

# Human Development Report 2006

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## Sanitation and Human Development

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## Thematic Paper: Sanitation and Human Development

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### Introduction

Sanitation is the safe disposal of human excreta and is a basic human need. At present more than two billion people worldwide lack access to improved sanitation. Most live in Asia and Sub-Saharan Africa. The sanitation coverage for Sub-Saharan Africa is just 36%. In some countries, such as Ethiopia, less than one in every ten people have access to sanitation. At the beginning of the twenty-first century this situation is shocking. Since the 2000 United Nations Summit, efforts have been underway to work towards the United Nations Millennium Development Goals (MDGs). The sanitation goal is to halve the proportion of those unserved by unimproved sanitation by 2015. For sanitation, this means an estimated 560 existing urban dwellers and around 2 billion rural dwellers need access to improved sanitation, without allowing for the increase in population by that time.

Lacking access to sanitation is associated with severe health risks. Diarrhoeal disease kills more than two million people every year. Most of them are children under the age of five. The burden of worm infections (intestinal helminths), with the most intense infections in children, is debilitating, causes anaemia and can stunt growth.

Lacking sanitation for millions of people means not having any privacy or dignity. It puts women and girls in danger from sexual harassment and assault when they have to go beyond the home after dark. It brings other social costs such as embarrassment when others visit and economic costs from health care and lost earnings. It is therefore vital to include sanitation in the 2005-2015 International Decade for Action - 'Water for Life.'

Beyond the direct impact on the many millions of households and individuals who lack access to it, sanitation will also have an impact on the progress towards other Millennium Development Goals. At the half-way point of 2002, water coverage looked set to meet the 2015 target.<sup>1</sup> However, sanitation progress is not keeping up with water and is not on target. If this trend continues it is likely to have a negative impact on other MDGs in the areas of extreme poverty and hunger, education, gender equality and child mortality.

The WHO/Unicef Joint Monitoring Programme has the remit of the United Nations to measure progress towards the sanitation goal. Within this task the JMP faces numerous challenges around definitions of sanitation coverage, availability of data and how representative data are.

This thematic paper aims to address two questions;

1. How is sanitation linked to health and the wider aspects of human development?
2. What are the difficulties associated with monitoring progress towards the sanitation MDG?

### Sanitation and human development

Sanitation is taken for granted by many in the developed world. For the 2.6 billion<sup>2</sup> people who lack access to improved sanitation largely in Asia and Sub-Saharan Africa, the subsequent difficulties are faced every

day. Women and girls suffer disproportionately with lack of privacy and the health and personal safety risks associated with not having access to household sanitation.

The following sections describe how sanitation is linked to numerous health and social benefits.

### Sanitation's health benefits

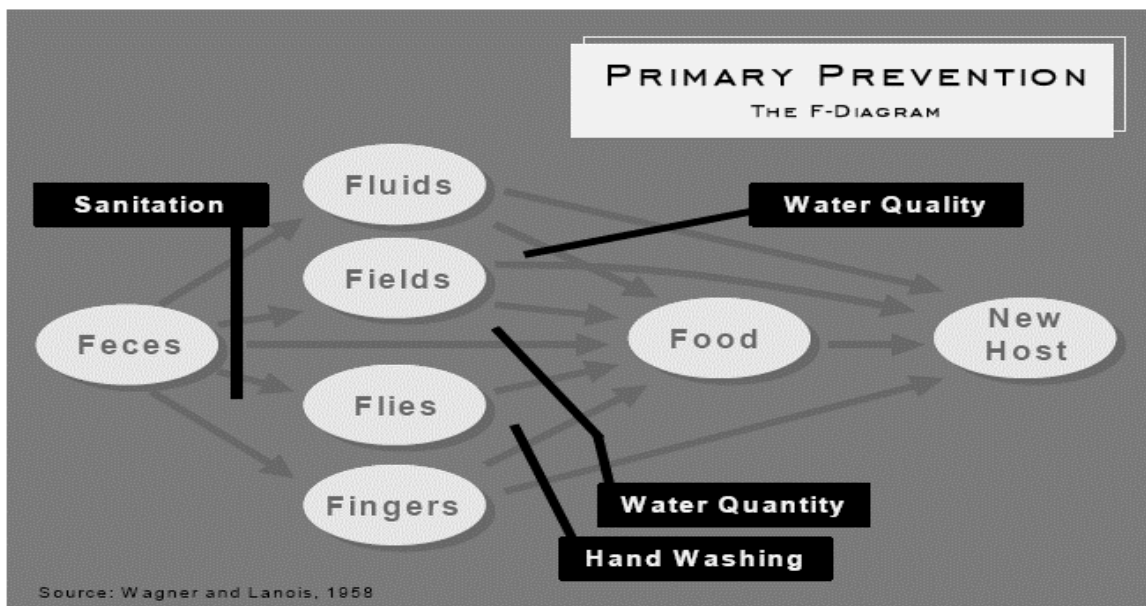
Sanitation brings health benefits in three main areas;<sup>3</sup>

- Diarrhoeal diseases
- Intestinal helminths
- Excreta-related insect vectors

### Diarrhoeal diseases

Lack of access to water supply, sanitation and hygiene is associated with 2.2 million deaths per year. This is mainly due to diarrhoeal disease and largely in children under five.<sup>4</sup> As can be seen in the F-diagram below, sanitation, through safely disposing of human faeces, is the primary barrier in preventing fecal-oral transmission of diarrhoeal diseases. Without removing faeces from potential contact with humans, animals and insects, pathogens (disease causing agents) may be carried on unwashed hands, in contaminated water or food, or via flies and other insects on to further human hosts. The secondary barriers to faecal-oral disease transmission are based on hygienic practices, such as washing hands following defecation and handling children's faeces and before storing and preparing food and water. Children's faeces in particular are known to be especially infective, but there is widespread belief that they are relatively harmless, so that they are also most likely not to be safely disposed of.<sup>5</sup>

Figure 1. The F-diagram, and primary and secondary barriers to fecal-oral disease transmission



Source: Wagner EG & Lanoix JN. Excreta disposal for rural areas and small communities. WHO monograph series No.39. WHO; Geneva. 1958.

### ***Intestinal helminths***

These include roundworm (*Ascaris*), whipworm (*Trichuris*) and hookworm (*Necator*, *Ancylostoma*). These parasitic worm infections are transmitted when their eggs are passed in human faeces. The eggs often need time in moist soil to mature and become infective. Intestinal helminths impact on human health by affecting nutrition in a number of different ways. Firstly, those who are heavily infected tend to eat less. Helminth infections also reduce the intestinal absorption of certain nutrients. This can then lead to nutritional deficiencies (such as Vitamin A deficiencies in those suffering from severe roundworm infection). Infections also lead to nutrient losses (such as anemia in those infected with hookworm). As a result, helminth infections lead to stunting of growth in children, anemia (which is particularly detrimental for pregnant women), diarrhoea, impaired learning and reduced productivity in adults. The stage of roundworm infection passing through the lungs, can produce severe symptoms similar (and mistakable for) asthma.<sup>6</sup>

Worldwide, the global prevalence of roundworm is estimated to be 1.47 billion. For hookworm the prevalence is 1.30 billion and for whipworm it is estimated to be 1 billion.<sup>7</sup>

### ***Excreta-related insect vectors***

Excreta-related insect vectors include mosquitoes, flies and cockroaches. The *Culex quinquefasciatus* mosquito breeds in septic tanks and flooded latrines. It transmits filariasis, a debilitating disease affecting millions of people in Asia and Africa in particular.

Flies and cockroaches are known to be responsible for causing some transmission of faecal-oral disease. Flies are also implicated in the transmission of trachoma. Trachoma is a disease that affects the eye and is the single largest cause of preventable blindness worldwide. The fly species involved in transmitting the disease prefers to breed in scattered human excrement. Construction of pit latrines can reduce the fly population by removing faeces from the open environment.<sup>8</sup> Worldwide, six million people are estimated to be blind due to trachoma and a further 150 million are in need of treatment.<sup>9</sup>

The health burden of sanitation is broader than that of water supply in that it includes intestinal worms and excreta-related insect vectors (which are unrelated to water supply). The size of the potential health risks associated with sanitation also varies in terms of scale from that of water, with more than twice the number of people lacking water supply lacking sanitation. Even when restricting the discussion to diarrhoeal disease, and for a given population, comparison of the relative impact of water supply, sanitation and hygiene concluded that improved sanitation has the greatest health gains.

Work investigating the health impacts of sanitation has been informed by the model of public and private domains.<sup>10</sup> The model relates to where disease transmission occurs. It complements the move away from the traditional, engineering approach to public health, bringing the focus towards health at household level. The concept of the domestic *domain* encompasses the decisions and actions taken at household level and their relation to environmental health, and is distinguished from the public domain in which the intervention of public authority is required to prevent disease transmission.

The risk of contamination (for example from fecal-oral disease) is greatest if it is present in the places that people spend most time. For most families, this equates to their homes. Families can gain health benefits from having latrines even if their neighbours do not have them. The primary focus for improving health is therefore at household level. If household sanitation coverage improves within a whole community then externalities apply (in that there are additional health benefits to all as the fecal contamination of the local environment reduces).

### **Conditions for health impact**

A number of factors influence the health impact of sanitation. Poverty is the key factor underlying much of the burden of disease associated with sanitation. The poorest have the least access to improved sanitation and suffer the greatest health burden. A number of other important, and often poverty-related factors can influence the nature and degree of the health burden. These include access to, and *use*, of services, maintenance and level of service and seasonality. These factors are mainly environmental (assuming some degree of control by intervention). Other factors, which are pathogen or host specific, are not considered here in detail.

- A key determinant of health impact is *who* uses services and *how*. For instance, do children use sanitation? Are infants' stools disposed of safely away from potential human contact? These factors are all important in faecal-oral transmission as they relate to the safe disposal of faeces. Cost is another factor that can influence the take-up and use of sanitation.<sup>11</sup>
- Level of service for sanitation is a further consideration. Private sanitation should in theory be the optimal level of service if faeces are safely removed from human contact. In theory, shared and public sanitation should, and in many cases do, also provide exactly the same role. However, shared and public sanitation often lack adequate maintenance, which in turn may affect use of services. There are additional problems of access for the elderly, children and those who are sick. Public latrines are also normally closed at night.
- Distance to water source has long been recognized as influencing health impact. Distance to sanitation can be a problem of personal security in some places where women wait until dark to use latrines.<sup>12</sup>
- Seasonality is a well-established variable in pathogen-specific diarrhoeal disease. However, seasonality can also be associated with functional problems for sanitation. For instance, floods may cause problems for both sewerage and on-plot sanitation.<sup>13</sup> Flooding can increase the likelihood of direct faecal contamination through the overwhelming of on-plot sanitation, sewerage or contaminated storm-water drainage systems. Floods can also force people to use other forms of sanitation or open ground.
- Urban-rural differences in diarrhoeal disease are not often investigated. Some evidence suggests that few differences exist between rural and urban diarrhoeal disease prevalence rates.<sup>14</sup> The true picture is largely unknown but it would seem safe to assume there are differences between urban and rural areas in terms of both extent of environmental faecal contamination and health care availability.
- Health impact can be much more extreme in conditions of natural disasters and conflict. Direct evidence of the health impact of the lack of sanitation during and in the wake of natural disasters and conflict is sparse. What evidence does exist, notes the importance of overcrowding, lack of water supply, sanitation and hygiene together with the debilitated state of the population in causing health impact to be extreme.<sup>15</sup>

### **Evidence of health impact**

Many of the epidemiological difficulties in assessing health impact in this area have been discussed elsewhere.<sup>16</sup> For the health burden of sanitation, one of the main scientific challenges has been separating out whether health gains come from owning and using a latrine or from hygienic behaviour around faeces disposal. Many observational studies compare self-selected households who have installed their own

latrines to households without sanitation. This then leads to difficulties in comparing the two groups as they are not *like for like*.

New research suggests that latrine owners behave more hygienically than non-owners in ways other than faeces disposal.<sup>17</sup> This has implications for the design of study that can be used. Intervention studies are therefore more appropriate than observational studies.

One review estimating health impact, calculated the expected reductions in diarrhoeal disease from a range of interventions.<sup>18</sup> As can be seen in table 1, sanitation (as defined by technology type) is the single most important intervention for the reduction of the prevalence of diarrhoeal morbidity, producing an expected reduction of 36%. Sanitation is closely followed by hygiene interventions that are expected to reduce diarrhoeal morbidity by 33%. By comparison, the provision of water supply was seen to reduce illness by 17%. These findings corroborate the a priori reasoning of the F-diagram with sanitation as the primary barrier to faecal-oral disease transmission.

The estimated reduction of diarrhoea by sanitation is thought to be an overestimate for some of the methodological reasons above, around study design particularly.<sup>19</sup> However, a more recent meta-analysis<sup>20</sup> has replicated these findings, adding confidence intervals. Although this review does not contradict the earlier findings, only one sanitation study was deemed rigorous suggesting a need for further, more rigorous, studies.

**Table 1. Expected reductions in diarrhoeal disease mortality from improvements in one or more components of water or sanitation**

Intervention	All studies		Rigorous studies	
	n*	% reduction in diarrhoeal disease	n*	% reduction in diarrhoeal disease
<b>Water and sanitation</b>	7/11	20	2/3	30
<b>Sanitation</b>	11/30	22	5/18	36
<b>Water quality and quantity</b>	22/43	16	2/22	17
<b>Water quality</b>	7/16	17	4/7	15
<b>Water quantity</b>	7/16	27	5/10	20
<b>Hygiene promotion</b>	6/6	33	6/6	33
n* The number of studies for which a morbidity reduction could be calculated, divided by the total number of studies that relate the type of facility to diarrhoeal morbidity, nutrition and / or mortality				

Source; Esrey SA, Habicht JP. Epidemiologic evidence for health benefits from improved water and sanitation in developing countries. *Epidemiologic Reviews*. 1986;117-127.

Another review investigated the role of water and sanitation interventions upon specific diseases other than diarrhoea. Ascariasis and hookworm were expected to show reductions in prevalence of 28% (range 0-83%) and 4% (0-100%) respectively. These figures are for water and sanitation interventions together. However, it seems likely that sanitation alone has a two-fold role in reducing the public health impact of worm infections. It appears to both reduce the prevalence of infections and also the intensity of infection.<sup>21</sup>

Research in The Gambia is investigating the role of pit latrines in controlling fly populations and subsequent trachoma transmission. Sanitation has been associated with a 30% reduction in trachoma prevalence by controlling flies.<sup>22</sup>

## **Sanitation's social benefits**

Less direct evidence exists for the wider benefits of sanitation than exists for health (although there are many crossovers between the health and social benefits). Sanitation users themselves are most aware of the many potential benefits.

Perhaps one of the most important links between sanitation and social development is that people demand sanitation. Sanitation can raise social status. It can make female householders safer, it can provide convenience and dignity to householders. It can also be an economic asset to be passed down as a legacy to the next generation. Many reasons are given for why people want sanitation.<sup>23</sup> Health benefits generally tend to come low down on households' lists of reasons.

### *Benefits to the household*

Sanitation brings many benefits at household level, as identified by householders themselves. Raised prestige is closely linked to improved sanitation for family members. Introducing or upgrading household sanitation can raise the social status of a household. This is a factor that is especially important for male heads of households. It can inspire families to aspire to feel 'modern.'<sup>24</sup>

Sanitation brings improved well-being for families in many ways. It can bring immediate benefits of convenience and comfort for family members young and old, and the sick and pregnant especially. Having the convenience of household sanitation can also save time. Time available to women is often seen as a key determinant of family health. Sanitation brings benefits to children. By reducing diarrhoeal disease and worm infections, sanitation at home and in schools, can improve both school attendance and learning.<sup>25</sup>

Sanitation can bestow greater self-respect, dignity and privacy to householders. Improved household sanitation may have the greatest benefits for women and girls. It can increase their safety by avoiding the dangers of sexual assault and harassment faced by many when waiting to use open ground or latrines away from their homes after dark.<sup>26</sup> Sanitation in the home can also provide wider health benefits to female householders who can suffer health consequences, such as urinary tract infections, chronic constipation and unnecessary stress from having to wait until darkness.<sup>27</sup>

Sanitation also improves the local environment when faeces are safely disposed of away from human contact. This can reduce flies and provide a cleaner environment. Having household sanitation can also help to avoid a number of other dangers of open defecation such as snakebites.

Although the construction and upgrading of sanitation costs money, it is also an investment and can act as part of a financial legacy for the next generation. There are also economic benefits from lower diarrhoeal disease and intestinal worm infections in the home, with reduced health care costs and less lost earnings. Where sanitation involves the reuse of waste for agriculture or fish farming, there are additional benefits to production.

### *Benefits to the community*

Sanitation can enhance social development by strengthening community development. This can be seen through examples of community upgrading where the value of water and sanitation services and hardware are increased as well as the human skills to develop and maintain sanitation facilities. Work to construct, upgrade and maintain sanitation can also strengthen the confidence and social status of those involved.

As well as at household level, sanitation, along with hygienic behaviour, can reduce worm infections and diarrhoeal disease at community level. Health benefits in terms of the avoidance of both epidemic and endemic disease burdens can bring economic benefits at the community level and beyond. For example,

the economic cost to Peru for the 1991 cholera epidemic (beyond the direct human cost) was estimated at \$1 billion in lost tourism and exports.<sup>28</sup>

Sanitation may play a role in improving economic growth by contributing to a reduction in infant mortality rates. WHO research suggests a strong link between lower infant mortality rates and higher economic growth at national level.<sup>29</sup> It seems reasonable to assume that this relationship also exists at lower levels, such as regions, cities and communities.

### ***Sanitation in schools***

School sanitation projects can improve enrolment. For example, girls reaching the age of menstruation in some cultures would not attend a school without segregated toilet facilities. A Unicef project in Bangladesh led to an 11% increase in female enrolment by building appropriate school sanitation.<sup>30</sup> The broader role in enabling female education has many positive long-term impacts on individuals, families and communities, such as increasing hygienic behaviour and improving child survival and health.

School sanitation can also create a whole new generation of sanitation champions who can carry the positive message to their homes and communities. Recent research has suggested that hygiene interventions are much more sustainable than previously thought (in terms of sustained changes in hygienic behaviour).<sup>31</sup> Promoting children as champions of sanitation (with implicit links to hygiene behaviour) within households and communities could therefore have potentially equally sustainable social gains.

### **Sanitation progress and other Millennium Development Goals**

The benefits of water supply, sanitation and hygiene together in meeting the MDGs have been discussed elsewhere.<sup>32</sup> The contribution of improved sanitation alone should still play a significant role in the achievement of many of the MDGs. Much of this contribution is in the form of health benefits, but social and economic benefits also play a role. Sanitation has perhaps the greatest potential for contributing to the four goals below.

#### **Goal 1: Eradicate extreme poverty and hunger**

- Health gains from sanitation reduce individual health care costs and lost earnings related to poor health.
- Reduced worm infections and diarrhoeal disease enable improved nutritional status.

#### **Goal 2: Achieve universal primary education**

- Health gains from sanitation enhance attendance and achievement in schools.
- Suitable sanitation within schools increases and sustains enrolment, of adolescent girls in particular.

#### **Goal 3: Promote gender equality and empower women**

- Household sanitation protects women and girls from the risks of sexual harassment and assault otherwise faced when going beyond the household after dark.
- Access to sanitation for female householders brings time savings, reduced health care costs and care-giving to other household members (especially children), allowing time to be spent on alternative activities.
- Involvement in sanitation projects can bring greater self-esteem and status for women within their homes and communities.

#### **Goal 4: Reduce child mortality**

- Sanitation together with hygiene (in the form of hand washing) can reduce the two main causes of death for children, acute respiratory infections and diarrhoea.<sup>33</sup>



- Reductions in worm infections can help in mitigating cases of extreme malnutrition.

The child mortality goal is seen as the most off-target of all the health-related MDGs.<sup>34</sup> The main reason is long-term under-investment in the necessary interventions to improve child health. Sanitation is one such investment, and one that families appear to be willing and able in many cases to take on themselves (with sufficient appropriate local support and supply). Sanitation, unlike many of the health care interventions recommended to meet the MDGs, is preventive and has many additional social benefits beyond its health impact. Sanitation interventions are also cost effective as compared to some continuing health care interventions (such as chemotherapy for helminth control).<sup>35</sup>

### **Where sanitation has made a difference**

The following examples show how sanitation has made a difference in two different settings.

- **Health benefits to communities**

A study in the city of Salvador, Brazil shows how sanitation infrastructure can reduce the prevalence of worm infections in children.<sup>36</sup> The study used the opportunity of local authority upgrading of community sanitation services across a number of similar low-income communities. Several of these did not receive improvements due to technical and financial reasons. The communities without public sanitation services were similar in socio-economic status to those which did receive it. This enabled the researchers to investigate the impact of sanitation infrastructure, as they were comparable communities.

Most of the households within the nine neighbourhoods had access to household sanitation, however before the local authority's interventions, these were not connected to any community sewerage, leaving much faecal waste flowing in the streets. Of the nine neighbourhoods, three had surface water drainage constructed, three had surface water drainage and sewerage and the remaining three acted as a control group, receiving neither intervention.

The results showed that children aged 5 to 14 without community sewerage or drainage were nearly three times more likely to have roundworm, whipworm and hookworm than children who had both community sewerage and drainage in their local environment. Similar results were found for the incidence of diarrhoea in young children. Children living in the control area had an incidence of diarrhoea three times greater than that of children who had community sewerage and drainage.<sup>37</sup>

- **Social benefits to the community**

The health clubs in various districts of Zimbabwe have made significant strides in increasing sanitation coverage and improving take up of hygienic behaviour.<sup>38</sup> The largely female membership are involved in regular health club activities, supported by existing Environmental Health Technicians, to enhance healthy behaviour in their communities. Within these activities, the women have physically constructed a large number of latrines. They have also applied good hygiene practice at regular meetings. Their work has also included developing messages and materials to take to other health club areas and to schools. The experience of this work has given the community members involved greater confidence and respect from others. In some cases it has increased their status, with some women becoming community leaders.

### **Data challenges**

The WHO/Unicef Joint Monitoring Programme (JMP) was set up by the United Nations to monitor progress towards the water and sanitation Millennium Declaration Goals. However, there are a number of difficulties associated with monitoring, such as data availability and quality.

### Monitoring initiatives

The Joint Monitoring Programme (JMP) began in 1990 when Unicef and WHO came together to monitor progress in the sector. Amongst other work, the JMP works on indicators and harmonising survey instruments, it monitors trends in the sector and informs policy makers at national and global level.

Before the JMP Global Assessment 2000, data came from service providers, such as ministries and utilities. They did not include sanitation facilities built by householders or communities themselves. Often the “data” were made in the absence of reliable statistics. National governments also varied in their definitions of sanitation coverage. This made comparison between countries difficult. Definitions have also changed over time, making time trend analysis problematic.

The Global Assessment 2000 introduced the use of nationally representative household survey data. These are data collected through face-to-face interviews with householders reporting what sanitation facilities they use. Work was also carried out to develop and agree definitions of ‘improved’ sanitation (Table 1).

The two main household surveys used are the DHS (Demographic and Health Survey) and Unicef MICS (Multiple Indicator Cluster Survey). Both are carried out in collaboration with national institutes of statistics. The DHS is carried out in eight or nine countries every year, and every four years in many other countries. MICS are carried out approximately every five years among around 70 countries.<sup>39</sup>

For each country of the world, these survey data along with census data are plotted on a time scale from 1980 to the present. Four graphs for each country plot urban and rural coverage for water and for sanitation respectively. Since the Global Assessment 2000, linear trend lines, based on the least-squares method, have been drawn through these data points to estimate coverage for 1990 and 2002.<sup>40</sup>

### Definitions of sanitation coverage

The definitions of service coverage used in the WHO / Unicef Global Assessment 2000 were based on improved technologies. Other technologies were not counted as representing service coverage due to their presumed negative impacts on health. Table 2 below lists which technologies were included as improved or unimproved in the Global Assessment 2000. The term “improved” relates to the technology being optimal in design (largely in terms of reduced microbiological risk). It does not, and cannot, refer to the quality and reliability of such technology types in different settings.

**Table 2. Sanitation technologies considered to be improved and unimproved in the WHO Unicef JMP Global Assessment 2000**

<b>Improved Sanitation</b>	<b>Unimproved Sanitation</b>
Connection to a public sewer	Service or bucket latrines (where excreta is manually removed)
Connection to a septic tank system	Public latrines
Pour-flush latrine	Open latrine
Simple pit latrine	
Ventilated improved pit latrine	

Source: Global Water Supply and Sanitation Assessment 2000 Report. WHO & Unicef Joint Monitoring Programme, Geneva. 2000.

Sewered sanitation (including also septic tanks) was considered as improved coverage in the Global Assessment 2000. Piped systems of sanitation should remove excreta from the house to be treated and disposed of elsewhere. Both dry and wet pit latrines were included as improved coverage. Pit latrines can represent safe disposal of faeces if well maintained and not used by many more people than they were designed for. They should not require manual emptying before faecal pathogens have died off. Some aspects such as smell and insects (which should be less of a problem with VIP (ventilated improved pits) and pour-flush latrines) can affect use.

The remaining types of sanitation were not included as *improved*. Public toilets were not included because some are inadequate to serve the numbers who use them. They can also be costly to use and inaccessible for the elderly and infirm. Access is limited at night as they are often locked. A further problem is that they are rarely used to dispose of children's faeces.

Bucket latrines were also not seen as improved, as they require manual emptying of fresh faeces that puts those carrying out the work at risk as well as potentially contaminating the local neighbourhood environment. 'Kutcha' (temporary) latrines, often in the form of structures that empty into streams or ponds, were also excluded as they do not safely separate excreta from human contact and can also be unstable structures. The use of open ground was excluded as faeces remain in the environment where people, animals and insects can come into contact with them. This is a more important health hazard in high-density urban areas. Open latrines where excreta are left on the ground beneath a raised platform or in an uncovered pit, were also excluded, as they do not represent a safe form of faeces disposal.

### **Progress on sanitation so far**

The JMP has updated the sanitation coverage figures since the 2000 Global Assessment and has produced data for 2002.<sup>41</sup> These data represent a half-way point for the MDG, between the baseline year of 1990 and the goal year of 2015. The proportion of the world's population with access to improved sanitation increased by just 9% between 1990 and 2002. This is a slower rate of progress than needed to reach the MDG sanitation target. Progress has been slowest in rural areas. In 2002, only 31% of the rural population in developing countries had access to improved sanitation, leaving 2 billion unserved. This is compared to 73% of urban dwellers with access, leaving 560 million unserved.

The table in Appendix A shows how each of the regions of the developing world is progressing towards the sanitation MDG. At the mid-way point, only two regions, Eastern Asia (which includes China) and South-Eastern Asia are on track to meet the MDG. A further two regions are nearly on track, Northern Africa and Latin America and the Caribbean. The remaining five regions are not on track at present to meet the MDG. They are South Asia (which includes India), Sub-Saharan Africa, Western Asia, Eurasia and Oceania.

### **Limitations of the data**

Although the Global Assessment 2000 marked a big step forward in national sector monitoring, there are still a number of difficulties associated with monitoring progress towards the MDG sanitation target. These relate to the availability of data, difficulties around definition, and how accurate and representative data are.

### ***Availability and completeness of data***

Relying on the availability of household surveys (and censuses) has proved problematic during and since the Global Assessment 2000. Data for some countries are much more sparse than for others. For instance, ex-Soviet Central Asian states were less likely in 1999 to have had household surveys carried out than, say, countries in Sub-Saharan Africa with a long history of donor involvement and collaboration with national institutes of statistics on surveys.

These limitations are most important for the forty most populous developing nations, which together represent 90% of the population of the developing world. These nations are listed in Appendix B. The data for these 40 nations received extra attention during the Global Assessment 2000 because of their importance for the global and regional totals. Several years on, data for three of these countries, (China, Brazil and Mexico) are still limited, in terms of the number of household surveys undertaken.<sup>42</sup>

The 2002 JMP figures are based on numerous additional household survey results available since 1999. Many of these surveys, having been informed by JMP work on harmonising tools, are now more complete in terms of the detail needed to reach more accurate coverage data. For instance, more detail is now available about the adequacy of pit latrines from these surveys. Previously when ‘pit latrines’ were recorded as a technology type with no further information about their adequacy, an arbitrary 50% were taken as improved and the remainder were counted as unimproved.<sup>43</sup> This has been a factor in the change in the figures from 2.4 billion in 2000 for the population unserved to 2.6 billion in 2002. The additional data and the ensuing time have also allowed the introduction of the least-squares method in estimating coverage.

### ***Definition problems and accuracy of data***

During the Global Assessment 2000, much variability in local definitions was found. At the same time, it became apparent that attaining consensus on these definitions of different forms of sanitation technology was difficult. For example, pit latrines, while acceptable to health officials in Sub-Saharan Africa, were unacceptable to those from Latin America.<sup>44</sup>

Beyond the difficulties in agreeing and applying universal standards to locally generated data, national ministries have changed their own definitions over time of what they accept as adequate coverage. Amongst the forty largest developing countries, these changes in national definitions over time can have a significant impact on global and regional trends. The examples of Chinese and Brazilian sanitation coverage below illustrate this point.

National coverage definitions have changed over time and between countries. There have also been changes in definitions within national household surveys. This partly reflects the previous lack of use of the data on a global scale. As it was not previously used in this way, there was no lobby to make definitions and survey instruments standardised. To rectify this, the JMP has been working for a number of years to improve harmony across the different survey instruments, such as MICS and DHS, with considerable success.

The Global Assessment 2000 adopted the term *improved* to replace the previous term ‘adequate’ (to safeguard human health). Although this was largely motivated by serious implications around calling drinking water *safe*, it also has meaning for sanitation. The previous provider-based sanitation figures could not tell us enough about safe disposal of faeces from household sanitation or give sufficient information about the standards of operation and maintenance of community sanitation infrastructures. Similarly, household surveys do not tell us all we need to know in terms of safety to human health. They are based on technology types assumed to be optimal and that are reported to be used (which assumes they are working). However, it does not tell us how adequately a sewerage system is working, whether water is available to operate pour-flush latrines or whether householders can afford to have pit latrines safely emptied when full.

Changes in sector monitoring over the last twenty years have meant many revisions to national and global coverage figures. For some observers, these changes may look inconsistent and confusing. However, in truth the changes represent improvements in the quality and rigour of the data, something that is vital if the data are to have any meaning.

### ***How representative are data?***

The national sample surveys used as the main data source by the JMP, are conducted in collaboration with national institutes of statistics. It is not known in every case whether government ministries use illegal urban settlements or scattered rural homesteads as part of their sampling frame. Even in a national census it is not uncommon for large and violent shanty towns to be missed out because the enumerators are too frightened to venture into them. It is therefore questionable whether the poorest urban inhabitants are

really represented in the figures. Some commentators believe that official figures are misleading and unrepresentative of the poorest urban dwellers.<sup>45</sup> Without doubt, national level statistics will always hide disparities within nations. The challenge for national level data is to be as representative as possible. A further issue is to be clear about the definitions used by all involved and to discuss and agree them.

### *Use of data*

The JMP produces national level data to fulfil its remit of monitoring progress to the MDGs targets. However, there is much discussion about how useful these data are within countries. Although the survey data available can be analysed by wealth quintiles, they cannot be disaggregated by geographical area.

The data collected and produced by the JMP in recent years represent a vast improvement to the sector data previously available. Data are now available from verifiable sources and are analysed using a standardised methodology. The availability of these data on the Water Supply and Sanitation Collaborative Council's website<sup>46</sup> is a great step forward in the public discussion of the data, as well as their use and application by a wider audience.

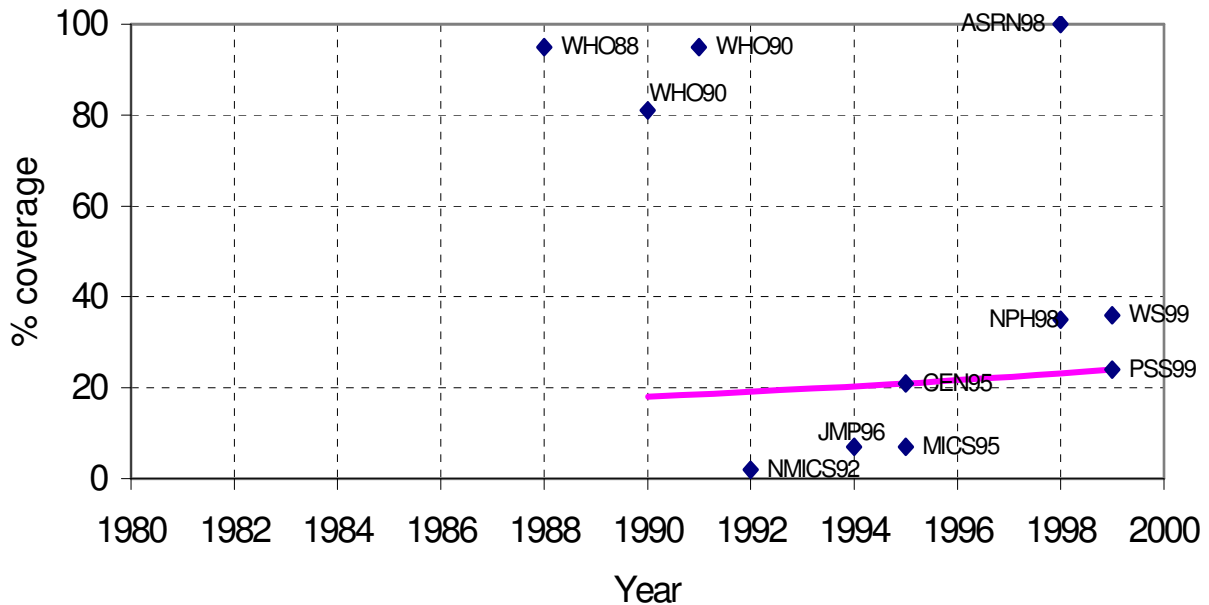
### **Country specific examples of under and over reporting**

Due to changes in national level definitions of sanitation over time, a number of countries have altered their definitions of coverage. The following two are examples.

- **China's over-reporting of sanitation coverage**

China's population without access to improved sanitation, together with those from India, represent a large proportion of those globally without access. The accuracy of data from these two countries can therefore have a great impact on global estimates. China's coverage data varied widely over the 1990s, as figure 2 shows. The variations are due to the changes made by the Chinese government in its definition of coverage.<sup>47</sup> In the 1980s, a concrete slab alone (on which excreta were deposited and periodically removed for disposal or reuse) was deemed an adequate sanitation facility. Today the definition has changed to include physical separation of faeces from the users as well as some kind of treatment or final disposal. The use of household surveys as the main source of data for countries means greater potential accuracy. For each country, JMP data have to be agreed by both the two international agencies and the government.<sup>48</sup>

**Figure 2. China's rural sanitation coverage**



Source: Cairncross S. Sanitation in the developing world: current status and future solutions. *International Journal of Environmental Health Research*. 2003;13:S123-S131

- **Brazil's under-reporting of sanitation coverage**

Reported sanitation coverage data for Brazil has also varied widely over the last two decades. During the 1980s the official sanitation coverage reported to WHO for a number of years included only household connections to sewerage systems operated by the state sanitation companies. Households with pit latrines, or connected to the sewers installed by municipalities, were not counted. This kept national urban coverage between 30 and 40% in the 1980s. None of these data have subsequently been used for estimates by the JMP. In 1986, a Demographic and Health Survey was carried out. This represented a much more accurate picture of coverage and formed the basis of estimates of national coverage. In 1996, a second DHS was carried out and later on year 2000 census data became available. These data, along with data from the minimum national social indicators set from the Brazilian Institute of Geography and Statistics, were used to develop estimates for the JMP mid-term report. These updated data suggest that improved urban sanitation coverage during the 1980s was over 80%. The figure for 2002 is 83%.

#### 4.0 Conclusion

Sanitation has many benefits. It brings gains to health as well as dignity, well-being and prestige. At the current rate of progress on sanitation coverage, the world will miss the 2015 goal. This will have an impact on the 2.6 billion people lacking sanitation now. It will also have an impact on at least four of the other MDGs. These goals, on poverty and hunger, child health, universal education and gender equality all depend on improved sanitation coverage for their own success. Without sufficient progress on sanitation, there will be many human development losses.

Enough evidence exists of the great benefits which sanitation offers to health and social development. The demand for sanitation within households and communities clearly exists. People are building their own

latrines when the conditions are right. It is therefore vital to support this demand for appropriate, affordable and sustainable improvements to sanitation and move towards the fulfilment of the MDG target.

The role of monitoring progress towards the sanitation MDG sits with the JMP. This body has made significant progress since its beginnings in 1990. It faces a number of challenges in monitoring the sanitation goal. These include data availability, lack of agreement over definitions and insufficiently representative household sample surveys. However, through discussion and continued collection and analysis of data, the task of monitoring the sanitation MDG appears fully achievable.

**Word Count:** 6,520 (including tables and figures)

**Appendix A. The forty countries that account for 90% of the population of the developing world**

Afghanistan	Morocco
Algeria	Mozambique
Argentina	Myanmar
Bangladesh	Nepal
Brazil	Nigeria
China	Pakistan
Colombia	Peru
Korea	The Philippines
Congo	Korea
Egypt	Saudi Arabia
Ethiopia	South Africa
Ghana	Sri Lanka
India	Sudan
Indonesia	Thailand
Iran	Turkey
Iraq	Uganda
Kenya	Tanzania
Madagascar	Venezuela
Malaysia	Viet Nam
Mexico	Yemen



## Appendix B. Regional Progress Towards the Sanitation Millennium Development Goal

	Coverage in 1990 (%)	Coverage in 2002 (%)	Coverage needed in 2002 to be on track (%)	Coverage needed in 2015 to achieve the MDG target (%)
<b>Regions on track</b>				
Eastern Asia	24	45	43	62
South-eastern Asia	48	61	61	74
<b>Regions nearly on track</b>				
Northern Africa	65	73	74	82
Latin America and Caribbean	69	75	77	84
<b>Regions not on track</b>				
South Asia	20	37	40	60
Sub-Saharan Africa	32	36	49	66
Western Asia	79	79	84	90
Eurasia	84	83	88	92
Oceania	58	55	68	79
World	49	58	62	75

Source: WHO/UNICEF Joint Monitoring Programme. Meeting the MDG Drinking Water and Sanitation Target. A Mid-Term Assessment of Progress. 2004.

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