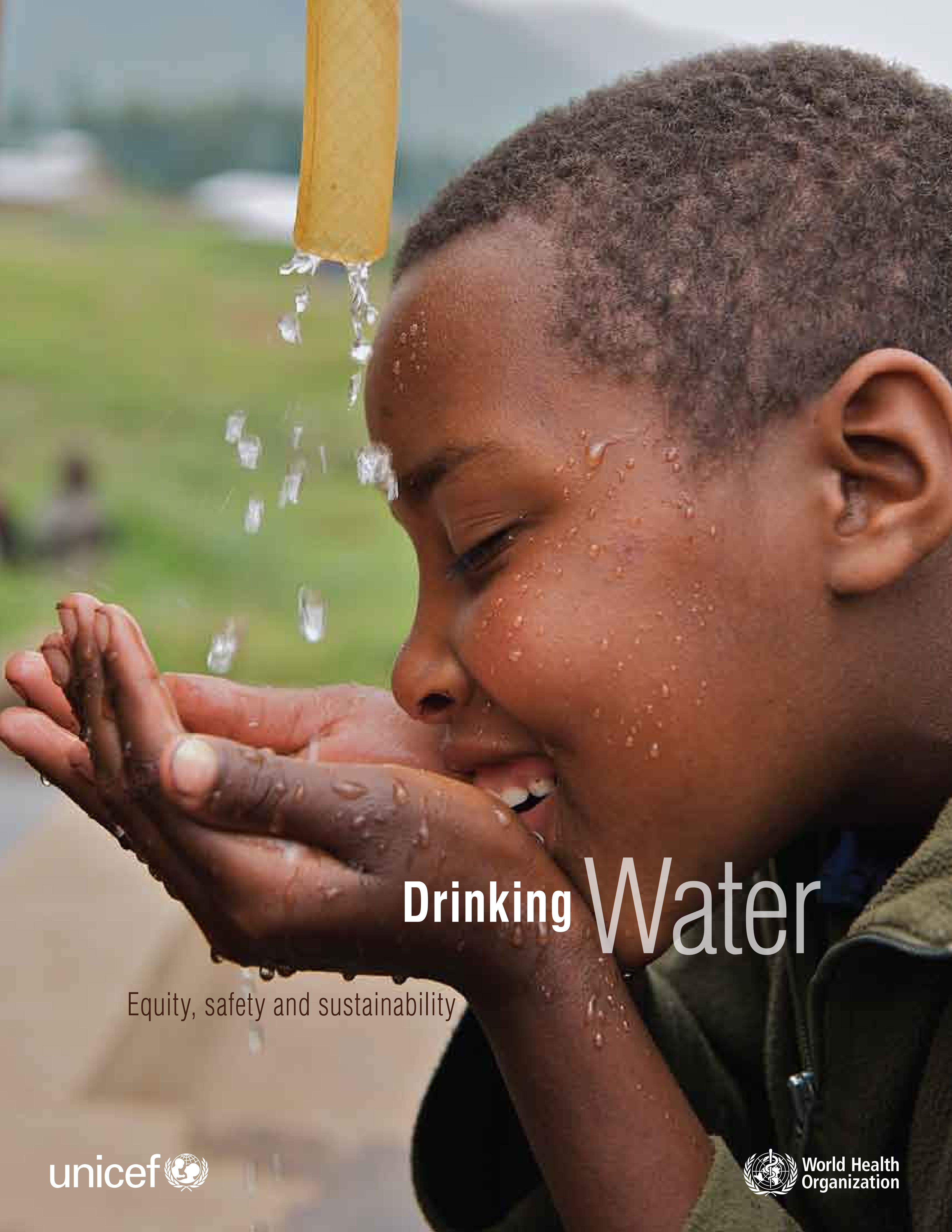

Drinking Water

Equity, safety and sustainability

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Acronyms and Abbreviations

CWIQ	Core Welfare Indicator Questionnaire
DHS	Demographic and Health Survey
GLAAS	Global Annual Assessment of Sanitation and Drinking-water
HBS	Household Budget Survey
HWT	household water treatment
HWTS	household water treatment and safe storage
IBNET	International Benchmarking Network for the Water and Sanitation Utilities
JMP	WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation
LDC	least developed country
LMIC	lower middle income country
LSMS	Living Standard Measurement Study
MDG	Millennium Development Goal
MDGCSO	Millennium Development Goals Country Status Overviews
MICS	Multiple Indicator Cluster Survey
ODA	official development assistance
OLIC	other low-income country
QMRA	quantitative microbial risk assessment
RADWQ	Rapid Assessment of Drinking Water Quality
UMIC	upper middle income country
UNICEF	United Nations Children's Fund
WHO	World Health Organization
WHS	World Health Survey
WSP	water safety plan

Drinking Water

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Introduction

The WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation (JMP) monitors progress towards the Millennium Development Goal (MDG) target to halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation. The JMP publishes a report every two years, which presents an update on the progress made towards reaching the MDG target for drinking water and sanitation. Among the other products of the JMP feature occasional thematic publications. This thematic report on drinking water is designed to complement the main JMP report (WHO/UNICEF, 2010).

Purpose and scope of this report

The primary purpose of the report is to investigate access to and use of drinking water in greater detail than is possible in the regular JMP progress reports. The report includes multiple disaggregation of water service levels and analyses of trends across countries and regions. These illustrate in detail how people access drinking water and what changes have occurred since 1990.

The report focuses on the three key challenges of equity, safety and sustainability. Disparities in terms of geography, wealth and gender are explored, which highlight the need to target water service delivery towards specific populations. Water safety concerns are highlighted and the scope of household water treatment is investigated. The challenges involved in sustaining water services and ensuring reliable supplies, in both rural and urban contexts, are also explored, including the unique threats posed by climate change.

The JMP tracks progress towards the MDG target by analysing datasets obtained through standardized household surveys and censuses, including Multiple Indicator Cluster Surveys (MICS), Demographic and Health Surveys (DHS), Living Standard Measurement Study (LSMS) surveys, Core Welfare Indicator Questionnaires (CWIQ), World Health Surveys (WHS) and Household Budget Surveys (HBS). The JMP analyses focus on two proxy indicators, one for drinking water supply and one for sanitation. This report highlights the opportunities and challenges for further strengthening of global monitoring, particularly in relation to monitoring the safety of drinking water and the sustainability of access. Future monitoring needs, including enhanced information on safety, sustainability and reliability, as well as possible strategies to address these, are outlined.

Based on JMP analyses, it is estimated that between 1990 and 2008 an estimated 1.77 billion people gained access to improved sources of drinking water; yet, by the end of 2008, 884 million people still lacked access to improved water sources. Current discussions about enhancing the information on access to and use of safe drinking water focuses on the trade-offs between the cost of higher value information and the need for stepped-up investment to further reduce the lack of access. This report contributes to the discussion by illustrating that the cost of enhanced information does not have to imply redirecting funds and other resources away from efforts to expand access to safe drinking water.

Challenges in global monitoring

The JMP measures "use of an improved drinking water source" as a proxy indicator for sustainable access to safe water. The definition of "improved sources" and "unimproved sources" is central to the JMP framework of methods and procedures and allows the generation of consistent datasets that are comparable for all countries over time. Consequently, this report examines this definition with respect to water safety and sustainability.

Water safety is affected by geogenic contamination of groundwater, pollution from industry and wastewater, poor sanitation, weak infrastructure, unreliable services, and the need for collection, transportation and storage in the home. This report investigates the quality of water from improved drinking water sources and examines the potential impact on coverage estimates and trends if drinking water safety is taken into account. It also outlines options to improve future monitoring strategies to address water safety.

Household water treatment and safe storage (HWTS) is one option for improving the quality of water for consumption within the home, especially where water handling and storage is necessary and recontamination is a real risk between the point of collection and point of use. Access to a distant source only, unreliable piped supplies and reliance on rainwater are all factors that make household storage a necessity. Living conditions in many humanitarian crises also call for effective HWTS. Consequently, the report explores the extent of the use of HWTS.

Sustainability and reliability of urban and rural water services are investigated to determine the extent to which improved drinking water sources provide sustainable access to safe water. Since currently there are limited data available, information is reviewed from a number of external sources. The relationship between water resource sustainability and climate change is also discussed.

The JMP is complementary to other monitoring mechanisms for water and sanitation, such as the UN-Water Global Annual Assessment of Sanitation and Drinking Water (GLAAS) and the Millennium Development Goals Country Status Overviews (MDGCSOs).

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The JMP provides global, regional and national statistics on populations' use of improved drinking water sources. Meanwhile, GLAAS responds to the challenge of identifying and monitoring bottlenecks in financial flows, policy frameworks, institutional arrangements and the human resource base at the national level. The MDGCSOs complement the JMP and GLAAS by providing guidance to countries to align their national priorities with global targets on water supply and sanitation, in terms of policy reforms, institutional change and resource allocation, and to link country efforts to existing supportive regional frameworks.

Current status and progress

Although the MDG drinking water target refers to sustainable access to safe drinking water, the MDG indicator – "use of an improved drinking water source" – does not include a measurement of either drinking water safety or sustainable access. This means that accurate estimates of the proportion of the global population with sustainable access to safe drinking water are likely to be significantly lower than estimates of those reportedly using improved drinking water sources.

Between 1990 and 2008, the proportion of the world's population with access to improved drinking water sources increased from 77% to 87%. This constitutes an increase of almost 1.8 billion people worldwide and puts the world well on track for meeting the MDG drinking water target of 89%. Despite this progress, it is estimated that in 2008, there were still 884 million people that did not use improved drinking water sources. At the current rate of progress, 672 million people will not use improved drinking water sources in 2015. It is likely that many hundreds of millions more will still lack sustainable access to safe drinking water.

The world is on-track to meet the MDG water target based on the indicator "use of an improved drinking water source"

…but, at the current rate of progress, this still will leave 672 million people without access to improved drinking water sources in 2015, and possibly many hundreds of millions more without sustainable access to safe drinking water.

Since 2008, the JMP has been reporting access estimates disaggregated into three main water source categories: piped water on premises, other improved drinking water sources and unimproved drinking water sources. For this report we have included further disaggregation which highlights some regional trends in the use of public taps and boreholes. Similarly, we have looked at regional trends in the direct use of surface water as the main drinking water source.

Piped water on premises	Other improved drinking water sources	Unimproved drinking water sources
Piped household connection located inside the user's dwelling, plot or yard	• Public taps or standpipes • Boreholes or tubewells • Protected dug wells • Protected springs • Rainwater collection	• Unprotected dug wells • Unprotected springs • Carts with small tank/drum • Tanker truck • Bottled water • Surface water (river, dam, lake, pond, stream, canal, irrigation channels)

Piped water on premises is the optimal service level, since it provides the most convenient supply and has positive impacts on health and hygiene, but in 2008 only 57% of the global population got its drinking water from a piped connection in the user's dwelling, plot or yard. In developing regions, this figure is 49%. Between 1990 and 2008, the proportion of the population in developing regions using piped drinking water on premises increased from 71% to 73% in urban areas and from 21% to 31% in rural areas.

Between 1990 and 2008 the proportion of the population in developing regions using unimproved drinking water sources decreased from 29% to 16%.

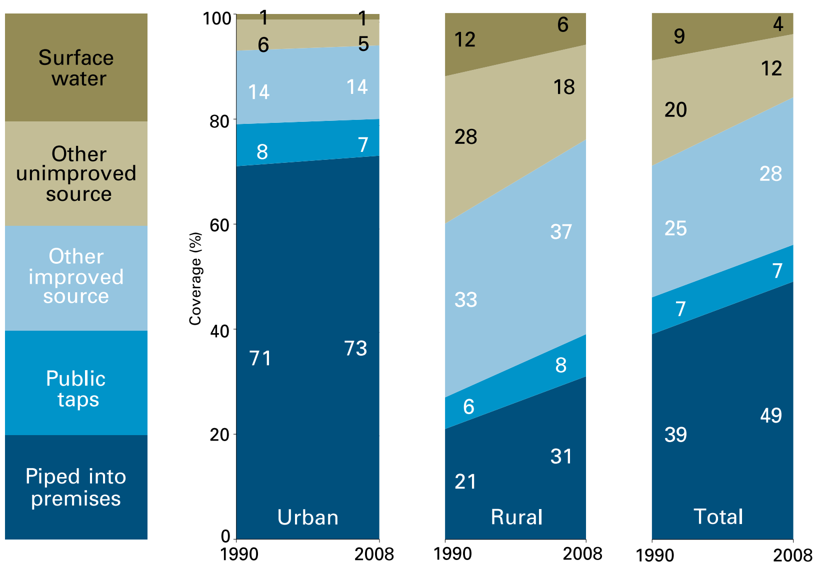

Figure 1. Proportion of the population using piped drinking water on premises, public taps, other improved drinking water sources, unimproved sources or surface water, developing regions, 1990-2008

The proportion of the population in developing regions using some form of piped drinking water supply (piped on premises or public taps) increased from 46% in 1990 to 56% in 2008. Meanwhile, the proportion of the population that uses other improved sources of drinking water increased in rural areas and remained static in urban areas of developing regions. This is of particular concern given the quality of water from wells, boreholes and springs (see section on water safety). The proportion of the population in developing regions using unimproved drinking water sources decreased from 29% to 16%. Use of surface water has declined significantly, but 6% of the rural population in developing regions still relied on surface water in 2008.

Table 1. Estimates of the population in developing regions relying on different types of drinking water sources, 2008[1]

Developing regions	Population (millions)					
Facility type	Urban	%	Rural	%	Total	%
Piped on premises	1,751	73%	929	31%	2,680	49%
Public tap/standpipe	161	7%	232	8%	393	7%
Borehole/tubewell	218	9%	1,026	34%	1,244	23%
Rainwater	12	0%	51	2%	63	1%
Dug wells	165	6%	434	13%	599	11%
Springs	40	2%	165	5%	205	4%
Tanker trucks/small carts with drum	48	2%	21	1%	69	1%
Surface water	15	1%	176	6%	191	4%
Total	2,410	100%	3,034	100%	5,444	100%
Bottled water*	143	6%	25	1%	168	3%

*Survey data show that most people who use bottled water as their main source of drinking water also have water piped onto premises as a secondary source. Bottled water users are counted under the category "piped on premises" in the table above.

In 2008, almost one quarter of the population in developing regions used boreholes or tubewells, making this category the second most commonly used technology after piped on premises. In rural areas it was the most common type of drinking water source.

More than half of the population in developing regions uses some form of piped drinking water supply.

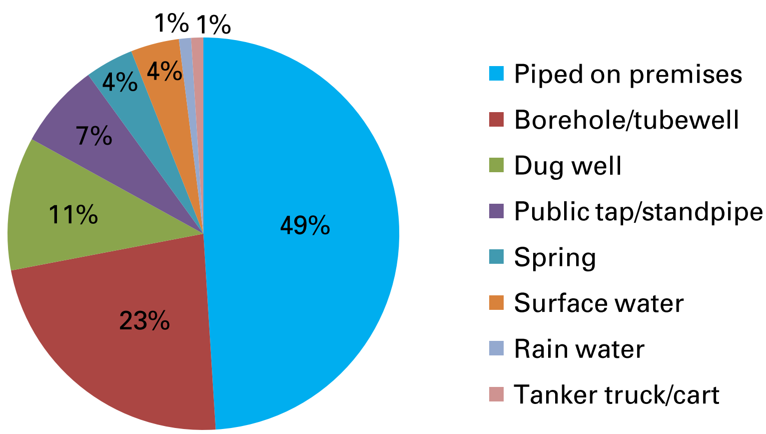

Figure 2. Proportion of the population using different drinking water source types, in developing regions, 2008

[1] Table 1 cannot wholly be compared to the usual JMP data as the usual data distinguish between bottled water, dug wells and springs that are improved and those that are unimproved.

External drivers

The world's population has increased by almost 1.5 billion people since 1990; 94% of this growth has occurred in developing regions. Sub-Saharan Africa has seen the greatest proportional population growth at 59%, while Western Asia, Oceania, Southern Asia, South-Eastern Asia, and Latin America and the Caribbean have all seen increases of 30% or more.

Some countries are failing to increase access to improved drinking water sources in line with population growth. For example, 12 countries (mainly in Sub-Saharan Africa) have each seen an increase of more than 1 million people in the absolute number of people without access since 1990, despite making significant progress in providing drinking water to millions more people and seeing increases in proportional coverage between 1990 and 2008.

In addition to population growth, the process of rapid urbanization presents challenges to increasing access to improved drinking water. The proportion of the world's population that lives in urban areas has increased from 43% in 1990 to 50% in 2008. Worldwide, the number of urban dwellers who gained access to improved drinking water between 1990 and 2008 was 1.052 billion, while the total urban population increased by 1.089 billion. The growth of informal settlements and poor environmental sanitation hinder efforts to increase access to safe drinking water in urban areas.

Climate change is likely to lead to increased water stress, meaning that drinking water requirements will face increasing demand from competing uses of water such as agriculture and industry. An increased prevalence of extreme weather events and climate-related natural disasters could result in an increased loss of functioning infrastructure. The combined effects of climate change are likely to provide significant challenges in advancing progress towards the MDG water target, which will have to be overcome by adaptation aimed at enhancing the resilience of systems and services in line with plausible climate change scenarios.

In addition to these external drivers, there are important political drivers that have shaped the current situation. For example, the 2010 GLAAS report indicates that almost two-thirds of total official development assistance (ODA) for drinking water and sanitation is targeted to the development of large systems (WHO, 2010). This demonstrates an emphasis on sophisticated urban systems that do not necessarily represent optimal investment for maximum coverage with attention to those in greatest need. In addition, only 42% of ODA for drinking water and sanitation is targeted at least developed countries and other low-income countries (WHO, 2010), which are those that are struggling the most with access to drinking water and sanitation.

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Equity and water

On 28 July 2010, the UN General Assembly adopted Resolution 64/292 recognizing that safe and clean drinking water and sanitation is a human right essential to the full enjoyment of life and all other human rights. It called on United Nations Member States and international organizations to offer funding, technology and other resources to help poorer countries scale up their efforts to provide clean, accessible and affordable drinking water and sanitation for everyone. The General Assembly voiced deep concern that "almost 900 million people worldwide do not have access to clean water". The formulation of this latter statement, quoting JMP data but misquoting the accompanying indicator, illustrates once again that there is confusion and misunderstanding about the indicator used for the MDG target. The indicator "use of an improved drinking water source" does not necessarily mean access to "clean water".

At its 15th session in September 2010, the UN Human Rights Council, in its Resolution A/HRC/RES/15/9, affirmed that the right to water and sanitation is derived from the right to an adequate standard of living and inextricably related to the right to the highest attainable standard of physical and mental health, and the right to life and human dignity. Human rights principles define various characteristics against which the enjoyment of the right can be assessed, namely: availability, safety (with reference to the WHO Drinking Water Quality Guidelines), acceptability, accessibility, affordability, participation, non-discrimination and accountability. This Resolution was re-affirmed with further details in March 2011.

The use of national averages in monitoring progress towards the MDGs does not necessarily show the real picture of development, since inequalities exist across many dimensions within countries. Progress at the national level usually masks the situation of poor and traditionally excluded households. Given that access to safe drinking water is now acknowledged as a human right, the importance of monitoring equity in that access is increasingly recognized.

This report addresses equity by investigating disparities in the use of improved drinking water sources by national income category, by region, between rural and urban populations, and by wealth quintile. Gender dimensions of inequity are also illustrated through an examination of water collection practices.

Global disparities

The proportion of the population that uses improved drinking water sources varies significantly by country and region. It is clear that Sub-Saharan Africa is not on track to meet the target; in 2008 40% of the total population still lacked access to improved drinking water sources, as compared to 51% in 1990.

Sub-Saharan Africa faces the greatest challenge in increasing the use of improved drinking water sources.

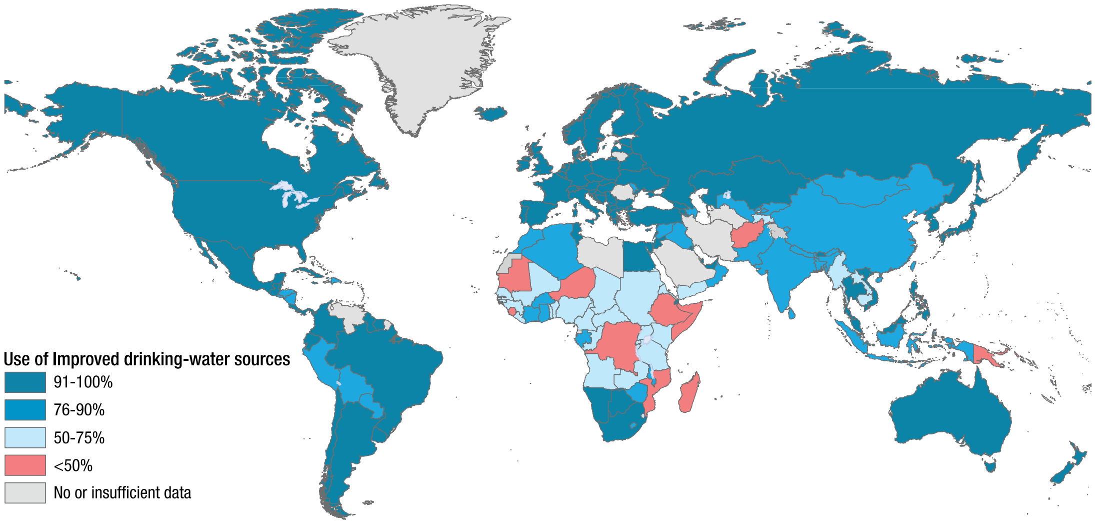

Figure 3. Worldwide use of improved drinking water sources in 2008

Sub-Saharan Africa, Southern Asia and South-Eastern Asia face the greatest challenges in providing piped water on premises.

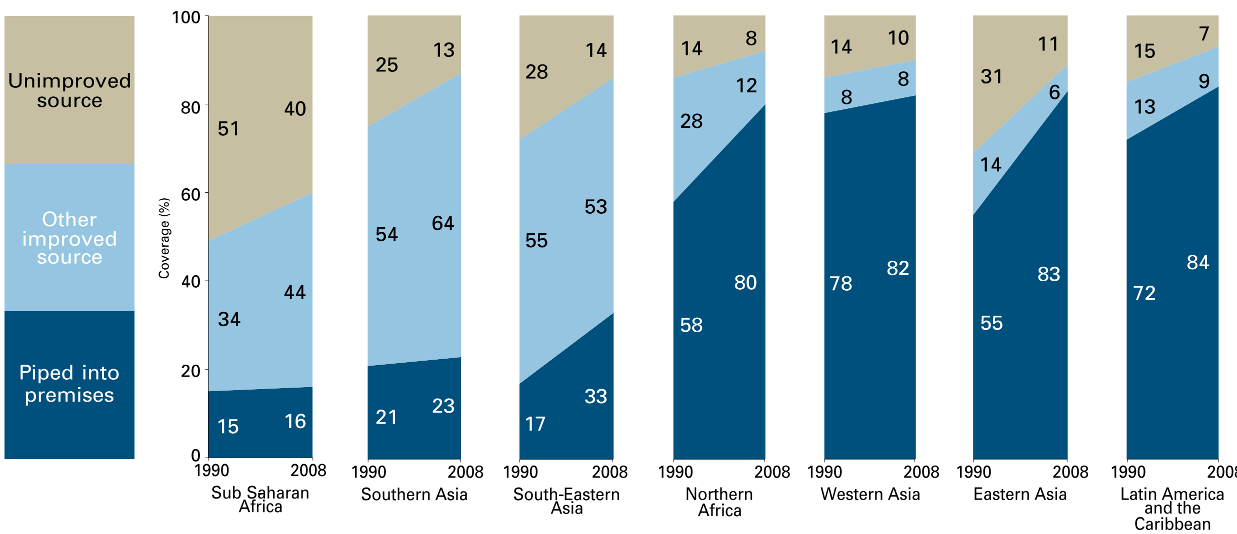

Figure 4. Proportion of the population using piped drinking water on premises, other improved drinking water source or an unimproved source, by MDG region, 1990 and 2008

Of the estimated 884 million people without access to improved sources of drinking water in 2008, 37% live in Sub-Saharan Africa, 25% in Southern Asia, 17% in Eastern Asia and 9% in South-Eastern Asia. Use of piped water on premises is lowest in Sub-Saharan Africa, Southern Asia and South-Eastern Asia.

Of particular concern among those people without access to improved drinking water sources are those who rely on surface water sources. Such sources include rivers, dams, lakes, ponds and canals, and are often the most susceptible to pollution and most likely to have poor water quality. Since 1990, use of surface water sources has decreased significantly and accounts for only a small proportion of drinking water sources in most regions. For example, only 2% of the rural population in Southern Asia and 5% of the rural population in South-Eastern Asia use surface water sources. In contrast, in Sub-Saharan Africa 20% of rural dwellers still rely on surface water sources.

In Sub-Saharan Africa, access to piped water supplies has decreased in urban areas and one-fifth of people in rural areas still rely on surface water.

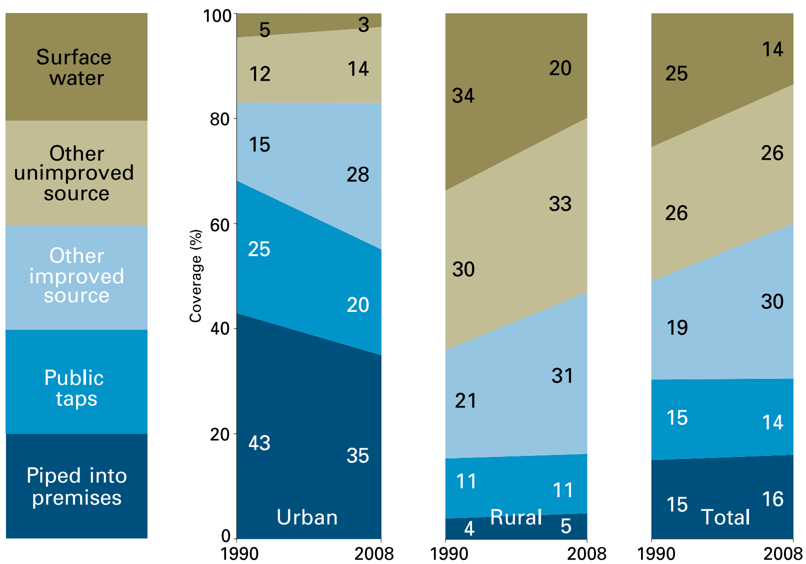

Figure 5. Trends in drinking water coverage, Sub-Saharan Africa, 1990-2008

Between 1990 and 2008, the urban population in Sub-Saharan Africa more than doubled. While overall urban coverage levels have stayed just above 80%, access to piped supplies decreased by 13 percentage points from 68% in 1990 to 55% in 2008. Still, over half of the 126 million urban dwellers that gained access did so through using piped supplies on premises (42 million) and public taps (23 million).

Since 1990, total access in Sub-Saharan Africa has significantly increased, from 49% to 60%, reaching 126 million additional people in urban and 111 million in rural areas. At the same time, the number of people in rural areas relying on surface water declined by 22 million from 34% in 1990 to 20% in 2008.

In Sub-Saharan Africa, population growth outstripped the number of people gaining access to improved drinking water sources between 1990 and 2008.

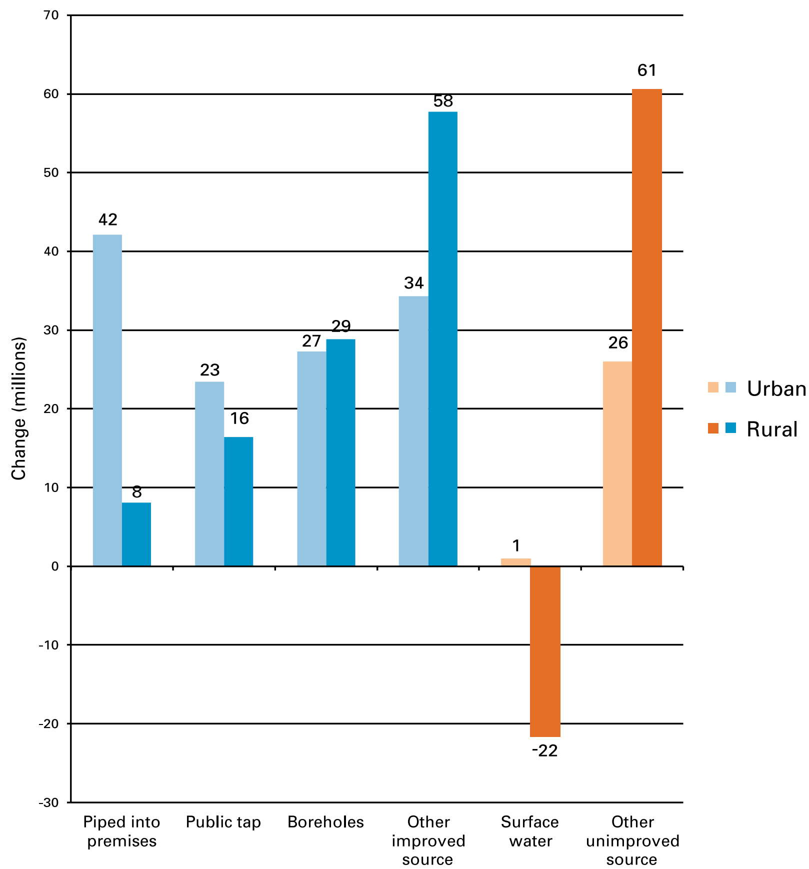

Figure 6. Change in population using different drinking water sources, Sub-Saharan Africa, 1990-2008

However, the population growth in Africa, which is the highest of all regions, outstripped the number of people gaining access. According to the estimates of the UN Population Division the population in Sub-Saharan Africa grew by 304 million people over the period 1990-2008, while only 237 million gained access to improved drinking water. As a result, the population using unimproved drinking water sources increased by 27 million in urban areas and 39 million in rural areas.

Of the 48 countries that are classified as least developed countries (LDCs), 32 are in Sub-Saharan Africa. Globally, only 42% of official development assistance for drinking water and sanitation is targeted to low-income countries. This is reflected in the limited progress in accelerating access to safe drinking water made by LDCs and other low-income countries (OLICs) since 1990 (WHO, 2010).

LDCs have seen an increase of only 7 percentage points (from 54% to 61%) in the use of improved drinking water sources and OLICs have seen an increase of 11 percentage points (from 68% to 79%). Meanwhile, lower middle income countries (LMICs) saw an increase of 16 percentage points (from 72% to 88%) and upper middle income countries (UMICs) saw an increase of 8 percentage points (from 88% to 96%).[2]

[2] LDCs, OLICs, LMICs and UMICs as classified in OECD (2010).

Progress has been slowest in least developed countries and other low-income countries, while middle income countries have already more than halved their 1990 proportion of the population without access.

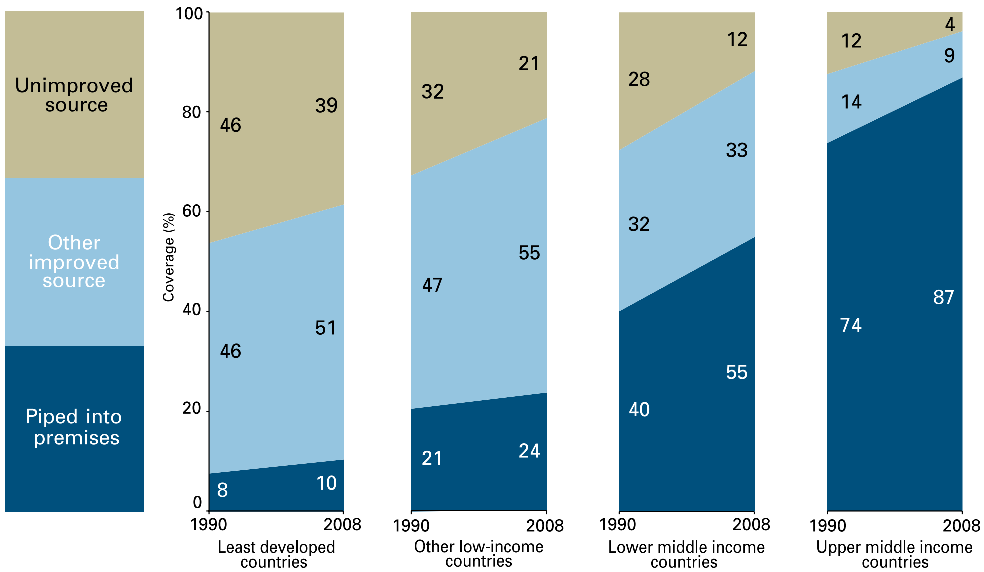

Figure 7. Proportion of the population using piped drinking water on premises, another improved drinking water source or an unimproved source, by country income level category, in 1990 and in 2008

Only 42% of aid is targeted at least developed countries and other low-income countries.

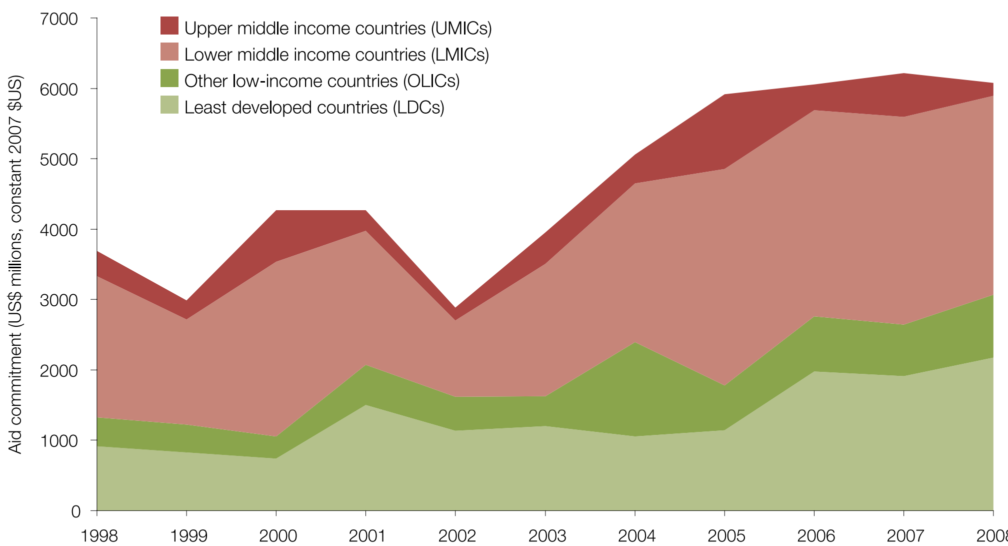

Figure 8. Trends in drinking water and sanitation commitments by recipient income level category, 1998-2008 (Source: WHO, 2010)[3]

[3] Data are available for 1998 to 2008 only.

Rural-Urban disparities

Strong progress made in rural areas between 1990 and 2008 has led to an overall reduction in the number of people without an improved drinking water source in developing regions by 346 million. Despite the fact that the overwhelming majority (84%) of the global population without access to an improved drinking source lives in rural areas, more people in urban areas gained access than did in rural areas (949 million vs. 728 million). The rural challenge remains daunting and, at this pace, it will take considerable time and effort to cover the remaining 726 million without access to an improved drinking water source, and to ensure continued access for those who have. Of the 949 million urban dwellers that gained access since 1990, three out of four people gained access to a piped supply on premises.

84% of the population without an improved drinking water source lives in rural areas.

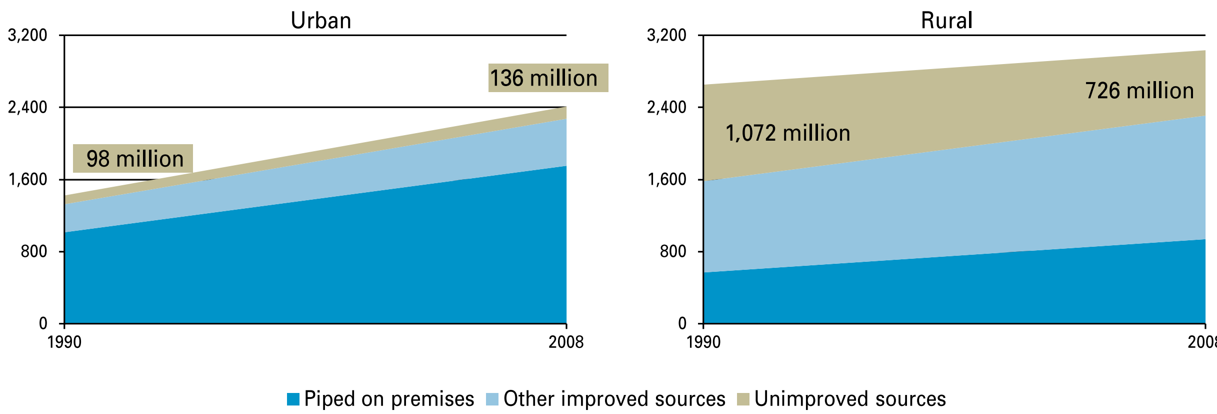

Figure 9. Urban and rural drinking water coverage trends in developing regions, 1990-2008, by population

With the exception of Western Europe, where there is parity, in almost all countries of the world access to improved drinking water sources is less, in relative terms, in rural areas than in urban areas. Although the gap between urban and rural areas has narrowed considerably since 1990, there are still significant disparities across many regions and countries.

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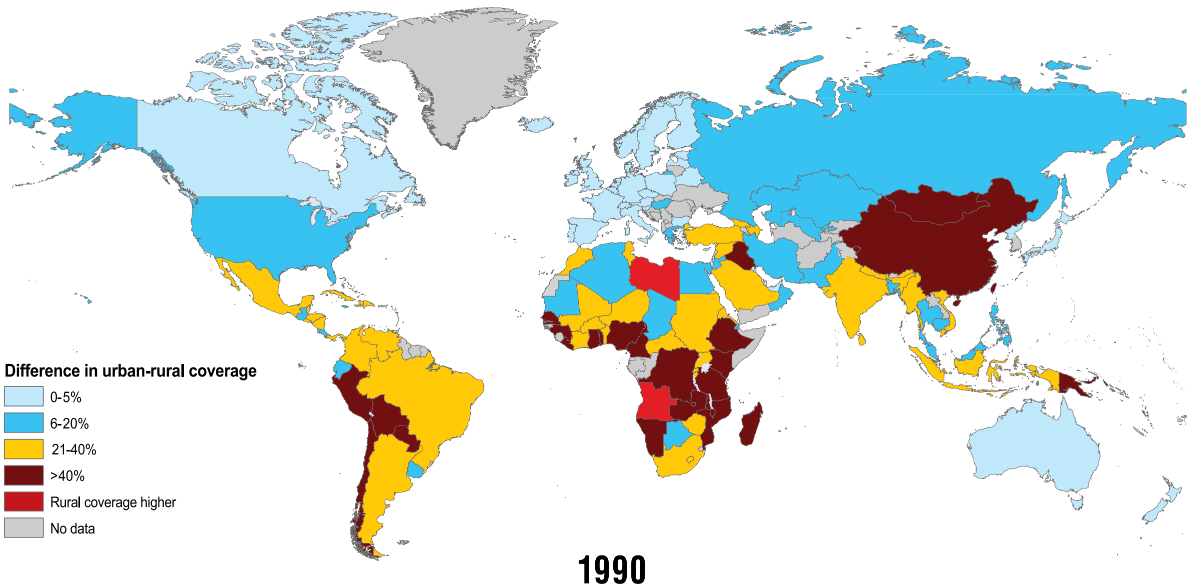
There are 25 countries in Sub-Saharan Africa in which the percentage point gap between use of improved drinking water in urban and rural areas is more than 25%. In seven countries – Congo, Democratic Republic of Congo, Ethiopia, Gabon, Niger, Sierra Leone and Somalia – it is more than 50%.

In other regions urban-rural disparities are less marked but there are several countries in which the percentage point gap is more than 25%. These include Bolivia, Colombia, Nicaragua, Paraguay and Peru in Latin America, as well as Afghanistan, Iraq, Mongolia, Morocco, Papua New Guinea and Tajikistan in other regions.

The use of improved drinking water sources is less in rural areas than in urban areas in all developing regions, but the gap has narrowed since 1990.



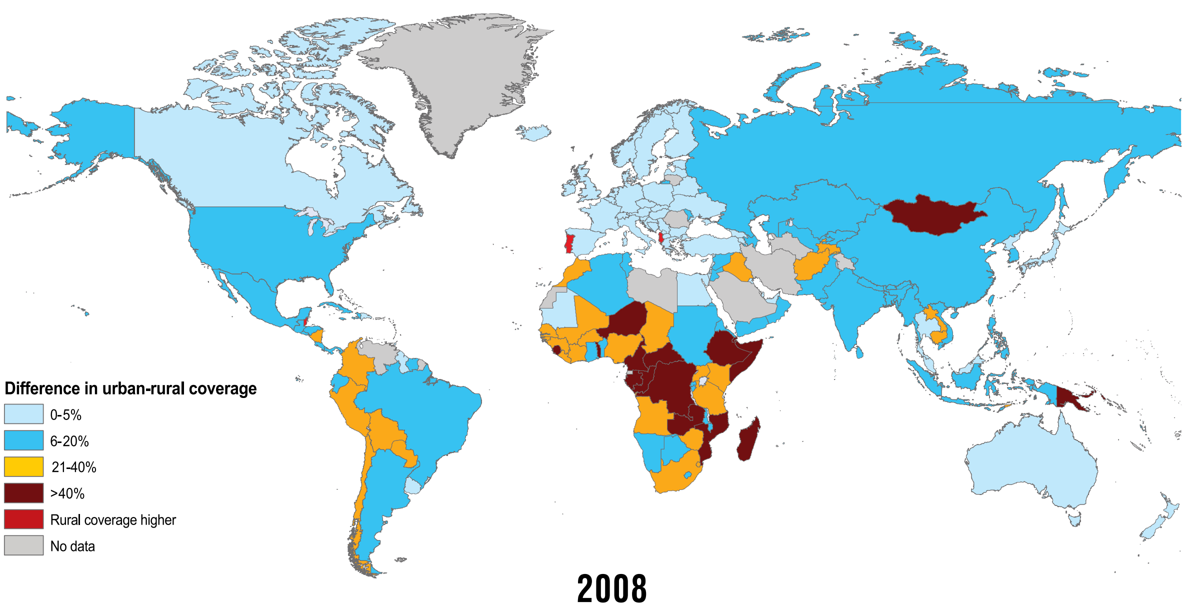


Figure 10. The number of percentage points by which the use of improved drinking water in rural areas lags behind that in urban areas, worldwide, 1990 and 2008

Since 1990, twice as many people in urban areas of the developing regions have gained access to piped water than in rural areas.

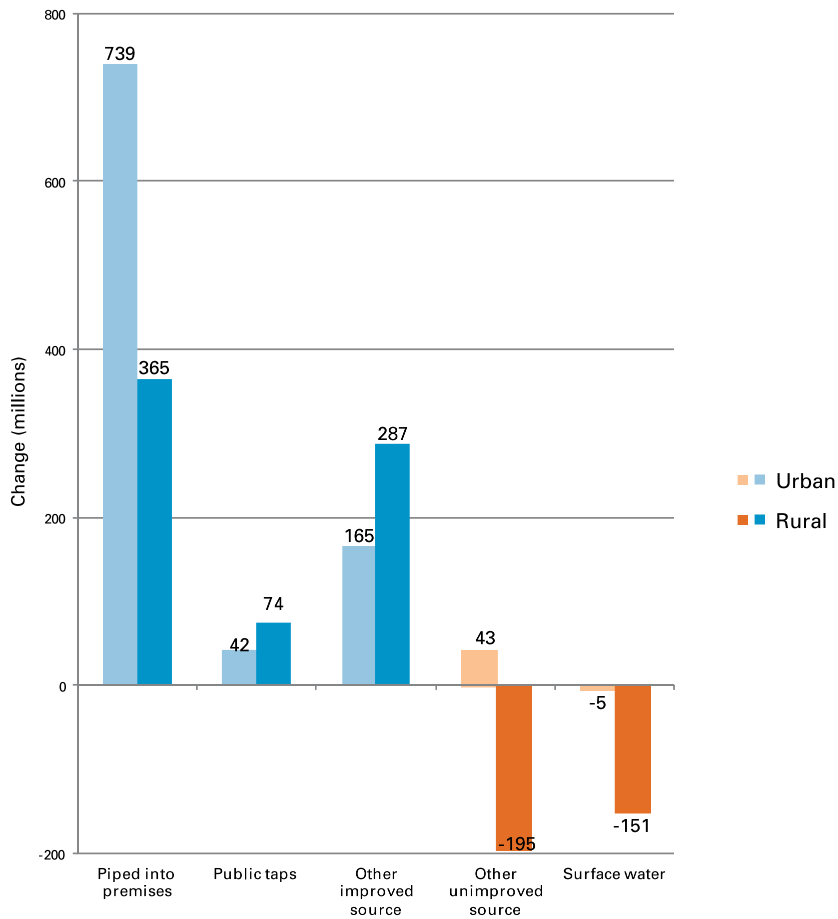


Figure 11. Change in the population using different drinking water sources, 1990-2008, developing regions

In urban areas of developing regions, between 1990 and 2008, 739 million people gained access to piped water on premises and 42 million gained access to public taps. During the same period, in rural areas (which account for 56% of the total population in developing regions), 365 million people gained access to piped water on premises, and 74 million people gained access to public taps.

Since 1990, 165 million people in urban areas and 287 million people in rural areas of the developing world gained access to other improved drinking water sources. The overall number of people without access to an improved drinking water source increased by 38 million in urban areas and decreased by 346 million in rural areas. The use of surface water has declined significantly, especially in rural areas.

Drinking water coverage in rural areas lags behind urban areas in all regions and disparities are greatest in Oceania, Sub-Saharan Africa and Western Asia

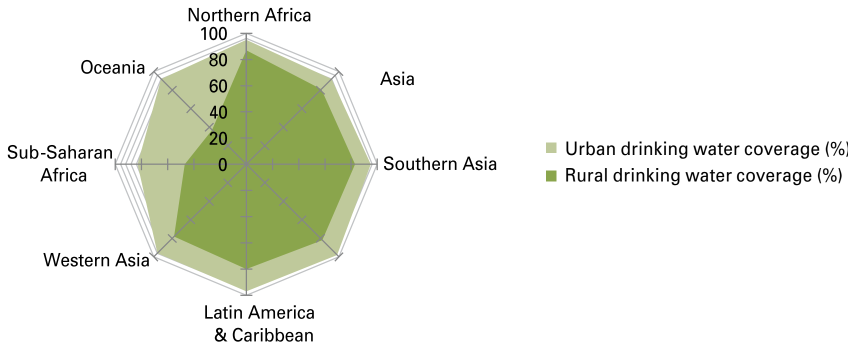


Figure 12. Urban-Rural disparities in use of improved drinking water, by region, 2008

Aid for basic drinking water and sanitation systems declined from 27% to 16% of total ODA for drinking water and sanitation between 2003 and 2008.

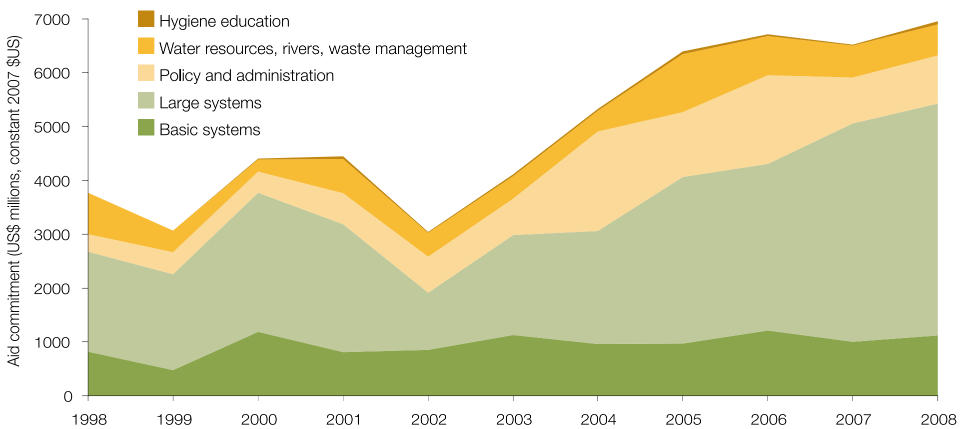


Figure 13. Trends in aid commitments to drinking water and sanitation, among purpose types, 1998-2008 (Source: WHO, 2010)

Despite the fact that rural coverage significantly lags behind urban coverage in all regions, and especially in sub-Saharan Africa, aid commitments for basic systems, which are targeted mainly at rural populations, declined from 27% to 16% of total ODA for drinking water and sanitation over the five years leading up to 2008 (in absolute terms, the amount contributed remained stable). Meanwhile, ODA for large systems increased from US$ 2.6 billion to US$ 4.3 billion from 2000 to 2008 (WHO, 2010).

Basic drinking water systems are defined as the provision of drinking water through low-cost technologies such as handpumps (installed on boreholes, tubewells or dug wells), spring catchment, gravity-fed systems, rainwater collection, storage tanks and small distribution systems. Large systems include infrastructure with a series of components: intakes, storage facilities, treatment, pumping stations, conveyance and distribution systems, or sophisticated technology such as desalination plants. Most rural populations in low-income countries rely heavily on basic systems, and if the trend continues rural areas may fall even further behind urban areas.

Social disparities

The gap between the richest and poorest in the use of drinking water sources differs significantly by region and country. However, in all developing regions access to improved drinking water sources increases with wealth, and access to piped water on premises is much higher among the richest quintiles.

The richest 20% in Sub-Saharan African countries are over twice as likely to use an improved drinking water source as the poorest 20%.

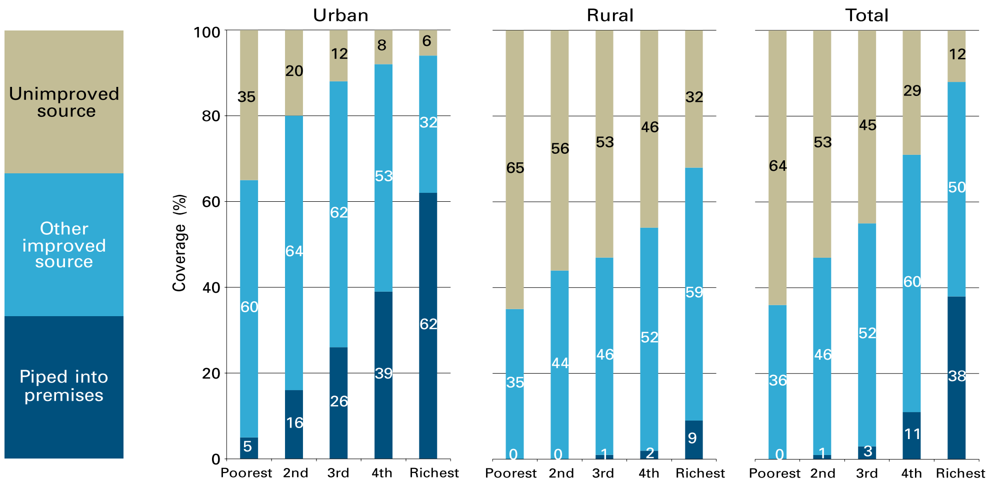


Figure 14. Proportion of the population of Sub-Saharan Africa using drinking water piped on premises, another improved drinking water source or an unimproved source, by urban, rural and total wealth quintiles[4]

Some regions where a relatively high percentage of the population uses improved drinking water sources, such as the Commonwealth of Independent States and Latin America and the Caribbean, include countries with significant disparities between wealth quintiles. In Haiti there is a gap of 56 percentage points between the richest and poorest quintiles, while in Bolivia the gap is 41 percentage points. In Turkmenistan and Tajikistan the gap between the richest and the poorest is 37 and 48 percentage points respectively.

Regional averages mask socio-economic disparities in access to improved drinking water sources within countries.

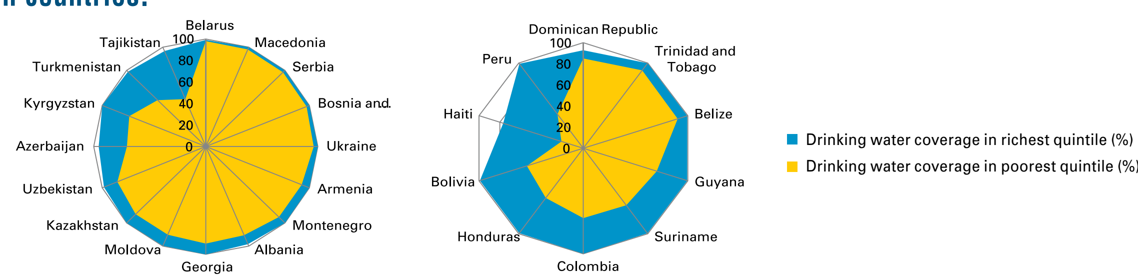
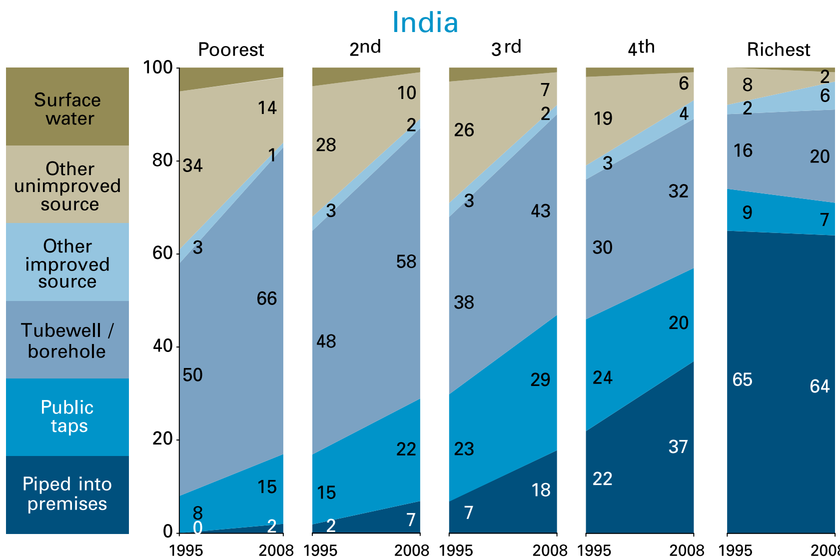


Figure 15. Gap between richest and poorest quintiles in proportion of population that uses an improved drinking water source, for selected countries in Latin America and the Caribbean and in the Commonwealth of Independent States[5]

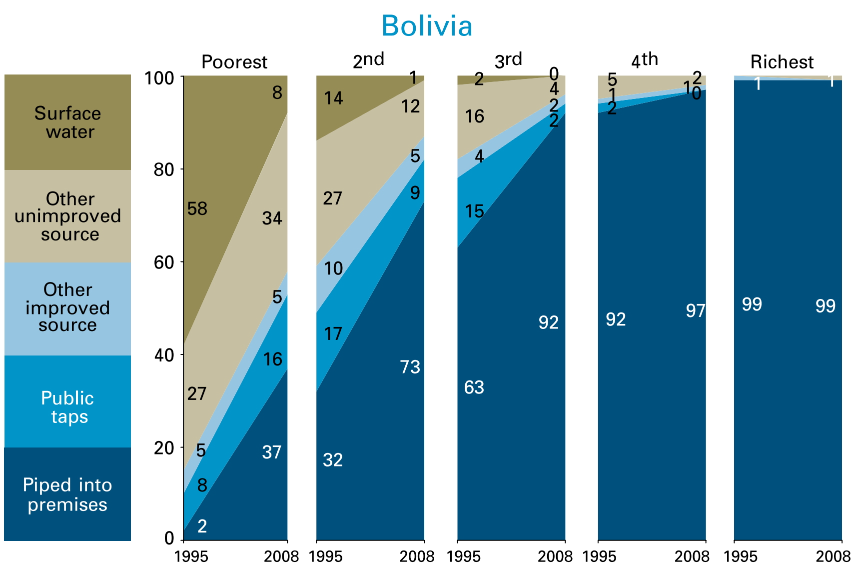
[4] The regional estimates by wealth quintile presented are population weighted aggregates of coverage by wealth quintiles of 33 countries in sub-Saharan Africa representing 79% of the regional population. The lowest quintile does therefore not represent the poorest 20% of the population of Sub-Saharan Africa. The asset index used to classify households into wealth quintiles has not been adjusted for the drinking water variable.
[5] The asset index used to classify households into wealth quintiles has not been adjusted for the drinking water variable.

Progress in access to improved drinking water sources shows different patterns across quintiles, but in all countries the poorest have the lowest level of service.

In India, progress in access to improved drinking water sources has been equity neutral. Coverage levels have increased significantly across all quintiles. The majority of the richest quintile, however continues to use piped water on premises, whereas an increasing number of the poorest rely on boreholes with handpumps.



Source: India NFHS 1993, 1996, 2006



Source: Bolivia DHS 1994, 1998, 2003, 2008

In Bolivia, the population in the richest two quintiles already enjoyed high levels of services. Despite significant increases in the use of improved drinking water sources among the poorest two quintiles, the richest are still twice as likely to have access as the poorest.

Figure 16. Trends in the proportion of the population using different drinking water sources, by wealth quintile, India and Bolivia, 1995 and 2008[6]

Perhaps the greatest disparity between the rich and the poor is in the amount paid for water in urban areas. The urban poor pay many times more for a litre of water than their richer neighbours, since they often have to buy their water from private vendors (UN Water, 2010). The increase in the total number of urban dwellers without access to improved drinking water, which includes those who rely on water from carts and tankers, means that more people may be forced to pay extortionate prices for drinking water.

[4] Wealth quintile data are available from 1995 only. The asset index used to classify households into wealth quintiles has not been adjusted for the drinking water variable.

In considering equity in access to drinking water it is important to consider its gender dimensions. In almost three-quarters of households without access to drinking water on premises, women and girls have the primary responsibility for collecting water. In some countries the proportion is more than 90%. This creates significant burden, especially when the time taken to collect water is considerable. It may also result in girls missing school.

Women and girls shoulder the largest burden in collecting water.

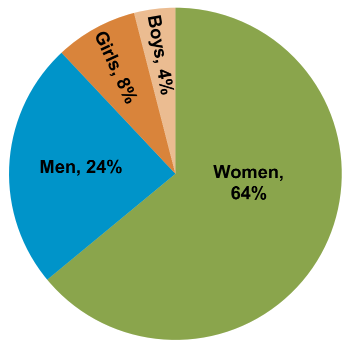


Figure 17. Gender distribution of those who usually collect drinking water within households without access to drinking water on the premises.

Research has shown that those spending more than half an hour per round trip progressively collect less water, and eventually fail to meet their families' minimum daily drinking water needs (Cairncross & Feachem, 1993; Hutton & Haller, 2004). In such cases the quantity of water collected is often less than 5 litres per person per day which is not sufficient for good hygiene practices such as handwashing (Howard & Bartram, 2003). Time to collect drinking water can, therefore, be viewed from both a gender and a health perspective.

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The MDG indicator does not take into account time taken to collect water. If the time needed to collect water was considered when determining whether a source is "improved" or not, access to improved drinking water would be significantly lower than is currently reported. In Sub-Saharan Africa, where water collection times of more than 30 minutes are most common, drinking water coverage drops by eight percentage points when taking time-to-source into account as a measure of access.

In 14 countries in Sub-Saharan Africa more than a quarter of the population takes longer than 30 minutes to make one water collection round trip. In many cases they will make more than one water collection trip per day.

More than a quarter of the population in several countries in Africa takes longer than 30 minutes to make one water collection round trip.

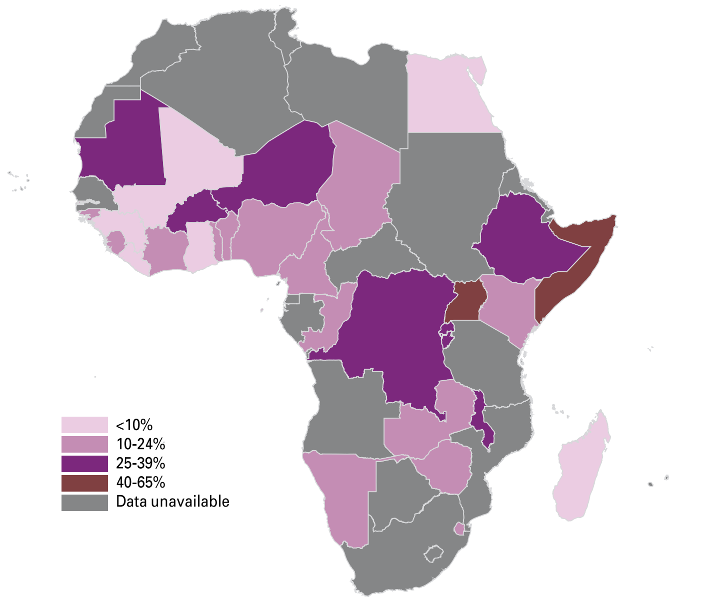

Figure 18. Percentage of population that spends more than 30 minutes on a water collection trip, Africa

Drinking water coverage in Sub-Saharan Africa drops by eight percentage points when taking time--to-source into account as a measure of access.

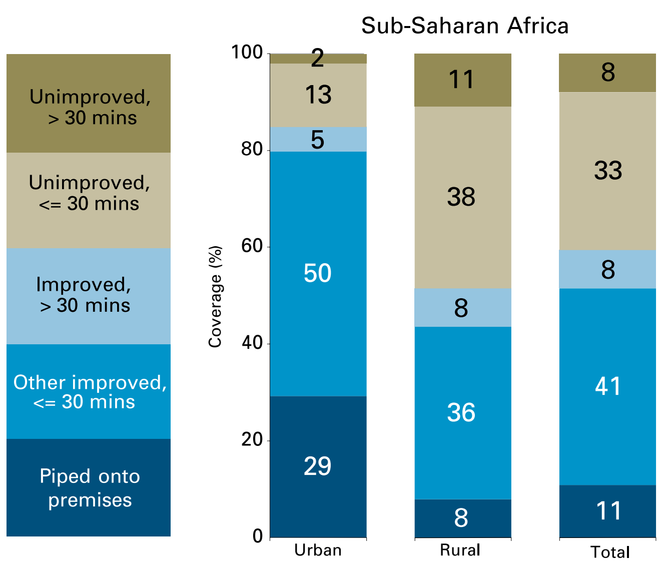

Figure 19. Proportion of the population using piped water on premises, spending half an hour or less, or more than half an hour, to collect water from an improved or unimproved source, Sub-Saharan Africa[7]

[7] This graph is based on an analysis of all available MICS and DHS surveys for a representative sample of countries with more than two available MICS or DHS survey reports with data on the time taken to collect water. The graphs should, therefore, not be compared to the usual JMP estimates, which are calculated using a wider range of survey data.

In Sub-Saharan Africa, the need to spend more than 30 minutes on a water collection round trip is significantly more common in rural areas than in urban areas. In rural areas, almost one in five households spends more than 30 minutes, and over half of these still draw water from an unimproved source. Not surprisingly the urban poor are much more likely to spend time collecting water than their richer neighbours who are three times more likely to have a piped supply on premises. It is not uncommon for people in poor densely populated areas to spend long periods of time queuing at public taps to fill their water containers.

Time to collect water is higher in rural areas than in urban areas across wealth quintiles in Sub-Saharan Africa.

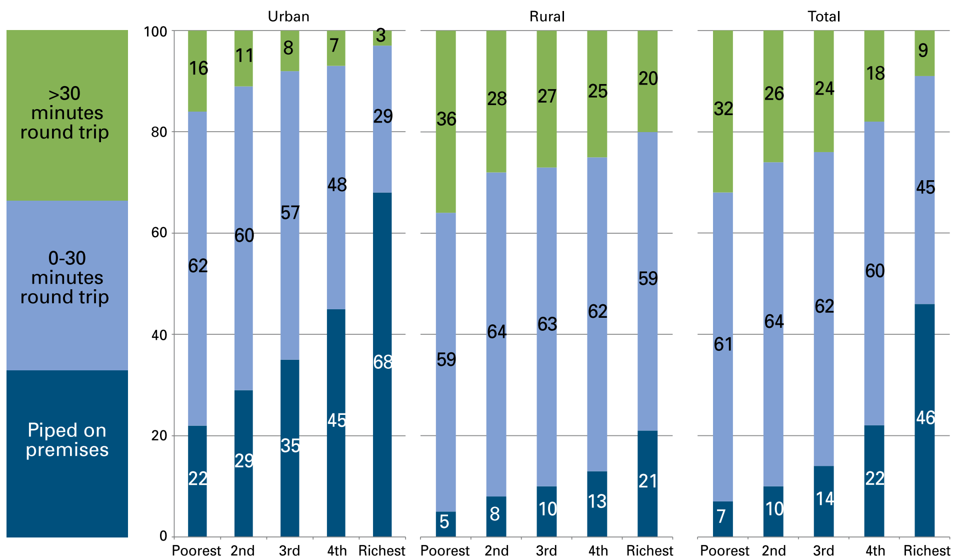

Figure 20. Proportion of the population using piped water on premises, spending half an hour or less, or more than half an hour, to collect water from any source, by urban, rural and total wealth quintiles, Sub-Saharan Africa[8]

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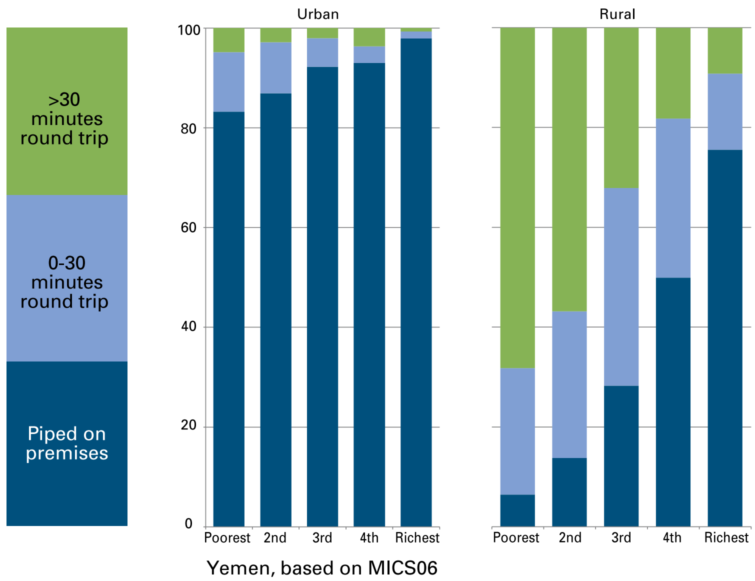
Outside of Sub-Saharan Africa the need to spend more than 30 minutes to make one water collection round trip is far less common. However, in rural areas of arid countries such as Mongolia and Yemen it is a significant issue.

In Yemen, access to a piped drinking water supply on premises for the population in the richest rural quintile is still lower than that of the population in the poorest urban quintile. More than 60% of the population in the poorest two rural quintiles spends more than 30 minutes per water collection round trip.

In Mongolia, only the population in the top two urban quintiles enjoys the benefits of a piped drinking water supply on premises. More than 20% of the rural population spends over 30 minutes per water collection trip, with higher proportions in the poorest quintiles.

[8] This graph is based on analysis of the latest available (2005-2009) MICS and DHS survey from 31 countries representing 75% of the population in Sub-Saharan Africa. The regional trends by wealth quintile presented are weighted averages of each of the quintiles of the countries represented in the graph. The lowest quintile does therefore not represent the poorest 20% of the population of Sub-Saharan Africa. The asset index used to classify households into wealth quintiles has not been adjusted for the drinking water variable.

In arid countries, such as Yemen and Mongolia, the need to spend more than 30 minutes to make one water collection trip is a distinctly rural feature which disproportionately affects the poorest.



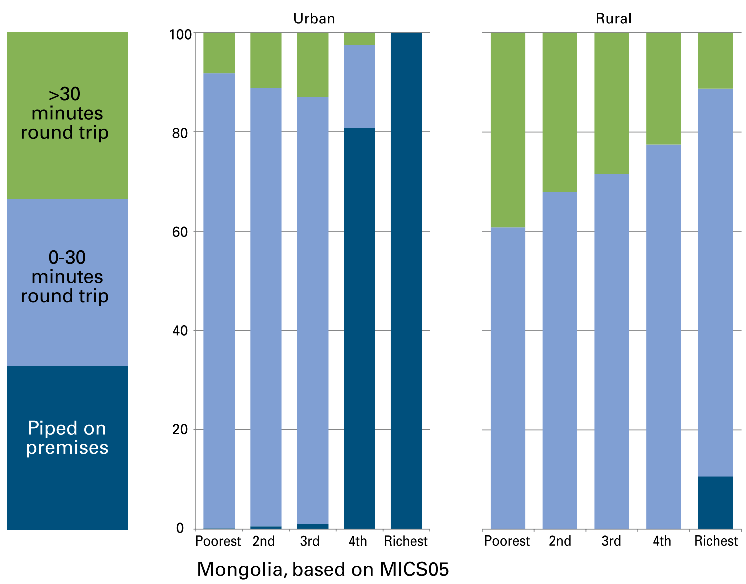
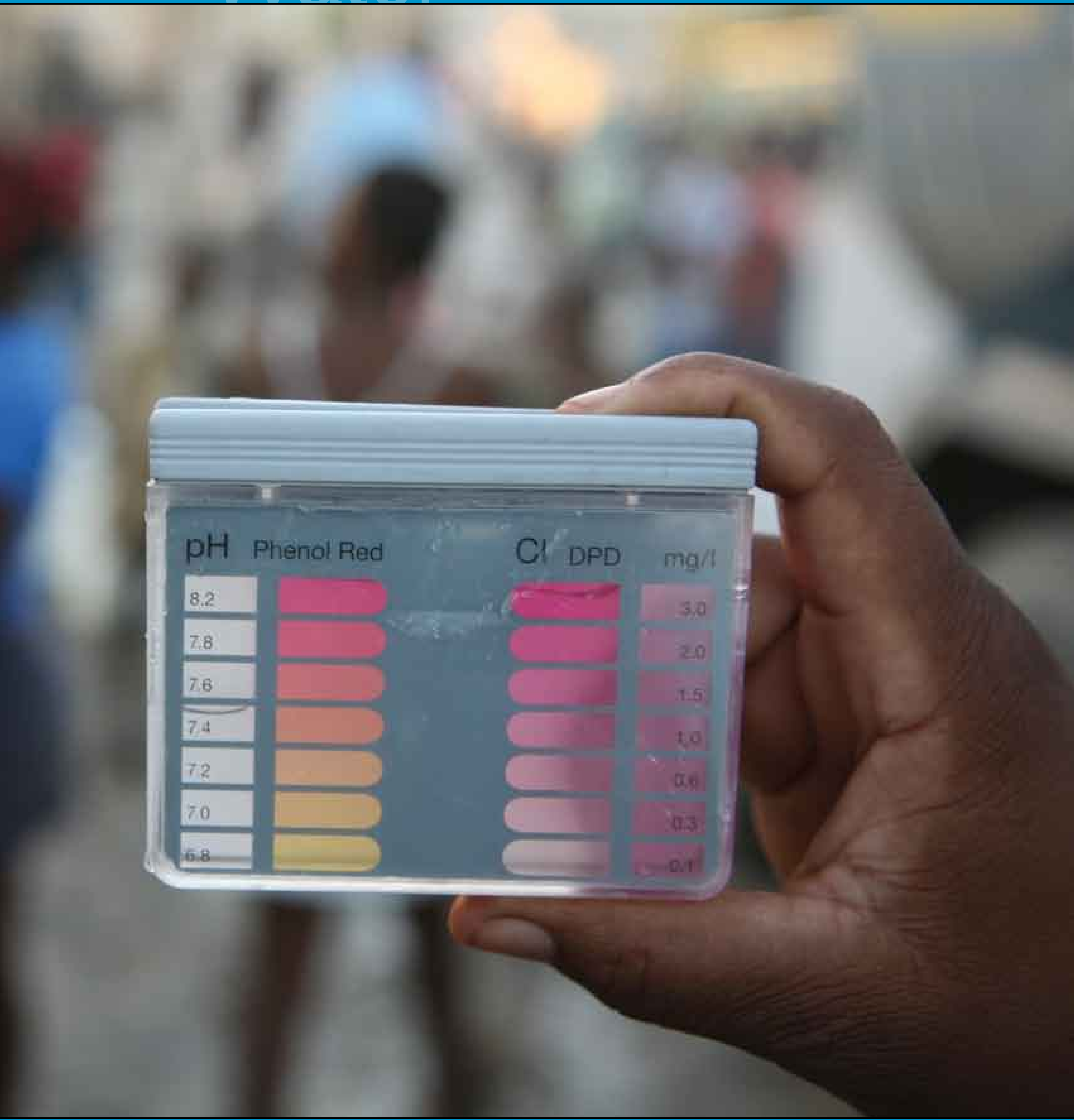


Figure 21. Proportion of the population using water on premises, spending half an hour or less, or more than half an hour, to collect water from any source, by urban and rural wealth quintile, Yemen and Mongolia[9]

Most often, women and girls have the primary responsibility for collecting drinking water. Therefore, they are burdened most by lengthy collection times. Poor women living in rural areas, especially in Sub-Saharan Africa, are disproportionately affected.

[9] The asset index used to classify households into wealth quintiles has not been adjusted for the drinking water variable.

Drinking Water



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Water safety

For a lack of historic time series of reliable nationally representative drinking water quality data, the JMP cannot report on the actual water safety aspect of the MDG drinking water target. The proxy indicator used in the global survey methodology – "use of improved drinking water sources" – does not guarantee that the quality of drinking water consumed by people meets the standards for safe drinking water as proposed in the WHO Guidelines for Drinking water Quality (WHO, 2011). Pollution from domestic and industrial sources, geogenic contamination, and poor sanitation and hygiene all threaten the safety of drinking water sources. In recognition of these threats, many drinking water supply operators and regulators are adopting an integrated risk assessment and management approach that takes risk spots and events into account along the chain of events from source to tap. Strategies include quantitative microbial risk assessment (QMRA), sanitary inspections, the application of health-based targets and water safety plans (WSPs).

The practice of household water treatment and safe storage (HWTS) can help improve water quality at the point of consumption, especially when drinking water sources are distant, unreliable or unsafe. However, HWTS is a stopgap measure only and does not replace the obligation of a service provider to provide access to safe drinking water. It is intended for people who have no access to improved drinking water sources at all, for people with access to improved sources outside of their home or premises (i.e. when contamination can occur during transport and storage), for people with unreliable piped supplies who have to store water to bridge the gaps between deliveries, and for people in emergency situations.

People relying on unimproved drinking water sources who apply an appropriate household water treatment method are still not considered to have sustainable access to safe drinking water. Doing so would absolve the providers of their responsibility to provide safe drinking water and in effect transfer this responsibility to consumers.

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Water safety of improved sources

Between 2006 and 2010, the JMP piloted the Rapid Assessment for Drinking Water Quality (RADWQ) approach to test water quality compliance of improved drinking water sources and explore possibilities to supplement current monitoring with nationally representative water quality information.

RADWQ applies a multi-stage cluster sampling approach to select a nationally representative sample of improved drinking water sources across a country. The selected sources are then tested for relevant drinking water quality parameters and a sanitary risk inspection is carried out for each source. The main parameters measured in the pilot were thermotolerant coliforms, arsenic, fluoride, nitrate, iron, turbidity, conductivity, and free/total chlorine (for piped supplies only). A small proportion (10%) of sources was also tested for faecal streptococci and household piped supplies were also tested for copper.

The output of a RADWQ survey is a measurement of the drinking water safety of each drinking water source tested, in terms of microbial contamination, chemical contamination and health risk. Overall findings are presented in terms of compliance to values proposed in the WHO Drinking-water Quality Guidelines (at the time of the RADWQ pilots: WHO, 2004; fourth edition published in 2011). RADWQ provides a nationally representative 'snapshot' of water quality. It is also an assessment that is valid in the longer term as it provides information on the risk of pollution and specific upgrading needs of water supplies, using sanitary risk.

The RADWQ pilot was completed in five countries: Ethiopia, Jordan, Nicaragua, Nigeria and Tajikistan. Findings are reported as the proportion of improved water sources meeting compliance standards by country and technology. Microbiological contamination was recorded in all five countries; fluoride contamination was recorded in water supplies in four countries; arsenic was confirmed in one country.

Across countries, on average one in two protected dug wells was contaminated and one in three protected springs and boreholes were contaminated.

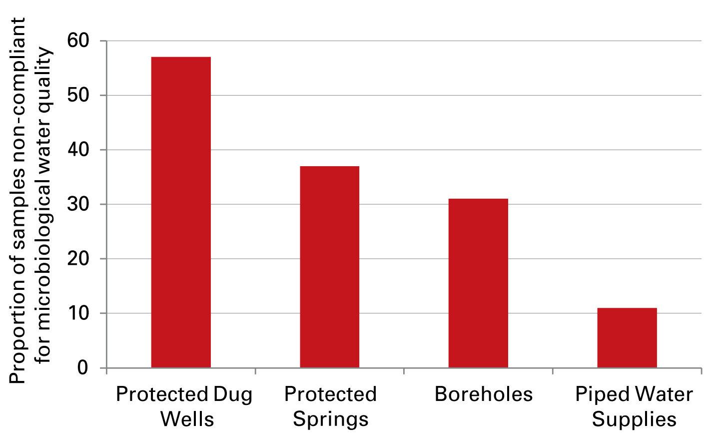

Figure 22. Non-compliance with microbiological water quality guideline values by improved drinking water source type, across all pilot countries

The overall compliance for microbiological water quality was relatively good for utility piped supplies, with 89% compliance; i.e. only 11% of sampled supplies were non-compliant. The least compliant technology was the protected dug well with only 43% compliance. The microbiological water quality compliance was 63% for protected springs and 69% for boreholes or tubewells.

Increasing reliance on boreholes and tubewells raises significant concerns over water safety and sustainability.

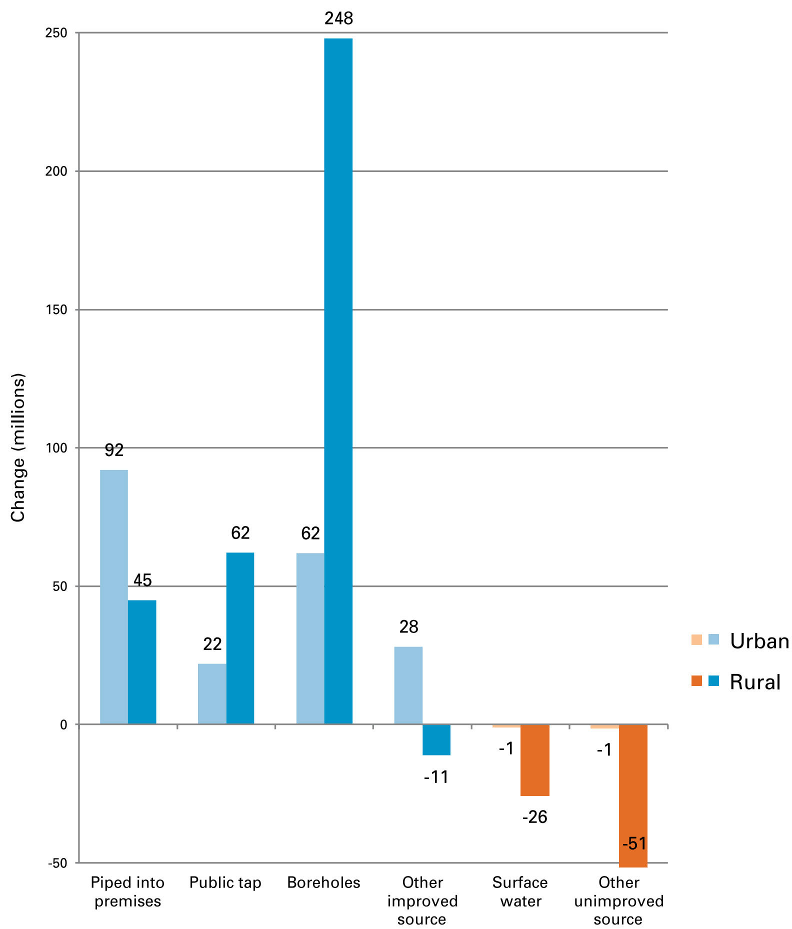

Figure 23. Change in absolute numbers (millions), 1990-2008, using each type, in Southern Asia

Given the rapid growth in the use of boreholes and tubewells, especially in Southern Asia where 310 million more people used boreholes in 2008 than in 1990, the limited water quality compliance for this technology is of significant concern. This rapid growth also raises concerns about the sustainability of water supplies, as discussed in the next section.

Total compliance for all water quality parameters tested was highly variable across countries. In Jordan 98% of drinking water sources were compliant; while in Ethiopia 68% of sources were compliant.

The proportion of improved drinking water sources that provides safe drinking water varies significantly across countries.

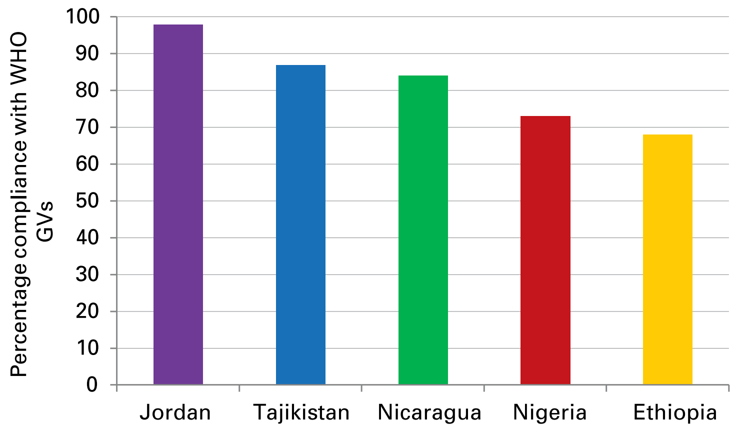

Figure 24. Total water quality compliance of improved drinking water sources in selected countries[10]

These findings have significant implications for JMP estimates of access to safe drinking water. For illustrative purposes the compliance results by drinking water source type were applied to the JMP estimates for Ethiopia, Nicaragua, Nigeria and Tajikistan in 1990 and 2008. For consistency purposes, only compliance for microbiological contamination was used. When applying total compliance or microbiological compliance the difference in the results was minimal, indicating that the vast majority of non-compliance was attributable to microbial contamination.

Applying the RADWQ water quality results to the JMP estimates results in a percentage point reduction for total access to safe drinking water in 2008 of 16% for Nicaragua, 11% for Ethiopia, 10% for Nigeria and 7% for Tajikistan. This means that the proportion of the total population with access to safe drinking water was 69% instead of 85% in Nicaragua, 27% instead of 38% in Ethiopia, 48% instead of 58% in Nigeria, and 63% instead of 70% in Tajikistan. If similar corrections were to be applied across all countries this would significantly reduce the JMP global estimate for access to safe drinking water.

[10] Parameters tested in RADWQ were thermotolerant coliforms, arsenic, fluoride, nitrate, iron, turbidity, conductivity, and free/total chlorine (for piped supplies only).

Water quality data suggest that access to safe drinking water is lower than the JMP estimates in many countries.

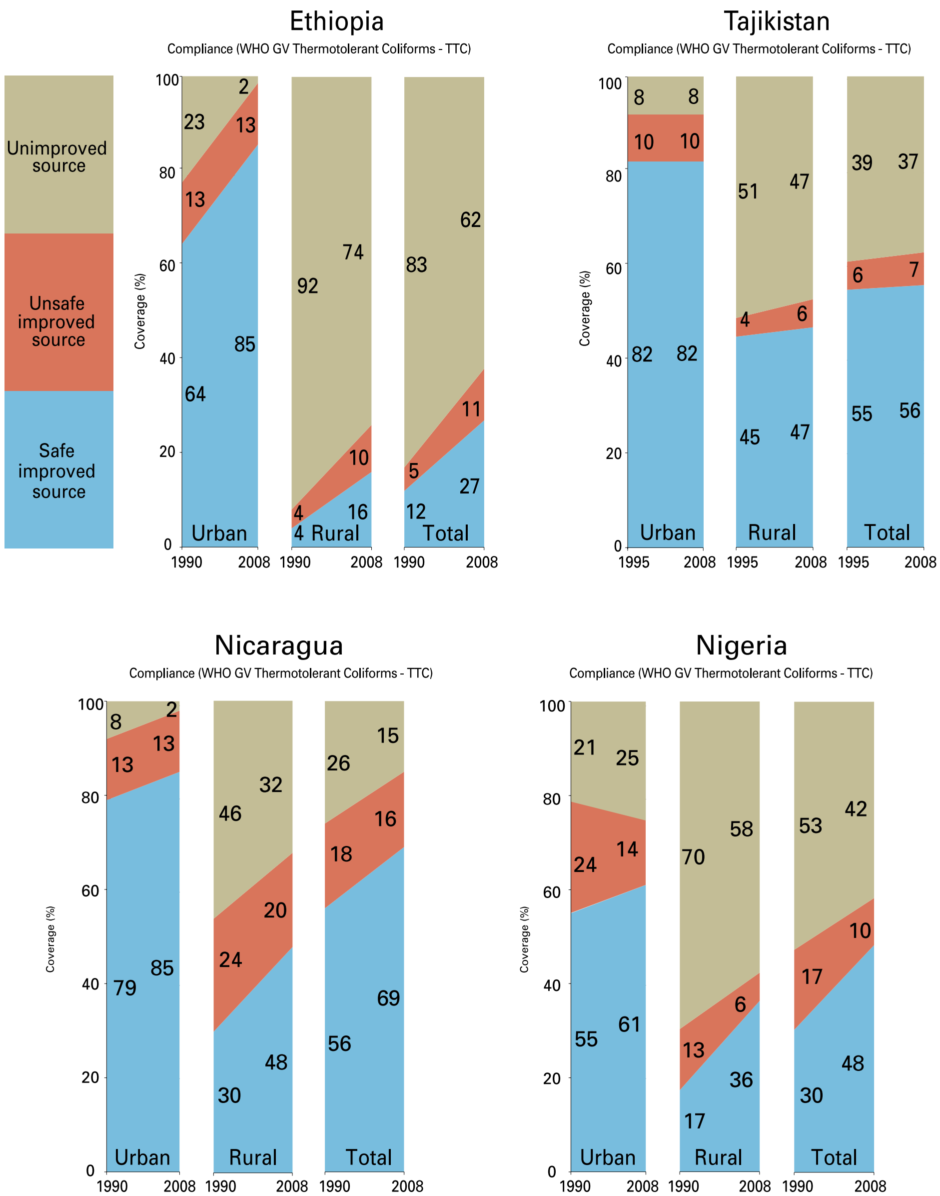

Figure 25. Microbiological water quality corrections applied to drinking water trends for four countries included in the RADWQ study[11]

Given that the impact of including water quality data was significant for the countries included in the RADWQ pilot, the JMP is investigating ways to include water safety in monitoring access to drinking water (as discussed later in this section).

[11] The RADWQ study was conducted in 2004-2005. The application of the RADWQ findings to the JMP 1990-2008 drinking water estimates for Ethiopia, Tajikistan, Nicaragua and Nigeria are for illustrative purposes only and do not represent the actual current drinking water quality situation.

Geogenic contamination of groundwater

To date, the only water safety correction in the JMP reporting practice has been applied to Bangladesh to compensate for the high prevalence of arsenic-contaminated wells in the country. Globally, over 130 million people are now estimated to be at risk from arsenic in drinking water at concentrations above the WHO drinking water guideline value of 10 µg/l (UNICEF, 2008). Arsenic occurs naturally in groundwater in many areas, and long-term exposure to arsenic in drinking water can lead to arsenic poisoning or arsenicosis.

There is a high probability of arsenic in groundwater in specific areas of all regions.

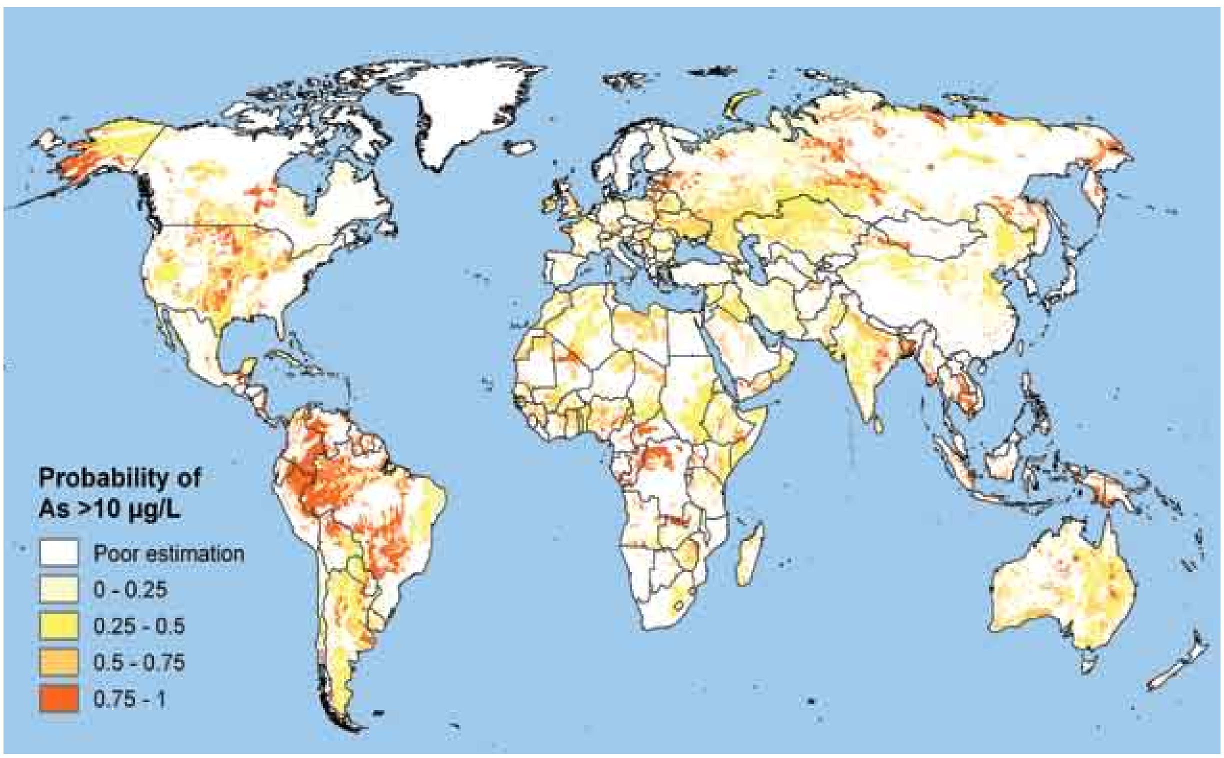

Figure 26. Arsenic in groundwater probability map (Source: Amini et al., 2008a)

Fluoride also occurs naturally in groundwater and can cause fluorosis which affects the teeth and bones. Although a certain amount of fluoride is healthy, moderately higher amounts lead to adverse dental effects, and long-term ingestion of large amounts can lead to potentially severe skeletal problems. High fluoride concentrations in groundwater occur in many areas of the world, including large parts of Africa, China, the Eastern Mediterranean and Southern Asia (Fawell, et al., 2006).

There is a high probability of fluoride in groundwater in significant parts of Asia, South America, the Middle East and North Africa.

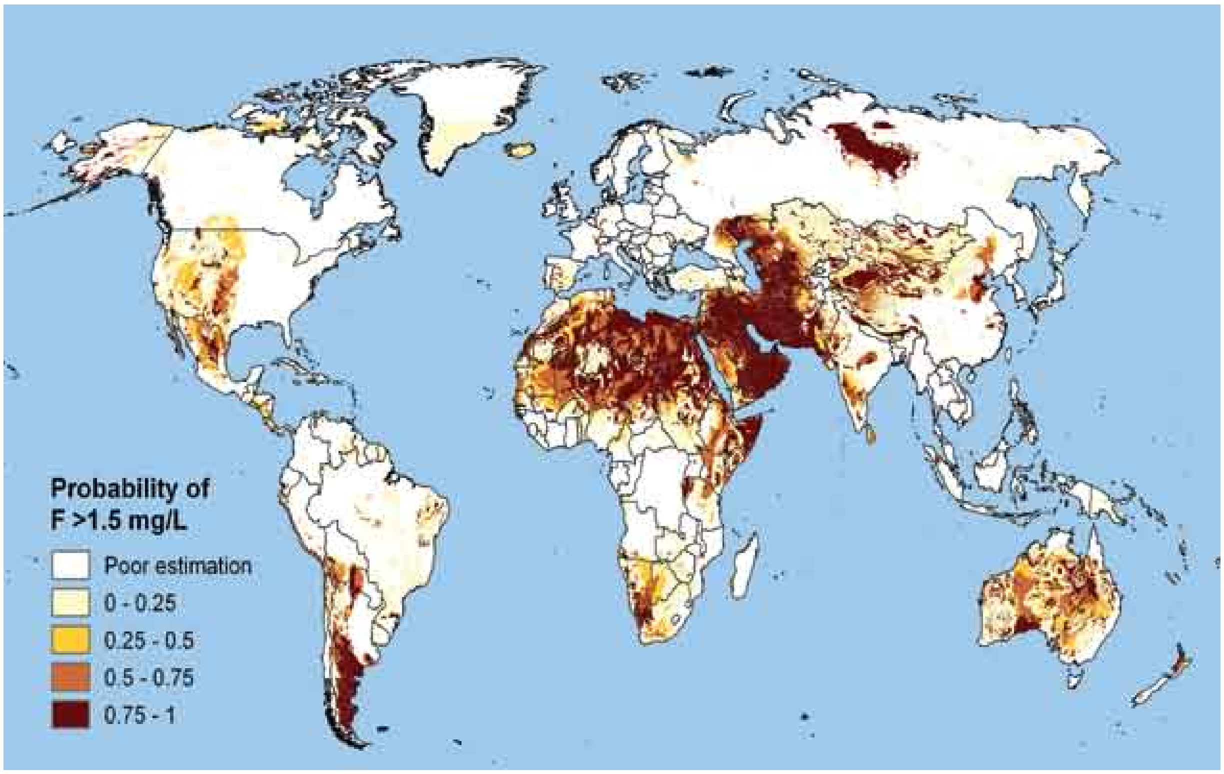

Figure 27. Fluoride in groundwater probability map (Source: Amini et al., 2008b)

There is a continuing need to monitor geogenic contamination of groundwater, especially where there is potential risk to public health via drinking water supplies, and to develop and implement appropriate mitigation strategies.

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Future monitoring strategies

In 2010, the JMP established a Task Force on Monitoring Drinking Water Quality to:

1. Review the current status of global monitoring by the JMP with respect to drinking water quality and to determine the scope and focus of future drinking water quality monitoring efforts within the context of the JMP mandate;
2. Review what options exist to strengthen drinking water quality monitoring as part of the JMP activities within the MDG period and beyond;
3. Review experiences in drinking water quality monitoring, in particular the JMP Rapid Assessment of Drinking Water Quality;
4. Review the options of new, rapid, direct measuring tools for drinking water quality and their potential value for the JMP;
5. Consider the role of sampling and statistical techniques to ensure the most cost-effective use of national measurements feeding into a consistent global picture;
6. Make recommendations for the adoption of methods and procedures, for further studies and pilots, and for strengthening links to on-going activities in the field of drinking water quality monitoring and surveillance at national and international levels.

The Task Force recognizes that with the short time remaining before 2015, final reporting on MDG achievement will have to continue using the current indicator of "use of improved drinking water sources". However, the Task Force considers it essential that new targets for post-2015 efforts should include water quality, notably in light of the Human Rights Framework.

For global monitoring purposes, a suitable target indicator in coming years is the proportion of samples having no detectable E. coli in a 100 ml sample. At national levels, quantitative data are likely to be more useful, and additional parameters may be included as appropriate, especially where there is particular concern related to geogenic contaminants such as arsenic and fluoride.

The Task Force has identified three modalities by which water quality testing data could be collected and used for global reporting purposes:

- add-on modules to national surveys;
- dedicated national water quality surveys building on the RADWQ experience; and
- regular reporting by drinking water regulators.

Each of the modalities might be appropriate in different circumstances, and the JMP will further explore these options in the coming years and elaborate the settings in which each of them is more appropriate.

The Task Force agreed that measuring drinking water quality within the household, under conditions representative of typical drinking water use, was of primary importance to maximize the relevance of these measurements with regard to disease burden. However, surveys should still record self-reported drinking water source, so that the means of access can continue to be measured, and where possible the quality of drinking water at the source should also be measured.

Household water treatment and safe storage

Household water treatment and safe storage can serve as an effective means to remove pathogens and reduce diarrhoeal diseases associated with ingested water, even when drinking water is collected from an unimproved or unsafe source. Meta-analysis of short-term (less than one year) studies link HWTS with a 35-44% reduction in diarrhoeal disease (Waddington et al., 2009; Fewtrell et al., 2005). Over longer periods of time disease reductions are less (Fischer Walker et al., 2011), most likely because of difficulties in sustaining consistent use. The DHS and MICS household surveys include self-report questions on household water treatment (HWT) to determine whether people treat their water prior to drinking it and what type of treatment they use.

In analysing data across countries, there is significant variation in the self-reported prevalence of appropriate HWT with respect to the type of drinking water source from which the water was collected. The prevalence of appropriate HWT is relatively high where drinking water is piped into the dwelling, suggesting that consumers may not trust the quality of their tap water. In contrast, less than one quarter of those using unprotected dug wells and unprotected springs use appropriate HWT. Appropriate HWT is practised by over 50% of people using protected wells but only 23% of those using unprotected wells. This indicates that many households with the poorest drinking water quality and most in need of HWT do not use such technologies. The rationale behind this may be a combination of economic, social, educational and geographical reasons.

Households with access to improved drinking water sources are more likely to treat their drinking water than households using unimproved sources.

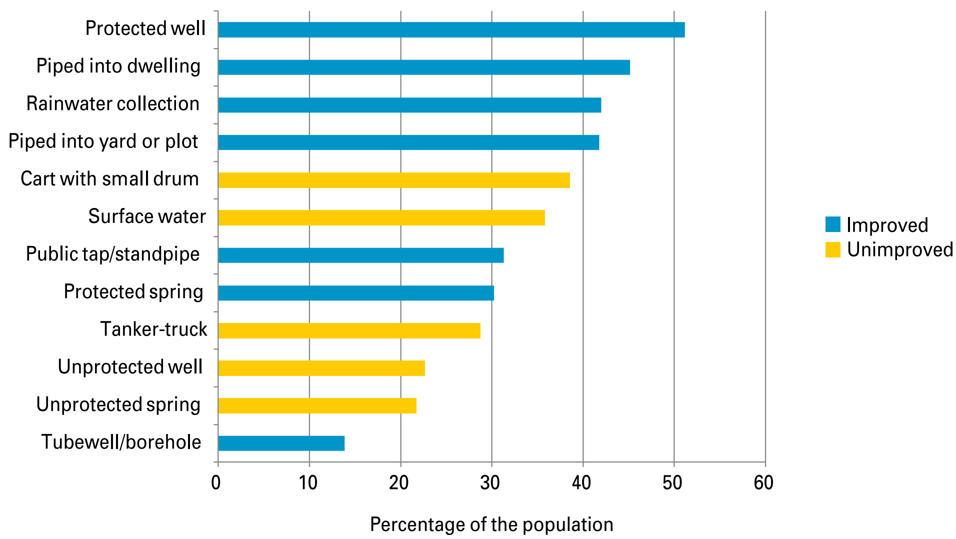


Figure 28. Proportion of the population which applies appropriate household water treatment by type of drinking water source used[12]

In general, the prevalence of appropriate HWT is highest in South-Eastern Asia and lowest in Northern Africa, Sub-Saharan Africa and Western Asia. However, reported use varies significantly between individual countries.

[12] Population weighted, based on the 35 MICS 2005-2007 surveys with relevant data available at the time of analysis.

The reported use of HWT is highly variable across countries.

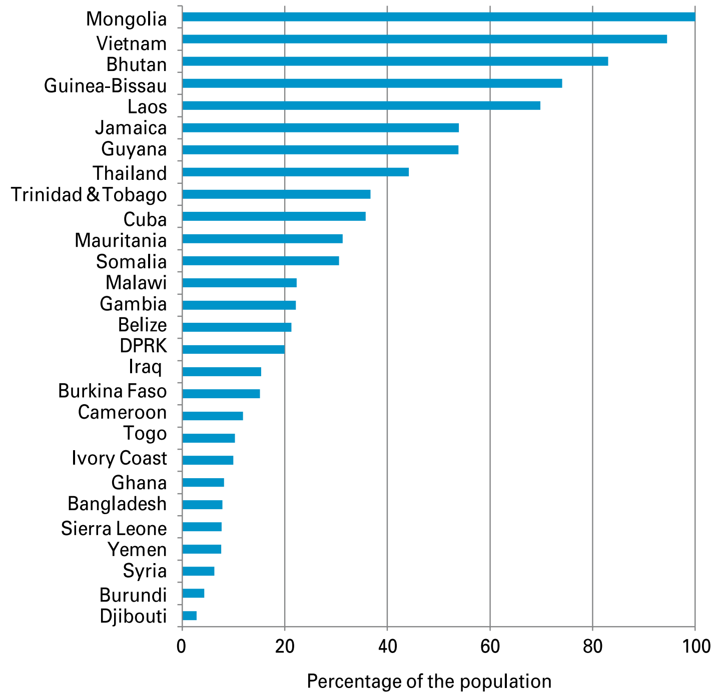


Figure 29. Proportion of the population reporting that they treat drinking water at home, for selected countries[13]

"Appropriate" HWT methods include boiling, filtration, adding chlorine or bleach, and solar disinfection. Straining water through a cloth or letting it stand and settle are not considered appropriate methods. Households are at least four times more likely to use boiling than any other HWT method.

Boiling is by far the most common HWT method.

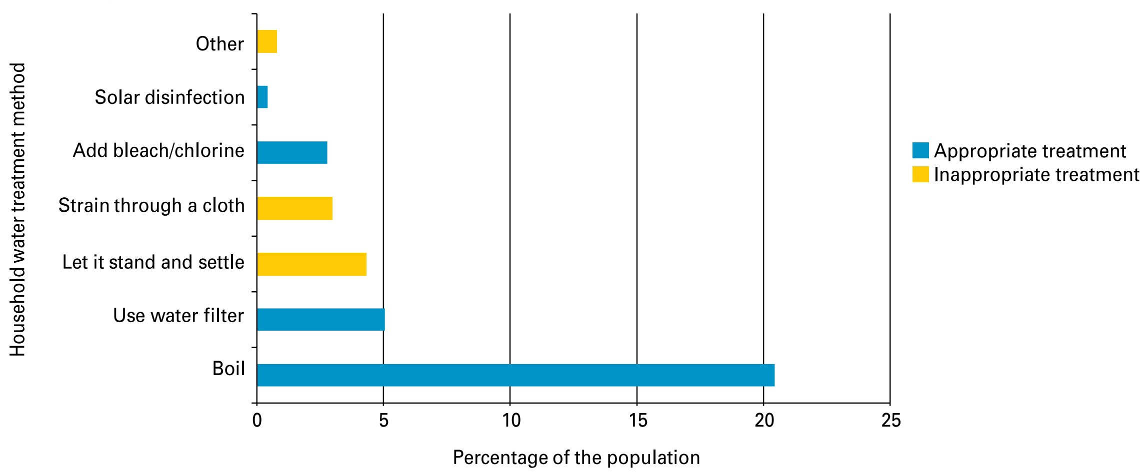


Figure 30. Prevalence of household water treatment methods reported across selected countries[14]

[13] 28 latest MICS reports with relevant data, 2005-2010, for countries in developing regions.
[14] 28 latest MICS reports with relevant data, 2005-2010, for countries in developing regions. Multiple responses were possible, so totals do not add up to 100%.

HWT practice increases with wealth in all regions.

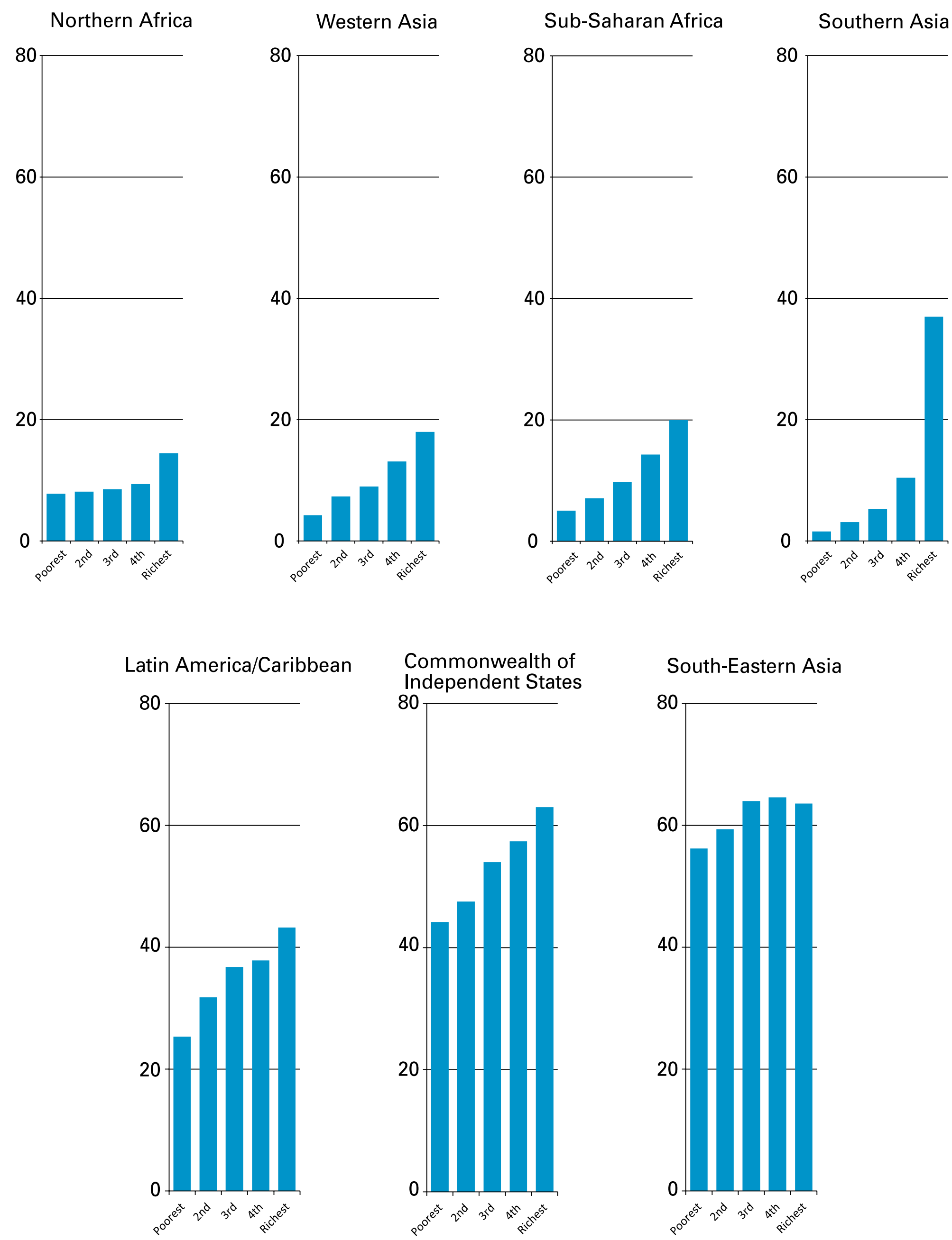


Figure 31. The average proportion of each wealth quintile in surveyed countries which uses appropriate HWT, by region[15]

[15] These graphs represent straight averages of data from countries with MICS, DHS, WHS, and LSMS surveys 2004-7, as provided by Rosa & Clasen (2010), regrouped according to MDG regions.

Overall, the reported use of appropriate HWT methods increases by wealth quintile. This pattern is clear in regions with relatively low prevalence of HWT, such as Northern Africa and Sub-Saharan Africa, as well as those with higher prevalence, such as Southern Asia and Latin America and the Caribbean. South-Eastern Asia, which is the only region in which the majority of the population practices HWT, is also the only region in which HWT prevalence is not highest in the richest quintile. Even here, however, prevalence is lowest in the poorest quintile.

In certain countries, the reported use of appropriate HWT methods is largely limited to the richer quintiles. This is especially true in Pakistan, Bangladesh and Nepal, but it is also the case in Guinea-Bissau, India, Mauritania, Sierra Leone and Egypt.

In a few countries, including Bosnia and Herzegovina, Indonesia, Lao People's Democratic Republic, and Panama, however, the opposite trend is observed with reported use of appropriate HWT options decreasing with wealth. In Benin, Ghana, Guatemala, Macedonia, and Kyrgyzstan, no significant differences are observed between wealth quintiles (Rosa & Clasen, 2010).

In Mauritania, the proportion of households in the poorest quintile that states they use appropriate treatment is far lower than the proportion that uses unimproved drinking water sources. The proportion of households in the richest quintile which reportedly treat their drinking water is higher than the proportion that uses unimproved sources.

In some countries the prevalence of HWT increases as the use of unimproved drinking water sources decreases.

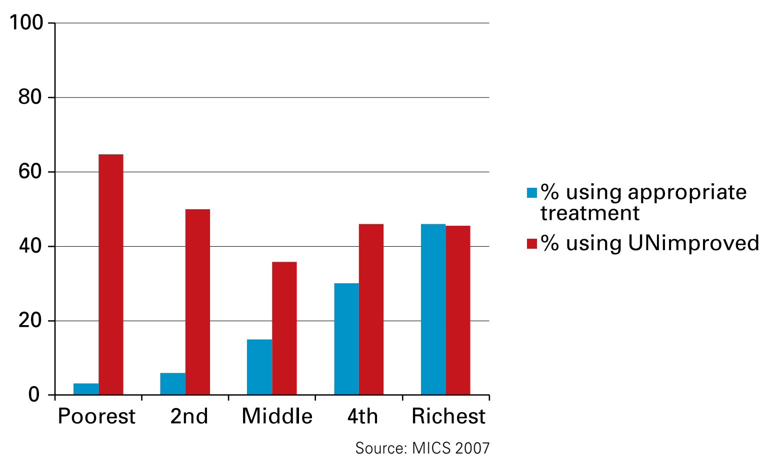


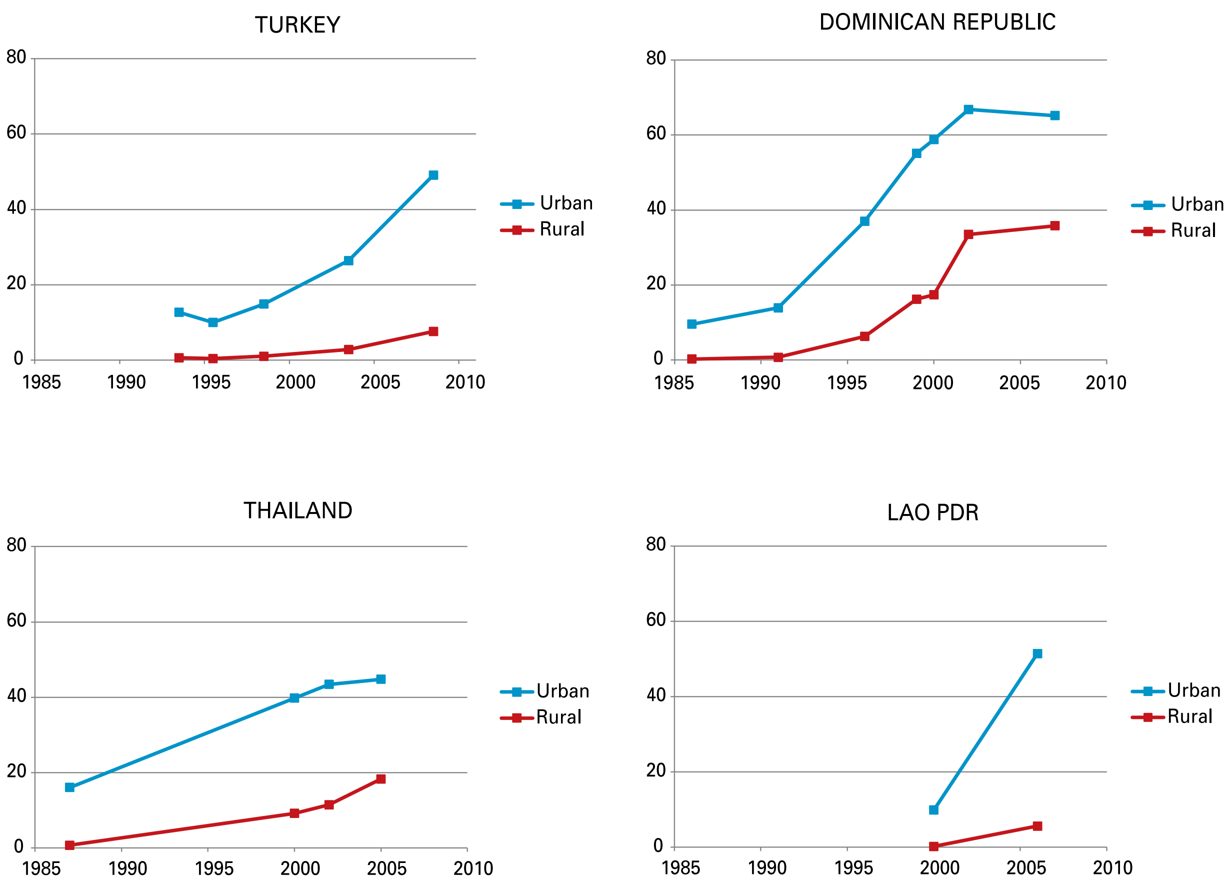
Figure 32. Proportion of households using appropriate HWT, and population using unimproved drinking water, by wealth quintile, in Mauritania

HWTS has the greatest potential positive impact for vulnerable groups, such as children suffering from malnutrition, displaced persons and people living with HIV/AIDs, who are often those in the lowest wealth quintiles. It is clear, however, that in many cases HWTS is not reaching those that need it the most, and there is a need for appropriate strategies to scale up HWTS to poorer households.

Bottled water

The JMP in the past has classified the use of bottled water as an "unimproved" drinking water source, since bottled water alone does not provide a convenient, affordable supply of water for all domestic needs. Bottled water is considered to be improved only when the household uses drinking water from an improved source for cooking and personal hygiene. This is because these households have the choice of using an improved drinking water source but simply opt for bottled water, most likely because of a better perceived or known water quality.

In some countries, increasingly people indicate to use bottled water as their main source of drinking water.



Source: All DHS and MICS surveys from depicted countries

Figure 33. Proportion of population using bottled water, in Turkey, Thailand, the Dominican Republic and Lao PDR, 1990-2008

In an increasing number of countries there is a rise in the use of bottled drinking water (especially in 4 gallon or 18-20 litre bottles) for purposes of drinking and food preparation. While survey data show that most of these households also have a piped supply on premises they prefer paying a huge premium for that part of their daily drinking water needs that must meet quality standards 100% of the time.

Drinking Water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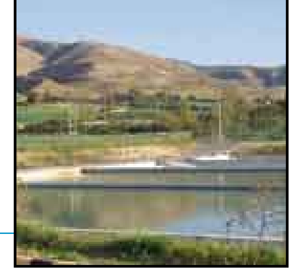


Sustainability of water services

The MDG water target is defined in terms of "sustainable" access to safe drinking water; therefore the sustainability, resilience and reliability of drinking water services need to be addressed. However, they are not reflected in the current proxy indicator in a satisfactory manner.

Non-operating systems, and intermittent or unreliable supplies, place an increased burden on the populations they are designed to serve, lead to household storage in often unhygienic conditions and, as a consequence, increase health risks. The sustainability of improved drinking water sources is often compromised by a lack of technical skills, equipment or spare parts for operation and maintenance, and a lack of sustained financing mechanisms for recurrent costs. This is particularly relevant in the context of small community water supplies.

The pressure on water resources is growing due to the combined effects of population growth, urbanization, economic development and climate change. This also threatens the sustainability of water supplies. The regions most vulnerable to domestic water shortages include those where access to water is already limited, the population is growing rapidly, urban centres are spreading, and the economy is burdened by financial problems and a lack of skilled workers (UNEP/GRID-Arendal, 2000). The main users of freshwater, however, are agriculture and industry rather than municipalities. Most pressure on groundwater resources in developing regions comes from agriculture, and yet most groundwater resources are well-suited for domestic drinking water supplies, due to ease of access and relatively good water quality.

Climate change and drinking water services

The impacts of climate change - including changes in temperature, precipitation and sea levels - are expected to have varying consequences for the availability of freshwater around the world. The main impacts of climate change on humans and the environment occur through water (UNESCO, 2009). Efficient management of water resources needs to be reconciled with society's desire for equity and environmental sustainability.

Increased loss of functioning infrastructure as a result of climate change would set back progress in drinking water supply and, indirectly, towards other MDG targets (WHO, 2009). There is a wide range of potential climate change impacts on water supply technologies, including flood damage to infrastructure, increased contamination, deteriorating water quality, increased treatment requirements and reduced availability. All drinking water technologies will be vulnerable to climate change, but all have some adaptive potential. Investment in this adaptive potential will make systems and services more resilient in the face of extreme weather conditions.

The Vision 2030 Study (WHO, 2009) set out to increase our understanding of how and where climate changes anticipated in the medium-term will affect the drinking water and sanitation situation; what can be done to optimize the technologies and systems that exist to maximize their resilience; and what needs to be done differently to ensure that the services of the future can cope with the impacts of climate change.

The technologies considered "improved" under JMP were categorized according to their climate change resilience, taking account of both vulnerability to climate changes (determined by engineering and environment) and adaptive capacity (ability to be adjusted or managed so as to cope in response to different climate conditions). This categorization was based on information from published literature, a series of semi-structured interviews and a web-facilitated questionnaire survey. More research is required to further refine these categories, and to take account of multiple source use.

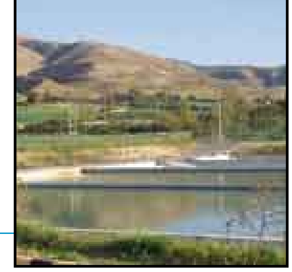
Table 2. Resilience of water technology to climate change: applicability 2030

Category 1: **Potentially resilient to all expected climate changes**	**Utility piped water supply** **Boreholes/tubewells**
Category 2: **Potentially resilient to most of expected climate changes**	**Protected springs** **Small piped systems**
Category 3: **Potentially resilient to only restricted number of climate changes**	**Dug wells** **Rainwater harvesting**
Technologies categorized by JMP as "not improved drinking water sources"	**Unprotected dug wells** **Unprotected springs** **Carts with small tank or drum** **Surface water (rivers, dams, lakes, ponds, streams, canals, irrigation channels)** **Bottled water**

Shallow groundwater systems, roof rainwater harvesting and some surface waters are vulnerable to extended dry periods. It is less likely that impacts will be felt in the medium-term in deep or old aquifers that have long recharge times.

Piped distribution networks are typically vulnerable to contamination and will be at increased risk where more frequent flooding occurs. In drying environments, piped water supplies may become more intermittent unless resource management measures conserve drinking water sources.

Boreholes and tubewells are the most resilient of the technologies reviewed; protected springs and small piped supplies have resilience to some climate changes; and dug wells and rainwater harvesting are resilient only to a few climate changes. Existing climate variability already represents a significant problem in the use of these technologies.



Sustainability of urban water services

Coverage with piped drinking water is high and increasing, with Africa the only continent with a significant number of countries predicted to have less than 75% piped water coverage in 2020 (WHO, 2009). By then, the majority of urban dwellers (an estimated 76%) will receive their drinking water through piped systems at home. Increased piped coverage will add a small but significant demand on water resources at the same time as pressures from other demands, such as agriculture and industry, are increasing and climate change modulates resource availability and demand patterns.

By 2020, three-quarters of urban dwellers will receive their drinking water through piped systems at home.

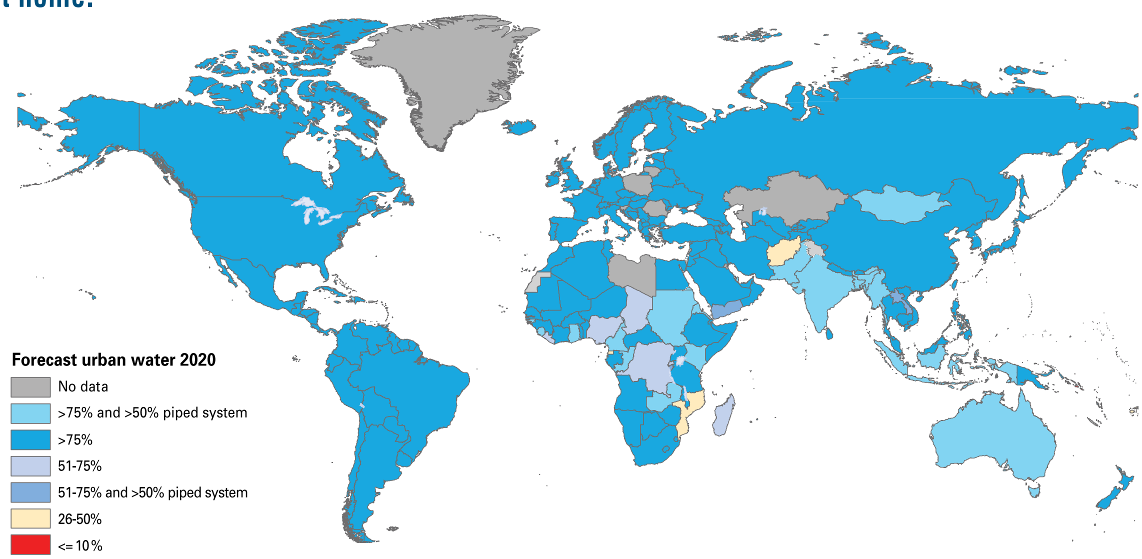


Figure 34. Predicted access to improved drinking water sources in urban areas, worldwide, 2020. (Source: WHO, 2009)

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Most of the world's population already receives piped drinking water from a utility and this proportion is increasing. Utility supplies are intrinsically vulnerable because they are often large and complex. However, well-run utility supplies which have human capital in the form of trained staff, and financial capital to invest in upgrading technology and new infrastructure, are potentially highly resilient to climate change. Many supplies are not resilient in practice because their resilience is reduced by factors such as excessive leakage or intermittent supply. In order to become climate resilient, utility operational performance needs to be addressed.

The number of people using piped drinking water has increased significantly in regions such as South-Eastern Asia.

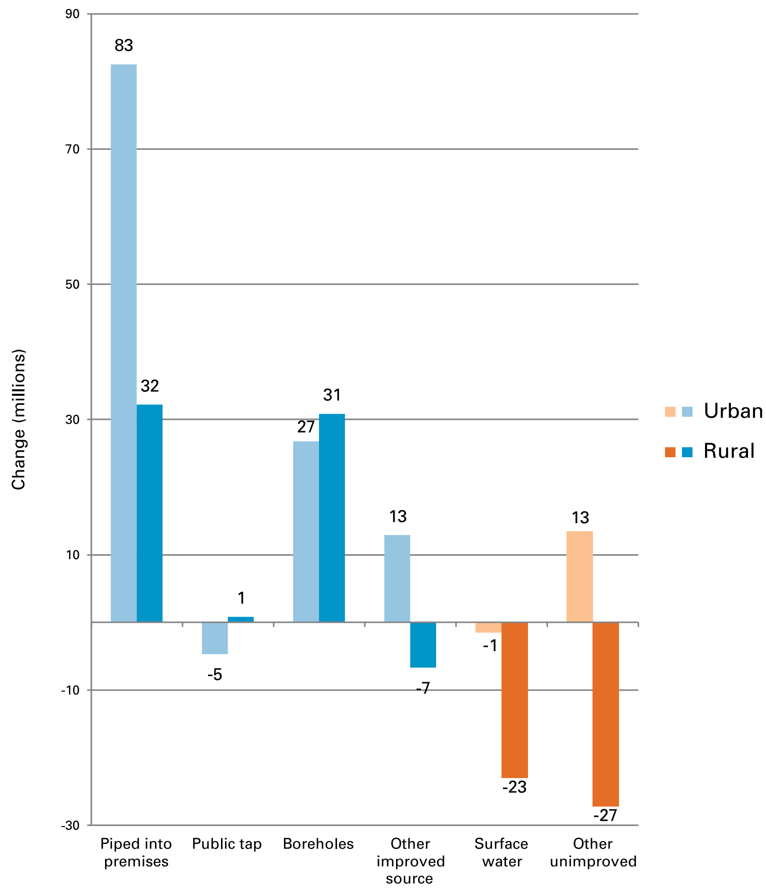

Figure 35. Change in absolute numbers (millions), 1990-2008, using each type of drinking water supply, in South-Eastern Asia

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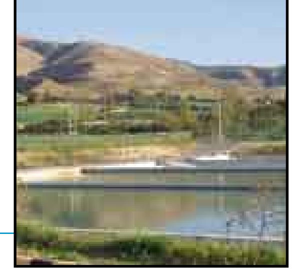
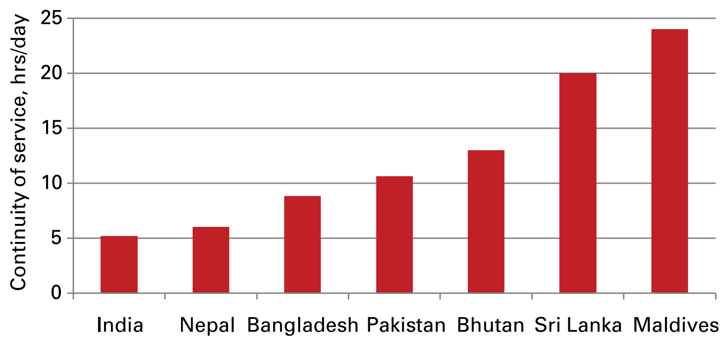
One of the main challenges in ensuring the sustainability of piped water supplies in urban areas is matching supply to demand. When demand exceeds supply, intermittent and unreliable services result in inconvenience to users, increased risk of compromised water safety, and reduced resilience to climate change. Continuity of service, measured in hours of service per day, is one of the indicators for quality of service used by the World Bank's International Benchmarking Network for the Water and Sanitation Utilities (IBNET). The IBNET database contains information from more than 2000 utilities from 85 countries (IBNET, 2011).



Analysis of IBNET data available for water utilities across Southern and South-Eastern Asia indicates that in most countries the average continuity of service is less than 24 hours per day. The situation is most acute in Bangladesh, India and Nepal which each have an average continuity of service of less than 10 hours a day. It is likely that increasing demand from growing urban populations is a contributing factor in these cases. It should be noted that these average figures represent the hours for which water is supplied as reported by the utilities. This does not mean that all customers receive water for this length of time. In reality, most utility customers are supplied with water for shorter periods of time than the reported average.

Continuity of service for urban water services is less than 15 hours per day on average in many countries in Southern Asia; most customers are supplied with water for less than the average period.



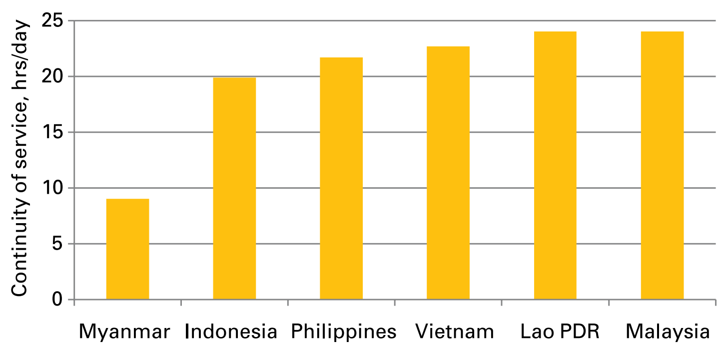


Figure 36. Average continuity of urban water services in selected countries in Southern Asia and South-Eastern Asia[16]

In Sub-Saharan Africa, continuity of service is highly variable across utilities and countries, with a regional average of 19 hours per day. The average for Latin America and the Caribbean is 22 hours per day, while that for South-Eastern Asia is 20 hours per day. The average for Southern Asia is only 11 hours per day.

[16] IBNET data are used for most recent year available (1995-2009).

Continuity of service for urban water services varies between 6 and 24 hours per day on average across countries in Sub-Saharan Africa; most customers are supplied with water for less than the average period.

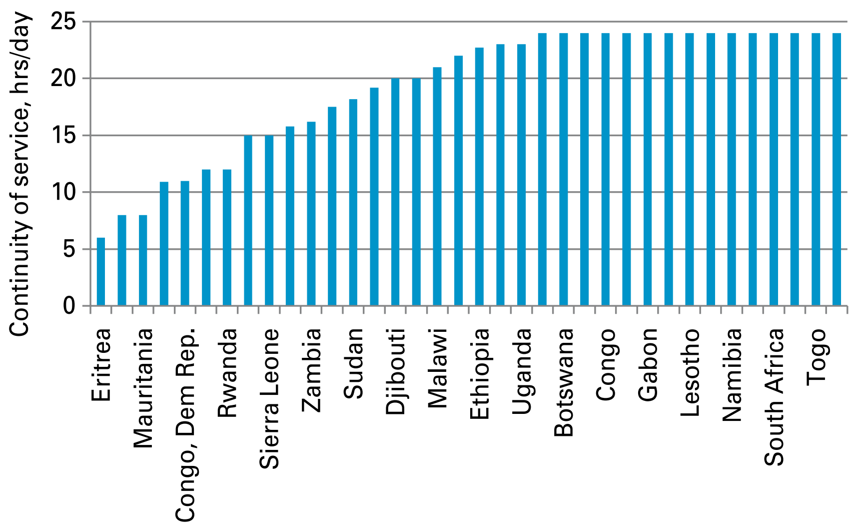


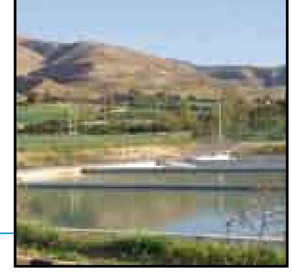
Figure 37. Average continuity of urban water services in selected countries in Sub-Saharan Africa[17]

Continuity of service is one of the few sustainability related indicators for which there are data available. The data tell us that while utility-managed water supplies typically have very high potential resilience and adaptive capacity, many have low actual resilience and little implemented adaptation. There is a need for water utilities to systematically assess their climate change vulnerability and, where risk is significant, initiate measures to increase resilience (WHO, 2009).

Preventive management approaches such as water safety plans provide a simple robust framework to make climate resilience assessments, and to plan progressive adaptation to climate change and concurrent challenges. The process includes defining hazards, assessing risks, and identifying and validating control measures. A preventive approach should lead to management responses and system improvements.

Many people in low-income urban areas rely on community water sources, such as boreholes and tubewells in Asia and protected springs and dug wells in Africa. Very vulnerable technologies, such as dug wells and protected springs in urban environments where aquifers are vulnerable to contamination, should be progressively replaced with more resilient alternatives.

[17] IBNET data are used for most recent year available (1995-2009).



Sustainability of rural water services

In 2020, the majority of rural dwellers (an estimated 57%) will collect their drinking water from community sources such as boreholes, tubewells, protected springs and protected wells. Of the commonly used community source technologies, only boreholes and tubewells appear resilient to most climate changes. However, many such sources rely on community management, which is associated with high rates of failure and contamination. Climate change will increase stresses on community management. Therefore, technologies which appear resilient on a technical level may still fail to deliver sustainable drinking water supplies.

By 2020, the majority of rural dwellers will collect their drinking water from community sources.

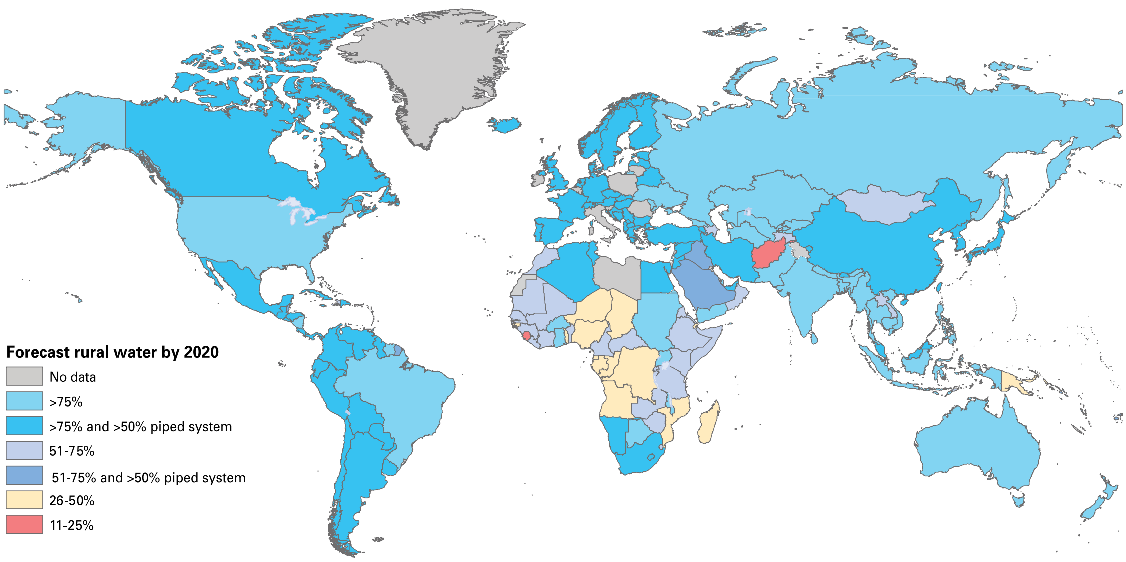


Figure 38. Predicted access to improved drinking water sources in rural areas, worldwide, 2020 (Source: WHO, 2009)

The use of boreholes and tubewells has increased in both rural and urban areas in Southern Asia, South-Eastern Asia and Sub-Saharan Africa. In Southern Asia, 56% of the rural population and 46% of the total population relies on boreholes and tubewells. In rural Sub-Saharan Africa, 32% of people who use an improved drinking water source rely on boreholes or tubewells, most of which are equipped with handpumps. Many protected dug wells are also equipped with handpumps. In most cases, such point water sources are managed by the communities they serve.

Reliance on boreholes and tubewells has increased in Southern Asia and Sub-Saharan Africa.

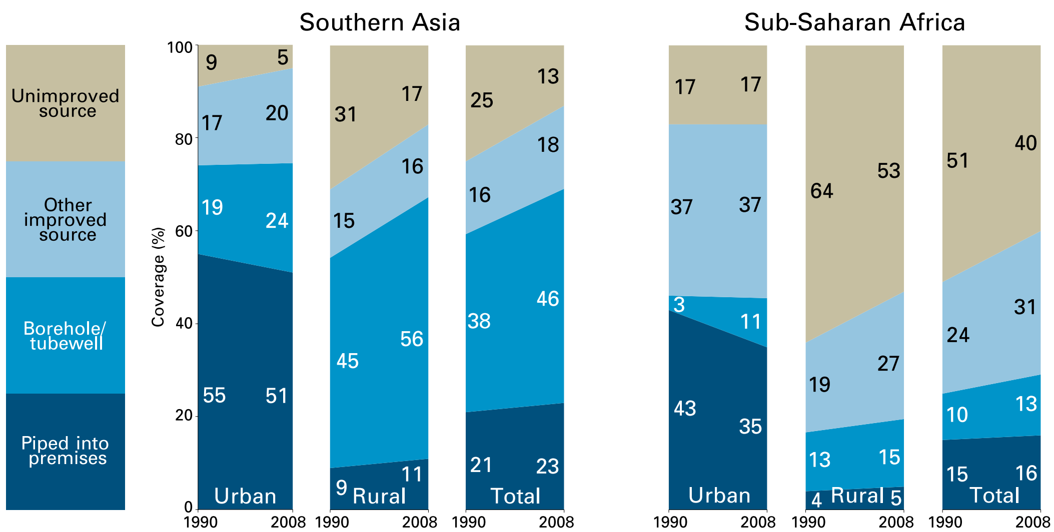
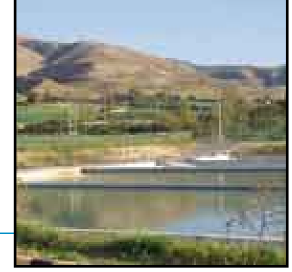


Figure 39. Trends in proportion of the population using piped water on premises, a borehole or tubewell, other improved drinking water source or an unimproved source, for Southern Asia and Sub-Saharan Africa

Across rural Sub-Saharan Africa, an average of 36% of handpumps is non-operational at any given time, and in some countries, it is estimated that more than 60% of handpumps are non-operational (RWSN, 2008). The reasons for such low levels of rural water supply sustainability are multifaceted and include limited demand, lack of affordability or acceptability among communities, limited sustainability of community management structures, inadequate supply chains for equipment and spare parts, insufficient government support, and environmental issues (Harvey, 2008).

Direct management of drinking water supplies by households and communities is common in small communities worldwide. Inadequate operation and maintenance cause frequent failures and contamination. Climate change impacts will adversely affect this already difficult situation by increasing the range and severity of challenges to system management.



More than a third of handpumps in Sub-Saharan Africa are non-operational at any given time.

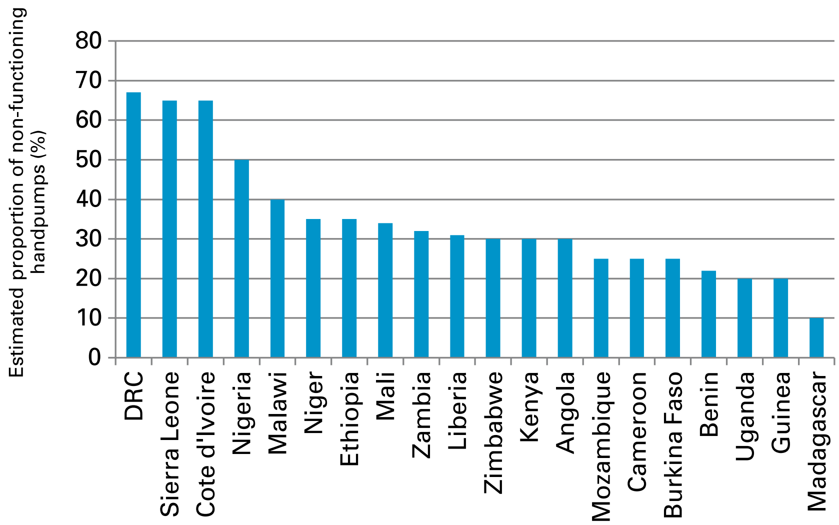


Figure 40. Estimated proportion of non-functioning handpumps in selected countries, Sub-Saharan Africa (Source: RWSN, 2008)

The principal health and development priority for drinking water is universal access to an improved source and preferably to piped water at home. However, community water sources will remain important for large populations for the foreseeable future. Given the limitations of community management, successful approaches to support community management should be extended and alternatives sought.

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Drinking Water

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Monitoring challenges and future strategies

A closer look at the details underlying the undeniably important progress towards the MDG target on sustainable access to safe drinking water reveals the need for substantial work to continue in order to reduce existing disparities between regions and countries, between urban and rural settings, and between different layers of society. While the ultimate goal remains universal access, additional monitoring tools and approaches are needed, particularly as those without access by 2015 will be the hardest to reach.

Given that the MDG target is to halve the proportion of the population without sustainable access to safe drinking water, monitoring the sustainability and safety aspects of water systems and services will need to be further stepped up. Currently, the JMP approach measures use of improved sources of drinking water as a proxy for sustainable access to safe drinking water. By looking at progress in effective use over time, the trend line indirectly integrates sustainability in progress estimates. This approach provides a reasonable estimate of the type of drinking water sources people use, i.e. improved or unimproved. However, it does not provide information on the quality of the water used, the reliability of water services, or whether people's sustained access to them is hampered for economic, financial social or environmental reasons. In short, the simplicity of having one relatively well-defined indicator has been at the root of JMP's success, but it is also its limitation – and this needs to be overcome at global, regional and national levels in the post-2015 period.

One of the main challenges in measuring safety, sustainability or reliability is the lack of adequate data. Most national monitoring systems do not collect information on these aspects. Where data do exist, they may not be nationally representative or may only cover certain settings, for example providing information only on formal urban settings without data on peri-urban and slum areas where a large proportion of the unserved population is likely to be located. Detailed data may, in some cases, be obtained from service providers but these may be of limited reliability if they are self-reported and have not been independently verified.

The recent resolutions adopted by the United Nations General Assembly and the United Nations Human Rights Council recognizing access to safe drinking water and sanitation as a human right corroborate the need for reinforced monitoring mechanisms that also address equity and non-discrimination. Fundamental to the human rights framework is the concept of progressive realization. Hence any monitoring system should operate at the appropriate level for a given target/indicator and should consist of a dynamic system of target/indicator review and redefinition as the entire process unfolds. Normative and cross-cutting criteria will include accessibility (physical), availability (quantity, reliability, continuity), quality, acceptability (culturally), affordability, sustainability, reliability, non-discrimination/equity, participation and accountability.

Monitoring challenges and future strategies

The present report points to the many determinants of an acceptable level of access to drinking water, and to the steps on the drinking water level that have to be dealt with in a continuum. To ensure that existing disparities are addressed, that the unserved population is clearly identified and that the additional aspects of drinking water are assessed, national and global monitoring will require a major evolution. The scope of global monitoring will need to be expanded with additional criteria while sharpening the focus on specific settings to capture the full range of situations for drinking water supply. The lessons learned from the MDG period, which has been instrumental in pushing the number of people with access dramatically upward will now need to be applied.

In May 2011, WHO and UNICEF organized a first consultation on post-2015 monitoring of drinking water and sanitation in Berlin[18]. This consultation has led to a comprehensive process to identify and elaborate key global indicators and targets regarding all major aspects of the human right to drinking water and sanitation.

Determining post-2015 targets and indicators will require identifying cost-effective and reliable data collection mechanisms and strengthening existing monitoring systems at national, regional and global level. The fact that monitoring requires resources that have to be proportionate to the actual investments in drinking water systems and services should never be overlooked. To establish post-2015 targets, indicators, procedures and methods, it will be essential that actors in charge of monitoring or involved in development and planning of drinking water services, from the different regions in the world, are involved in the process. In line with its strategy, the JMP will serve as a platform for all actors and stakeholders to contribute in sharing existing experiences and participate in facing these new challenges.

[18] The report of the first consultation on Post-2015 Monitoring of Drinking Water and Sanitation is available on the JMP website: www.wssinfo.org.

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Annex A

Development Goals: regional groupings

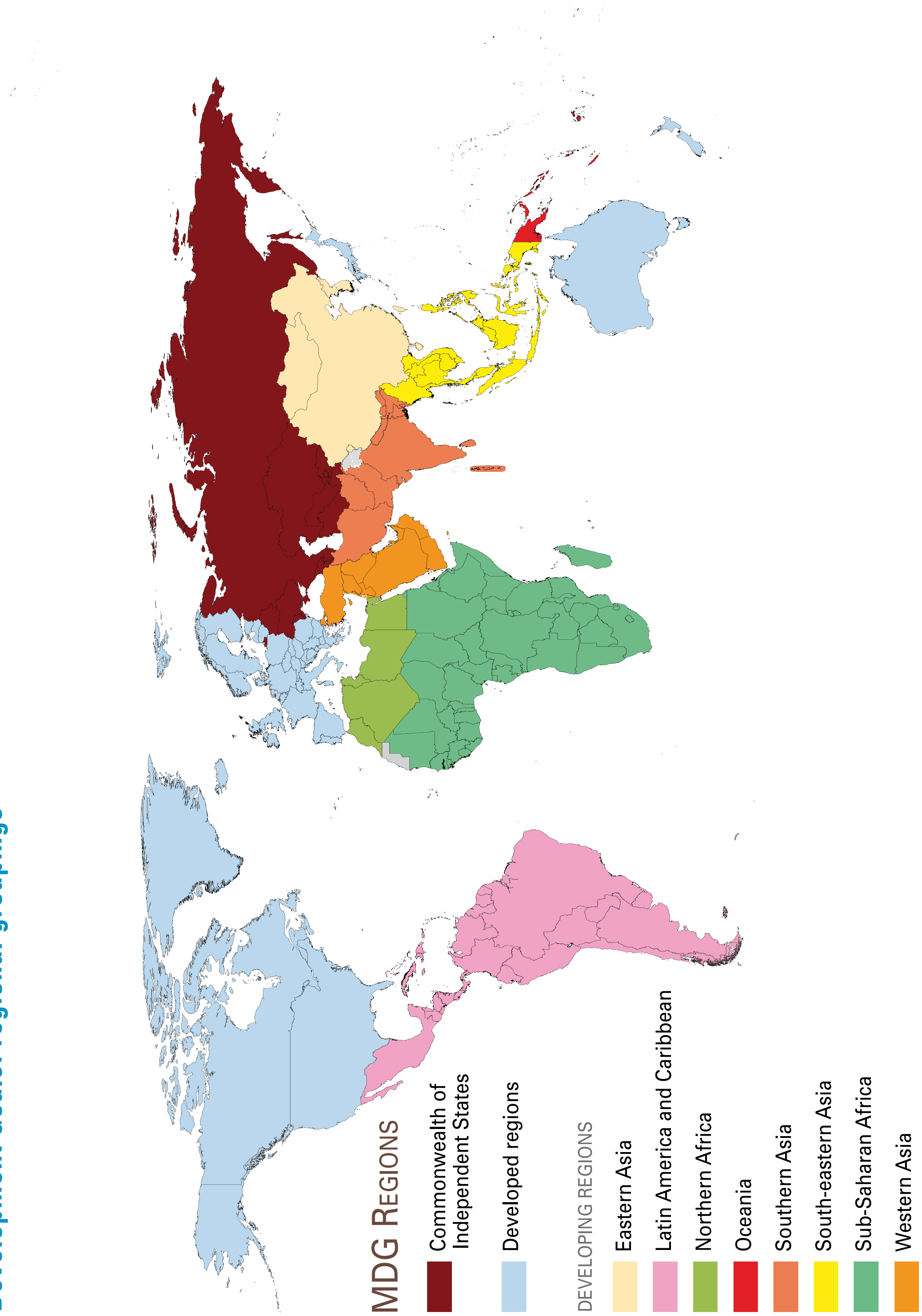

Figure A. United Nations classification of the world's countries into three regions (developed regions, developing regions and the Commonwealth of Independent States), and the subdivision of the developing regions

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Equity, safety and sustainability

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