half of the GDP for OECD countries, dependent on the method used.<sup>288</sup> With replacement cost approach, the value of unpaid work ranged from 19% of GDP in Korea to 53% of GDP in Portugal, whereas use of the opportunity cost approach led to increased estimates. Women spent more time on

For the Costa Rican universal health care programme see <http://www.ccss.sa.cr/>

unpaid work than men, but the gender gap varied among countries (lowest for Nordic countries and highest for India, Mexico, and Turkey).<sup>288</sup> Other studies that used time-use surveys to compute the value of time spent in unpaid family care (ie, child care and adult care) estimate this amount to range from 3.7% to 4.4% of the Polish GDP and from 4.1% to 5% of the Italian GDP, dependent on the estimation approach used.<sup>289</sup>

In OECD countries, on average, women spend 20.7% of their time on unpaid household activities. The amount of time allocated to care activities inversely correlates with female labour force participation rates.<sup>290</sup> In Turkey, women spend 25.7% of their time on caregiving activities, which among OECD countries is exceeded only by Mexico, where women spend 31.1% of their time on such activities.<sup>291</sup> Per capita GDP is a good predictor of time spent by women on unpaid household activities, with a negative relation between GDP per capita and the amount of time women spend on such work. However, in both Turkey and Mexico, women spend more time on home-based unpaid activities than that predicted by per capita GDP.

Additionally, some studies have attempted to quantify all of the contributions of women to the global economy, precisely because they are mostly unrecognised, are not remunerated, and this work is severely undervalued, showing that contributions of women outside the paid labour force provide a huge impetus to economic growth and human development. However, no study thus far has focused on health care.

In summary, although several studies have estimated the value of women's contribution to unpaid domestic care, the many contributions of women to the health sector have not been appropriately quantified. Many of these contributions come from women's unpaid time spent on activities that promote the health of their own families. Additionally, women contribute to the health of their communities and countries through paid and unpaid labour.

The value of the unpaid care that women provide is substantial and, if remunerated, would account for a large proportion of a country's GDP. Despite this, health systems, national health accounts, economists, and ministries of finance do not take into account the full value of women's contributions (remunerated or unremunerated) to health. Paid work is undervalued owing to gender discrimination, and unpaid work is not valued at all.

To fill this crucial knowledge gap and provide evidence for policies and programmes to support women in their many roles as health caregivers, we undertook the Global Valuing the Invaluable (GVtI) analysis described below. We used the name Valuing the Invaluable from a series of papers about the financial value of family caregivers' contributions to long-term services and support to relatives with disabilities,<sup>281</sup> however, our focus was unique. The GVtI analysis quantified the paid

and unpaid contributions that women make to the health sector, focusing on the value of unpaid contributions. The analysis involved five in-depth country case studies with data from Mexico, Peru, Canada, Turkey, and Spain, and data analyses from 32 countries to develop worldwide estimates by use of the opportunity cost method and the proxy good method, both adjusted for gender discrimination and gross income.

To give a real economic and social value to women's contributions through health-related activities to family, community, society, economy, and to overall development of countries is extremely difficult. To estimate the monetary value of women's contributions, the first step is to develop a comprehensive frame of reference for all activities that can be considered health promoting. A major challenge to develop such a framework is to distinguish the activities that are uniquely health related—such as caring for a sick child—from others that are not fully dedicated to provision or maintenance of health—such as preparation of food, maintenance of a hygienic home, taking children to exercise or sport activities, or collection of clean water. Further, to assign a financial value to activities that have both economic and social benefits is challenging. Data and methodological needs are important. Additionally, no comprehensive, international standards exist that are consistently applied in all countries. Indeed, despite substantial efforts by institutions such as the statistical office of the EU (EUROSTAT) and the ILO to collect and disseminate information about the paid and unpaid work of women, data specific to health is scarce, and existing data are not easily comparable between countries.

Notwithstanding these challenges, we aimed to estimate the economic value of the contribution of women to health care. Although we recognise that women contribute to economies and societies in many ways, and these contributions have an intrinsic value beyond their economic value, we confined the analysis to contributions through paid participation in the health labour force and unpaid care to adults and children at home, with a special emphasis on unpaid care at home. The methods for data collection and analysis are briefly described in panel 7 and explained in detail in the appendix.

See Online for appendix

### Financial value of women's contributions to the health sector

The global value of unpaid work dedicated to the health of women's own families—without consideration of the value of social benefits or the effect of gender discrimination—is estimated at 1.10% of global 2010 GDP (95% CI, 1.10–1.11) with the minimum wage scenario, and 2.35% (95% CI, 2.34–2.36) with the average wage scenario, or \$700–1489 billion for the 32 countries in the study (figure 4 and appendix).

**Panel 7: Summary description of the methods of the Global Valuing the Invaluable study**

In-depth country case studies and quantitative analyses were undertaken to assess the value of women's contribution to health care, to identify policies to promote these contributions and to empower women. Extensive reviews of the scientific literature covering both quantitative methods and women's unpaid work provided background for the analysis.

Valuation of unpaid care is inherently difficult, and four methods are typically used, each with advantages and disadvantages: opportunity cost; proxy good; contingent valuation; and conjoint analysis. These methods are often combined with quality-of-life assessments for the person being cared for and the caregiver to quantify other costs and benefits (eg, physical and mental burdens). We applied the opportunity cost and proxy good methods. Additionally, we considered the effects of labour market discrimination with econometric methods. Finally, we estimated the market value of social security benefits or social benefits packages provided to salaried workers, and considered this in valuation of unpaid contributions to health.

A sensitivity analysis was undertaken, and several scenarios were considered during development of estimates of the economic value of both paid and unpaid work in the health sector. We report three of the scenarios developed: use of the country's reported minimum wage to value unpaid work; use of the average reported full-time wage of each country to value unpaid work; and use of the average wage of the country, accounting for the value of benefits (social security and taxes), and an estimate of the real value of wages, taking into account gender discrimination (calculated econometrically based on the remuneration received by men with similar education, training, and occupations).

We developed a detailed case study of Mexico, for which we used primary data from several surveys to obtain a complete account of all time spent on health and caregiving activities, both paid and unpaid, inside and outside the home, including community service. These estimates were made by combination of detailed survey categories of time use, occupation, and sector of work. We initially considered only activities uniquely or mostly associated with health and caregiving. We then took into account all household activities that are partly health-related or health-promoting to develop a maximum threshold for comparison.

Primary data for time use in Turkey, Peru, Canada, and Spain were also analysed. For each country, detailed primary data were developed for paid activities for health care. Identification of unpaid activities dedicated to health was more complex, and data were available only for Canada, Spain, and Peru. In Turkey, data for the proportion of time spent on health-related

activities in the home were not available, and the distribution from the data for Mexico was used to impute a value. For each of these countries, in-depth analysis of surveys was undertaken to gather complete information about all activities that could be considered health-related, whether paid or unpaid. Both occupation and sector of work were included in the analysis so that any woman working in a health-related sector, even if not as a health professional, was included.

A database for 27 additional countries (32 in total, see appendix) was developed by use of publicly available national statistics. The global calculations are based on analysis of these 32 countries. Sex-disaggregated data for time spent in unpaid, household-based health work for each of the 27 countries was identified. Countries were included in the sample if data were available. Data for time use was complemented by published data for wages and country income. Sex-disaggregated data for overall total paid hours worked in the labour force were identified. Unfortunately, no published summary data were available for how many of these hours were spent on paid work in the health sector, and analysis of individual data from labour market surveys for such a large group of countries was beyond the scope of this analysis. Thus, data for paid work in health was used from the five anchor countries—Mexico, Peru, Turkey, Canada, and Spain—to impute a value for the 27 additional countries and apply this to the average and minimum wage in each country. For the five anchor countries, we also reviewed variance and calculated CIs. This information was then used to develop ranges for the global estimates.

The 32 countries account for almost 52% of the world's population, but under-represent low-income countries. The only low-income countries included were Madagascar and Benin, and they represent only 3.8% of the world's population living in poor countries. By contrast, the sample accounts for 91% of the population living in lower middle-income countries, because China, India, and Pakistan are included. 12 upper-middle income countries were included, covering slightly more than 17% of the population living in countries of this income group; 14 high-income countries were included, accounting for 33% of the population living in this income group. The countries were selected on the basis of access to published data, and efforts were made to identify as many countries from each region and income level as possible. However, language barriers (we were not able to access data for many countries because they are presented in local languages) and data restrictions (many countries do not produce these surveys) are evident. We compare the imputed economic value of paid and unpaid work in health with country and global gross domestic product (GDP) and focus on unpaid work.

Since these contributions of women are mostly unrecognised and unaccounted for, they can be considered hidden subsidy to health care that has never been paid for through private or public spending and

that should be valued. Additionally, the total value of countries' health sector investments exceeds that reported in official statistics or through national health accounts. That is, countries invest more in health than

they have hitherto reported, precisely because of the substantial contributions of women through unpaid work. The unpaid work of men, although consisting of fewer hours and beyond the scope of this report, should likewise be quantified in future studies.

Women’s paid work in the health sector constitutes a large investment in health of at least 2.47% of global GDP (95% CI 2.46–2.47). Dependent on the method used for valuation, paid labour accounts for 51–69% of the total contributions of women to health (figure 4 and appendix).

Overall, women’s paid and unpaid contributions to the health sector amount to 3.57% of global GDP with the lower bound, minimum wage scenario or the equivalent of US\$2.26 trillion. By use of the average wages reported in 2010, women’s contributions sum to 4.81% of global GDP or the equivalent of \$3.05 trillion. Accounting for gender wage differentials and social security benefits, the value of unpaid and paid work increases considerably to 7.04% of global GDP or the equivalent of \$4.47 trillion (figure 4 and appendix).

These numbers vary according to countries’ level of development. For low-income countries (LICs), the average estimated value of women’s unpaid contributions to health is 2.94% (this sample included only two countries), and for LMICs, women’s unpaid contribution is 2.82%. The average contribution is 1.90% for upper-MICs, and 1.91% for HICs (figure 5 and appendix). In view of the non-representative sample of countries, generalisable conclusions about patterns are difficult to make. However, our findings suggest that in LICs, women invest many more hours of time in unpaid work in health than those living in higher income settings, where the opportunity cost of time is high. The differences between LICs and HICs might likewise show nonlinearity in income differentials.

In per capita terms, a clear and marked gradient exists from LICs to HICs, mostly owing to differences in wages. For HICs, the annual value of unpaid work in health per woman is about \$1650. This value is more than four times the value in upper-MICs and almost eight times for lower-MICs, even though these women spend more time on unpaid health-related work than do their counterparts in HICs (figure 6 and appendix).

In our sample of countries, the value of women’s unpaid contributions fluctuates between 0.6% and 3.5% of GDP, although most country estimates are between 1% and 3% of GDP (appendix). In per capita terms, not surprisingly, a clear positive association exists with level of country income. However, analysis with descriptive statistics suggests that neither measure was associated with level of women’s education or female labour force participation.

The in-depth analysis of paid and unpaid work in Mexico, Turkey, Peru, Spain, and Canada provided additional insights into the value of women’s contribution to health (figure 7). The total value of women’s

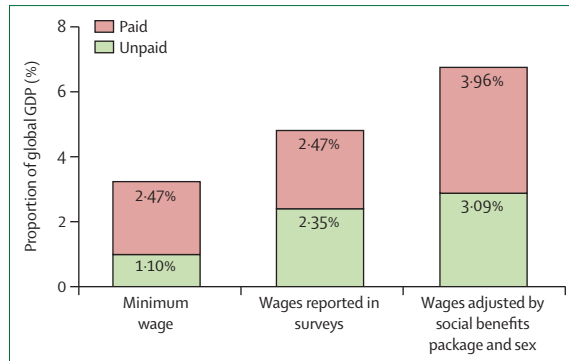


Figure 4: Estimated value of contributions of women to the health sector paid and unpaid work, % of global GDP, 2010, by wage valuation method  
GDP=gross domestic product.

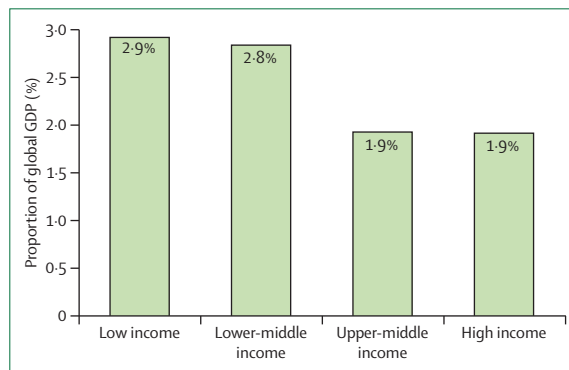


Figure 5: Estimated annual value as % GDP of women’s unpaid contributions to the health sector by income, averaging over countries for which data are available, 2010  
Income levels categorised according to World Bank definitions.<sup>292</sup> GDP=gross domestic product.

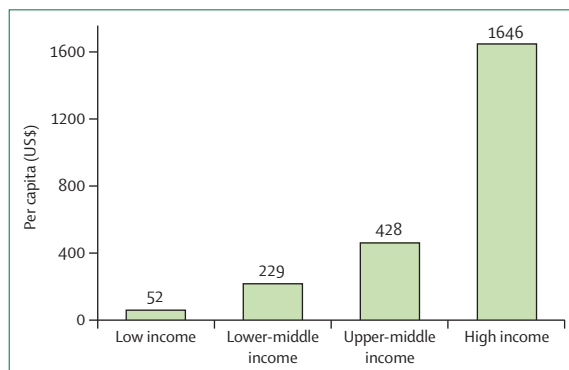
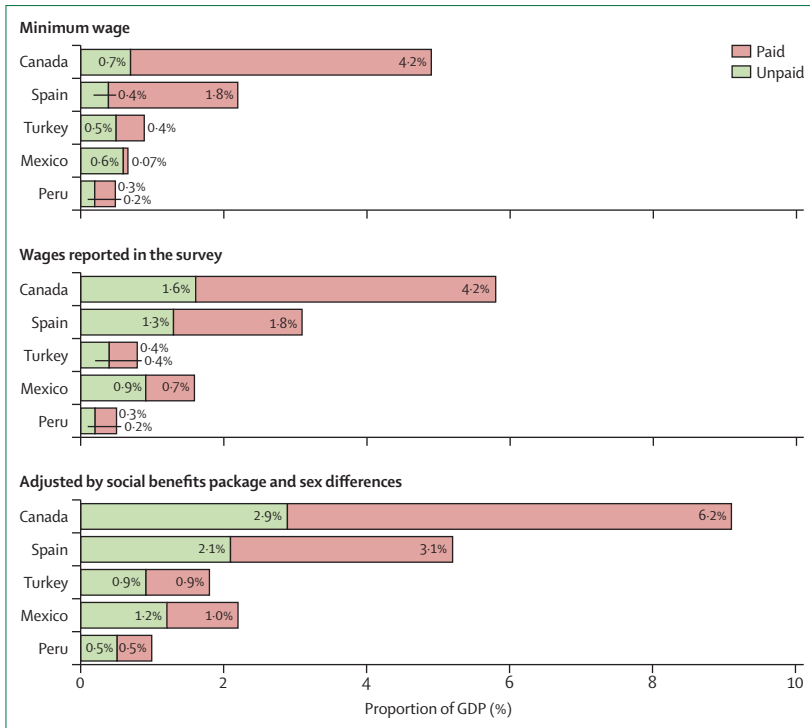
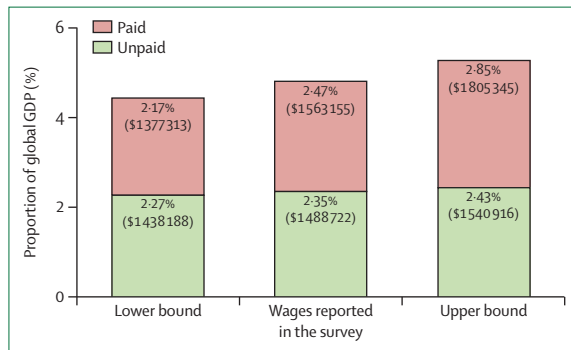


Figure 6: Estimated annual value per capita of women’s unpaid contributions to the health sector by income, averaging over countries for which data are available, 2010  
Income levels categorised according to World Bank definitions.<sup>292</sup>

contributions to health—under all wage scenarios—is higher in HICs than in MICs. This value is 5.2–9.1% of GDP in Canada, and 2.2–5.2% in Spain. Paid work constitutes most of women’s contributions to the health sector. By contrast, the values are lower in Turkey (0.8–1.8% of GDP), Mexico (1.3–2.2% of GDP), and



**Figure 7:** Estimated value of women's contributions to the health sector, paid and unpaid for Canada, Spain, Turkey, Mexico, and Peru. Detailed estimates were made by use of household surveys and various wage scenarios, 2010. See appendix for details.



**Figure 8:** Estimated global contributions, paid and unpaid, of women to the health sector, with survey data from Mexico, Peru, Spain, Canada, and Turkey, 2010, by average wage scenario. US\$ estimates are shown for each proportion of global GDP (appendix). The lower bound is the lower average estimate based on Wages Reported in the survey and the lower bound mean variation of values of remunerated and non-remunerated work in Canada, Spain, Mexico, Peru and Turkey; the upper bound is the upper average estimate based on Wages Reported in the survey and the upper bound mean variation of values of remunerated and non-remunerated work in Canada, Spain, Mexico, Peru and Turkey (panel 9). GDP=gross domestic product.

Peru (0.5–1.0% of GDP). In all three countries, unpaid work constitutes about half of the total value of women's contributions to the health sector.

Results of the population-weighted average variation in estimates of the paid and unpaid contribution of women in the five anchor countries (Mexico, Turkey, Canada,

Peru, and Spain) with the average wage scenario are 11.9–15.5% for paid work, and –3.4–3.5% for unpaid work. These results show the dispersion in data for wages and concentration of the data on unpaid hours of work.

We apply the population-weighted average variation in data from the anchor countries as another way to bind our estimates of the value of women's contributions to health worldwide (figure 8). This calculation suggests that, by use of the average wage scenario, the global value of women's paid work varies between 2.17% and 2.85% of global GDP, and the value of women's unpaid work varies between 2.27% and 2.43% of global GDP. The total value is thus between 4.4% and 5.28% of global GDP, with a value of US\$2.816 trillion to \$3.346 trillion.

Our estimates, although large, are conservative. First, we present different scenarios to estimate the monetary value of time, and the lowest is the minimum wage estimate. Second, we were unable to account for unpaid activities in the home that contribute, for example, to promotion of health and prevention of disease. These activities are considered joint activities because their primary purpose is not, or is not recognised to be, health.

Sensitivity analysis was undertaken for Mexico to ascertain the value of all time dedicated to the household that could be considered in any way to promote health. Such an approach increases the value of unpaid work in health, and hence increases the overall values for Mexico; these findings would undoubtedly be replicated in all countries if data were available. By use of the minimum wage to value these hours, the value of contributions increases substantially to 6.5–14.7% of GDP. This increase suggests that our estimates of the total value of unpaid work, although large, are conservative because they include only activities declared as full-time and health-related, and exclude all hours spent on other activities that promote health.

As examples, we present two case studies of women's contributions to health care. We describe women's contribution to health and the health-care sector in Mexico (panel 8, figure 9) and in Turkey (table 5, panel 9)

The Global Valuing the Invaluable analyses will help to advance women and health by providing a powerful advocacy and policy method—for the first time, the large scale of the invisible subsidy that women provide to health-care systems and, more broadly, to societies has been quantified. The quantification of women's undervalued health-care contribution highlights the magnitude of these contributions and will help to advance evidence-based policies and programmes to appropriately value and remunerate care provided by women.

### Investment in women and health

Recognition, valuation, and compensation of women's roles in health care are necessary to achieve gender equality and maximise women's contributions to



**Panel 8: Valuation of women's contribution to health and the health sector—Mexico case study**

We analysed the National Time Use Survey of 2009, which included almost 15 500 households, and the National Survey of Occupations and Employment of 2009, which included almost 121 500 households—both are nationally representative surveys.

The total value of women's paid and unpaid contributions to health is 1.3% of gross domestic product (GDP) with the minimum wage estimate, 1.6% of GDP based on wages reported in the surveys, and 2.2% of GDP with gross earnings (social security benefits and taxes) and accounting for gender wage discrimination (figure 9). 45–57% of this contribution is unpaid work (figure 9).

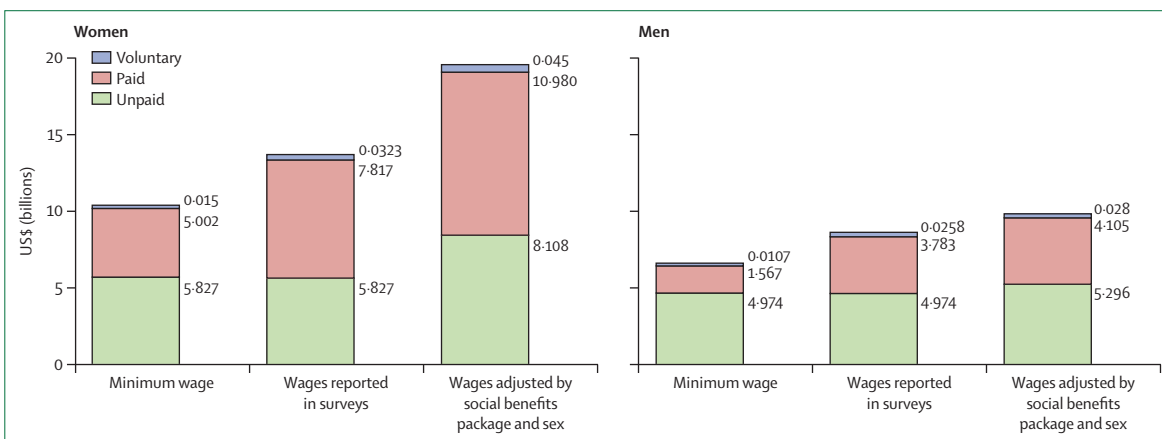
For men, by contrast, the total value of work in health ranges from almost 0.7% to 1.1% of GDP. Unpaid work makes up a smaller proportion of the total for men than it does for women, corresponding to 24–44% of the value of contributions to health. In terms of hours spent, men spend a smaller proportion of time in unpaid work than women. On a per-capita basis (for people aged 15 years or older), men devote 0.8 unpaid h per week exclusively to health care, compared with women, who devote 2.3 h per week.

Reported total investment in health in Mexico was 6.3% of GDP in 2010. By adding only the undervalued and unpaid contributions of women, the value increased to between 6.9–7.5% of GDP. When the unpaid contributions of men are considered, the value increases to 7.0–8.0% of GDP.

We analysed the time spent in volunteer work in the health sector, declared in the national surveys. This time proved to be very small, and the total value was between 0.004–0.009% of GDP, or US\$3576 million. We conclude that, although these contributions might be catalytic, measurement of their value is very difficult with any of the available survey data.

By contrast, time spent on household activities that can be considered health promoting or partly devoted to health (eg, preparation of healthy food, fetching water or wood, and maintenance of a clean house) is large. To measure this time with precision is very difficult due to challenges in separating out time devoted to health and assessing whether this time leads to good, high quality health outcomes. However, to have at least a benchmark measure is important, because these contributions are clearly very important to health. Indeed, these are often the activities that most promote health and prevent disease. The benchmark value shows that our estimates of women's unpaid contributions to health, although large, are indeed likely to be conservative because most survey data do not consider these joint activities.

On a per capita (per woman aged >15 years) basis in Mexico, 2.3 h per week per woman were spent on activities that in some way contribute to health. Although no formal way exists to assign the proportion of time that can be considered devoted to health in these joint activities, if 25% of the total unpaid time in joint activities is assumed to be health related, that would be 7.2 h, giving a total of almost 9.5 unpaid hours per week devoted to health. This time significantly increases the contribution of unpaid work in health and hence the overall percentage of GDP devoted to health care in Mexico. By use of the minimum wage (the lowest of all of our estimates) to value these hours, and assuming that 25% of each hour devoted to joint activities is invested in health, the total value of women's unpaid contributions to health increases from 0.5% of GDP to 2.0% of GDP. By use of the wages reported in the survey to value time, the total value of women's unpaid activities in health care reaches almost 4.6% of GDP.



**Figure 9: Value of work in the health sector in Mexico, by wage valuation method, in women versus men, 2010**  
See panel 8 and appendix for details.

	Men			Women		
	Paid care	Child health care	Adult health care	Paid care	Child health care	Adult health care
<b>Net earnings</b>						
Paid	0.36%	..	..	0.50%	..	..
Unpaid opportunity cost	..	0.12%	0.17%	..	0.14%	0.05%
Unpaid proxy good (minimum wage)	..	0.07%	0.11%	..	0.33%	0.15%
Unpaid proxy good (comparable occupation)	..	0.12%	0.16%	..	0.36%	0.15%
<b>Gross earnings</b>						
Paid	0.63%	..	..	0.89%	..	..
Unpaid opportunity cost	..	0.21%	0.30%	..	0.24%	0.09%
Unpaid proxy good (minimum wage)	..	0.11%	0.17%	..	0.51%	0.22%
Unpaid proxy good (comparable occupation)	..	0.21%	0.28%	..	0.65%	0.28%

See panel 9 and appendix for details.

**Table 5: Value of paid and unpaid health care provided by men and women as a percentage of gross domestic product (GDP) in Turkey, 2011**

families, communities, and society. Not only will women be able to provide improved health care with increased support, but they will also be able to pursue education and production opportunities, thus advancing their fundamental human rights and contributing to sustainable development.

Although more health-sector support for women's health-care roles is essential, action outside the health sector is also crucial to promote women's health. Action outside the health sector is crucial to sustainably improve women's health status and support their health-care roles. Education of girls and women, social protection, and provision of a healthy environment are among other priorities to reduce gender inequality, empower women and girls to improve their life prospects and wellbeing, help to enhance their caregiving, and boost their contribution to society.

**Girls' education**

Improvement of girls' access to quality education is a priority. The content of, and participation in, education is crucial to change gender norms and realise girls' rights, including the right to education. Further, education of women protects both their health and their children's health, reduces domestic burden, boosts their productivity as workers—including as health-care workers—and promotes gender equality. However, despite widespread agreement about the importance of girls' education and considerable advances in the past 15 years, school is inaccessible for many girls in many countries. An estimated 44 million school-age girls do not attend school (57% of all children

**Panel 9: Valuation of women's contribution to health and the health sector—Turkey case study**

We used the Turkey Time Use Survey (2006), a nationally representative sample that records people's daily time use for various activities, and the Turkey Labour Force Survey (2011), a nationally representative household survey that records information about the structure of the labour force in the country. With these surveys, we applied opportunity cost and proxy good methods to estimate contribution to informal care and informal health care (appendix).

We estimated the value of the net earning and gross earnings, applying minimum wage and wages for comparable occupation, and corrected for wage discrimination between men and women.

The total value of care (including care not relating to health) provided by women, in net amounts, is 0.81–2.35% of the GDP, dependent on method used, and the combined value of care provided by men and women is 1.77–3.26% of the GDP. The total value of care provided by women, in gross amounts, is 1.36–4.24% of the GDP, dependent on the method used, and the combined value of care provided by men and women is 3.01–5.84% of the GDP.

The value of unpaid health-care work, in terms of net earnings, is 0.28–0.65% of GDP for women, and 0.21–0.28% of GDP for men (table 5). The value of unpaid health-care work contributed by women according to these calculations is about equal to the value of paid work that they provide to the health sector (0.50% of GDP). The value of unpaid health-care work, in terms of gross earnings, is 0.33–0.93% of GDP for women and 0.28–0.51% of GDP for men. The value of unpaid health-care work contributed by women, in terms of gross earnings, according to these calculations, is about equal to the value of paid work that they contribute to the health sector (0.89% of GDP).

The total value of paid and unpaid health care provided by women, in net amounts, is 0.69–1.01% of the GDP, dependent on the method used. In terms of gross earnings, total value of paid and unpaid health care provided by women is 1.22–1.82% of GDP. In 2011, health-care expenditure in Turkey amounted to 6.1% of GDP. With the addition of informal health care provided by women (in gross terms), the adjusted estimated health expenditures would be valued at 6.43–7.03% of GDP.

who do not attend school), mostly in Africa and Asia.<sup>293</sup> In Latin America and the Caribbean, more girls than boys are enrolled at school,<sup>294</sup> but illiteracy is still a substantial problem among indigenous adolescents, showing ongoing socioeconomic disparities in that region. The gender gap in schooling becomes more pronounced as children grow: in LMICs, 83 young women per 100 young men are in tertiary education, and women are especially underrepresented in science, technology, and engineering.<sup>294</sup>

The immediate and long-term health benefits of girls' education are broadly accepted; girls need skills and literacy to live up to their health potential.<sup>295</sup> Schooling of sufficient duration and quality is associated with delay of sexual initiation, marriage, and childbearing, and reduced risk of HIV and gender-based violence. Women with a secondary education marry 2 years later than those with no education or a primary education in Bangladesh and Nigeria, 3 years later in Ethiopia and Mali, and 4 years later in Chad.<sup>296</sup>

Education can likewise have substantial benefits across generations. A mother's level of schooling is strongly linked with her children's survival. Researchers attribute more than 50% of child deaths averted between 1970 and 2009 to women's increased levels of education.<sup>297</sup>

The health of family members affects education opportunities for girls. Healthy adults are less likely to rely on daughters' labour for domestic, agricultural, or market production, and domestic health care.<sup>298</sup> Results of time-use studies in rural Kenya, Nicaragua, Pakistan, and South Africa show that girls who do not attend school spent 6–7 h a day on domestic work, compared with 2–3 h for their peers who attend school.<sup>299</sup> Equitable distribution of domestic chores and provision of support for caregivers promote girls' schooling.

Several approaches have been implemented to increase girls' school enrolment. Financial barriers and the low priority that some families give to girls' education can be overcome with subsidies or cash transfers targeted to disadvantaged girls. To ensure that learning environments are safe, secure, and free of sexual harassment and gender-based violence can likewise improve female enrolment rates. Promotion of girls-only schools has increased girls' access to education in some settings, as has provision of sex-segregated bathrooms.<sup>300</sup> To address girls' transport to school can reduce risk of harassment and violence and increase attendance. In India, the Government of Bihar gives girls funds to buy bicycles when they enrol in grade nine, increasing girls' enrolment in secondary school and reducing the gender gap in enrolment.<sup>301</sup>

Removal of access barriers is only part of the solution; the quality and content of schooling is crucial. This content should include topics that address some of girls' and adolescents' most urgent needs, such as sexuality education, which is present in many secondary schools worldwide, albeit of varying effectiveness.<sup>302</sup> To be effective, sexuality education should be comprehensive and cover sexual rights, life skills such as critical thinking and decision making, and self-esteem. The open, positive approach to comprehensive sexuality education in the Netherlands contributes to their low adolescent pregnancy rate: 4.6 pregnancies per 1000 girls aged 15–19 years, compared with 41.2 in the USA.<sup>303</sup>

Girls' education can boost their future productivity as workers. Girls' secondary education has even more economic benefits than boys' education since the reduced fertility of educated women decreases their domestic

responsibilities, increasing time available for remunerated work. In Thailand, Ghana, and Côte d'Ivoire, economic returns on secondary education are 15–25% higher for women than men.<sup>304</sup>

In view of the large proportion of women in the global health-care workforce, to ensure that girls have access to quality education at least to secondary school level can strengthen the human capital of the future health-care workforce. Assessments of CHW programmes show that their effectiveness increases with CHWs' education level. In recognition of this, the Pakistan Lady Health Workers programme requires new recruits to have at least 8 years of formal education.<sup>305</sup> To ensure that female health-care providers have access to continued education is also essential; training opportunities can be empowering for unsatisfied health-care workers, as described for Thai nurses in a previous section.

Despite widespread acceptance of the many benefits of education for girls, and proven approaches to boost school attendance, progress to keep girls enrolled beyond primary school has been slow. Evidence is insufficient about the context-specific barriers that prevent girls' regular attendance, grade succession, and learning. New sources of organised opposition to girls' education are emerging and gaining strength, including terrorist groups such as Boko Haram and the Taliban. The increasing frequency of natural disasters likewise affects girls' education prospects, which are often more affected than boys' in the wake of a disaster. After the 2005 earthquake in Kashmir, for example, many young girls who lost their parents were forced to leave school and care for siblings or to get married.<sup>306</sup>

### Social protection

The girls and women who are not benefiting from globalisation and economic growth need to be reached for health inequity to be reduced. Social protection, which aims to promote a minimum level of subsistence for all, can extend benefits to marginalised groups, especially to individuals and households who don't have productive capacity and experience persistent discrimination. Transformative social protection measures, which raise individuals and households out of poverty and reduce inequality, are central to improvement of women's health and building of their capabilities—promoting financial security and changing social norms.<sup>307</sup>

Social protection that is part of a national system with universal benefits leads to better population health, including decreased preventable mortality among ageing people and socially disadvantaged groups.<sup>307</sup> Social protection can improve girls' education and nutritional status, empowers them, benefits women's health, and supports women as caregivers.<sup>308</sup> Social protection programmes should be designed to simultaneously meet practical gender needs, to contribute to improved gender equality, and avoid reinforcement and exacerbation of entrenched gender roles.

Cash transfer programmes are increasingly used worldwide to provide a basic level of social protection through support to caregivers, and to protect economically vulnerable households. Cash transfer programmes can improve nutrition, health-care seeking, and education in beneficiary households.<sup>309</sup> Benefits for girls and women can be substantial: in Colombia, Kenya, and Malawi, cash transfers or subsidies for school costs increased girls' marriage age and reduced early pregnancies.<sup>308–310</sup> Transfers are likewise used to incentivise positive health behaviours, including protection against HIV.<sup>311</sup> When transfers target poor households effectively, they can mitigate the catastrophic financial effects of illness or death of a family member. A gender-responsive design that accounts for gender inequality can have additional benefits, as the experience with Oportunidades in Mexico shows (panel 10).

**Panel 10: Oportunidades—Mexico's successful gender-responsive national social protection programme**

Oportunidades, the first cash-transfer programme of its kind, is Mexico's primary anti-poverty programme. Started under the name Progresas, the social welfare programme has grown from 300 000 families in 1997 to 5·8 million families at present.<sup>312</sup> Oportunidades provides cash transfers to impoverished families, which are conditional on children's school attendance, uptake of preventive health-care measures such as vaccinations, and improved nutrition.

Oportunidades is credited with increasing girls' opportunities. The programme recognises the substantial obstacles to girls' schooling and provides households with larger benefits for girls attending secondary school than for boys.<sup>313</sup> Although Oportunidades has extended schooling for boys and girls, girls have benefited more—the programme has resulted in an increase of 0·85 years spent in education over 10 years for girls compared with 0·65 years for boys. Access to, and uptake of, health services including reproductive health and prenatal care has increased, and the nutritional status of children in beneficiary households has improved.<sup>314</sup>

Assessments show that participation in Oportunidades empowers women. The programme has improved women's ability to manage their household finances, obtain credit, and use other banking services, which increases their self-esteem. Husbands in beneficiary households are less likely than other men to make unilateral decisions about medical treatment, children's school attendance, and food expenditures. The programme has increased the autonomy and leadership capacity of female participants, and increased their participation in community functions.<sup>315</sup>

By taking account of gender inequality and social norms, Oportunidades has successfully increased service access and reduced both infant and maternal mortality.<sup>316</sup> Importantly, by shifting gender norms, Oportunidades has laid the groundwork for sustainable change.

In some countries, cash-transfer programmes include support for health-care providers, increasing their effectiveness and mitigating harmful effects that caregiving might have on them. In east and southern Africa, cash-transfer programmes have been used to reduce the effects of AIDS. Under South Africa's expanded National Public Works Programme,<sup>317</sup> home-based health-care providers were eligible to receive public wages, a rare public recognition for undervalued workers. Additionally, the South African Government offers child support and disability grants to eligible citizens. The child support grant covers more than 10 million children, assisting caregivers—many of whom are elderly, poor women—with ongoing child-care responsibilities that have been exacerbated by the country's AIDS epidemic. The income from the child support grant is frequently used to buy food to benefit the entire household, and is credited with substantial benefits for adolescent girls' health, including healthy sexual relationships and decreased substance use.<sup>318</sup>

In addition to cash transfers, transformative social protection measures—such as legislative, regulatory, and policy measures—can create an enabling environment for women and health by helping the poorest and most excluded women to access their basic rights and fulfil their roles. In addition to removal of health user fees or elimination of gender-based employment discrimination, legal protection can guarantee women's property and inheritance rights, protecting widows and orphaned girls and helping them to retain their property, which might be their only asset.<sup>319</sup>

Universal health care (UHC) is an essential component of social protection because it addresses catastrophic health-care expenditures and enables equitable access to health care.<sup>94</sup> The drive for universal health care aims to mitigate financial barriers to health services faced by women. Many countries, including Ethiopia, India, Mexico, and Rwanda, have developed UHC plans, and more than 50 countries have attained near-universal coverage.<sup>320</sup> In some cases, policies specifically focus on maternal health. Ghana, Burundi, Tanzania, and Bangladesh introduced delivery fee exemption policies to encourage women to give birth in facilities.<sup>321</sup> India's Janani Suraksha Yojana programme, which provides cash incentives for women giving birth in health facilities, has increased use of antenatal care and institutional deliveries.<sup>322</sup> However, increased use of institutional delivery has not always resulted in improved health outcomes. The most likely reason for this limited effect is poor quality of care.<sup>315</sup>

The growing number of informal workers (60% of all workers worldwide, or 1·8 billion people) who are not covered by employer-based health insurance are a challenge to UHC.<sup>323</sup> Two-thirds of women who work in LMICs are informal workers. Informal workers have substantial health risks because of their insecure employment status and little control over working

conditions. Informal workers have limited access to affordable and appropriate health care for themselves and their families—a particular concern for women who might lose their jobs when pregnant, or who receive little or no maternity leave, whether paid or unpaid.

### A healthy environment for women

A healthy environment contributes to population health, wellbeing, and opportunities. Support and expansion of women's roles in resource conservation, increased access to water and sanitation, and decreased indoor air pollution can make a measurable difference to women's health and their caregiving contribution, which has an environmental effect that advances sustainable development.

Girls and women have a crucial role in all conservation efforts. Expansion of access to improved water sources and adequate sanitation reduces health risks and the time spent on water collection, which eases girls' and women's domestic burden. A connection to a piped water system saves women an estimated average of 15 h a week, which enables them leisure opportunities and improves their wellbeing and mental health.<sup>32</sup> Additionally, improved access to water can enhance women's productivity: results of a study in Pakistan showed that a nearby water source was associated with an increase in the time women dedicated to market work.<sup>324</sup>

Women need to have a central role in water and sanitation planning and decision making at all levels—household, community, and national. One reason women must be involved in planning is that their perspectives and preferences differ from men's. Results of a study<sup>325</sup> of panchayats (local governing councils) in India showed that female heads of panchayat prioritise drinking water, whereas male heads prioritise irrigation systems. Women and men differ on their preferences for sanitation facility design: women tend to be more concerned with privacy and safety than men, often preferring enclosed latrines in or near their homes. As with environmental conservation, women's involvement in water-related decision making improves effects. Results of a study<sup>326</sup> of community water and sanitation projects in 88 communities across 15 countries showed that projects designed and run with women's full participation are more effective and sustainable than those without women's involvement.

Natural resource management is an important part of women's domestic responsibilities, especially in LMICs. To meet household needs in villages and slums, women must be knowledgeable about local ecosystems and adaptation strategies. Women are important in agriculture, comprising nearly half of the agriculture labour force.<sup>327</sup> In panel 11, we discuss what can be achieved when agricultural policies recognise the potential of women farmers. By increasing the

gender-responsiveness of programmes, there is an opportunity to improve health in millions of farming households.

Improved cooking stoves might have the potential to reduce indoor air pollution and the associated health burden. In Bangladesh, households with improved stoves had less indoor pollution than others. The improved stoves were energy efficient, so women using them collected fuel wood less frequently and in smaller amounts than those using traditional stoves.<sup>334</sup> Women in coastal Guinea started smoking their fish over improved ovens that needed less fuel wood, spending far less time stoking their fires, which enabled them to attend literacy classes.<sup>335</sup> Use of alternative energy sources might likewise make a difference. Kerosene and liquefied petroleum gas are recommended alternatives to biofuels since they are relatively non-polluting and more efficient, reducing cooking time and eliminating women's time spent on collection of fuel wood.<sup>336</sup>

Although not available in many rural areas of low-income and middle-income countries, electrification yields several benefits for women because it reduces indoor air pollution, eases their domestic burden and improves quality of health care and education. In rural Nicaragua and South Africa, electrification saved women time and increased female labour participation.<sup>337</sup> Electrification is crucial to the quality of health services and health-care-worker effectiveness, and can be life-saving in cases of night-time emergency births.

### The enabling environment: policy and partnerships

Gender-responsive multisectoral programmes for women and health can be introduced and their effect sustained, when the policy environment is an enabling one. Policies that combat gender inequality contribute to economic growth,<sup>338</sup> and a gendered approach to programming improves effectiveness and helps to guarantee girls' and women's rights and combat gender discrimination.<sup>339</sup> Women's leadership in political and decision-making bodies—working alongside supportive men—can promote a policy environment that supports and protects women who are balancing work and domestic roles to achieve their full potential.

Strong partnerships between governments, the private sector, and civil society are another component of the enabling environment for women and health. Civil society organisations can encourage local ownership of women and health and promote accountability through community-driven development. Women's groups, with their track record of engaging communities and establishing partnerships, have a central role. Investment in women's groups has reduced barriers to health care, increased health knowledge, reduced gender-based violence, and improved health outcomes for women, mothers, and children.<sup>340</sup>

An assessment of the use of a participatory learning and action approach with women's groups shows its



**Panel 11: Gender-responsive programmes add value to the agricultural sector**

“If women had the same access to productive resources as men, they could...reduce the number of hungry people in the world by 12–17 percent.”<sup>327</sup>

Closing the gender gap in agriculture is finally recognised as the most effective path towards increased yields and reduction of undernutrition. Investment in female farmers will boost women’s role as key leaders of agricultural development. Fundamental and sustainable benefits, however, necessitate gender responsiveness being instilled into planning for agricultural growth.

Worldwide, women comprise about 43% of the agricultural labour force, with variation within and across countries.<sup>327</sup> In sub-Saharan Africa and south Asia, 50% of the agricultural labour force is female, with a higher proportion in countries in which effects of migration, HIV, and conflict are prominent. Despite their importance to agriculture, women are often undervalued and overlooked as farmers. Women have less access to the necessary inputs, knowledge, and productive assets than do their male counterparts.

In sub-Saharan Africa, women’s land ownership varies—3% in Zimbabwe, 11% in Benin, and 26% in the Democratic Republic of Congo—and tends to be smaller than men’s land ownership.<sup>328</sup>

A World Bank review showed that women’s access to extension and advisory services was less than men’s in Ethiopia, India, and Ghana, notwithstanding variation by region and type of crop or livestock.<sup>329</sup>

Female farmers do not receive crucial assets, knowledge, and skills without development programmes that are sensitive to their unique circumstances. Evidence from economic modelling suggests that minimisation of gender differences in access to inputs, education, financial capital, and other productive resources improves overall productivity.

In Burkina Faso, modelling showed that yields of women’s plots were on average 30% lower than men’s because labour and fertiliser were used less intensively. Output could increase by 10–20% if existing resources were shifted between men’s and women’s plots.<sup>330</sup>

In Ghana, women’s tenure insecurity was associated with differences in men’s and women’s productivity. Women rarely left their land fallow, despite risking overuse, because that would jeopardise their access to that land.<sup>331</sup>

Increased productivity does not necessarily improve nutritional outcomes. However, women’s increased earnings are reinvested into the household, sometimes at a higher rate than men’s. This investment means that, when women control resources and income, their households are well nourished and educated, conferring benefits across generations.

In Bangladesh, when women’s earned and controlled income increased, households spent more money on food than when men had similar income gains<sup>332</sup> and, in the Philippines, women’s increased income boosted protein and caloric consumption.<sup>333</sup>

Programmes with increased gender-responsiveness provide an opportunity to improve health in millions of farming households.

potential for maternal and neonatal health. Evidence from Bangladesh, India, Malawi, and Nepal suggests that four-phase participatory learning and action cycles led to an overall reduction of 37% for maternal mortality and 23% for neonatal mortality, probably by improvement of hygiene and antenatal care.<sup>341</sup> In panel 12, we show the empowering potential of women’s groups, which in Nepal were able to sustain the benefits of an internationally sponsored programme well beyond the withdrawal of external support (Hahn HP, Epting A, Pact, personal communication).

The broad approach of women and health considers the many pathways to improvement of women’s health across the life course. Education of girls, expansion of social protection, and protection of the environment can have substantial health benefits. What is less well established—but equally important—is the effect of these investments on women’s roles as health-care providers and producers. Recognition of health as more than a sectoral outcome, gender-responsive policies, and multisectoral programmes that involve women in an enabling environment can empower them to achieve their full potential at home, in their communities, and in the health-care workforce.

**Translation of evidence into action**

When women are able to achieve their human rights and maximise their potential, families, societies, and economies benefit in the long term, making sustainable development possible. Women’s health status and role in health care affect their ability to exercise rights and achieve their potential. The Women and Health approach—the interplay between women as bearers of health problems and providers of health care—demands that all women are valued, enabled, and empowered, and that societies are accountable to women. If these conditions are met, women will be healthy and have equity in all aspects of their lives, enabling sustainable development.

Advances will only be possible if Women and Health is a priority in the post-2015 era of global development. We provide a set of recommendations for international agencies, development partners, academic institutions, advocates, donors, and stakeholders at country level—governments and civil society organisations. The recommendations are inextricably linked and dependent on each other, and will have an increased effect when implemented together. Specific mechanisms to take the recommendations forwards vary across global, regional, and national levels and between countries.

**Panel 12: Pact's WORTH programme—empowerment of women to drive sustainable change**

Pact's WORTH programme integrates three approaches—literacy training, community banking, and microbusiness development. By doing so, the programme empowers typically poor, isolated women to become social activists, social entrepreneurs, and effective leaders who effect change in their communities. Through WORTH, women envision their goals and achieve them through management, growth, and leverage of their assets and social networks. More than 300 000 women in more than 14 countries in Asia and Africa have participated in WORTH since 1999.

Pact piloted and scaled up WORTH in Terai Valley, Nepal, reaching 130 000 poor rural women between 1999 and 2001. On the basis of the principle that “dependency is not empowering,” participants become wholly self-reliant by creation of their own village banks with their own savings. Unlike many programmes that provide capital and inputs, WORTH offers no seed money, no matching grants, no subsidised interest rates, and no classroom teachers.<sup>342</sup>

In 2001, an insurgency resulted in civil war in Nepal, and Pact's formal support ended, leaving the WORTH groups on their own. When the insurgency began to subside 5 years later, Pact returned to see if any of the WORTH groups survived the war. An impressive 64% of the original village banks were still active, with a total of 25 000 members. Additionally, some of the original WORTH groups had helped other women to organise their own savings groups based on the WORTH model, and 878 new groups had formed, involving 12 000 women. This expansion occurred wholly independently of Pact.

Despite the civic turmoil surrounding them, the WORTH groups continued to increase their assets and held, on average, more than three times the total capital they had in 2001. Through their increased capital, the women were better able to meet their immediate needs than previously. For example, 40% of the group members reported borrowing to meet health-related needs. 86% of group members agreed that their access to health services improved as a result of WORTH.

The effects of the WORTH programme extended beyond financial benefits. Through savings and learning in groups, WORTH women increased their social capital and became empowered participants in community development. Women with limited community involvement before WORTH started to use their groups as platforms to begin social campaigns; up to 95% of WORTH members reported engagement in social action to benefit community members. Participation in WORTH also increased women's household decision-making ability, and an average of 89 000 women of 130 000 enrolled reported that their decision-making authority increased in family planning, marriage for their children, buying and selling of property, and girl's schooling. Additionally, the WORTH groups enabled women to learn about sensitive health issues such as HIV, reproduction, and safe motherhood. This factor contributed to a 78% increase in the number of WORTH women practising family planning during the course of 2 years.

**Recommendations****Value women**

*Develop and enforce gender-responsive policies to support women in their diverse roles*

Gender-responsive social, economic, environmental, education and health policies and programmes can accelerate sustainable development. To be gender-responsive, programmes should meet three requirements: show an understanding of women and acknowledge their contributions (know her); be designed to reach and benefit women and men (design for her); and assess progress in relation to women's success (be accountable to her). Gender-responsive programmes aim to eliminate gender discrimination and achieve gender equality.

Development partners, governments, and civil society should increase the gender-responsiveness of efforts to address social determinants of health, including support of girls and women in the context of education, social protection, and a healthy environment.

Gender-responsive education policies that prioritise girls' school attendance to at least secondary school level are a high priority in view of the profound effects of women's level of education on health outcomes across generations. Gender-responsive labour market policies

are likewise important, including proven measures such as maternity and paternity leave, child care, and flexible work and career schedules.

*Recognise women's paid and unpaid contributions as health-care providers*

Women's contributions to health care and the health sector are impressively large in number of hours and overall value. However, these contributions are severely undervalued, and the unpaid health care that women provide is invisible. To value women's contributions as members of the health-care workforce and unpaid caregivers, and to design, implement, and guarantee supportive policies and programmes are crucial priorities for governments, planners, implementers, academics, and civil society organisations.

Caregiver support policies need to be assessed where they exist and be introduced where they do not, and the most effective approaches should be widely incorporated into social security institutions and health reform initiatives.

Caregiving support policies should apply to men and women alike to contribute to reduced gender inequality, empowerment of women, and investment in economic, human, and social development.

### *Implement policies to enable women to integrate their social, biological, and occupational roles*

Health policies should be gender-responsive. Development partners and ministers of health should develop and implement health sector policies that show gendered priority setting and budgeting. This gendered priority setting includes enabling women to integrate their social, biological, and occupational roles in the health sector. Ministries of health and education and academic institutions should ensure that human resource policies are designed to enable women to function to their full capacity in all of their roles and throughout their life course. They should promote women's career advancement in the health sector with measures to incentivise and reward gender-responsive policies and practices, and eliminate differences in men's and women's access to advanced training and leadership positions by removal of barriers and establishment of flexible career trajectories to ensure women are not penalised for balancing family and professional duties.

### *Ensure women's universal access to comprehensive health care that is responsive to gender and the life course*

UHC is a crucial goal for health systems after 2015. Integration of a comprehensive package of interventions to address the wide range of women's health challenges needs changes to health systems. In addition to focus on access, comprehensiveness, responsiveness, and affordability of curative interventions, health systems should prioritise prevention, patient education, long-term monitoring, and quality and people-centred care. Health systems should improve outreach and self-management to cope effectively with risk factors, illness episodes, and multimorbidity over the life course. The success of the continuum of care framework relies on women becoming more central to sexual, reproductive, maternal, newborn, and child health; however, success also needs frequently neglected elements to be addressed, especially chronic disorders and NCDs, quality of care, and social determinants of health. These changes would benefit women with all disorders and diseases across the life course and would make both economic and human sense.

Increased commitment to UHC is needed to reach the most vulnerable members of society, which usually include women and children. To identify which services are covered is a key aspect of the design of UHC policies, providing an important opportunity to promote women and health in the post-2015 health framework.

Governments and the private sector should expand service delivery platforms to address the unfinished women's SRHR agenda, and chronic disorders, NCDs, and their major risk factors, which need legislative and regulatory approaches to ensure enabling policy environments and investments in training of the health workforce and infrastructure.

To ensure equity, health policy makers and planners must implement targeted measures to ensure access to

UHC for women and girls within comprehensive health strategies. These measures include provision of financial protection against catastrophic health expenditures, with supply and demand side incentives to improve quality and access to services, and strategies to reduce obstacles to health care for all, with particular attention to obstacles affecting the most vulnerable and marginalised girls and women.

### **Compensate women**

#### *Estimate the value of women's unpaid contributions to health care and recompense their invisible subsidy*

To create awareness and raise the international profile of women's invisible subsidy to health care, generation of evidence for the monetary value of women's caregiving, and promotion of country-level action are essential. Advocacy efforts on the basis of this evidence should encourage establishment of policies and programmes to support women and promote country-level action.

Countries should establish mechanisms to provide support and adequate remuneration for women's contributions to health care, both paid and unpaid. Appropriate designation of institutions to support women as unpaid health-care providers will vary between countries. Action at country level needs support of international institutions; at global level, UN Women is well placed to support women's caregiving in collaboration with agencies such as WHO, the World Bank, and UNFPA.

The quality of unpaid caregiving and health promotion will be improved by training of women carers, who need enabling technologies and support to reduce the stress and burden of caregiving.

#### *Ensure that men and women receive equal compensation for equal work in the health sector*

Within health professions, women routinely earn less than men, even when doing similar jobs. The wage gap between men and women in the health-care workforce—including support for women health researchers—should be reduced to advance women's careers and maximise the potential of health systems.

Academic, professional, and labour organisations should advocate for support and compensation of women in the health workforce, with improved information about gender and human resources for health.

Finance ministers should work with health ministers to benchmark the level of compensation for women health-care workers across disciplines, regions, and countries.

### **Count women**

#### *Ensure that women are accounted for in the health-care workforce*

Global data for human resources for health is scarce. In the context of increasing availability of this crucial information, sex disaggregation of data for human resources for health is urgently needed to increase understanding of gender differences and inequalities in the health-care workforce.

Professional organisations such as the International Federation of Obstetricians and Gynaecologists and International Council of Nurses collect data for human resources for health nationally and worldwide. Sex disaggregated data will show the dimensions of women's roles, location, and conditions in the health-care workforce and will guide gender-responsive efforts.

WHO should promote collection of sex-disaggregated health workforce information.

*Guarantee that sex-disaggregated civil, vital, and health statistics and survey data are collected through national systems*

At present, civil registration and vital statistics systems substantially undercount girls and women. Almost one-third of the 135 million births and more than two-thirds of the roughly 57 million deaths worldwide are unregistered and unrecorded.<sup>343</sup> Furthermore, an increased emphasis on national data collection, monitoring, and assessment is needed to improve understanding of dynamics between girls' and women's health, their caregiving roles, and their productive contributions. To fill these crucial gaps will only be possible when national vital registration systems, health information systems, surveys, and other data collection platforms are functional and disaggregate data by age and sex.

The data revolution called for by the High Level Panel on the Post-2015 Development Agenda might catalyse action to rebuild long-neglected vital registration systems.<sup>344</sup> In this context, investments are needed to strengthen national information systems and population surveys to construct a comprehensive view of women's health across the life course and build national capacity for evidence-based policy and programmes. Additionally, census commissions, vital registration entities, academic and survey institutions, and funders of research should ensure that crucial data are disaggregated by age and sex.

The increasing availability of mobile technology—mostly mobile phones—is shifting prospects for women even in the most remote parts of the world. Technology has the potential to increase availability of health information that is sex and age disaggregated. Mobile health (mHealth) and electronic health approaches have improved access to health data, evidence, and learning at all levels, although to increase the scale of mHealth approaches has proved challenging. More robust assessment of effects and operational research are needed before the potential of mHealth for data collection can be maximised.

*Mandate that research studies enrol women and make sex differences a core component of research*

Research funding agencies, scientific journals, and development partners should increase evidence for the interaction between women and health. This evidence will make an important contribution to understanding the role of sex in differential disease risk, vulnerability, progression, and outcomes, to the benefit of both men and women.

Basic, clinical, social science, and public health research projects should disaggregate study populations by sex and explicitly consider gender in their design, implementation, analysis, and reporting. Recommendations resulting from research should consider differences by sex. Academic institutions should have women and health research and education agendas to train future health professionals and leaders.

**Be accountable to women**

*Develop and implement an accountability framework and indicators for Women and Health*

An accountability framework must underpin the Women and Health approach for stakeholders to track and assess achievements in improvement of women's comprehensive health across the life course, promotion of women's full and equal participation in health systems, and valuation of their contributions. Development of an accountability framework will need a rigorous process that brings together experts in key aspects of Women and Health.

A multidisciplinary expert group should develop a framework and indicators to track progress on the basis of available evidence of effectiveness, feasibility of measurement, data availability, and programmatic relevance.

Indicators to measure progress of Women and Health should take account of interconnections: women as bearers of health problems, women as health-care providers, and more broadly, women as contributors to families, societies, and economies. Additionally, indicators should provide information about the synergy between these dimensions, for example, the mental health of domestic caregivers, or the effect of gender-based violence on women's productivity.

Agreement on a set of meaningful indicators is only part of the Women and Health measurement challenge. Collection, analysis, interpretation, and translation of data to gauge progress and prompt action are larger challenges. The MDGs helped to focus data collection efforts on major sources of disadvantages of women and girls.

Progress in data collection should be extended to other aspects of women and health to provide a basis to increase recognition of women's health needs throughout the life course, their unrecognised caregiving contribution, and its effects on other aspects of their lives.

Data should be used to track progress at national, regional, and global levels.

*Establish independent mechanisms at global and country levels to support, catalyse, and ensure accountability for global, regional, and country action on women and health*

Global advocates for women, agencies such as UN Women and WHO, and national-level civil society organisations from HICs, MICs, and LICs alike should hold governments accountable to make women's contributions visible.

The Independent Expert Review Group<sup>345</sup> established by the UN Secretary-General to monitor progress of the Global Strategy on Women's and Children's Health provides a useful model for use of country-level data to neutrally and powerfully gauge progress.

A Women and Health accountability commission should be established that builds on the experience of the iERG and reports to UN-Women; the UN Secretary-General is likewise positioned to have an important role in promotion of accountability in the context of general accountability mechanisms for the Sustainable Development Goals.

### Conclusion

In this Commission, we show the crucial importance of the Women and Health approach for advancement of global and national sustainable development. In their dual roles as users of health-care systems and providers of health care, women are affected by gender discrimination, a disproportional burden of poverty, and many dimensions of inequality, all of which hinder their ability to contribute to sustainable development.<sup>346</sup> To enable, empower and value women to achieve their fundamental human rights and reach their full potential are urgent priorities, not options. In this Commission, we discuss the essential concepts, empirical evidence, analytical frameworks, and recommendations needed to build and progress an urgent agenda. We call for establishment of a Women and Health movement to address the ethical and public health imperatives of women's health along the life course and recognition and value of their essential contributions to health care as top priorities in the global development agenda in 2015 and beyond.

#### Contributors

The Women and Health concept was first conceived of by JF, AL, and FMK. The first draft of this report was written by a core writing team led by AL, which also included AM, JMC, MT, and RA; the writing team met regularly during the course of the Commission's work. All authors contributed fully to the overall report structure and concepts, the writing and editing of subsequent drafts, and the conclusions. The report was prepared under the general direction of the Chair (AL) and Co-Chair (AM), with substantial input from JMC and RA throughout the process as well as from ADK during finalisation of the manuscript. FMK and RA led the Global Valuing the Invaluable study. HAO and MA had an important role in data analysis and interpretation. Data gathering was done by a supporting research team listed in the Acknowledgments. The views expressed herein are those of the authors and do not necessarily represent the views of the donors or affiliated organisations.

#### Declaration of interests

The work of the Commission on Women and Health was supported by the Bill & Melinda Gates Foundation (Seattle, WA, USA), the John D and Catherine T MacArthur Foundation (Chicago, IL, USA), and the Josiah Macy Jr Foundation (New York, NY, USA). These grants covered travel, accommodation, and meal expenses for the Commission and writing team meetings as well as research team time for background papers and original research. The Commission also received in-kind support from the John D Rockefeller Bellagio Conference Center, which included meeting space, accommodation, and meals for one of the Commission meetings. AM is Advisory Board Member at Orbis Education, Educational Advisory Committee Member at Harvard School of Public Health, Advisory Committee Member at University of Texas

Southwestern Medical Center, Co-chair of the Global Health and Microbiology Interest Group at the Institute of Medicine, External Advisory Committee Member of the PhD Program in Health Sciences from University of Coimbra, Founding Board Member of the Academy of Women's Health, Board Member of the Faculty Scholars Program at the Josiah Macy Jr Foundation, and is a member of the Advisory Committee on Research on Women's Health at National Institutes of Health; and declares personal fees from University of Pennsylvania and Josiah Macy Jr Foundation, outside the submitted work. TK declares grants from the Bill & Melinda Gates Foundation; and personal fees and support for travel from the non-governmental organization Balance whose mandate is promotion of women's sexual and reproductive health and rights in the 36 months preceding publication of this manuscript. JD was an editor at *The Lancet* when the work was started and is now Editor in Chief of *The Lancet Diabetes and Endocrinology*. MC and FAD are employees of the Bill & Melinda Gates Foundation and declare no competing interests. AB is Minister of Health for Rwanda and declares no competing interests. MT was compensated as a consultant for her writing and editing contributions and declares no competing interests. AL, RA, MA, HAO, ZAB, RB, JMC, FMK, CG, RL, NS, JMG, GS, ADK, SS, and JF declare no competing interests.

#### Acknowledgments

We thank the following individuals for their contributions to this report. Panel 2 was written by Tonda L Hughes (University of Illinois at Chicago College of Nursing) and Marilyn Sawyer Sommers (University of Pennsylvania School of Nursing). Panel 4 was written by Paula Johnson, Jaclyn Chai, Therese Fitzgerald, and Carolyn Luk, all of the Connors Center for Women's Health and Gender Biology, Brigham and Women's Hospital, and Harvard Medical School. Panel 6 was written with the help of Apeporn Ratinthorn (Mahidol University). Panel 10 was written by the Agriculture and Gender Team at the Bill & Melinda Gates Foundation. Panel 11 was written by staff at PACT. Andrew Marx (Harvard Global Equity Initiative) and Jennifer Catino provided input for the initial draft of the manuscript. Katie Millar and Abigail Nasshan (both with the Maternal Health Task Force/Women and Health Initiative, Harvard T H Chan School of Public Health) copy-edited the report. The Global Valuing the Invaluable study led by FKM and RA was also supported by Oscar Méndez (Fundación Mexicana para la Salud), Maja Pleic (Harvard Global Equity Initiative), and Nazli Aktakke (Development Analytics). The Global Valuing the Invaluable study underwent technical review before being incorporated into the manuscript by two panels of economic experts, one in Boston, MA, USA and the other in Mexico City, Mexico (see appendix for list of reviewers). Mary Lou de Leon Siantz, Rebecca Salisbury, and Sally Moyce, all of the UC Davis Betty Irene School of Nursing, provided critical input regarding health workforce migration. The authors also thank the anonymous peer reviewers who provided important feedback on earlier drafts of the report.

#### References

- Rosenfield A, Maine D. Maternal mortality—a neglected tragedy. Where is the M in MCH? *Lancet* 1985; 2: 83–85.
- Starrs AM. Safe motherhood initiative: 20 years and counting. *Lancet* 2006; 368: 1130–32.
- Sen G, and the The Cairo Conference. The World Programme of Action: a new paradigm for population policy. *Environment* 1995; 37: 10–15, 34–37.
- Johnson JH, Turnbull W. The women's conference: where aspirations and realities met. *Fam Plann Perspect* 1995; 27: 254–58.
- Royston E, Armstrong S. Preventing maternal deaths. Geneva: World Health Organization, 1989.
- UN. Millennium Development Goals. New York: United Nations, 2000. <http://www.un.org/millenniumgoals/bkgd.shtml> (accessed Jan 15, 2015).
- UN Women. Fourth Annual Conference on Women: platform for action. <http://www.un.org/womenwatch/daw/beijing/platform/health.htm> (accessed April 12, 2015).
- WHO. Global status report on noncommunicable diseases. Geneva: World Health Organization, 2010.
- Gijsbers van Wijk CMT, van Vliet KP, Kolk AM. Gender perspectives and quality of care: towards appropriate and adequate health care for women. *Soc Sci Med* 1996; 43: 707–20.



- 10 George A. Nurses, community health workers, and home carers: gendered human resources compensating for skewed health systems. *Glob Public Health* 2008; 3 (suppl 1): 75–89.
- 11 George A. Human resources for health: a gender analysis. Paper commissioned by the Women and Gender Equity Knowledge Network. Geneva: World Health Organization, 2007.
- 12 Downs JA, Reif LK, Hokenoro A, Fitzgerald DW. Increasing women in leadership in global health. *Acad Med* 2014; 89: 1103–07.
- 13 WHO. Women and health: today's evidence tomorrow's agenda. Geneva: World Health Organization, 2009.
- 14 Say L, Raine R. A systematic review of inequalities in the use of maternal health care in developing countries: examining the scale of the problem and the importance of context. *Bull World Health Organ* 2007; 85: 812–19.
- 15 Frenk J, Gómez-Dantés O, Langer A. A comprehensive approach to women's health: lessons from the Mexican health reform. *BMC Womens Health* 2012; 12: 42.
- 16 Women and Health Initiative. Women and health. Boston: Harvard T.H. Chan School of Public Health, 2010. <http://www.hsph.harvard.edu/women-and-health-initiative/> (accessed Jan 15, 2015).
- 17 Langer A, Frenk J, Horton R. Women and Health Initiative: integrating needs and response. *Lancet* 2012; 380: 631–32.
- 18 UN. Sustainable Development Goals. New York: United Nations, 2015. <https://sustainabledevelopment.un.org/index.php?menu=1565> (accessed April 12, 2015).
- 19 Dasgupta PS, Ehrlich PR. Pervasive externalities at the population, consumption, and environment nexus. *Science* 2013; 340: 324–28.
- 20 UNFPA. Framework of actions for the follow-up to the Programme of Action of the International Conference on Population and Development Beyond 2014. New York: United Nations Population Fund, 2014.
- 21 Kirigia JM, Oluwole D, Mwabu GM, Gatwiri D, Kainyu LH. Effects of maternal mortality on gross domestic product (GDP) in the WHO African region. *Afr J Health Sci* 2006; 13: 86–95.
- 22 UNFPA. By choice, not by chance: family planning, human rights and development. New York: United Nations Population Fund, 2012.
- 23 Upadhyay UD, Gipson JD, Withers M, et al. Women's empowerment and fertility: a review of the literature. *Soc Sci Med* 2014; 115: 111–20.
- 24 Bloom DE, Canning D, Sevilla J. The demographic dividend: a new perspective on the economic consequences of population change. Santa Monica: RAND, 2003.
- 25 Stenberg K, Axelson H, Sheehan P, et al, and the Study Group for the Global Investment Framework for Women's Children's Health. Advancing social and economic development by investing in women's and children's health: a new Global Investment Framework. *Lancet* 2014; 383: 1333–54.
- 26 World Commission on Environment and Development. Our Common Future. Oxford: Oxford University Press, 1987.
- 27 Laslett B, Brenner J. Gender and social reproduction: historical perspectives. *Annu Rev Sociol* 1989; 15: 381–404.
- 28 Al-Rodhan NRF, Stoudmann G. Definitions of globalization: a comprehensive overview and a proposed definition. Geneva: Geneva Centre for Security Policy, 2006.
- 29 Bach S. International mobility of health professionals: brain drain or brain exchange? Helsinki: UNU World Institute for Development Economics Research (UNU-WIDER), 2006.
- 30 Shangquan G. Economic globalization: trends, risks and risk prevention. New York: United Nations, 2000.
- 31 Marmot M, Friel S, Bell R, Houweling T, Taylor S. Closing the gap in a generation: health equity through action on the social determinants of health: final report of the Commission on Social Determinants of Health. Geneva: World Health Organization, 2008.
- 32 Fuentes-Nieva R, Galasso N. Working for the few: political capture and economic inequality. Oxford: Oxfam International, 2014.
- 33 Pearce D. The feminization of poverty: women, work, and welfare. *Urban Soc Change Rev* 1978; 11: 28–36.
- 34 World Bank. World development report 2012: gender equality and development. Washington, DC: World Bank, 2011.
- 35 Sutherland-Addy E. Gender equity in junior and senior secondary education in sub-Saharan Africa. Washington, DC: World Bank; 2008.
- 36 Iyer A, Sen G, Ostlin P. The intersections of gender and class in health status and health care. *Glob Public Health* 2008; 3 (suppl 1): 13–24.
- 37 WHO. Global health atlas. Geneva: World Health Organization, 2006. <http://apps.who.int/globalatlas/default.asp> (accessed April 12, 2015).
- 38 European Commission. Figure 11, Female graduates by field of study. In: Eurostat: education statistics. London: European Commission, 2011. [http://ec.europa.eu/eurostat/statistics-explained/index.php/Education\\_statistics](http://ec.europa.eu/eurostat/statistics-explained/index.php/Education_statistics) (accessed April 12, 2015).
- 39 Phillips SP, Austin EB. The feminization of medicine and population health. *JAMA* 2009; 301: 863–64.
- 40 Messing K, Östlin P. Gender equality, work and health: a review of the evidence. Geneva: World Health Organization, 2006.
- 41 McMurray JE, Cohen M, Angus G, et al. Women in medicine: a four-nation comparison. *J Am Med Womens Assoc* 2002; 57: 185–90.
- 42 ILO. Domestic workers across the world: global and regional statistics and the extent of legal protection. Geneva: International Labour Organization, 2013.
- 43 LaLiberté P, ed. The challenge of inequality. *Int J Lab Res* 2014; 6: 1.
- 44 George G, Gow J, Bachoo S. Understanding the factors influencing health-worker employment decisions in South Africa. *Hum Resour Health* 2013; 11: 15.
- 45 ILO. Global employment trends for women. Geneva: International Labour Organization, 2008.
- 46 Field C, Barros V, Dokken K, et al. Climate change 2014: impacts, adaptations, and vulnerability. Intergovernmental panel on climate change report. Cambridge, UK: Cambridge University Press, 2014.
- 47 Costello A, Abbas M, Allen A, et al. Managing the health effects of climate change: *Lancet* and University College London Institute for Global Health Commission. *Lancet* 2009; 373: 1693–733.
- 48 Dankelman I, Alam K, Ahmed W, Gueye Y, Fatema N, Mensah-Kurin R. Gender, climate change and human security: lessons from Bangladesh, Ghana and Senegal. New York: Women's Environment and Development Organization, 2005.
- 49 Bartram J, Lewis K, Lenton R, Wright A. Focusing on improved water and sanitation for health. *Lancet* 2005; 365: 810–12.
- 50 Malmberg CC. Case study on the role of women in rural transport: access of women to domestic facilities. Washington, DC: World Bank, 1994.
- 51 Charmes J. A review of empirical evidence on time use in Africa from UN-sponsored surveys. In: Blackden CM, Wodon Q, eds. Gender, time use, and poverty in sub-Saharan Africa. Washington, DC: World Bank, 2006: 39.
- 52 Roy JL, Crow B, Swallow B. Getting access to adequate water: community organizing, women and social change in Western Kenya. International workshop on African Water Laws: Plural Legislative Frameworks for Rural Water Management in Africa; Johannesburg, South Africa; Jan 26–28, 2005. [http://www.iwmi.cgiar.org/assessment/files\\_new/research\\_projects/Project\\_Workshops/Africa%20Water%20Laws\\_%20jessica.pdf](http://www.iwmi.cgiar.org/assessment/files_new/research_projects/Project_Workshops/Africa%20Water%20Laws_%20jessica.pdf) (accessed May 18, 2015).
- 53 Ogden J, Esim S, Grown C. Expanding the care continuum for HIV/AIDS: bringing carers into focus. *Health Policy Plan* 2006; 21: 333–42.
- 54 Torres-Duque C, Maldonado D, Pérez-Padilla R, Ezzati M, Viegi G, and the Forum of International Respiratory Studies (FIRS) Task Force on Health Effects of Biomass Exposure. Biomass fuels and respiratory diseases: a review of the evidence. *Proc Am Thorac Soc* 2008; 5: 577–90.
- 55 Smith KR, Mehta S. The burden of disease from indoor air pollution in developing countries: comparison of estimates. *Int J Hyg Environ Health* 2003; 206: 279–89.
- 56 UNIFEM. UNIFEM responds to the tsunami tragedy one year later: a report card. New York: United Nations Development Fund for Women, 2005.
- 57 Hunter LM, Castro J, Kleiber D, Hutchens K. Swimming and gendered vulnerabilities: evidence from the Northern and Central Philippines. Boulder, CO, USA: Institute of Behavioral Science, 2014.
- 58 UN-Habitat. Cities and climate change: global report of human settlements 2011. London: Earthscan, 2011.
- 59 Robine JM, Cheung SL, Le Roy S, Van Oyen H, Herrmann FR. Report on excess mortality in Europe during summer 2003. EU Community Action Programme for Public Health, 2007.

- 60 UNDESA. World urbanization prospects: the 2011 revision. New York: United Nations Department of Economic and Social Affairs, 2012.
- 61 Meleis AI. Developing urban areas as if gender matters. In: Meleis AI, Birch EL, Wachter SM, eds. Women's health and the world's cities. Philadelphia: University of Pennsylvania Press, 2011.
- 62 Popkin BM, Nielsen SJ. The sweetening of the world's diet. *Obes Res* 2003; **11**: 1325–32.
- 63 Harpham T. Background paper on improving urban population health. New York: Center for Sustainable Urban Development, 2007.
- 64 García-Moreno C, Jansen H, Ellsberg M, Heise L, Watts C. WHO multi-country study on women's health and domestic violence against women: summary report of initial results on prevalence, health outcomes and women's responses. Geneva: World Health Organization, 2005.
- 65 Temin M, Montgomery M, Engebretsen S, Barker K. Girls on the move: adolescent girls and migration in the developing world. New York: Population Council, 2013.
- 66 UNFPA. Unleashing the potential of urban growth. New York: United Nations Population Fund, 2007.
- 67 National Bureau of Statistics. ORC Macro. Tanzania Demographic and Health Survey 2004–05: key findings. Calverton, MD: NBS and ORC Macro, 2005.
- 68 Matthews Z, Channon A, Neal S, Osrin D, Madise N, Stones W. Examining the “urban advantage” in maternal health care in developing countries. *PLoS Med* 2010; **7**: e1000327.
- 69 Yardley J. Indian women find new peace in rail commute. *New York Times* (New York), Sept 15, 2009.
- 70 García-Moreno C, Chawla M. Making cities safe for women and girls: integrating a gender perspective into urban health and planning. In: Meleis A, Birch E, Wachter S, eds. Women's health and the world's cities. Philadelphia, PA: University of Pennsylvania Press, 2011.
- 71 Patel S. Are women victims, or are they warriors? In: Meleis A, Birch E, Wachter S, eds. Women's health and the world's cities. Philadelphia, PA: University of Pennsylvania Press, 2011.
- 72 Langer A, Catino J. A gendered look at Mexico's health-sector reform. *Lancet* 2006; **368**: 1753–55.
- 73 WHO. Unsafe abortion: global and regional estimates of the incidence of unsafe abortion and associated mortality in 2008. Geneva: World Health Organization, 2011.
- 74 Cottingham J, Kismodi E, Hilber AM, Lincetto O, Stahlhofer M, Gruskin S. Using human rights for sexual and reproductive health: improving legal and regulatory frameworks. *Bull World Health Organ* 2010; **88**: 551–55.
- 75 Annan J, Brier M. The risk of return: intimate partner violence in northern Uganda's armed conflict. *Soc Sci Med* 2010; **70**: 152–59.
- 76 Rehn E, Sirleaf EJ. War and women's health. Women, war, peace: the independent experts' assessment on the impact of armed conflict on women and women's role in peace-building. New York: United Nations Development Fund for Women, 2002.
- 77 Webster PC. Roots of Iraq's maternal and child health crisis run deep. *Lancet* 2013; **381**: 891–94.
- 78 Black B, Bouanchaud P, Bignall J, Simpson E, Gupta M. Reproductive health during conflict. *Obstet Gynaecol* 2014; **16**: 153–160.
- 79 UNFPA. Promoting gender equality: protecting women in emergency situations. <http://www.unfpa.org/gender/emergency.htm> (accessed April 12, 2015).
- 80 Blake S. Malawi President Joyce Banda makes news for commitment to maternal health. Feb 8, 2013. <http://www.mhtf.org/2013/02/08/malawi-president-joyce-banda-makes-news-for-commitment-to-maternal-health/> (accessed April 12, 2014).
- 81 Atun R, Andrade LOM, Braga J, et al. Health systems strengthening and universal health coverage in Latin America. *Lancet* 2015; **385**: 1230–47.
- 82 Lesthaeghe R. The unfolding story of the second demographic transition. *Popul Dev Rev* 2010; **36**: 211–51.
- 83 Madsen E, Daumerie B, Hardee K. The effects of age structure on development: policy and issue brief. Washington, DC: Population Action International, 2010.
- 84 Bongaarts J. Population policy options in the developing world. *Science* 1994; **263**: 771–76.
- 85 Murray CJ, Vos T, Lozano R, et al. Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012; **380**: 2197–223.
- 86 Agyei-Mensah S, de-Graft Aikins A. Epidemiological transition and the double burden of disease in Accra, Ghana. *J Urban Health* 2010; **87**: 879–97.
- 87 Atun R, Jaffar S, Nishtar S, et al. Improving responsiveness of health systems to non-communicable diseases. *Lancet* 2013; **381**: 690–97.
- 88 Xu K, Evans DB, Carrin G, Aguilar-Rivera AM, Musgrove P, Evans T. Protecting households from catastrophic health spending. *Health Aff (Millwood)* 2007; **26**: 972–83.
- 89 Knaul FM, Wong R, Arreola-Ornelas H, eds. Household spending and impoverishment. In: Financing health in Latin America series. Cambridge, MA: Harvard University Press, 2012.
- 90 Kruk ME, Goldmann E, Galea S. Borrowing and selling to pay for health care in low- and middle-income countries. *Health Aff (Millwood)* 2009; **28**: 1056–66.
- 91 UNAIDS. UNAIDS expanded business case: enhancing social protection. Geneva: Joint United Nations Programme on HIV/AIDS, 2010.
- 92 Hawkes S, Buse K. Gender and global health: evidence, policy, and inconvenient truths. *Lancet* 2013; **381**: 1783–87.
- 93 WHO. World Health Report 2010: health systems financing: the path to universal coverage. Geneva: WHO, 2010.
- 94 Vega J. Universal health coverage: the post-2015 development agenda. *Lancet* 2013; **381**: 179–80.
- 95 Jamison DT, Summers LH, Alleyne G, et al. Global health 2035: a world converging within a generation. *Lancet* 2013; **382**: 1898–955.
- 96 Victora CG, Barreto ML, do Carmo Leal M, et al, and the *Lancet* Brazil Series Working Group. Health conditions and health-policy innovations in Brazil: the way forward. *Lancet* 2011; **377**: 2042–53.
- 97 Wagstaff A, Lindelow M, Jun G, Ling X, Juncheng Q. Extending health insurance to the rural population: an impact evaluation of China's new cooperative medical scheme. *J Health Econ* 2009; **28**: 1–19.
- 98 Knaul FM, González-Pier E, Gómez-Dantés O, et al. The quest for universal health coverage: achieving social protection for all in Mexico. *Lancet* 2012; **380**: 1259–79.
- 99 Tangcharoensathien V, Patcharanarumol W, Ir P, et al. Health-financing reforms in southeast Asia: challenges in achieving universal coverage. *Lancet* 2011; **377**: 863–73.
- 100 Atun R, Aydın S, Chakraborty S, et al. Universal health coverage in Turkey: enhancement of equity. *Lancet* 2013; **382**: 65–99.
- 101 Quick J, Jay J, Langer A. Improving women's health through universal health coverage. *PLoS Med* 2014; **11**: e1001580.
- 102 UN. The road to dignity by 2030: ending poverty, transforming all lives and protecting the planet. New York: United Nations, 2014.
- 103 GBD 2013 Mortality and Causes of Death Collaborators. Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 2015; **385**: 117–71.
- 104 Barros AJ, Ronsmans C, Axelson H, et al. Equity in maternal, newborn, and child health interventions in Countdown to 2015: a retrospective review of survey data from 54 countries. *Lancet* 2012; **379**: 1225–33.
- 105 Kassebaum NJ, Bertozzi-Villa A, Coggeshall MS, et al. Global, regional, and national levels and causes of maternal mortality during 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 2014; **384**: 980–1004.
- 106 Mumtaz Z, Salway S. Understanding gendered influences on women's reproductive health in Pakistan: moving beyond the autonomy paradigm. *Soc Sci Med* 2009; **68**: 1349–56.
- 107 Adanu RM, Johnson TR. Migration and women's health. *Int J Gynaecol Obstet* 2009; **106**: 179–81.
- 108 Raine R. Does gender bias exist in the use of specialist health care? *J Health Serv Res Policy* 2000; **5**: 237–49.
- 109 Blanc AK. The effect of power in sexual relationships on sexual and reproductive health: an examination of the evidence. *Stud Fam Plann* 2001; **32**: 189–213.
- 110 Jafarey SN, Korejo R. Mothers brought dead: an enquiry into causes of delay. *Soc Sci Med* 1993; **36**: 371–72.
- 111 Ghana Statistical Service, Ghana Health Service, ICF Macro. Ghana Demographic and Health Survey. Calverton, MD: ICF Macro, 2009.

- 112 KNBS, ICF Macro. Kenya Demographic and Health Survey 2008–09. Calverton, Maryland: Kenya National Bureau of Statistics and ICF Macro, 2010.
- 113 Institut National de la Statistique (INSTAT). Enquête Démographique et de Santé de Madagascar 2008–2009 (in French). Antananarivo, Madagascar: Institut National de la Statistique (INSTAT) and ICF Macro, 2010.
- 114 NPC, ICF Macro. Nigeria Demographic and Health Survey 2008. Abuja, Nigeria: National Population Commission [Nigeria] and ICF Macro, 2009.
- 115 CSO, Ministry of Health, Tropical Diseases Research Centre (TDRC), University of Zambia, ICF Macro. Zambia Demographic and Health Survey 2007. Calverton, MD: Central Statistical Office and ICF Macro, 2009.
- 116 Krieger N, Fee E. Man-made medicine and women's health: the biopolitics of sex/gender and race/ethnicity. *Int J Health Serv* 1994; **24**: 265–83.
- 117 IHME. GBD 2010 life expectancy & probability of death. Seattle, WA: Institute for Health Metrics and Evaluation, 2013.
- 118 Fuse K, Crenshaw EM. Gender imbalance in infant mortality: a cross-national study of social structure and female infanticide. *Soc Sci Med* 2006; **62**: 360–74.
- 119 Leon DA, Saburova L, Tomkins S, et al. Hazardous alcohol drinking and premature mortality in Russia: a population based case-control study. *Lancet* 2007; **369**: 2001–09.
- 120 IHME. GBD Cause Patterns. Seattle, WA: Institute for Health Metrics and Evaluation, University of Washington, 2013. <http://vizhub.healthdata.org/gbd-cause-patterns/> (accessed Jan 15, 2015).
- 121 IHME. GBD Arrow Diagram. Seattle, WA: Institute for Health Metrics and Evaluation, University of Washington, 2013. <http://vizhub.healthdata.org/irank/arrow.php> (accessed Jan 15, 2015).
- 122 Hogan MC, Foreman KJ, Naghavi M, et al. Maternal mortality for 181 countries, 1980–2008: a systematic analysis of progress towards Millennium Development Goal 5. *Lancet* 2010; **375**: 1609–23.
- 123 Katz I, Komatsu R, Low-Beer D, Atun R. Scaling up towards international targets for AIDS, tuberculosis, and malaria: contribution of global fund-supported programs in 2011–2015. *PLoS One* 2011; **6**: e17166.
- 124 Chi BH, Stringer JS, Moodley D. Antiretroviral drug regimens to prevent mother-to-child transmission of HIV: a review of scientific, program, and policy advances for sub-Saharan Africa. *Curr HIV/AIDS Rep* 2013; **10**: 124–33.
- 125 Thomas TN, Gausman J, Lattof SR, Wegner MN, Kearns AD, Langer A. Improved maternal health since the ICPD: 20 years of progress. *Contraception* 2014; **90** (suppl): S32–38.
- 126 Heidari S, Kippax S, Sow PS, Wainberg MA. Women hold up half the sky—and half the burden of the HIV epidemic. *J Int AIDS Soc* 2013; **16**: 18608.
- 127 Bonita R, Beaglehole R. Women and NCDs: overcoming the neglect. *Glob Health Action* 2014; **7**: 23742.
- 128 Kontis V, Mathers CD, Rehm J, et al. Contribution of six risk factors to achieving the 25x25 non-communicable disease mortality reduction target: a modelling study. *Lancet* 2014; **384**: 427–37.
- 129 Alwan A. Global status report on noncommunicable diseases 2010. Geneva: World Health Organization, 2012.
- 130 Healthy Newborn Network. Newborn numbers. Washington, DC: Healthy Newborn Network, 2009. <http://www.healthynetwork.org/page/newborn-numbers> (accessed April 12, 2015).
- 131 Amos A, Greaves L, Nichter M, Bloch M. Women and tobacco: a call for including gender in tobacco control research, policy and practice. *Tob Control* 2012; **21**: 236–43.
- 132 Samet JM, Yoon SY. Gender, women, and the tobacco epidemic. Manila: World Health Organization, 2010.
- 133 Devries KM, Mak JYT, Garcia-Moreno C, et al. Global health. The global prevalence of intimate partner violence against women. *Science* 2013; **340**: 1527–28.
- 134 WHO. Intimate partner violence fact sheet. Geneva: World Health Organization, 2002. [http://www.who.int/violence\\_injury\\_prevention/violence/world\\_report/factsheets/en/ipfacts.pdf](http://www.who.int/violence_injury_prevention/violence/world_report/factsheets/en/ipfacts.pdf) (accessed April 12, 2015).
- 135 Heise L, Garcia Moreno C. Violence by intimate partners. World report on violence and health. Geneva: World Health Organization, 2002: 87–121.
- 136 Marmot M, Allen J, Bell R, Bloomer E, Goldblatt P, and the Consortium for the European Review of Social Determinants of Health and the Health Divide. WHO European review of social determinants of health and the health divide. *Lancet* 2012; **380**: 1011–29.
- 137 Gluckman PD, Hanson MA, Cooper C, Thornburg KL. Effect of in utero and early-life conditions on adult health and disease. *N Engl J Med* 2008; **359**: 61–73.
- 138 Barros FC, Papageorgiou AT, Victora CG, et al. The distribution of clinical phenotypes of preterm birth syndrome: implications for prevention. *JAMA Pediatrics* 2015; **169**: 220–29.
- 139 Barker DJP. Fetal origins of coronary heart disease. *BMJ* 1995; **311**: 171–74.
- 140 Almond D, Currie J. Killing me softly: the fetal origins hypothesis. *J Econ Perspect* 2011; **25**: 153–72.
- 141 UNDESA. World population prospects: the 2010 revision. New York: United Nations Department of Economic and Social Affairs, 2011.
- 142 Guilmo C. Sex imbalances at birth: current trends, consequences and policy implications. Bangkok: United Nations Population Fund Asia and Pacific Regional Office, 2012.
- 143 Sawyer CC. Child mortality estimation: estimating sex differences in childhood mortality since the 1970s. *PLoS Med* 2012; **9**: e1001287.
- 144 Ram U, Jha P, Ram F, et al. Neonatal, 1–59 month, and under-5 mortality in 597 Indian districts, 2001 to 2012: estimates from national demographic and mortality surveys. *Lancet Glob Health* 2013; **1**: e219–26.
- 145 UNDESA. Sex differentials in childhood mortality. New York: United Nations Department of Economic and Social Affairs, 2011.
- 146 Black RE, Victora CG, Walker SP, et al, and the Maternal and Child Nutrition Study Group. Maternal and child undernutrition and overweight in low-income and middle-income countries. *Lancet* 2013; **382**: 427–51.
- 147 Walker SP, Wachs TD, Grantham-McGregor S, et al. Inequality in early childhood: risk and protective factors for early child development. *Lancet* 2011; **378**: 1325–38.
- 148 Kimani-Murage EW, Kahn K, Pettifor JM, et al. The prevalence of stunting, overweight and obesity, and metabolic disease risk in rural South African children. *BMC Public Health* 2010; **10**: 158.
- 149 Victora CG, Adair L, Fall C, et al, and the Maternal and Child Undernutrition Study Group. Maternal and child undernutrition: consequences for adult health and human capital. *Lancet* 2008; **371**: 340–57.
- 150 Lawn JE, Blencowe H, Oza S, et al, and the Lancet Every Newborn Study Group. Every Newborn: progress, priorities, and potential beyond survival. *Lancet* 2014; **384**: 189–205.
- 151 WHO. UNICEF. Every newborn: an action plan to end preventable deaths. Geneva: World Health Organization, 2014.
- 152 Temin M, Levine R. Start with a girl: a new agenda for global health—a Girls Count report on adolescent girls. Washington, DC: Center for Global Development, 2009.
- 153 IHME. GBD Heatmap. Seattle: Institute for Health Metrics and Evaluation, 2013. <http://vizhub.healthdata.org/irank/heat.php> (accessed April 12, 2015).
- 154 Sawyer SM, Afifi RA, Bearinger LH, et al. Adolescence: a foundation for future health. *Lancet* 2012; **379**: 1630–40.
- 155 Hingson RW, Heeren T, Winter MR. Age at drinking onset and alcohol dependence: age at onset, duration, and severity. *Arch Pediatr Adolesc Med* 2006; **160**: 739–46.
- 156 Hoffman KL, Demo DH, Edwards JN. Physical wife abuse in a non-Western society: an integrated theoretical approach. *J Marriage Fam* 1994; **56**: 131–46.
- 157 WHO. Essential nutrition actions: improving maternal, newborn, infant and young child health and nutrition. Geneva: World Health Organization, 2013.
- 158 Balarajan Y, Ramakrishnan U, Özaltin E, Shankar AH, Subramanian SV. Anaemia in low-income and middle-income countries. *Lancet* 2011; **378**: 2123–35.
- 159 Dewey KG, Begum K. Long-term consequences of stunting in early life. *Matern Child Nutr* 2011; **7** (suppl 3): 5–18.
- 160 Case A, Menendez A. Sex differences in obesity rates in poor countries: evidence from South Africa. *Econ Hum Biol* 2009; **7**: 271–82.
- 161 Smink FR, van Hoeken D, Hoek HW. Epidemiology of eating disorders: incidence, prevalence and mortality rates. *Curr Psychiatry Rep* 2012; **14**: 406–14.

- 162 Eddy KT, Hennessey M, Thompson-Brenner H. Eating pathology in East African women: the role of media exposure and globalization. *J Nerv Ment Dis* 2007; **195**: 196–202.
- 163 WHO. Health for the world's adolescents: a second change in the second decade. Geneva: World Health Organization, 2014. <http://apps.who.int/adolescent/second-decade/section3/page2/mortality.html> (accessed April 12, 2015).
- 164 Ganchimeg T, Ota E, Morisaki N, et al, and the WHO Multicountry Survey on Maternal Newborn Health Research Network. Pregnancy and childbirth outcomes among adolescent mothers: a World Health Organization multicountry study. *BJOG* 2014; **121** (suppl 1): 40–48.
- 165 Blanc AK, Winfrey W, Ross J. New findings for maternal mortality age patterns: aggregated results for 38 countries. *PLoS One* 2013; **8**: e59864.
- 166 Nove A, Matthews Z, Neal S, Camacho AV. Maternal mortality in adolescents compared with women of other ages: evidence from 144 countries. *Lancet Glob Health* 2014; **2**: e155–64.
- 167 Conde-Agudelo A, Belizán JM, Lammers C. Maternal-perinatal morbidity and mortality associated with adolescent pregnancy in Latin America: cross-sectional study. *Am J Obstet Gynecol* 2005; **192**: 342–49.
- 168 UNAIDS. Update: how Africa turned AIDS around. Geneva: Joint United Nations Programme on HIV/AIDS, 2013.
- 169 Agosti JM, Goldie SJ. Introducing HPV vaccine in developing countries—key challenges and issues. *N Engl J Med* 2007; **356**: 1908–10.
- 170 Ng M, Fleming T, Robinson M, et al. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 2014; **384**: 766–81.
- 171 Benoist B, ed. Worldwide prevalence of anaemia 1993–2005: WHO global database on anaemia. Geneva: World Health Organization, 2008.
- 172 Ben-Haroush A, Yogev Y, Hod M. Epidemiology of gestational diabetes mellitus and its association with Type 2 diabetes. *Diabet Med* 2004; **21**: 103–13.
- 173 Catalano PM, Ehrenberg HM. The short- and long-term implications of maternal obesity on the mother and her offspring. *BJOG* 2006; **113**: 1126–33.
- 174 Darroch J, Singh S. Estimating unintended pregnancies averted from couple-years of protection (CYP). New York: Guttmacher Institute; 2011.
- 175 WHO, UNICEF, UNFPA, World Bank. Trends in maternal mortality: 1990 to 2010. Geneva: World Health Organization, 2012.
- 176 Unsafe abortion. Global and regional estimates of the incidence of unsafe abortion and associated mortality in 2008. Geneva: WHO, 2010.
- 177 Shah I, Ahman E. Unsafe abortion in 2008: global and regional levels and trends. *Reprod Health Matters* 2010; **18**: 90–101.
- 178 Yamin AE, Boulanger VM, Falb KL, Shuma J, Leaning J. Costs of inaction on maternal mortality: qualitative evidence of the impacts of maternal deaths on living children in Tanzania. *PLoS One* 2013; **8**: e71674.
- 179 Ronsmans C, Chowdhury ME, Dasgupta SK, Ahmed A, Koblinsky M. Effect of parent's death on child survival in rural Bangladesh: a cohort study. *Lancet* 2010; **375**: 2024–31.
- 180 Wall LL. Obstetric vesicovaginal fistula as an international public-health problem. *Lancet* 2006; **368**: 1201–09.
- 181 Rich-Edwards JW, Fraser A, Lawlor DA, Catov JM. Pregnancy characteristics and women's future cardiovascular health: an underused opportunity to improve women's health? *Epidemiol Rev* 2014; **36**: 57–70.
- 182 Robertson E, Grace S, Wallington T, Stewart DE. Antenatal risk factors for postpartum depression: a synthesis of recent literature. *Gen Hosp Psychiatry* 2004; **26**: 289–95.
- 183 Mascarenhas MN, Cheung H, Mathers CD, Stevens GA. Measuring infertility in populations: constructing a standard definition for use with demographic and reproductive health surveys. *Popul Health Metr* 2012; **10**: 17.
- 184 Ombelet W, Cooke I, Dyer S, Serour G, Devroey P. Infertility and the provision of infertility medical services in developing countries. *Hum Reprod Update* 2008; **14**: 605–21.
- 185 Dhont N, van de Wijgert J, Coene G, Gasarabwe A, Temmerman M. 'Mama and papa nothing': living with infertility among an urban population in Kigali, Rwanda. *Hum Reprod* 2011; **26**: 623–29.
- 186 Obeisat S, Gharaibeh MK, Oweis A, Gharaibeh H. Adversities of being infertile: the experience of Jordanian women. *Fertil Steril* 2012; **98**: 444–49.
- 187 Nahar P. The link between infertility and poverty: evidence from Bangladesh. *Hum Fertil (Camb)* 2012; **15**: 18–26.
- 188 Liefbroer AC. The impact of perceived costs and rewards of childbearing on entry into parenthood: evidence from a panel study. *Eur J Popul* 2005; **21**: 367–91.
- 189 Miller AR. The effects of motherhood timing on career path. *J Popul Econ* 2011; **24**: 1071–100.
- 190 Avison M, Furnham A. Personality and voluntary childlessness. *J Pop Res* 2015; **32**: 45–67.
- 191 Opdahl S, Alsaker MD, Janszky I, Romundstad PR, Vatten LJ. Joint effects of nulliparity and other breast cancer risk factors. *Br J Cancer* 2011; **105**: 731–36.
- 192 Azenha GS, Parsons-Perez C, Goltz S, et al. Recommendations towards an integrated, life-course approach to women's health in the post-2015 agenda. *Bull World Health Organ* 2013; **91**: 704–06.
- 193 Torchalla I, Okoli CT, Botorff JL, Qu A, Poole N, Greaves L. Smoking cessation programs targeted to women: a systematic review. *Women Health* 2012; **52**: 32–54.
- 194 WHO. Ensuring human rights in the provision of contraceptive information and services: guidance and recommendations. Geneva: World Health Organization, 2014.
- 195 Forouzanfar MH, Foreman KJ, Delossantos AM, et al. Breast and cervical cancer in 187 countries between 1980 and 2010: a systematic analysis. *Lancet* 2011; **378**: 1461–84.
- 196 Ahlgren M, Melbye M, Wohlfahrt J, Sørensen TI. Growth patterns and the risk of breast cancer in women. *N Engl J Med* 2004; **351**: 1619–26.
- 197 Jemal A, Siegel R, Ward E, Hao Y, Xu J, Thun MJ. Cancer statistics, 2009. *CA Cancer J Clin* 2009; **59**: 225–49.
- 198 Zervoudis S, Iatrakis G, Tomara E, Bothou A, Papadopoulos G, Tsakiris G. Main controversies in breast cancer. *World J Clin Oncol* 2014; **5**: 359–73.
- 199 Dratva J, Gómez Real F, Schindler C, et al. Is age at menopause increasing across Europe? Results on age at menopause and determinants from two population-based studies. *Menopause* 2009; **16**: 385–94.
- 200 Kapur P, Sinha B, Pereira BMJ. Measuring climacteric symptoms and age at natural menopause in an Indian population using the Greene Climacteric Scale. *Menopause* 2009; **16**: 378–84.
- 201 Shuster IT, Rhodes DJ, Gostout BS, Grossardt BR, Rocca WA. Premature menopause or early menopause: long-term health consequences. *Maturitas* 2010; **65**: 161–66.
- 202 Palacios S, Henderson VW, Siseles N, Tan D, Villaseca P. Age of menopause and impact of climacteric symptoms by geographical region. *Climacteric* 2010; **13**: 419–28.
- 203 Nygaard I, Barber MD, Burgio KL, et al, and the Pelvic Floor Disorders Network. Prevalence of symptomatic pelvic floor disorders in US women. *JAMA* 2008; **300**: 1311–16.
- 204 Zeleke BM, Ayele TA, Woldetsadik MA, Bisetegn TA, Adane AA. Depression among women with obstetric fistula, and pelvic organ prolapse in northwest Ethiopia. *BMC Psychiatry* 2013; **13**: 236.
- 205 Lindau ST, Gavrilova N. Sex, health, and years of sexually active life gained due to good health: evidence from two US population based cross sectional surveys of ageing. *BMJ* 2010; **340**: c810.
- 206 Woloski-Wruble AC, Oliei Y, Leefsa M, Hochner-Celnikier D. Sexual activities, sexual and life satisfaction, and successful aging in women. *J Sex Med* 2010; **7**: 2401–10.
- 207 Larson EB, Yaffe K, Langa KM. New insights into the dementia epidemic. *Lancet* 2013; **369**: 2275–77.
- 208 WHO, Alzheimer's Disease International. Dementia: a public health priority. Geneva: World Health Organization, 2012.
- 209 Gillespie LD, Robertson MC, Gillespie WJ, et al. Interventions for preventing falls in older people living in the community. *Cochrane Database Syst Rev* 2012; **9**: CD007146.
- 210 Sofi F, Valecchi D, Bacci D, et al. Physical activity and risk of cognitive decline: a meta-analysis of prospective studies. *J Intern Med* 2011; **269**: 107–17.
- 211 WHO, WEF. From burden to "best buys": reducing the economic impact of non-communicable diseases in low- and middle-income countries. Geneva: World Health Organization, 2011.
- 212 Beaglehole R, Bonita R, Horton R, et al, and the Lancet NCD Action Group, and the NCD Alliance. Priority actions for the non-communicable disease crisis. *Lancet* 2011; **377**: 1438–47.



- 213 Callaway M, Foley KM, De Lima L, et al. Funding for palliative care programs in developing countries. *J Pain Symptom Manage* 2007; **33**: 509–13.
- 214 Rani M, Bonu S, Harvey S. Differentials in the quality of antenatal care in India. *Int J Qual Health Care* 2008; **20**: 62–71.
- 215 Standing H. Gender: a missing dimension in human resource policy and planning for health reforms. *Hum Res Dev J* 2000; **4**: 27–42.
- 216 Save the Children. Saving the lives of mothers and newborns in Afghanistan: Afghanistan newborn health situation analysis. Kabul: Save the Children, 2008.
- 217 Lehavot K, Simpson TL. Incorporating lesbian and bisexual women into women veterans' health priorities. *J Gen Intern Med* 2013; **28** (suppl 2): S609–14.
- 218 Hequemour AL, Livingston JA, Parks KA. Sexual victimization and associated risks among lesbian and bisexual women. *Violence Against Women* 2013; **19**: 634–57.
- 219 Rothman EF, Exner D, Baughman AL. The prevalence of sexual assault against people who identify as gay, lesbian, or bisexual in the United States: a systematic review. *Trauma Violence Abuse* 2011; **12**: 55–66.
- 220 Austin SB, Jun HJ, Jackson B, et al. Disparities in child abuse victimization in lesbian, bisexual, and heterosexual women in the Nurses' Health Study II. *J Womens Health (Larchmt)* 2008; **17**: 597–606.
- 221 King M, Semlyen J, Tai SS, et al. A systematic review of mental disorder, suicide, and deliberate self harm in lesbian, gay and bisexual people. *BMC Psychiatry* 2008; **8**: 70.
- 222 McCabe SE, Hughes TL, Bostwick WB, West BT, Boyd CJ. Sexual orientation, substance use behaviors and substance dependence in the United States. *Addiction* 2009; **104**: 1333–45.
- 223 Cochran SD, Mays VM, Bowen D, et al. Cancer-related risk indicators and preventive screening behaviors among lesbians and bisexual women. *Am J Public Health* 2001; **91**: 591–97.
- 224 Alleyne G, Binagwaho A, Haines A, et al, and the Lancet NCD Action Group. Embedding non-communicable diseases in the post-2015 development agenda. *Lancet* 2013; **381**: 566–74.
- 225 Bloom DE, Canning D. Policy forum: public health. The health and wealth of nations. *Science* 2000; **287**: 1207–09.
- 226 World Bank. World Development Report 1993: investing in health. Washington, DC: Oxford University Press, 1993.
- 227 Institute of Medicine, Committee on Integrating the Science of Early Childhood Development and Board on Children, Youth, and Families. From neurons to neighborhoods: the science of early childhood development. Washington, DC: The National Academies Press, 2000.
- 228 Fogel RW. New findings on secular trends in nutrition and mortality: some implications for population theory. In: Rosenzweig M, Stark O, eds. Handbook of population and family economics, vol 1A. Amsterdam: Elsevier, 1997: 433–81.
- 229 Jamison DT, Lau LJ, Wang J. Health's contribution to economic growth in an environment of partially endogenous technical progress. In: Lopez-Casasnovas G, Rivera B, Currais L, eds. Health and economic growth: findings and policy implications. Cambridge, MA: The MIT Press, 2005: 67–91.
- 230 Buvinic M, Lunde T, Sinha N. Investing in gender equality: looking ahead. World Bank, Poverty Reduction and Economic Management Network, 2010.
- 231 Bloom DE, Canning D, Jamison DT. Health, wealth, and welfare. *Finance Dev* 2004; **41**: 10–15.
- 232 Hausmann R, Tyson LD, Zahidi S. The global gender gap report 2012. Geneva: World Economic Forum; 2012.
- 233 UNDP. Human Development Report 2013: the rise of the South—human progress in a diverse world. New York: United Nations Development Programme, 2013.
- 234 UN. Norway called 'haven for gender equality', as women's anti-discrimination committee examines reports on compliance with Convention. Press release. Jan 20, 2003. New York: United Nations, 2003.
- 235 Norway Ministry of Labour and Social Affairs. Political platform for a majority government issued by The Labour Party, The Socialist Left Party and The Centre Party. Soria Moria: Senter Partiet, 2005.
- 236 World Bank. The international migration of women: fact sheet. <http://go.worldbank.org/SE29Y07880> (accessed May 18, 2015).
- 237 Ramirez C, Dominguez MG, Morais JM. Crossing borders: remittances, gender, and development. Santo Domingo: UN International Research and Training Institute for the Advancement of Women, 2005.
- 238 IOM. Gender, migration, and remittances. Geneva: International Organization for Migration, 2010.
- 239 Migration Policy Institute. The global remittances guide. *Migration Rev* 2011; **39**: 45–68.
- 240 Orozco M, Lowell L, Schneider J. Gender specific determinant of remittances: differences in structure and motivation. Washington, DC: World Bank, 2006.
- 241 Suarez-Orozco C, Rhodes J, Milburn M. Unraveling the immigrant paradox: academic engagement and disengagement among recently arrived immigrant youth. *Youth Soc* 2009; **41**: 151–85.
- 242 Zontini E. Family formation in gendered migrations: Moroccan and Filipino women in Bologna. In: King R, ed. The Mediterranean passage: migration and new cultural encounters in southern Europe. Liverpool: Liverpool University Press, 2003: 231–57.
- 243 Pickbourn LJ. Migration, remittances and intra-household allocation in Northern Ghana: does gender matter? PhD thesis, University of Massachusetts, 2011.
- 244 Alcala M, Leidl P. State of the world population 2006: a passage to hope, women and international migration. New York: United Nations Population Fund, 2006.
- 245 Levitt P. Social remittances: a conceptual tool for understanding migration and development. Oxford: University of Oxford, 1996.
- 246 Basa C, Harcourt W, Zarro A. Remittances and transnational families in Italy and the Philippines: breaking the global care chain. *Gen Dev* 2011; **19**: 11–22.
- 247 Chen L, Evans D, Evans T, et al. The world health report 2006: working together for health. Geneva: World Health Organization, 2006.
- 248 Ramakrishnan A, Sambuco D, Jaggi R. Women's participation in the medical profession: insights from experiences in Japan, Scandinavia, Russia, and Eastern Europe. *J Womens Health (Larchmt)* 2014; **23**: 927–34.
- 249 Salim Z. The role of female doctors in health services in the Sudan. *Ahfad J* 1991; **8**: 37–58.
- 250 Kvaerner KJ, Aasland OG, Botten GS. Female medical leadership: cross sectional study. *BMJ* 1999; **318**: 91–94.
- 251 Newman P. Releasing potential: women doctors and clinical leadership. London: National Health Service, 2011.
- 252 Carnes M, Morrissey C, Geller SE. Women's health and women's leadership in academic medicine: hitting the same glass ceiling? *J Womens Health (Larchmt)* 2008; **17**: 1453–62.
- 253 Head MG, Fitchett JR, Cooke MK, Wurie FB, Hayward AC, Atun R. UK investments in global infectious disease research 1997–2010: a case study. *Lancet Infect Dis* 2013; **13**: 55–64.
- 254 Landivar LC. Men in nursing occupations: American community survey highlight report. Washington, DC: US Census Bureau, 2013.
- 255 Lovell V. Solving the nursing shortage through higher wages. Washington, DC: Institute for Women's Policy Research, 2006.
- 256 Institute of Medicine. The future of nursing: leading change, advancing health. Washington, DC: The National Academies Press, 2011.
- 257 Douthwaite M, Ward P. Increasing contraceptive use in rural Pakistan: an evaluation of the Lady Health Worker Programme. *Health Policy Plan* 2005; **20**: 117–23.
- 258 Budlender D. Compensation for contributions: report on interviews with volunteer care-givers in six countries. New York: Huairou Commission, 2009.
- 259 Bhutta ZA, Lassi ZS, Pariyo G, Huicho L. Global experience of community health workers for delivery of health related Millennium Development Goals: a systematic review, country case studies, and recommendations for integration into national health systems. Geneva: Global Health Workforce Alliance, 2010.
- 260 Alam K, Tasneem S, Oliveras E. Retention of female volunteer community health workers in Dhaka urban slums: a case-control study. *Health Policy Plan* 2012; **27**: 477–86.
- 261 Liu A, Sullivan S, Khan M, Sachs S, Singh P. Community health workers in global health: scale and scalability. *Mt Sinai J Med* 2011; **78**: 419–35.
- 262 UNFPA. The state of the world's midwifery 2014: a universal pathway a woman's right to health. New York: United Nations Population Fund, 2014.



- 263 Ronsmans C, Graham WJ, and the *Lancet* Maternal Survival Series steering group. Maternal mortality: who, when, where, and why. *Lancet* 2006; **368**: 1189–200.
- 264 Karim R, Ali SHM. Maternal health in Malaysia: progress and potential. *Lancet* 2013; **381**: 1690–91.
- 265 ETUC. Working time in the health sector in Europe. Brussels: European Trade Union Confederation, 2011.
- 266 Blaauw D, Erasmus E, Pagaiya N, et al. Policy interventions that attract nurses to rural areas: a multicountry discrete choice experiment. *Bull World Health Organ* 2010; **88**: 350–56.
- 267 Chirawatkul S, Fongkeaw W, Sindhu S, Rungreangkolkit S. Happiness and professional attachment among Thai registered nurses. *Thai J Nursing Council* 2012; **27**: 26–42.
- 268 Davidson P, Sindhu S. Becoming a nurse leader. In: Daly J, Speedly S, Jackson D, eds. Contexts of nursing. Chatswood DC, Australia: Elsevier, 2014: 233–52.
- 269 Sindhu S, Wongrot P. Case management of hypertensive and diabetes mellitus patient, 2nd edn. Bangkok. Wathana printing; 2014. 242.
- 270 Sindhu S, Pholpet C, Puttapitukpol S. Meeting the challenges of chronic illness: a nurse-led collaborative community care program in Thailand. *Collegian* 2010; **17**: 93–99.
- 271 Association of American Medical Colleges. AAMC/AMA 2006 survey of physicians under 50. In: Langston EL, ed. Report 19 of the Board of Trustees: gender disparities in physician income and advancement. Chicago: American Medical Association, 2008.
- 272 Frenk J, Chen L, Bhutta ZA, et al. Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. *Lancet* 2010; **376**: 1923–58.
- 273 Sugiura K, Ito M, Mikami H. Evaluation of gender differences of family caregivers with reference to the mode of caregiving at home and caregiver distress in Japan (in Japanese). *Nippon Koshu Eisei Zasshi* 2004; **51**: 240–51.
- 274 Navaie-Waliser M, Spriggs A, Feldman PH. Informal caregiving: differential experiences by gender. *Med Care* 2002; **40**: 1249–59.
- 275 WHO. World report on disability. Geneva: World Health Organization, 2011.
- 276 Shaji KS, Reddy MS. Caregiving: a public health priority. *Indian J Psychol Med* 2012; **34**: 303–05.
- 277 Marphatia AA, Moussié R. A question of gender justice: exploring the linkages between women's unpaid care work, education, and gender equality. *Int J Educ Dev* 2013; **33**: 585–94.
- 278 ILO. Gender equality at the heart of decent work. International Labour Conference, 98th session. Geneva: International Labour Organization, 2009.
- 279 Reza IC, Alvarez M, Tijoux ME. The invisible costs of caring for patients in the household: a Chilean case study. In: Suárez R, Jara L, eds. The invisible economy and gender inequalities: the importance of measuring and valuing unpaid work. Washington, DC: Pan American Health Organization, 2010: 167–80.
- 280 Pastrana T, De Lima L, Wenk R, et al. Atlas de cuidados paliativos de Latinoamérica (in Spanish). Houston: International Association for Hospice & Palliative Care Press, 2012.
- 281 Gibson MJ, Houser A. Valuing the invaluable: a new look at the economic value of family caregiving. *Issue Brief Pub Policy Inst* 2007; **1**–12.
- 282 CCSS. Caja Costarricense del Seguro Social Memoria Institucional 2012. San Jose: Caja Costarricense del Seguro Social, 2013.
- 283 Feinberg L, Reinhard SC, Houser A, Choula R. Valuing the invaluable: 2011 update: the growing contributions and costs of family caregiving. AARP public policy institute; 2011.
- 284 Eiken S, Sredl K, Burwell B, Gold L. Medicaid Long Term Care Expenditures FY 2009. Cambridge, MA: Thomson Reuters, 2010.
- 285 Giannelli GC, Mangiavacchi L, Piccoli L. GDP and the value of family caretaking: how much does Europe care? *Appl Econ* 2012; **44**: 2111–31.
- 286 Maitre B, Nolan B, Whelan CT. A critical evaluation of the EU 2020 Poverty and Social Exclusion Target: an analysis of EU-SILC 2009. Dublin: University College Dublin, 2013.
- 287 Katz SJ, Kabeto M, Langa KM. Gender disparities in the receipt of home care for elderly people with disability in the United States. *JAMA* 2000; **284**: 3022–27.
- 288 Miranda V. Cooking, caring and volunteering: unpaid work around the world. Paris: OECD Publishing, 2011.
- 289 Francavilla F, Giannelli GC, Grotkowska G, Socha MW. Use of time and value of unpaid family care work: a comparison between Italy and Poland. Bonn: Institute for the Study of Labor, 2011.
- 290 ILO. Key Indicators of the labour market, 7th edn. Geneva: International Labour Organization Database, 2013.
- 291 Uraz A, Aran M, Hüsamoglu M, Şanalmiş DO, Çapar S. Recent trends in female labour force participation in Turkey. Ankara: State Planning Organization of the Republic of Turkey and World Bank, 2010.
- 292 World Bank. World development indicators, 2012. Washington, DC: World Bank, 2012. <http://data.worldbank.org/data-catalog/world-development-indicators> (accessed April 17, 2015).
- 293 Global Thematic Consultation on Education. The world we want: education in the post-2015 agenda—draft synthesis report. New York: United Nations Children's Fund, 2013.
- 294 Rose P. Education for All global monitoring report 2012: youth and skills—putting education to work. Paris: United Nations Educational, Scientific and Cultural Organization, 2012.
- 295 Lloyd CB. New lessons: the power of educating adolescent girls. Washington, DC: Population Council, 2009.
- 296 Brown G. Out of wedlock, into school: combating child marriage through education. London: Office of Sarah and Gordon Brown, 2012.
- 297 Gakidou E, Cowling K, Lozano R, Murray CJ. Increased educational attainment and its effect on child mortality in 175 countries between 1970 and 2009: a systematic analysis. *Lancet* 2010; **376**: 959–74.
- 298 Irwin A, Adams A, Winter A. Home truths: facing the facts on children, AIDS, and poverty. Brooklyn, NY: Joint Learning Initiative on Children and HIV/AIDS, 2009.
- 299 Lloyd CB. Growing up global: the changing transitions to adulthood in developing countries. Washington, DC: National Academies Press, 2005.
- 300 Lewis M, Lockheed M. Inexcusable absence: why 60 million girls still aren't in school and what to do about it. Washington, DC: Center for Global Development, 2006.
- 301 Muralidharan K, Prakash N. Cycling to school: increasing secondary school enrollment for girls in India. Bonn: Institute for the Study of Labor, 2013.
- 302 Kirby D, Short L, Collins J, et al. School-based programs to reduce sexual risk behaviors: a review of effectiveness. *Public Health Rep* 1994; **109**: 339–60.
- 303 Ferguson RM, Vanwesenbeeck I, Knijn T. A matter of facts...and more: an exploratory analysis of the content of sexuality education in The Netherlands. *Sex Educ* 2008; **8**: 93–106.
- 304 Schultz TP. Why governments should invest more to educate girls. *World Dev* 2002; **30**: 207–25.
- 305 Jalal S. The lady health worker program in Pakistan—a commentary. *Eur J Public Health* 2011; **21**: 143–44.
- 306 Irshad H, Mumtaz Z, Levay A. Long-term gendered consequences of permanent disabilities caused by the 2005 Pakistan earthquake. *Disasters* 2012; **36**: 452–64.
- 307 Devereux S, Sabates-Wheeler R. Transformative social protection. Brighton, UK: University of Sussex, Institute of Development Studies, 2004.
- 308 Baird S, Chirwa E, McIntosh C, Özler B. The short-term impacts of a schooling conditional cash transfer program on the sexual behavior of young women. Washington, DC: World Bank, 2009.
- 309 Lagarde M, Haines A, Palmer N. The impact of conditional cash transfers on health outcomes and use of health services in low and middle income countries. *Cochrane Database Syst Rev* 2009; **4**: CD008137.
- 310 DNP. Programa Familias en Acción: impactos en capital humano y evaluación beneficio-costo del programa. Bogotá and Washington, DC: DNP, SINERGIA, ACCION SOCIAL, IADB, World Bank, 2008.
- 311 Pettifor A, MacPhail C, Nguyen N, Rosenberg M. Can money prevent the spread of HIV? A review of cash payments for HIV prevention. *AIDS Behav* 2012; **16**: 1729–38.
- 312 SEDESOL. Oportunidades, 15 years of results. Mexico City: Programa de Desarrollo Humano Oportunidades, 2012.
- 313 Behrman JR, Calderon MC. Case study on IFPRI and conditional cash transfer (CCT) and non-conditional cash transfer (NCCT) programs. Washington, DC: International Food Policy Research Institute, 2009.

- 314 González de la Rocha M, Escobar A. Vulnerabilidad y activos de los hogares: El Programa Progresar Oportunidades en ciudades pequeñas. In: Cortés F, Escobar A, González de la Rocha M. Método científico y política social: a propósito de las evaluaciones cualitativas de programas sociales. México: El Colegio de México, Centro de Estudios Sociológicos, 2008: 129–202.
- 315 Molyneux M. Conditional cash transfers: a 'pathway to women's empowerment'? Sussex, UK: Pathways of Women's Empowerment, 2009.
- 316 Hernández B, Ramírez D, Moreno H, Laird N. Evaluación del Impacto de Oportunidades en la Mortalidad Materna e Infantil. In: Prado BH, Ávila MH, eds. Evaluación externa de impacto del Programa Oportunidades 2003. Cuernavaca, Mexico: Instituto Nacional de Salud Pública, 2005: 73–95.
- 317 McCord A. A critical evaluation of training within the South African National Public Works Programme. *J Vocat Educ Train* 2005; **57**: 565–88.
- 318 UNICEF. South Africa's Child Support Grant: overall findings from an integrated qualitative-quantitative evaluation. Pretoria: United Nations Children's Fund, 2012.
- 319 Grown C, Gupta GR, Kes A. Taking action: achieving gender equality and empowering women. London: United Nations Development Programme, 2005.
- 320 Gerber W. Addressing the issue of gender in achieving universal health coverage. In: Global Health Impact. Medford, MA: Management Sciences for Health, May 28, 2013. <http://www.msh.org/blog/2013/05/28/addressing-the-issue-of-gender-in-achieving-universal-health-coverage> (accessed April 17, 2015).
- 321 Kruk ME, Mbaruku G, Rockers PC, Galea S. User fee exemptions are not enough: out-of-pocket payments for 'free' delivery services in rural Tanzania. *Trop Med Int Health* 2008; **13**: 1442–51.
- 322 Lim SS, Dandona L, Hoisington JA, James SL, Hogan MC, Gakidou E. India's Janani Suraksha Yojana, a conditional cash transfer programme to increase births in health facilities: an impact evaluation. *Lancet* 2010; **375**: 2009–23.
- 323 Jütting J, Laiglesia JRd. Is informal normal? Towards more and better jobs in developing countries. Paris: Development Centre of the Organisation for Economic Co-operation and Development, 2009.
- 324 Ilahi N, Grimard F. Public infrastructure and private costs: water supply and time allocation of women in rural Pakistan. *Econ Dev Cult Change* 2000; **49**: 45–75.
- 325 Chattopadhyay R, Duflo E. Women as policy makers: evidence from a randomized policy experiment in India. *Econometrica* 2004; **72**: 1409–43.
- 326 Gross B, Wijk CV, Mukherjee N. Linking sustainability with demand, gender and poverty: a study in community-managed water supply projects in 15 countries. Washington, DC: Water and Sanitation Programme, World Bank; 2001.
- 327 FAO. The state of food and agriculture 2010–11: women in agriculture. Closing the gender gap for development. Rome: Food and Agriculture Organization of the United Nations, 2011.
- 328 Cotula L, ed. Land and water rights in the Sahel: tenure challenges of improving access to water for agriculture. London: International Institute for Environment and Development, 2006.
- 329 IFPRI. Gender and governance in rural services: insights from India, Ghana, and Ethiopia. Washington, DC: World Bank, 2010.
- 330 Alderman H, Hoddinott J, Haddad L, Udry CR. Gender differentials in farm productivity: implications for household efficiency and agricultural policy. In: Quisumbing A, ed. Household decisions, gender, and development: a synthesis of recent research. Washington, DC: IFPRI, 2003: 61–66.
- 331 Goldstein M, Udry C. The profits of power: land rights and agricultural investment in Ghana. New Haven, CT: Economic Growth Center at Yale University, 2005.
- 332 Pitt MM, Khandker SR. The impact of group-based credit programs on poor households in Bangladesh: does the gender of participants matter? *J Polit Econ* 1998; **106**: 958–96.
- 333 Ranis G, Stewart F, Ramirez A. Economic growth and human development. *World Dev* 2000; **28**: 197–219.
- 334 Roy BCS. Fuelwood, alternative energy and forest user groups in Chunar Wildlife Sanctuary. In: Fox J, Bushley B, Miles W, Quazi S, eds. Connecting communities and conservation: collaborative management of protected areas in Bangladesh. Honolulu: East-West Center, 2008: 209–26.
- 335 Anoko JN. Gender and equity in the protected areas of West Africa. Fondation Internationale du Banc d'Arguin and Union Internationale pour la Conservation de la Nature Program on African Protected Areas and Conservation, 2008.
- 336 Barnes D, Sen M. The impact of energy on women's lives in rural India. Washington DC: United Nations Development Programme and Energy Sector Management Assistance Programme, 2004.
- 337 Dinkelman T. The effects of rural electrification on employment: new evidence from South Africa. *Am Econ Rev* 2011; **101**: 3078–108.
- 338 Kabeer N, Natali L. Gender equality and economic growth: is there a win-win? Brighton, UK: Institute of Development Studies, 2013.
- 339 Rogow D, Haberland N, Del Valle A, et al. Integrating gender and rights into sexuality education: field reports on using It's All One. *Reprod Health Matters* 2013; **21**: 154–66.
- 340 Victora CG, Barros FC. Participatory women's groups: ready for prime time? *Lancet* 2013; **381**: 1693–94.
- 341 Prost A, Colbourn T, Seward N, et al. Women's groups practising participatory learning and action to improve maternal and newborn health in low-resource settings: a systematic review and meta-analysis. *Lancet* 2013; **381**: 1736–46.
- 342 Mayoux L. Women ending poverty. The WORTH Program in Nepal: empowerment through literacy, banking, and business. Kathmandu: Kathmandu Valley Research Group, 2008.
- 343 Oomman N, Mehl G, Berg M, Silverman R. Modernising vital registration systems: why now? *Lancet* 2013; **381**: 1336–37.
- 344 Pande V, Elgin-Cossart M. Africa: fight poverty—with data. Cape Town: AllAfrica, July 10, 2015. <http://allafrica.com/stories/201307101239.html?viewall=1> (accessed April 17, 2015).
- 345 WHO. Every woman, every child: a post-2015 vision: the third report of the independent Expert Review Group on Information and Accountability for Women's and Children's health. Geneva: World Health Organization, 2014.
- 346 Horton R. Offline: why the sustainable development goals will fail. *Lancet* 2014; **383**: 2196.