3 COUNTRY SUCCESS STORIES

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Overview

The 2030 Agenda for Sustainable Development lays out an ambitious array of goals and targets, including one SDG on health and many health-related SDG targets. Faced with this potentially daunting challenge, countries have maintained and accelerated actions to improve the health of their populations. In Part 3, a selection of stories are presented which illustrate the wide range of actions that countries have taken to achieve documented progress. These stories demonstrate that the health-related SDG targets can be reached through the six lines of action outlined in Part 1 of this report.

One central theme in this part has been the diverse range of intersectoral actions taken by Ghana, Ireland, the Republic of Korea, the Russian Federation, and Uruguay in bringing about significant improvements in strengthening IHR capacity, and reducing mortality due to noncommunicable diseases, suicide, harmful use of alcohol, and tobacco use, respectively. These actions have variously involved collaborations with the agricultural, financial, transportation, customs and immigration, and housing sectors, among others. Many of these intersectoral actions involved innovative strategies and interventions, such as the trailblazing nationwide ban on smoking in all enclosed public places and workplaces in Ireland, and the largest-in-the-world warning labels placed on cigarette packs in Uruguay.

Another prominent strand in these country success stories is the vital importance of health system strengthening. The importance of relentless efforts to implement known health system interventions using validated strategies should not be underestimated. This was demonstrated by the experiences of Cambodia, Papua New Guinea and the Russian Federation in their efforts to improve coverage of hepatitis B vaccination, reduce malaria incidence and treat alcohol-use disorders, respectively. These stories show that reaching all populations, as well as being an important goal in itself, is a necessary step in ensuring high levels of population coverage by interventions. In Papua New Guinea, the challenge of ensuring sustainable financing was also highlighted – where funding sources for an activity are not maintained, any progress made will be put at risk.

The importance of monitoring in raising awareness, identifying areas for improvement and identifying successful policy actions cannot be overstated. The existence of monitoring data demonstrating an improvement in a health-related SDG indicator was a prerequisite for the selection of country stories. In Kazakhstan and the Islamic Republic

of Iran a specific focus was placed on improving monitoring systems for capturing maternal deaths and on building up the national CRVS system for monitoring mortality by cause, respectively.

The evidence presented here of successful efforts to enhance country capacities to achieve the health-related SDG targets and ultimately to improve population health is encouraging. The stories selected range across different countries, WHO regions and income levels, and across the broad spectrum of health-related SDG targets and indicators. All share the common message that efforts made in accordance with the six lines of action described in this report can be the catalyst for bringing about profound change in the lives of so many.

3.1 Ending preventable maternal deaths in Kazakhstan

SDG Target 3.1
By 2030, reduce the global maternal mortality ratio to less than 70 per 100 000 live births

Indicator 3.1.1: Maternal mortality ratio

Country:	**Kazakhstan**
WHO region:	**European Region**
World Bank income category, 2015:	**Upper middle income**
Life expectancy at birth, 2015:	**70.2 years**
Maternal mortality ratio, 2015:	**12 per 100 000 live births**

Despite global progress in reducing the maternal mortality ratio (MMR) *(1)* immediate action is needed to meet SDG Target 3.1 – and ultimately eliminate preventable maternal mortality. Although the rates of reduction that are needed to achieve country-specific SDG targets may be ambitious for most high-mortality countries, some countries have already made remarkable progress in reducing their MMR. Such countries can provide inspiration and guidance on how to accomplish the acceleration of efforts needed to reduce the number of preventable maternal deaths.

Measuring maternal mortality is challenging because of limited data availability, and even countries with well-functioning civil registration and vital statistics (CRVS) systems have difficulties, due to misclassification, in ascertaining the causes of maternal deaths. The United Nations Maternal Mortality Estimation Inter-Agency Group (UN-MMEIG), of which WHO is a member, has published a succession of MMR estimates used for global reporting and comparison *(2–7)*. Before each release of new MMR estimates, WHO conducts a country consultation process during which countries have the opportunity to review and discuss the estimates made, and the data and methodology used to generate them. A particular focus is placed on the strengths and limitations of data inputs and on problems related to the misclassification of maternal deaths.

In acknowledging the problem of misclassification, Kazakhstan is one of a number of countries that have implemented specialized surveillance systems and conducted "confidential enquiries" into maternal deaths. This has allowed for the strengthening of CRVS systems, and for the reviewing and correction of mistakes in cause-of-death assignment. Such confidential enquiries are designed to improve maternal health and health care by collecting data, identifying any shortfalls in the care provided and devising recommendations to improve future care. The approach involves identifying and investigating the cause of all deaths of women of reproductive age using multiple sources of data – including interviews with family members and community health workers, and reviews of CRVS data, household surveys, health-care facility records and burial records.

Kazakhstan initiated its confidential enquiry system in 2011, when the Central Confidential Audit Commission (CCAC) audited the officially reported maternal deaths for 2009–2010 to determine why these deaths occurred *(8)*. This audit resulted in recommendations to revise clinical guidelines. In 2014, the CCAC audit was expanded to cover deaths in women of reproductive age that were not officially assigned to maternal causes. The CCAC then reviewed pregnancy-related deaths[1] that had occurred between 2011 and 2013. These included 166 deaths that had officially been registered as maternal deaths[2] and 18 deaths that had been registered as accidents or deaths due to other causes. Following CCAC review, 10 of the original 166 deaths were found not to have been due to maternal causes, while eight of the 18 pregnancy-related deaths were re-categorized as maternal deaths (Table 3.1) *(9)*.

This example shows how the proactive reviewing and reclassification of maternal deaths can improve the classification of cases and quantify the accuracy of the data systems used to monitor the MMR. Such efforts are recognized by the UN-MMEIG – for countries conducting and describing this type of high-quality study, UN estimates of maternal mortality can be computed directly from the country data without global adjustment factors. As a result, in countries with primarily high-quality CRVS data, national level data and global estimates are harmonized. Furthermore, the results of confidential enquiries can be used to revise and strengthen clinical guidelines, and to support activities aimed at ending preventable maternal deaths.

Table 3.1
Results of the 2014 CCAC confidential enquiry, Kazakhstan

	Number of deaths			
Categorization	2011	2012	2013	Total
Officially registered as maternal deaths (a)	65	52	49	166
Re-categorized as non-maternal deaths (b)	4	1	5	10
Confirmed maternal deaths (a - b = c)	61	51	44	156
Additional pregnancy-related deaths identified in the enquiry (d)	8	3	7	18
Re-categorized as maternal deaths (e)	4	2	2	8
Total maternal deaths (c + e)	**65**	**53**	**46**	**164**

[1] Defined as: *...the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death* (International statistical classification of diseases and related health problems, 10th revision. Volume 2: Instruction manual. Geneva: World Health Organization; 2011).

[2] Defined as: *...the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes* (International statistical classification of diseases and related health problems, 10th revision. Volume 2: Instruction manual. Geneva: World Health Organization; 2011).

3.2 Reducing the level of malaria in Papua New Guinea

SDG Target 3.3
By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases

Indicator 3.3.3: Malaria incidence per 1000 population

Country:	**Papua New Guinea**
WHO region:	**Western Pacific Region**
World Bank income category, 2015:	**Lower middle income**
Life expectancy at birth, 2015:	**62.9 years**
Malaria incidence, 2015:	**122 per 1000 population at risk**

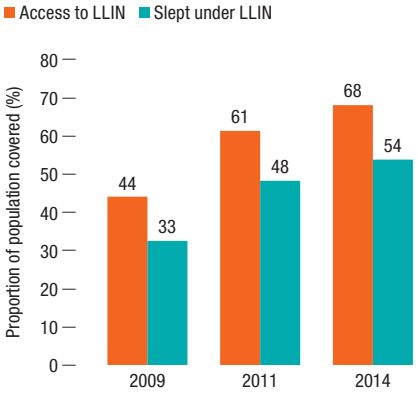
Papua New Guinea is largely mountainous but has a diverse geography which also includes coastal plains, swamps, plantations and offshore atolls. Malaria is highly endemic in coastal areas, where two thirds of the population live. People in these areas are continuously exposed to malaria, with both cases and deaths being concentrated in younger age groups. Patterns of malaria are less stable in the Highlands Region, which is prone to epidemics that cause a significant number of fatalities. In 2005, an estimated 1.4 million cases occurred leading to an estimated 2800 deaths, representing one of the highest malaria morbidity and mortality rates outside Africa *(10)*.

The WHO-recommended package of core interventions to prevent infection and reduce morbidity and mortality comprises vector control, chemoprevention, diagnostic testing and treatment. Two forms of vector control – insecticide-treated nets (ITNs) and indoor residual spraying – are effective in a wide range of circumstances. WHO recommends that all cases of suspected malaria be confirmed using parasite-based diagnostic testing – using either microscopy or a rapid diagnostic test (RDT) – before any treatment is administered. All episodes of malaria should be treated with at least two effective antimalarial medicines with different mechanisms of action (combination therapy).

The reduction of malaria-related morbidity and mortality is a key objective of Papua New Guinea's National Health Plan, with the mass distribution of ITNs viewed as an essential component of the malaria-control strategy. In 2009, the country received US$ 102 million from the Global Fund and more than 7.5 million ITNs were distributed in three mass distribution rounds between 2009 and 2015. In addition, RDTs for improving diagnosis and guiding the use of combination therapy (artemether–lumefantrine) were introduced in 2011. Substantial investments, including investments in activities of nongovernmental organizations, were made to reach some of the most remote population groups in the world.

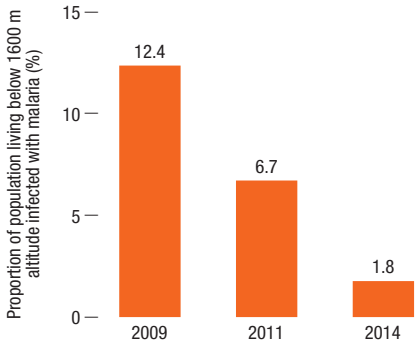
The numbers of malaria cases, admissions and deaths at health facilities is tracked through the national health information system. In addition, progress has been monitored through three nationally representative household surveys undertaken in 2009, 2011 and 2014 *(11–13)* and through health-facility surveys in 2010, 2011, 2012, 2014 and 2016 *(14)*. The household surveys showed that the proportion of the population that had access to long-lasting insecticidal nets (LLINs) increased, with a corresponding increase observed in the proportion of the population sleeping under such nets (Figure 3.1). The health-facility surveys showed that the proportion of suspected malaria cases receiving a diagnostic test rose from 17.5% in 2010 to 73.5% in 2016. Antimalarial prescriptions for febrile patients who were not tested declined over the same period.

Figure 3.1
Trends in LLIN access and use in Papua New Guinea, 2009–2014



Household surveys *(11, 12)* also revealed a drop in parasite prevalence among the population living below an altitude of 1600 metres (Figure 3.2). In total, WHO estimated that in 2015 the number of malaria cases in Papua New Guinea had been reduced to 900 000, with 1200 deaths *(10)*.

Figure 3.2
Trend in prevalence of *Plasmodium falciparum* or P. *vivax* malaria parasites in Papua New Guinea, 2009–2014



Despite the impressive progress made, gaps in programme coverage remain and continued efforts are needed to ensure the continuity of ITN distribution between mass campaigns, and to extend diagnostic testing and treatment to the most remote populations. However, the large reduction in malaria cases and deaths may result in the disease no longer being seen as a priority for funding. Approximately 80% of the financing for malaria programme expansion in Papua New Guinea stems from the Global Fund, and more diverse sources of funding will be needed to ensure programme stability. According to data reported to WHO *(10)* governmental funding for the country's malaria programme increased more than ten-fold between 2010 and 2015. However, Papua New Guinea's recent GDP growth, which allowed for this investment, is largely attributed to an expansion of natural resource projects and international demand for such resources can be volatile.

3.3 Combating viral hepatitis in Cambodia

SDG Target 3.3
By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases

Indicator 3.3.4: Hepatitis B incidence per 100 000 population

Country:	**Cambodia**
WHO region:	**Western Pacific Region**
World Bank income category, 2015:	**Lower middle income**
Life expectancy at birth, 2015:	**68.7 years**
Infants receiving three doses of hepatitis B vaccine, 2015:	**89%**

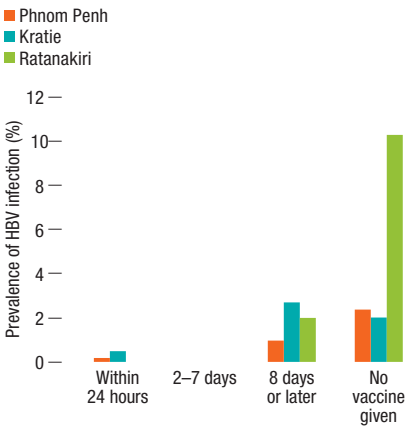
In 2015, infection with the hepatitis B virus (HBV) contributed to an estimated 887 000 deaths worldwide. Most of these deaths result from the chronic sequelae of HBV infection such as cirrhosis (52%) and liver cancer (38%) *(15)*. These chronic sequelae in adulthood are most often the result of HBV infections acquired at birth or during childhood. The prevalence of hepatitis B surface antigen (HBsAg) among children 5 years of age may be used as a surrogate indicator of the cumulated incidence of chronic HBV infections from birth to age five. Such early HBV infection can be prevented by timely vaccination.

Several studies had indicated that the prevalence of chronic HBV infection as measured by the prevalence of HBsAg was high in Cambodia, with prevalence in specific adult populations such as blood donors and emigrants ranging from 8% to 14% *(16)*. In 2001, Cambodia began to phase-in the universal immunization of infants against HBV, based upon a first dose administered as soon as possible after birth and two subsequent doses. HBV vaccination was implemented nationwide in 2005. Biomarker surveys conducted in 2006 and 2011 documented the improvement in immunization rates that had occurred since 2000.

The 2006 national biomarker survey was conducted specifically to provide a formal initial assessment prior to large-scale vaccine introduction *(16)*. The prevalence of HBsAg was measured among children 5 years of age – all of whom had been born prior to the introduction of routine hepatitis immunization in their geographical area. At the national level, it was found that 55 out of 1558 children were HBsAg positive, corresponding to a prevalence of 3.5%. Prevalence was higher in males than in females (4.8% versus 2.2% respectively) and in the least-developed areas compared with the most developed region (8.6% versus 3.2% respectively).

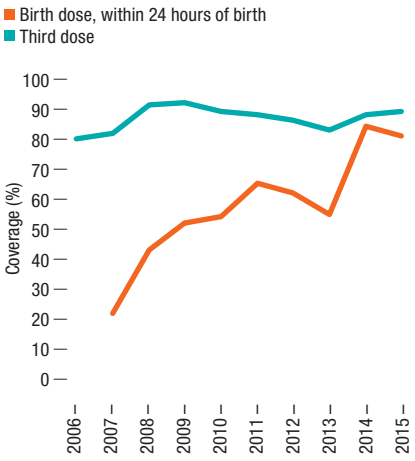
In 2011, a second biomarker survey was conducted in three provinces among children who had been born in 2006–2007 following the national roll-out of HBV vaccination *(17)*. In all three provinces, the prevalence of HBsAg had decreased compared with the estimates obtained for children born in similar settings in 2000. In Phnom Penh, where third-dose coverage and timely birth-dose coverage were 91% and 55% respectively, 0.33% of 1196 children were HBsAg positive. In Kratie (third-dose and timely birth-dose coverage 82% and 36% respectively) 1.41% of 569 children were HBsAg positive. In Ratanakiri (third-dose and timely birth-dose coverage 64% and 22% respectively) 3.45% of 637 children were HBsAg positive. Children born at home without a skilled birth attendant were 1.94 times less likely to have received a timely birth-dose compared with those born in a health facilities with a skilled birth attendant. Children who had received a first dose of vaccine after 7 days of life or who had never received the vaccine were found to have the highest prevalence of HBsAg (Figure 3.3).

Figure 3.3
Prevalence of HBV infection (HBsAg) by first-dose vaccination timing among four- and five-year olds in Phnom Penh, Kratie, and Ratanakiri, Cambodia, 2011



Despite the absence of nationally representative data following the implementation of HBV vaccination, the intermediate biomarker-based assessment conducted in 2011 had suggested that Cambodia was on course to meet the goal set by the Regional Committee for the Western Pacific of reducing the seroprevalence of HBsAg to < 2% among children 5 years of age by 2012 *(18)*. The lessons learnt from this intermediate evaluation also led to successful national efforts to increase both third-dose coverage and timely birth-dose coverage (Figure 3.4). Such increases, if maintained, would allow the country to meet the new control goals of the global health sector strategy on viral hepatitis 2016–2021 of reducing HBsAg seroprevalence in children 5 years of age to 1% by 2020, and to 0.1% by 2030 *(19)*. In 2017, a new biomarker survey will further document the progress made towards these goals. The incorporation of robust monitoring and evaluation activities as part of HBV vaccine roll-out in Cambodia will allow for the efficient targeting of resources to ensure that all children are covered by the vaccination programme.

Figure 3.4
WHO and UNICEF estimates[a] of hepatitis B timely birth-dose and hepatitis B third-dose vaccination coverage, Cambodia, 2006–2015



[a] Based on national immunization coverage data reported to WHO and UNICEF.

3.4 Improving health by clearing the air in Ireland

SDG Target 3.4
By 2030, reduce by one third premature mortality from noncommunicable diseases through prevention and treatment and promote mental health and well-being

Indicator 3.4.1: Mortality rate attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease

Country:	**Ireland**
WHO region:	**European Region**
World Bank income category, 2015:	**High income**
Life expectancy at birth, 2015:	**81.4 years**
Probability of dying from any of cardiovascular disease, cancer, diabetes or chronic respiratory disease, between age 30 and exact age 70, 2015:	**10.3%**

SDG Target 3.4 on reducing premature mortality from noncommunicable diseases (NCDs) will require multifaceted action. Such action will include improving primary health care to treat heart disease, diabetes and hypertension; promoting healthy diets and physical activity; and building healthy environments. Between 2000 and 2015, the rate of mortality due to the four main NCDs[1] declined globally by 17% *(15)*. Such recent improvements are estimated to be mainly due to reductions in cardiovascular and chronic respiratory disease mortality. Because of the myriad of ways in which deaths from cardiovascular disease can be prevented, modelling studies are typically used to estimate which particular factors have led to the observed reductions in mortality. These studies have shown that previous improvements in high-income countries were the result of reductions in risk factors and improvements in medical care in approximately equal measure *(20, 21)*. In the case of chronic respiratory diseases, the main risk factors are tobacco smoking, outdoor air pollution and indoor use of solid fuels *(22)*.

Ireland has achieved exemplary reductions in mortality from NCDs – having achieved the second largest reduction in mortality from the four main NCDs between 2000 and 2015. During this period, the probability of dying from any of the four main NCDs between the ages of 30 and 70 fell from 17.8% to 10.3% (Figure 3.5), corresponding to a reduction of 42%. Of the four main NCDs, the largest reductions were observed in the level of cardiovascular mortality (Figure 3.6). Among the factors contributing to these reductions were declining prevalence of both cigarette smoking *(23, 24)* and raised blood pressure *(25)*, and improvements in medical treatment. A further contributing factor was a reduction in exposure to harmful particles in the air.

Breathing fine particles is known to cause cardiovascular disease, respiratory disease and cancers *(26)*. These dangerous particles may come from tobacco smoke, smoke from fires for home energy needs, or from transportation and industrial sources. Depending on the source, exposure may occur indoors or outdoors. Policies implemented in Ireland to reduce exposure to dangerous particles have resulted in documented reductions in mortality from chronic respiratory diseases. In September 1990, a ban on the sale of bituminous (smoky) coal abruptly improved air quality in Dublin and reduced chronic respiratory disease mortality *(27)*. The ban was subsequently extended to other cities and large towns in the following decades, contributing to declines in measured black smoke concentrations and to the reductions in NCD-associated mortality observed from 2000 onwards.

Figure 3.5
Probability of dying from any of the four main NCDs between age 30 and exact age 70, Ireland (by sex), WHO European Region and the world

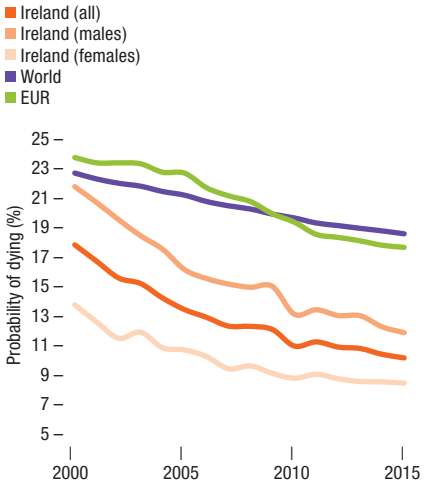
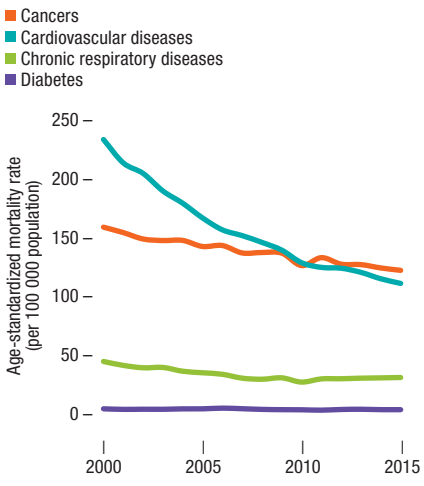


Figure 3.6
Age-standardized mortality rate by cause, four main NCDs, Ireland



Although the Dublin coal ban was implemented more than 25 years ago, bituminous coal is still used for home energy needs in small towns and rural areas in Ireland. Currently, smoke from solid fuel use continues to be the main source of particulate matter (PM) in rural areas – where PM_{10} concentrations[2] are similar to those seen in cities and large towns *(28)*. These exposures are expected to reduce following the scheduled nationwide implementation of the coal ban by the end of 2018 *(29)*.

In 2004, Ireland became the first country in the world to ban smoking in all enclosed public places and workplaces. The ban is strictly enforced and includes bars, restaurants, clubs, offices, public buildings, company cars, trucks, taxis and vans. A private residence is considered a workplace when trades people, such as plumbers or electricians, are working there. Premises must display a sign informing patrons of the ban and providing the details of the person to be contacted in the event of any complaints. A workplace can be given a fine of €3000 for each person found smoking (resulting, for example, in a €15 000 for five people in violation). In addition, a compliance line has been set up by the Office of Tobacco Control that people can call to report incidences of smoking in an enclosed public place. Studies have found that the ban has resulted in significant reductions in hospital admissions for pulmonary disease and acute coronary syndromes *(30)* and in mortality from ischaemic heart disease, stroke and chronic obstructive pulmonary disease *(31)*. These findings are consistent with international reviews of the health effects of smoking bans *(32, 33)*. Together with other anti-tobacco initiatives, the ban on smoking may also have contributed to an observed decline in the rate of cigarette smoking.

[1] Refers to the probability of dying between age 30 and exact age 70 from any of cardiovascular disease, cancer, diabetes, or chronic respiratory disease.

[2] Concentrations of particulate matter with an aerodynamic diameter of 10 µm or less.

3.5 Preventing suicide in the Republic of Korea

SDG Target 3.4
By 2030, reduce by one third premature mortality from noncommunicable diseases through prevention and treatment and promote mental health and well-being

Indicator 3.4.2: Suicide mortality rate

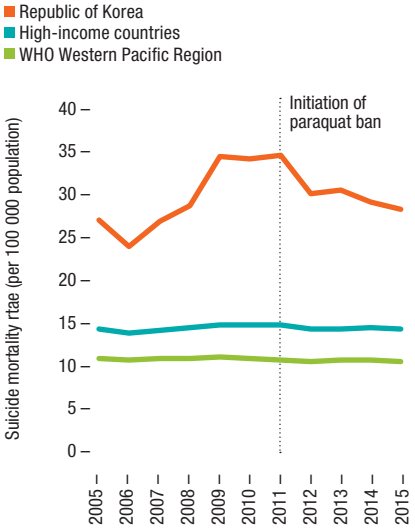
Country:	**Republic of Korea**
WHO region:	**Western Pacific Region**
World Bank income category, 2015:	**High income**
Life expectancy at birth, 2015:	**82.3 years**
Suicide mortality rate, 2015:	**28.3 per 100 000 population**[1]

In 2015, there were almost 800 000 suicide deaths, making suicide the second leading cause of injury death after road traffic injuries, and one of the leading causes of death overall *(15)*. Some suicides are linked to depression – a mental health disorder estimated to affect 311 million people worldwide *(34)*. Because of this link, suicide mortality was selected as one of the two indicators for SDG Target 3.4.

The importance of limiting access to means of suicide as an effective way of reducing suicide mortality was highlighted in the first-ever WHO report on suicide prevention in 2014 *(35)*. A leading means of suicide in many parts of the world is self-poisoning with pesticides *(36)*. The impact of access to pesticides on suicide rates was first identified in a 1995 study (*37)* that demonstrated both an increase in suicide mortality following the introduction of paraquat (a highly toxic herbicide) in Samoa in 1972, and a subsequent reduction in such mortality after its banning in 1981. Since then, further studies demonstrating the link between pesticide availability and suicide rates have emerged *(38–40)*. A recent study of a proposed ban on pesticides in India concluded that such a policy would reduce health inequities by providing "higher protection to the poor relative to the rich" given the greater availability of pesticides in rural areas *(41)*.

For many years, suicide mortality in the Republic of Korea has been high compared to other high-income countries and to the WHO Western Pacific Region in general (Figure 3.7) *(15)*. According to WHO estimates the suicide rate in the Republic of Korea was 14.8 per 100 000 population in 2000, 34.1 per 100 000 in 2010 and 28.3 per 100 000 in 2015[1] – with the suicide rate among males in 2015 being 2.5 times higher than that among females.

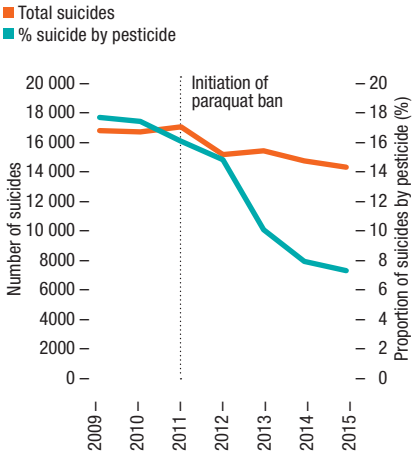
Figure 3.7
Estimated suicide mortality rates in the Republic of Korea,[1] high-income countries, and the WHO Western Pacific Region, 2000–2015



Suicides by pesticides accounted for about one fifth of all suicides in the Republic of Korea during 2006–2010 *(42)*. Efforts to control and minimize the harmful impact of pesticides in the Republic of Korea prior to 2011 had not had any meaningful impact as the pesticides that accounted for the majority of deaths were not adequately controlled. In 2011, the Republic of Korea cancelled the re-registration of paraquat and banned its sale in 2012. These actions resulted in an immediate and clear decline in pesticide-poisoning suicides, and contributed to a decline in overall suicide rates (Fig 3.8) *(15, 42–44)*. The intervention appeared to reduce suicide rates among all population groups, including men, women, all age groups, and those living in urban and rural areas *(42)*. More than half of the overall reduction in the suicide rate between 2011 and 2013 could be attributed to the paraquat ban. Notably, this was achieved without any impact on crop yield.

Given the magnitude of suicide by pesticide self-poisoning around the world, tens of thousands of lives could be saved every year should effective regulation of pesticides be enforced worldwide. Ensuring safer access to pesticides will require an intersectoral approach, including pesticide bans and other related policies, community interventions *(45)*, improved health care (*46)*, and training and surveillance activities. The successful approach taken by the Republic of Korea provides an encouraging model for other countries aiming to reduce suicide deaths.

Figure 3.8
Total number of suicides and the proportion of suicides by pesticide in the Republic of Korea, 2009–2015[1]



[1] The estimate of total suicide mortality for the Republic of Korea for the years 2014 and 2015 have been updated using data published in the WHO Mortality Database after the closure date for the Global Health Estimates 2015 *(15)*.

3.6 Preventing early deaths due to alcohol in the Russian Federation

SDG Target 3.5
Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol

Indicator 3.5.2: Harmful use of alcohol, defined according to the national context as alcohol per capita consumption (aged 15 years and older) within a calendar year in litres of pure alcohol

Country:	**Russian Federation**
WHO region:	**European Region**
World Bank income category, 2015:	**Upper middle income**
Life expectancy at birth, 2015:	**70.5 years**
Total per capita (≥ 15 years of age) alcohol consumption, 2016:	**13.9 litres of pure alcohol**

Following the dissolution of the Soviet Union in 1991, the Russian Federation experienced a major demographic and health crisis characterized by premature mortality, ill health and disability among young adults *(47)*. Research on the underlying determinants of the increased mortality suggested that it was caused by the collapse of the social, economic and health systems; a high prevalence of unhealthy behaviours; and lack of concerted efforts to prevent and control NCDs. The privatization and deregulation of the alcohol market in the 1990s may have contributed to the escalation of alcohol-related problems *(48, 49)*, with alcohol consumption contributing substantially to the increased morbidity and mortality levels *(48–51)*.

The seriousness of the situation called for a major reframing of health policy to control the alcohol market and reduce the harmful use of alcohol. In 2004, the government began a process of strengthening alcohol-control policies *(49, 51, 52)*. In 2005, the President of the Russian Federation explicitly acknowledged the urgency of this problem, linking the shorter life expectancy of the population compared to western European countries to the prevalence of NCDs and to alcohol use *(47)*. Later the same year a series of amendments to the law governing regulation of the production and trading volume of alcohol products was passed. This was then followed by amendments to other laws and regulations related to alcohol (Box 3.1).

Between 2007 and 2016, total (recorded and unrecorded) alcohol consumption was reduced by 3.5 litres of pure alcohol per capita (Figure 3.9) *(53)*. During the period 2005–2015, the number of new cases of alcoholic psychoses decreased from 52.3 to 20.5 per 100 000 population *(54)*, with the death rate from alcohol use also declining, especially in males (Figure 3.10) *(15)*. Similar patterns were also observed among patients diagnosed with alcohol dependence and other alcohol-related diseases, along with an important reduction in total adult mortality – all of which are likely to be a result of the downward trends in general alcohol consumption *(55)*. Consumption of homemade alchohol seems not to have increased in response to limitations on the formal market for alcohol *(56)*. The new policies seem to have made an important contribution to reducing alcohol consumption in the Russian Federation with beneficial effects on morbidity and mortality *(57)*.

Many of the policies implemented in the period 2005–2016 have been evidence based, in line with the WHO *Global strategy to reduce the harmful use of alcohol (58)* and the *WHO Global action plan for the prevention and control of noncommunicable diseases 2013–2020 (59)* and were introduced in a step-wise manner. The country's experience clearly demonstrates that comprehensive government initiatives that utilize evidence-based interventions and intersectoral approaches can produce notable results.

Figure 3.9
Total alcohol consumption per capita (adults 15 years and over) in the Russian Federation, WHO European Region and the European Union (EU), 2000–2016

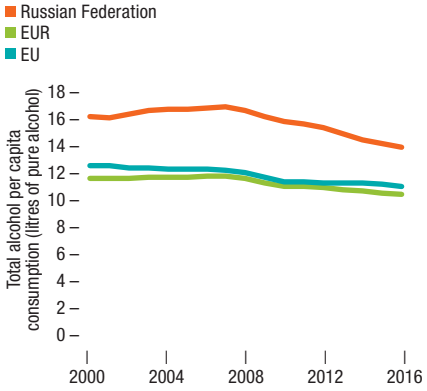
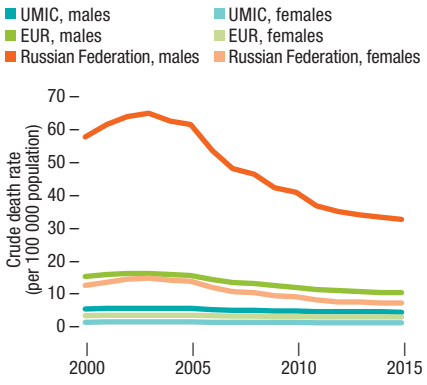


Figure 3.10
Death rate from alcohol use per 100 000 population in the Russian Federation,[a] WHO European Region, and upper middle-income countries (UMIC), 2000–2015



[a] Latest year of data from the Russian Federation is 2011. Estimates for 2012–2015 are projections based on trends in prior years.

Box 3.1
Alcohol policy in the Russian Federation (2005–2016): timeline of selected key policy changes *(52, 53, 57, 60)*

— 2005 —
- Strengthening of the control system for production, distribution, and sales (wholesale and retail) of alcohol, and no sales at selected public spaces.
- Mandatory excise stamp on all alcoholic beverages for sale in the domestic market.
- Ban on sales of alcoholic beverages containing more than 15% ethanol alcohol by volume (ABV) in selected public places, by individuals, and other places not properly licensed.

— 2008 —
- Advertising ban for alcohol on all types of public transportation infrastructure.
- Alcohol excise duties increase 10% per year as part of an amendment to the tax code.

— 2010 —
- Adoption of a national programme of actions to reduce alcohol-related harm and prevent alcoholism among the Russian population for the period 2010–2020.
- Establishment of a minimum retail price for beverages stronger than 28% ABV.
- Zero tolerance for use of alcohol by drivers and 0.0% blood alcohol concentration for driving.

— 2011 —
- Strict enforcement and increased severity of administrative liability for the sale of alcohol products to minors.
- Prohibition of alcohol sales at gas stations.
- Implementation of an initiative to improve the treatment system for alcohol and drug use disorders.

— 2012 —
- Prohibition of sales of beer in selected places.
- Ban on alcohol advertising on the internet and in electronic media.

— 2013 —
- Ban on alcohol advertising in any printed media.
- Further increase in minimum retail prices of spirits.
- A limit of 0.16 mg/l (as a maximum measurement error) for a breathalyzer test introduced while maintaining a "zero tolerance" policy; increased severity of punishment for drink-driving.

— 2014 —
- A "Development of Health" programme initiated to prevent harmful use of alcohol.
- Further increase in fines for alcohol sales to minors, and criminal responsibility for repeated violation.
- Increase of alcohol excise duties by 33% and further increase of minimum prices for spirits.
- Relaxed advertising laws to accommodate domestic wine-making and the removal of some restrictions on advertising beer and beverages until 2019, in connection with the FIFA World Cup to be held in the Russian Federation in 2018.

— 2015 —
- Decrease in the minimum price of vodka.
- Initiation of the social communication project "Health Factory", aimed at addressing risk factors (including alcohol-use disorders) and targeted towards active people of working age.

— 2016 —
- Increase in the minimum price of vodka.
- Introduction of an alcohol-registration system at retail level.

3.7 Fighting the tobacco industry in Uruguay

SDG Target 3.a
Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate

Indicator 3.a.1: Age-standardized prevalence of current tobacco use among persons aged 15 years and older

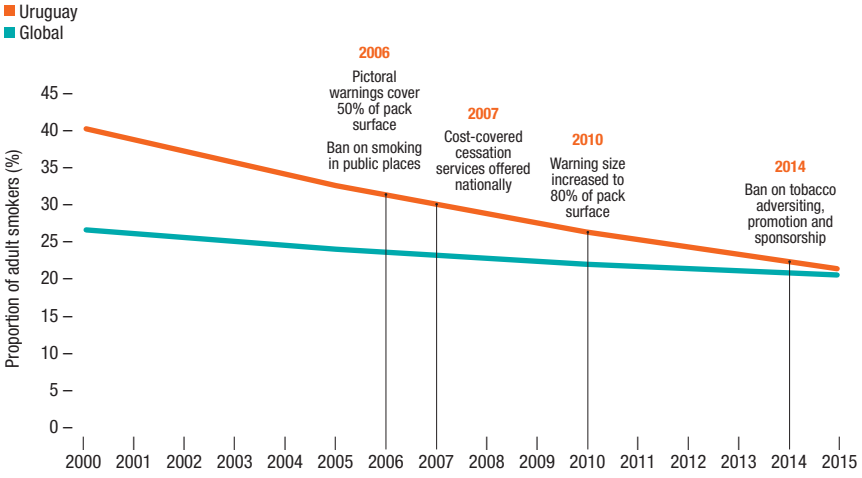
Country:	**Uruguay**
WHO region:	**Region of the Americas**
World Bank income category, 2015:	**High income**
Life expectancy at birth, 2015:	**77.0 years**
Age-standardized prevalence of current tobacco smoking among persons aged 15 years and older, 2015:	**26.7% (males), 19.4% (females)**

In September 2004, Uruguay became a Party to the WHO Framework Convention on Tobacco Control (WHO FCTC). Since then, the country has become a global leader in this area through its step-wise and comprehensive approach to the implementation of the Convention (Figure 3.10). In March 2005, the Health Ministry established a formal national tobacco control programme. Within months, pictures were added to health-warning labels and misleading terms such as "light", "ultra-light" and "mild" were prohibited. In 2006, Uruguay became the first country in Latin America to ban smoking in enclosed public places. In 2009, Uruguay implemented an ordinance permitting only one variant of a given tobacco brand to be on the market at any one time. This aim of this ordinance was to ensure that tobacco product packaging and labelling did not promote a tobacco product through any means that were false or misleading, including through packaging designs, colours, or any other feature that could create the false impression that one tobacco product was less harmful than another. In the same year, the size of warning labels was further increased to 80% of the primary pack surface area – the world's largest at that time. In order to monitor the impact of these and other interventions, national surveys were conducted in 2003, 2006, 2009 and 2013 to actively monitor the scale of tobacco use among adults.

In response to the actions taken by Uruguay, the international tobacco company Philip Morris International challenged the packaging and labelling laws through the unprecedented initiation of international arbitration in early 2010. At the World Bank International Centre for Settlement of Investment Disputes, the company claimed that Uruguay had violated its bilateral investment treaty with Switzerland. However, Uruguay was able to stand up against the tobacco industry and actively defend its national laws. Support for Uruguay was provided by WHO, the WHO FCTC Secretariat and the Pan American Health Organization, which filed amicus briefs, and by international and national NGOs and Michael Bloomberg, who provided financial support. In July 2016, the tobacco industry finally lost the six-year landmark battle to block Uruguay's strong tobacco packaging and labelling measures. This decision represented a major victory for the people of Uruguay and it showed countries everywhere that they can stand up to tobacco companies and win. Uruguay's experience sets an important precedent for other countries considering implementing similar legislation, and will strengthen the resolve of governments to not be intimidated by tobacco industry threats of litigation.

Based on the monitoring data collected by Uruguay, WHO has estimated that the proportion of adults who smoke tobacco in Uruguay almost halved during 2000–2015, from 40% to 22%, representing approximately twice the global rate of reduction during the same period (Fig 3.11) *(61)*. The approximate number of smokers aged 15 and over in Uruguay fell from one million in 2000 to less than 600 000 in 2015. By progressively strengthening its tobacco control measures and winning the fight against the tobacco industry, Uruguay has led the way in accelerating the implementation of the WHO FCTC.

Figure 3.11
Trends in prevalence of current smokers ≥ 15 years of age, globally and in Uruguay, and introduction of tobacco-control measures in Uruguay, 2000–2015



3.8 Strengthening health emergency preparedness in Ghana

SDG Target 3.d
Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks

Indicator 3.d.1: International Health Regulations (IHR) capacity and health emergency preparedness

Country:	**Ghana**
WHO region:	**African Region**
World Bank income category, 2015:	**Lower middle income**
Life expectancy at birth, 2015:	**62.4 years**
Average of 13 International Health Regulations core capacity scores, 2016:	**74**

The International Health Regulations (2005) (IHR) *(62)* – a legal instrument that is binding on 196 countries including all WHO Member States – aim to help countries prevent and respond to acute public health risks that have the potential to cross borders and threaten people worldwide. In order to be able to notify the international community of events and respond to public health risks and emergencies, countries must have the capacity to detect such events through a well-established national surveillance and response infrastructure.

The IHR Monitoring and Evaluation Framework outlines an approach for reviewing the implementation of the core public health capacities required in this area. The Framework consists of four components: (a) States Parties annual reporting; (b) after-action review; (c) simulation exercises; and (d) joint external evaluation (JEE). This approach provides a comprehensive picture of a country's ability to respond to risks by identifying strengths, gaps and priorities. The implementation status of 13 IHR core capacities has therefore been selected as the indicator to monitor progress toward SDG Target 3.d.

The Ebola outbreak of 2014 in West Africa highlighted the need for African countries to strengthen their national capacities. During the outbreak, Ghana served as a vital coordination and operational base for response activities, and was thus well positioned to participate in and learn from the wide range of programme activities launched. Ghana was among the first countries in Africa to roll out the activities outlined in the Ebola virus disease (EVD) consolidated preparedness checklist *(63)* developed by WHO and its partners to guide preparedness activities in high-risk countries. In accordance with IHR requirements, these activities aimed to strengthen country capacities for early warning, risk reduction and the management of national and global health risks.

A well-functioning surveillance system plays a crucial role in guaranteeing the public health security of the community, and ensuring that public health events are promptly detected and addressed through coordinated response mechanisms. Surveillance-strengthening activities were conducted by the Ministry of Health of Ghana with the support of WHO. These activities included the orientation of 239 community health volunteers in five border districts on the Integrated Disease Surveillance and Response (IDSR) guidelines, and community outreach covering over 276 communities with public health messages. To enhance disease detection, WHO and Ministry of Health teams trained over 40 clinicians on the principles of IDSR. As part of promoting community engagement, Ghana rolled out the unique strategy of training over 200 representatives of the Traditional Medicine Practitioners Association and community radio operators on their roles in public health emergencies.

The lack of diagnostics reagents, materials and equipment has also been a persistent gap. Consumables and reagents for sample collection, packaging, transportation and diagnosis were therefore procured and distributed to national public health laboratories and research organizations as part of building diagnostic capacity. The procurement of such materials, along with the training of over 200 people on sample management and biosafety and biosecurity requirements, has enhanced Ghana's capacity to accurately and rapidly detect emerging and dangerous pathogens such as the Ebola virus. Some of these laboratory materials were later used during cholera and meningitis outbreaks reported in 2016.

Another key aspect of disease surveillance is monitoring points of entry. WHO trained 28 point-of-entry staff on ship inspection and ship sanitation, following updated IHR certification procedures.

To encourage cross-border communication and cooperation, a cross-border coordination meeting was also held at the Tatale border point involving over 30 representatives from Ghana and Togo.

All of these activities contributed towards strengthening Ghana's core capacities under the IHR – as highlighted by an assessment of the country's implementation of the EVD preparedness checklist during 2015 (Figure 3.12). In late 2015, as the threat of Ebola was decreasing in the region, preparedness activities were broadened to apply to all diseases. In 2016, Ghana carried out a tabletop exercise – in the form of a facilitated discussion of a simulated emergency situation – to test laboratory pre-diagnostic capacities (such as sample collection and transport) which helped to identify major gaps and key areas that required strengthening.

To complement the self-assessment undertaken as part of IHR annual reporting to the World Health Assembly, and to determine its level of preparedness after several months of intense preparation, Ghana volunteered for a JEE, which was carried out in February 2017. During the JEE process, an external team of experts conduct a series of multisectoral discussions based upon 19 technical areas defined in the JEE tool *(64)*. In Ghana, this consisted of a formal presentation of Ghana's national capacities with all national stakeholders in health security. During the conducting of the JEE process, best practices in all technical areas were identified and recommendations provided for further improvement. Although the outcome scores of the JEE process were lower than the results of the self-assessment carried out in 2016 (Figure 3.13), the JEE report allows the country to take stock of its findings and turn the recommendations made into actionable activities. This will result in further strengthening of Ghana's national IHR preparedness and response capacities.

Figure 3.12
Implementation of EVD preparedness checklist components, Ghana, 2015

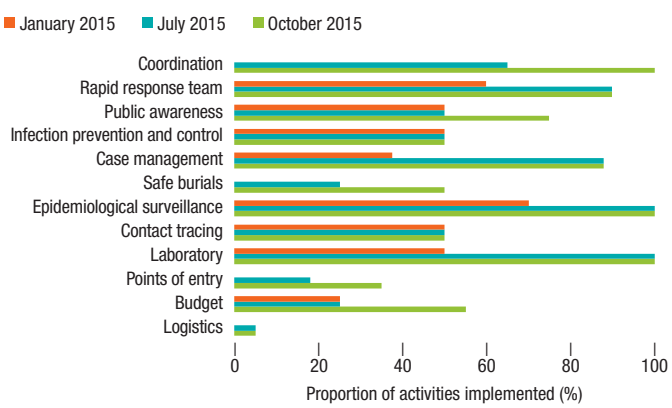
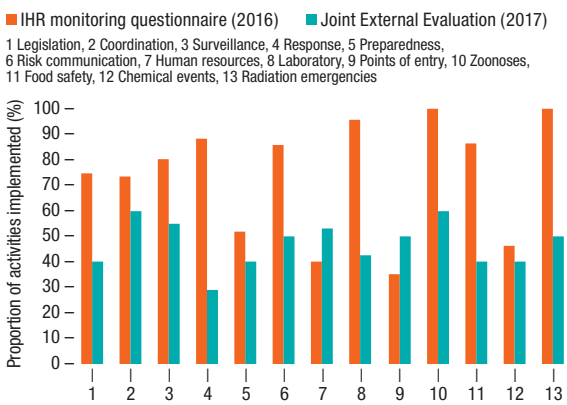


Figure 3.13
Comparison of IHR self-assessment and JEE results, Ghana



3.9 Monitoring mortality and cause of death in the Islamic Republic of Iran

SDG Target 17.9
By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity-building in developing countries

Indicator 17.19.2: Proportion of countries that: (a) have conducted at least one population and housing census in the last 10 years; and (b) have achieved 100 per cent birth registration and 80 per cent death registration

Country:	**Islamic Republic of Iran**
WHO region:	**Eastern Mediterranean Region**
World Bank income category, 2015:	**Upper middle income**
Life expectancy at birth, 2015:	**75.5 years**
Completeness of cause-of-death registration, 2015:	**90%**

A well-functioning civil registration and vital statistics (CRVS) system produces information on vital events such as births, marriages, deaths and causes of death. With 15 of the 17 SDGs requiring CRVS data to measure their indicators, investing in CRVS systems is a key step in SDG monitoring. It is only through the use of such systems that continuous and routine data can be generated on population, fertility and mortality by cause, disaggregated by socioeconomic status and geographic area.

In many countries, death registration lags behind birth registration. However, death registration is vitally important for a range of legal, administrative and statistical purposes, including monitoring the health of populations. In addition, more than a dozen SDG indicators require information on total or cause-specific mortality. Specific health-related SDG indicators generated from death registration data include those for maternal and infant mortality, and for cause-specific mortality such as deaths due to cancers, diabetes and cardiovascular conditions, as well as those due to external causes such as road traffic accidents, suicide and violence.

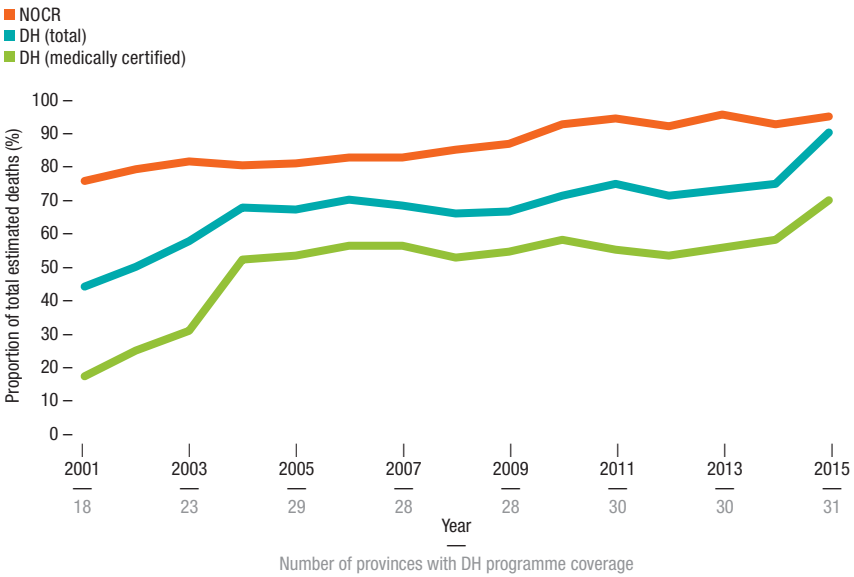
In the Islamic Republic of Iran there are two institutions that operate death registration systems: the National Organization for Civil Registration (NOCR) and the Ministry of Health and Medical Education (MOH&ME). The NOCR is legally responsible for the registration of four vital events: births, deaths, marriages and divorces. However, only limited information on cause of death is recorded in the NOCR system. In response to the demand for timely and accurate cause-of-death data, the MOH&ME developed the Deputy of Health (DH) programme, which aims to improve death registration data, including through improvements in the medical certification of cause of death *(65)*. The DH programme operates in parallel with the NOCR system, with both systems receiving a copy of each death certificate issued.

First piloted in 1997, the DH programme in 1999 was still only capturing cause-of-death data in four provinces, with a coverage rate of 5% of all deaths in the entire country. In 2001, the system was expanded to cover 18 provinces, and by 2014 was covering 30 out of 31 provinces, covering 65 million people and around 75% of all deaths (Figure 3.14). Tehran, the most populous province, was the only province not covered. In 2015 a programme was launched to collect all death certificates sent to Tehran cemeteries – thereby capturing cause-of-death information for all provinces nationwide. In addition to geographic expansion, the capturing of death and cause-of-death data has also been strengthened by the cross-checking of data using multiple sources at the district level, such as NOCR, cemetery and facility data, to identify omissions and duplication.

In addition to the substantial increase in the proportion of deaths with cause recorded, the level of detail on cause of death has also increased. During the period 2006–2012, cause-of-death data were coded to a condensed list of 318 cause categories using the ICD-10 classification system. Since then, major investments in system strengthening (including the training of certifiers and coders) have resulted in data for the year 2013 onwards being coded to the ICD-10 detailed (four-digit) codes corresponding to over 1500 cause categories. Such detailed data enable epidemiological research to be conducted to support evidence-based policy decision-making in the country.

As clearly demonstrated by the Islamic Republic of Iran, a long-term, step-wise strategy of CRVS system development is crucial to the foundation of a solid evidence base with which to monitor the health of a nation. The use of multiple data sources by the MOH&ME to assess completeness and improve the capture of mortality data has allowed the country to build a system for monitoring mortality by cause, and hence for monitoring many of the health-related SDGs – all in less than two decades. Future MOH&ME plans to further improve the capture of mortality data include linking death registration in the DH programme and NCOR systems.

Figure 3.14
Coverage of NOCR death registration, coverage of DH programme total death registration, coverage of DH programme death registration with medical certification of cause of death, and number of provinces with the DH programme, Islamic Republic of Iran, 2001–2015)[a]



[a] Data on numbers of deaths captured by the NOCR and DH programme, number of provinces covered, and numbers of deaths medically certified were provided to WHO by the Islamic Republic of Iran. Estimated coverage (%) was then calculated using WHO estimates of total mortality in the Islamic Republic of Iran *(15)*.

References

1. Trends in maternal mortality: 1990 to 2015. Estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Geneva: World Health Organization; 2015 (http://www.who.int/reproductivehealth/publications/monitoring/maternal-mortality-2015/en/, accessed 30 March 2017).

2. Maternal mortality in 1995: Estimates developed by WHO, UNICEF, UNFPA. Geneva: World Health Organization; 2001 (http://apps.who.int/iris/bitstream/10665/66837/1/WHO_RHR_01.9.pdf, accessed 30 March 2017).

3. Maternal mortality in 2000: Estimates developed by WHO, UNICEF, UNFPA. Geneva: World Health Organization; 2004 (http://apps.who.int/iris/bitstream/10665/42930/1/9241562706.pdf, accessed 30 March 2017).

4. Trends in maternal mortality: 1990 to 2008. Estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Geneva: World Health Organization; 2010 (http://www.who.int/reproductivehealth/publications/monitoring/9789241500265/en/, accessed 30 March 2017).

5. Trends in maternal mortality: 1990 to 2010. Estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Geneva: World Health Organization; 2012 (http://www.who.int/reproductivehealth/publications/monitoring/9789241503631/en/, accessed 30 March 2017).

6. Trends in maternal mortality: 1990 to 2013. Estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Geneva: World Health Organization; 2014 (http://www.who.int/reproductivehealth/publications/monitoring/maternal-mortality-2013/en/, accessed 30 March 2017).

7. Alkema L, Chou D, Hogan D, Zhang S, Moller A-B, Gemmill et al. Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group. Lancet. 2016;387(10017):462–74 (http://www.thelancet.com/pb/assets/raw/Lancet/pdfs/S0140673615008387.pdf, accessed 30 March 2017).

8. Improvement of maternal and child health in Kazakhstan. Entre Nous, No. 74. 2011: pages16–7 (http://www.euro.who.int/__data/assets/pdf_file/0008/146978/313914_Entre_Nous_74_low.pdf, accessed 30 March 2017).

9. Commission CCA. Findings of a confidential audit of maternal mortality rates in the Republic of Kazakhstan 2011–2013. Astana: Ministry of Health; 2014.

10. World Malaria Report 2016. Geneva: World Health Organization; 2016 (http://www.who.int/malaria/publications/world-malaria-report-2016/en/, accessed 18 March 2017).

11. Hetzel MW, Pulford J, Ura Y, Robinson L, Morris H, Mueller I et al. Country-wide household survey 2010/11: malaria control intervention coverage and prevalence of parasitaemia. Goroka: Papua New Guinea Institute of Medical Research; 2012 (http://www.adi.org.au/wp-content/uploads/2016/11/Country-Wide-Household-Survey-Malaria-Control-Intervention-Coverage-and-Prevalence-of-Parasitaemia-2014.pdf, accessed 18 March 2017).

12. Hetzel MW, Pulford J, Gouda H, Hodge A, Siba PM, Mueller I. The Papua New Guinea National Malaria Control Program: primary outcome and impact indicators, 2009–2014. Goroka: Papua New Guinea Institute of Medical Research; 2014 (http://www.pngimr.org.pg/research%20publications/IMR%20-%20outcome%20and%20impact%202014.pdf, accessed 18 March 2017).

13. Hetzel MW, Choudhury AAK, Pulford J, Ura Y, Whittaker M, Siba PM et al. Progress in mosquito net coverage in Papua New Guinea. Malar J. 2014;13:242 (https://malariajournal.biomedcentral.com/articles/10.1186/1475-2875-13-242, accessed 18 March 2017).

14. Kurumop SF, Tandrapah A, Hetzel MW, Siba PM, Mueller I, Pulford J. The Papua New Guinea National Malaria Control Program: health facility surveys, 2010–2106. Goroka: Papua New Guinea Institute of Medical Research; 2016 (http://www.pngimr.org.pg/research%20publications/PNGIMR%202016%20-%20HFS%202010-2016.pdf, accessed 18 March 2017).

15. Global Health Estimates 2015: Deaths by cause, age, sex, by country and by region, 2000–2015. Geneva: World Health Organization; 2016 (http://www.who.int/healthinfo/global_burden_disease/estimates/en/index1.html, accessed 18 March 2017).

16. Soeung SC, Rani M, Huong V, Sarath S, Kimly C, Kohei T. Results from nationwide hepatitis B serosurvey in Cambodia using simple and rapid laboratory test: implications for National Immunization Program. Am J Trop Med Hyg. 2009;81(2):252–7 (http://www.ajtmh.org/content/journals/10.4269/ajtmh.2009.81.252#html_fulltext, accessed 18 March 2017).

17. Mao B, Patel MK, Hennessey K, Duncan RJW, Wannemuehler K, Soeung SC. Prevalence of chronic hepatitis B virus infection after implementation of a hepatitis B vaccination program among children in three provinces in Cambodia. Vaccine. 2013;31(40):4459–64 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4663664/, accessed 18 March 2017).

18. Measles Elimination, Hepatitis B Control and Poliomyelitis Eradication. Resolution WPR/RC56.R8. In: Report of the Regional Committee for the Western Pacific fifty-sixth session, Noumea, 19–23 September 2005 (http://www2.wpro.who.int/rcm/en/archives/rc56/rc_resolutions/wpr_rc56_r08.htm, accessed 18 March 2017).

19. Global health sector strategy on viral hepatitis 2016–2021. Towards ending viral hepatitis. Geneva: World Health Organization; 2016 (http://apps.who.int/iris/bitstream/10665/246177/1/WHO-HIV-2016.06-eng.pdf?ua=1, accessed 18 March 2017).

20. Di Cesare M, Bennett JE, Best N, Stevens GA, Danaei G, Ezzati M. The contributions of risk factor trends to cardiometabolic mortality decline in 26 industrialized countries. Int J Epidemiol. 2013;42(3):838–48 (https://academic.oup.com/ije/article/42/3/838/912718/The-contributions-of-risk-factor-trends-to, accessed 32 March 2017).

21. Ezzati M, Obermeyer Z, Tzoulaki I, Mayosi BM, Elliott P, Leon DA. Contributions of risk factors and medical care to cardiovascular mortality trends. Nat. Rev. Cardiol. 2015;12(9):508–30 (abstract: http://www.ncbi.nlm.nih.gov/pubmed/26076950, accessed 31 March 2017).

22. Institute for Health Metrics and Evaluation. GBD Compare. Viz Hub [online tool]. Seattle (WA): University of Washington; 2017 (see: http://vizhub.healthdata.org/gbd-compare, accessed 22 February 2017).

23. Smoking in Ireland 2014: Synopsis of key patterns. Dublin: Health Service Executive; 2015 (http://www.hse.ie/eng/about/Who/TobaccoControl/Research/smokinginireland2014.pdf, accessed 31 March 2017).

24. Tobacco use. Data by country [online database]. Global Health Observatory data repository. Geneva: World Health Organization (http://apps.who.int/gho/data/node.main.65).

25. Mean systolic blood pressure trends, age-standardized (mmHg). Estimates by country [online database]. Global Health Observatory data repository. Geneva: World Health Organization (http://apps.who.int/gho/data/node.main.A882?lang=en).

26. Burnett RT, Pope III CA, Ezzati M, Olives C, Lim SS, Mehta S et al. An integrated risk function for estimating the global burden of disease attributable to ambient fine particulate matter exposure. Environ Health Perspect. 2014;122(4):397–403 (https://ehp.niehs.nih.gov/1307049/, accessed 31 March 2017).

27. Dockery DW, Rich DQ, Goodman PG, Clancy L, Ohman-Strickland P, George P et al. Effect of air pollution control on mortality and hospital admissions in Ireland. Research Report 176. Boston (MA): Health Effects Institute; 2013 (https://www.healtheffects.org/system/files/Dockery-176.pdf, accessed 31 March 2017).

28. Air quality in Ireland 2015: Key indicators of ambient air quality. County Wexford: Environmental Protection Agency; 2016 (http://www.epa.ie/pubs/reports/air/quality/Air%20Quality%20Report%202015.pdf, accessed 31 March 2017).

29. Smokeless zones. Brief outline of the "smoky coal" ban [website]. Greenheat (http://www.greenheat.ie/useful-information/smoky-coal-ban/, accessed 31 March 2017).

30. Kent BD, Sulaiman I, Nicholson TT, Lane SJ, Moloney ED. Acute pulmonary admissions following implementation of a national workplace smoking ban. Chest. 2012;142(3):673–9 (https://www.ncbi.nlm.nih.gov/pubmed/22383660, accessed 31 March 2017).

31. Stallings-Smith S, Zeka A, Goodman P, Kabir Z, Clancy L. Reductions in cardiovascular, cerebrovascular, and respiratory mortality following the national Irish smoking ban: Interrupted time-series analysis. PloS One. 2013;8(4)1–7 (http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0062063, accessed 1 April 2017).

32. Frazer K, Callinan JE, McHugh J, van Baarsel S, Clarke A, Doherty K et al. Legislative smoking bans for reducing harms from secondhand smoke exposure, smoking prevalence and tobacco consumption (Review). Cochrane Database of Systematic Reviews 2016, Issue 2. Art. No.: CD005992 (abstract: http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD005992.pub3/epdf/abstract, accessed 1 April 2017).

33. Tan CE, Glantz SA. Association between smoke-free legislation and hospitalizations for cardiac, cerebrovascular, and respiratory diseases: a meta-analysis. Circulation. 2012;126(18):2177–83 (https://www.ncbi.nlm.nih.gov/pubmed/23109514, accessed 1 April 2017).

34. Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. GBD 2015 Disease and Injury Incidence and Prevalence Collaborators. Lancet. 2016;388(10053):1545–1602 (http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)31678-6/fulltext, accessed 1 April 2017).

35. Preventing suicide: a global imperative. Geneva: World Health Organization; 2014 (see: http://www.who.int/mental_health/suicide-prevention/world_report_2014/en/, accessed 1 April 2017).

36. Gunnell D, Eddleston M, Phillips MR, Konradsen F. The global distribution of fatal pesticide self-poisoning: systematic review. BMC Public Health. 2007;7:357 (http://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-7-357, accessed 1 April 2017).

37. Bowles JR. Suicide in Western Samoa: an example of a suicide prevention programme in a developing country. In: Diekstra, RFW, Gulbinat W, Kienhorst I, de Leo D, editors. Preventive strategies on suicide. Leiden: Brill Academic Publishers; 1995:173–206.

38. Kong Y, Zhang J. Access to farming pesticides and risk for suicide in Chinese rural young people. Psychiatry Res. 2010;179(2):217–21 (doi: 10.1016/j.psychres.2009.12.005).

39. Gunnell D, Fernando R, Hewagama M, Priyangika WDD, Konradsen F, Eddleston D. The impact of pesticide regulations on suicide in Sri Lanka. Int J Epidemiol. 2007;36(6):1235–42 (doi:10.1093/ije/dym164).

40. Knipe DW, Metcalfe C, Fernando R, Pearson M, Konradsen F, Eddleston M et al. Suicide in Sri Lanka 1975–2012: age, period and cohort analysis of police and hospital data. BMC Public Health. 2014;14:839 (http://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-14-839, accessed 1 April 2017).

41. Nigam A, Raykar R, Chisholm D. Self-harm in India: Cost-effectiveness analysis of a proposed pesticide ban. 2015. Unpublished Working Paper (available at; www.dcp-3.org, accessed 1 April 2017).

42. Cha ES, Chang SS, Gunnell D, Eddleston M, Khang YH, Lee WJ. Impact of paraquat regulation on suicide in South Korea. Int J Epidemiol. 2016;45(2):470–9 (https://academic.oup.com/ije/article/45/2/470/2572538/Impact-of-paraquat-regulation-on-suicide-in-South, accessed 1 April 2017).

43. Korea Statistical Information Service. Cause of Death. Daejeon: Statistics Korea; 2016. (https://mdis.kostat.go.kr/index.do, accessed 9 March 2017).

44. Myung W, Lee GH, Won HH, Fava M, Mishoulon D, Nyer M et al. Paraquat prohibition and change in the suicide rate and methods in South Korea. PLoS ONE. 2015;10(6):e0128980. doi:10.1371/journal.pone.0128980

45. Safer access to pesticides for suicide prevention: Experiences from community interventions. Geneva: World Health Organization; 2016 (http://apps.who.int/iris/bitstream/10665/246233/1/WHO-MSD-MER-16.3-eng.pdf?ua=1, accessed 1 April 2017).

46. Clinical management of acute pesticide intoxication: Prevention of suicidal behaviours. Geneva: World Health Organization; 2008 (http://www.who.int/mental_health/prevention/suicide/pesticides_intoxication.pdf, accessed 1 April 2017).

47. Dying too young: Addressing premature mortality and ill health due to non-communicable diseases and injuries in the Russian Federation. Washington (DC): World Bank; 2005 (http://siteresources.worldbank.org/INTECA/Resources/DTY-Final.pdf, accessed 13 April 2017).

48. Nemtsov AV. Alcohol-related human losses in Russia in the 1980s and 1990s. Addiction. 2002;97(11):1413–25.

49. Interpersonal violence and alcohol in the Russian Federation: Policy briefing. 2006, Copenhagen: WHO Regional Office for Europe; 2006 (http://www.euro.who.int/__data/assets/pdf_file/0011/98804/E88757.pdf, accessed 1 April 2017).

50. Leon, D.A., et al., Hazardous alcohol drinking and premature mortality in Russia: a population based case-control study. Lancet, 2007. 369(9578): p. 2001-9.

51. Levintova M. Russian alcohol policy in the making. Alcohol Alcohol. 2007;42(5):500–5.

52. Yashkin AP. The dynamics of alcohol consumption in the Russian Federation: Implications of using price related policies to control alcohol use. Doctoral dissertation. Department of Health Policy and Management, University of South Florida, Tampa, Florida, the USA; 2013:110.

53. WHO Global Information System on Alcohol and Health [online database]. Geneva: World Health Organization; 2017 (http://apps.who.int/gho/data/node.main.GISAH?showonly=GISAH).

54. Diseases of social importance in the population of Russia in 2015. Statistical materials. Moscow: Ministry of Health of the Russian Federation; 2016.

55. Shield KD, Rylett M, Rehm J. Public health successes and missed opportunities. Trends in alcohol consumption and attributable mortality in the WHO European Region, 1990–2014. Copenhagen: WHO Regional Office for Europe; 2016 (http://www.euro.who.int/__data/assets/pdf_file/0018/319122/Public-health-successes-and-missed-opportunities-alcohol-mortality-19902014.pdf, accessed 1 April 2017).

56. Radaev V. Impact of a new alcohol policy on homemade alcohol consumption and sales in Russia. Alcohol Alcohol. 2015;50(3):365–72 (https://academic.oup.com/alcalc/article-lookup/doi/10.1093/alcalc/agv008, accessed 13 April 2017).

57. Neufeld M, Rehm J. Alcohol consumption and mortality in Russia since 2000: are there any changes following the alcohol policy changes starting in 2006? Alcohol Alcohol. 2013;48(2):222–30 (https://academic.oup.com/alcalc/article-lookup/doi/10.1093/alcalc/ags134, accessed 13 April 2017).

58. Global strategy to reduce the harmful use of alcohol. Geneva: World Health Organization; 2010 (see: http://www.who.int/substance_abuse/activities/gsrhua/en/, accessed 1 April 2017).

59. Global action plan for the prevention and control of noncommunicable diseases 2013–2020. Geneva: World Health Organization; 2013 (see: http://www.who.int/nmh/events/ncd_action_plan/en/, accessed 1 April 2017).

60. Alcohol policy timeline database of countries in the WHO European Region [online database]. Global Health Observatory data repository. Geneva: World Health Organization (http://apps.who.int/gho/data/node.main.A1500?lang=en&showonly=GISAH).

61. WHO global report on trends in prevalence of tobacco smoking 2015. Geneva: World Health Organization; 2015 (http://apps.who.int/iris/bitstream/10665/156262/1/9789241564922_eng.pdf, accessed 22 March 2017).

62. International Health Regulations (2005). Third edition. Geneva: World Health Organization; 2016 (see: http://www.who.int/ihr/publications/9789241580496/en/, accessed 2 April 2017).

63. Ebola virus disease. Consolidated preparedness checklist. Geneva: World Health Organization; 2014: Revision 1; 15 January 2015 (WHO/EVD/Preparedness/14 Rev.1; see: http://www.who.int/csr/resources/publications/ebola/ebola-preparedness-checklist/en/, accessed 2 April 2017).

64. IHR (2005) Monitoring and Evaluation Framework. Joint external evaluation tool and process overview. Geneva: World Health Organization; 2016 (WHO/HSE/GCR/2016.18; http://www.who.int/ihr/publications/WHO-HSE-GCR-2016-18/en/, accessed 2 April 2017).

65. Khosravi A, Taylor R, Naghavi M, Lopez A. Mortality in the Islamic Republic of Iran, 1964–2004. Bull World Health Organ. 2007;85(8):607–14 (http://www.who.int/bulletin/volumes/85/8/06-038802/en/, accessed 2 April 2017).