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Promoting Sustainability and Equity in WASH Service Coverage With Indicators - Proposal for UN's Sustainable Development Goal 6

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Abstract
The United Nation's Millennium Development Goals (MDGs) are set to end by the end of 2015. The MDGs were formed as an effort to combat the root causes of poverty, with seven targets relating to public health, poverty and hunger, gender equality, education, economic development, and environmental sustainability. Goal 7, to ensure environmental sustainability, incorporated water and sanitation goals within Target 7.C. The target proposed to "halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation". As the 2015 deadline of the MDGs comes to an end, the goals have led to a great deal of progress.

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Promoting Sustainability and Equity in WASH Service Coverage with Indicators -

Proposal for UN's Sustainable Development Goal 6

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Contents

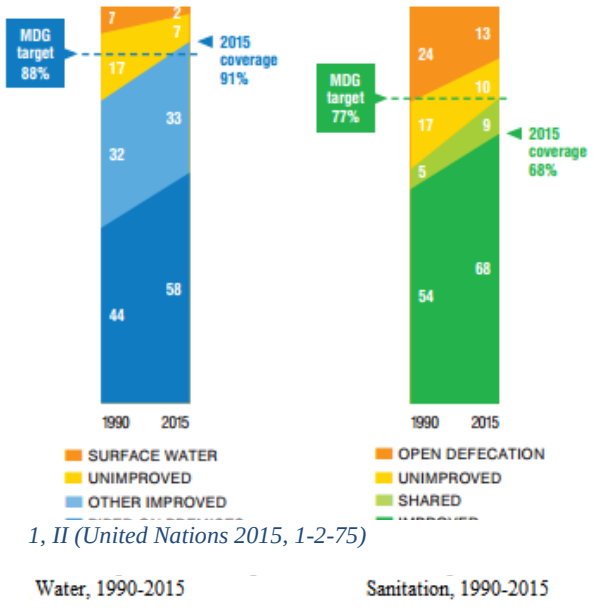
List of Abbreviations

HWT	Household Water Treatment
IAEG-SDGs	Inter Agency Group on Sustainable Development Goal Indicators
JMP	Joint Monitoring Program
MDG	Millennium Development Goal
MHM	Menstrual Hygiene Management
OWG	Open Working Group
SDG	Sustainable Development Goal
UN	United Nations
UNEP	United Nations Environment Program
WASH	Water, sanitation, and hygiene

Introduction

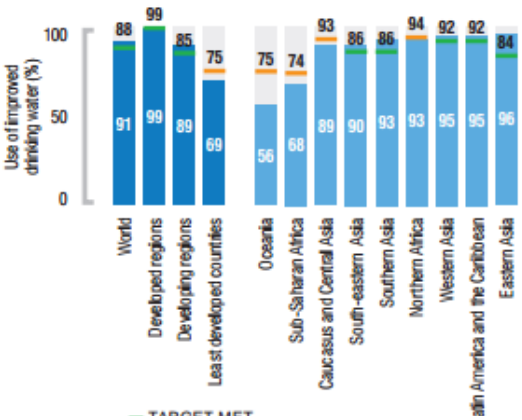
The United Nation's Millennium Development Goals (MDGs) are set to end by the end of 2015. The MDGs were formed as an effort to combat the root causes of poverty, with seven targets relating to public health, poverty and hunger, gender equality, education, economic development, and environmental sustainability. Goal 7, to ensure environmental sustainability, incorporated water and sanitation goals within Target 7.C. The target proposed to "halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation". As the 2015 deadline of the MDGs comes to an end, the goals have led to a great deal of progress.

Within Goal 7, the target for drinking water was achieved five years ahead of schedule and surpassed the original MDG target. In 2015, 91% of the global population uses an improved drinking water source, compared to 76% in 1990 (United Nations 2015, 1-2-75). Although the progress on sanitation access missed the MDG target by about 10%, 2.1 billion people have gained access to improved sanitation since 1990. (United Nations 2015, 1-2-75) In 2015, 68% of the global population uses an improved sanitation facility, compared to 54% in 1990 (United Nations 2015, 1-2-75).



1, II (United Nations 2015, 1-2-75)

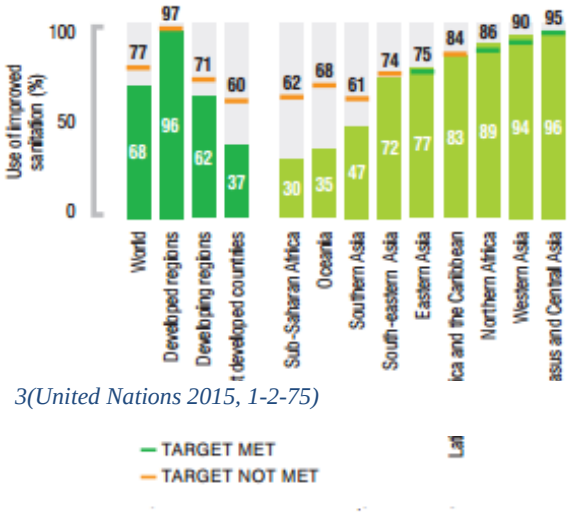
Looking at the progress on a regional level exposes the particular weaknesses of the sector. The MDGs were formed to serve the poorest of the global population. Despite global progress, the least developed countries continue to lack drinking water service provision. While the drinking water target was achieved overall, both Oceana and Sub-Saharan Africa, as seen in Figure 3, fell short of their respective targets. Nearly half of global population still using unimproved sources of drinking water live in sub-Saharan Africa (United Nations 2015, 1-2-75). The commonality between sub-Saharan Africa and Oceana is that they are both regions that house some of the lowest quintile wealth populations living in very rural areas. The issues of continued lack of service are highly connected to wealth inequalities. Over the last 25 years, rich, urban areas have received more of the drinking water development over poor, rural areas. This is a lesson for the global development community. Rural communities are a continued challenge for drinking water service provision.



2(United Nations 2015, 1-2-75)

Fig 3. Use of improved drinking water (%), in 2015 vs. MDG target

While most developed regions achieved the MDG target for sanitation, only 62% of the developing regions and 37% of the least developed countries use improved sanitation in 2015. The regions that are particularly lagging are in Sub-Saharan Africa, Oceana, and Southern Asia. As with drinking water, in these regions, the greatest issue is the service provision in rural areas, with 50% of the rural population lacking sanitation facilities, compared to 18% in urban areas (United Nations 2015, 1-2-75). It is obvious that while the MDGs may have been an effective strategy for much of the world, they failed Sub-Saharan African, Oceana, and South Asia. The sector has an opportunity to learn from the lack of progress within these regions and implement new strategies.



3(United Nations 2015, 1-2-75)

Fig 4. Use of improved sanitation (%), in 2015 vs. MDG target

The need for additional global progress toward development, particularly within the most poverty-stricken populations, led to the formulation of a new set of goals to replace the MDGs, called the Sustainable Development Goals (SDGs). In September of this year, the United Nations formalized the Sustainable Development Goals and mandated a fifteen year time-line to achieve them. The water and sanitation goals now fall under Goal 6, to "ensure access to water and sanitation for all". Goal 6 includes a number of targets that expand upon the original Target 7.C of the MDGs. The targets are as follows:

> *6.1 by 2030, achieve universal and equitable access to safe and affordable drinking water for all.*
>
> *6.2 by 2030, achieve access to adequate and equitable sanitation and hygiene for all, and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.*

6.3 by 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated waste water, and increasing recycling and safe reuse by x% globally.

6.4 by 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity, and substantially reduce the number of people suffering from water scarcity.

6.5 by 2030 implement integrated water resources management at all levels, including through transboundary cooperation as appropriate.

6.6 by 2020 protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.

6.A by 2030 expand international cooperation and capacity-building support to developing countries in water and sanitation related activities and programs, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies.

6.B support and strengthen the participation of local communities for improving water and sanitation management.

As the name implies, the driving factor behind the Sustainable Development Goals is to ensure not only that these targets are achieved, but that they are achieved with a focus on sustainability, equity, and long-term impact. This applies to all of the SDGs, including Goal 6. While the MDGs attempted to simplify their process by focusing simply on global development, the SDGs understand that the focus should be shifted on development that is equitable and targeted at the most impoverished communities. Applied to Goal 6, this emphasis on equitable, sustainable growth means that the rural, impoverished areas in sub-Saharan Africa and Oceana that only saw marginal improvement under the MDGs are being scrutinized more closely. The MDGs were a great lesson to the development community, and have given us a greater understanding of how to reach these communities under the time frame of the SDGs to ensure that access to drinking water, sanitation, and hygiene for all is achieved.

Monitoring

There are large discrepancies in terms of who is receiving WASH services. As previously mentioned, despite the last fifteen years of collective effort towards the Millennium Development Goals, the poorest quintile of the global population still lack basic water and sanitation services. Arguably, the progress made under the terms of the MDGs were the "low hanging fruit" of wealthier communities. There are a variety of questions that this raises. Did these communities see growth because the funding intended to go towards the lower quintile communities stopped at the higher income communities? Did the funding reach the lowest quintile yet still have a minimal impact on the community? The solution to these questions in either case is to establish better monitoring practices for the WASH sector as a whole. This means that within every WASH development project there is a need to allocate funds to post-project monitoring in order to fully gauge the impact of the project on the community. In addition, the local and federal governments of each country should have monitoring agencies in place to facilitate the reporting and collection of relevant data. In order to fully understand the issues of inequity in service coverage and to bridge that service gap, to ensure that the funds allocated to WASH development are reaching the appropriate users, and to determine which projects have failed and to develop sustainable, impactful projects going forward, it is crucial to ensure that monitoring is a built-in piece of the puzzle.

Within the development sector, the word "indicator" is used to define a trackable data point that can be monitored over time to gauge progress. Choosing the right indicators is the key to meeting the goals of the project. Good indicators define the target and reflect true progress. They must be informative but also easy and relatively cheap to collect. Often, an indicator that provides more information, such as one that involves environmental or health testing, is too cost prohibitive to be realistic on a larger scale. An indicator that may provide less information but is

easier to collect, such as a survey, may prove the better choice. For example, a visual inspection of a latrine to observe if it is sanitary and “free of fecal matter” is much less costly and time consuming than performing health testing to determine if an individual has fallen ill due to fecal contamination. If the facility is kept sanitary, it implies that the users suffer lower negative health impacts without needing expensive health indicators. In the case of the SDGs that apply on a global scale, the most cost-effective performance indicators are ones that involve simple quantitative analysis.

GLAAS reported that only half of the countries that responded to the 2013/2014 survey reported using indicators on sanitation. The use of drinking water indicators was more widely used, which may help account for its relative success. Hygiene indicators were almost nonexistent and inconsistent. The Joint Monitoring Program, a UN/WHO agency that is tasked with collecting the relevant data for the indicators, has performed with or without help on a national level. For lasting change, however, and to demonstrate a vested interest in improvement of WASH services for disadvantaged populations within their borders, each individual nation must have functioning monitoring agencies in place for the collection and reporting of indicators. Without monitoring agencies in place, functional progress will end within the time frame of the SDGs.

In 2015, the UN called for agencies to suggest indicators for the SDGs. The UN used two monitoring indicators for water and sanitation for the MDGs: one, the proportion of the population using an improved drinking water source, and two, the proportion of the population using an improved sanitation facility. These indicators are a basic starting point to improve upon given the SDGs additional emphasis of equity and sustainability. In addition to monitoring indicators, each target should include sustainability and equity indicators.

The indicators must address sustainability to demonstrate that the service will continue to be used and properly serviced into the future. The SDG's focus on sustainability is particularly important in the WASH sector, with its notorious history of service failure. The average global failure rate for water points in developing countries is over 40% (Improve International 2015, 10). Post-project monitoring is an important component of sustainability. It can help determine why projects fail, if there are technical issues or social issues in the implementation of the project, and improve sustainability of the sector over time.

The indicators address include inequity by targeting users who experience the most hardships due to lack of service provision. In the next section, I will suggest indicators for the first three targets of the SDGs using these guidelines.

Suggested Indicators

Target 6.1

- *By 2030, achieve universal and equitable access to safe and affordable drinking water for all.*

In the following sections, I will suggest monitoring, equity, sustainability, and health indicators to effectively address each component of the target. The tables below summarize the indicators that I have proposed. I have divided the target into two components; access on a household level and access at schools and hospitals. While the MDGs only monitored their indicators on a household level, the SDGs stipulate "universal" access, which implies access on a broader level. I believe that vulnerable populations, such as those present at schools and hospitals, should be included in "universal" access, which I will discuss further on.

Access to Drinking Water on a Household Level

Sub-target 6.1.1	Indicators	
• Achieve equitable access to safe and affordable drinking water on a household level	Monitoring / Equity Indicator:	• **Proportion of population using a safely managed drinking water source with a total collection time of 30 minutes or less for a roundtrip including queuing.**
	Sustainability Indicator:	• Proportion of safely managed drinking water sources with accessible plans and funds for repairs that involve its users.
	Health Indicators:	• Proportion of population daily performing household water treatment. • Proportion of drinking water sources that supply populations of over (X) number of people that are regularly tested for faecal coliform bacteria. • Proportion of drinking water sources that are tested for naturally-occurring chemical contaminants.

Monitoring / Equity Indicator

The UN-Water suggested indicator for Target 6.1 is “the percentage of population using safely managed drinking water services” (UN-Water 2015, 1-2-42) . UN-Water believes that this data can be computed based on household surveys and censuses, with a safely managed drinking water source being defined as “a basic drinking water source which is located on premises and available when needed and free of faecal contamination” (UN-Water 2015, 1-2-42). Given that water collection is time consuming for a large portion of the poorest quintile in many developing

countries, it is overambitious to expect that within fifteen years of development they will have on-site access to drinking water. This would require the need to provide water sources on the residences of millions of households. In Sub-Saharan Africa, for example, over a third of the population spends over 30 minutes a day on water collection (UNICEF 2011, 1-2-64). If the UN adopts this as the definition, the goal of achieving 100% access to safely managed water services will not be achieved.

A more achievable indicator would include an acceptable distance or time to source water, thus ensuring that the collection of drinking water does not take up unreasonable portions of the collector's day. In lower income communities or in rural areas where one water source is shared by many families, this helps stakeholders define placement and an acceptable number of drinking water point sources in a community. Under the MDGs, the indicator defined that an acceptable or improved water source is less than one kilometer from its place of use Instead of using distance, defining the total collection time has more of an impact on equity within the community. Close access to a drinking water source, even if it is within feet of a household, does not necessarily indicate that it is not a large time burden to a collector if many families share the same source and queues are long.

During a joint UNICEF and WHO consultation, the collaborators suggested the following monitoring indicator for drinking water supply: "Percentage of population using an improved source with a total collection time of 30 minutes or less for a roundtrip including queuing" (UNICEF 2013, 1-2-8). Research shows that those who spend more than 30 minutes per round trip to collect water do not provide for their household's minimum daily drinking water needs (UNICEF 2011, 1-2-64). Those with longer collection times, due of the number of trips required to provide for a household and the quantity that the collector is capable of providing per trip, do

not collect the required 5 liters per person per day that is sufficient for drinking, food preparation, and maintaining good hygiene practices. WHO reports that inadequate drinking water leads to over half a million diarrheal deaths per year in low- and middle- income countries (WHO 2014 Core Indicators). Requiring that the total collection time is less than 30 minutes ensures that a collector can provide enough water to maintain the health for each individual in their household.

In addition to the health impacts of reduced water collection time, water collection is highly connected to equity. Firstly, time to collect water is higher in the poorest populations. For example, in Sub-Saharan Africa, 32% of poorest quintile population spent half an hour or more to collect water compared to 9% of the richest quintile population (UNICEF 2011, 1-2-64). Rural communities particularly suffer from lack of service, with over 60% of the population in the poorest two rural quintiles spending 30 minutes or more to collect water. These communities are underrepresented, and providing an indicator with data on populations with high water collection times can help the development community target "high need" users and improve equity across wealth quintiles. Secondly, women and girls disproportionately bear the burden of collecting this water. Women and girls are responsible for collecting water in almost three-quarters of households without access to drinking water on the premises (UNICEF 2011, 1-2-64). In Uganda, for example, women spend an average of 660 hours per year, or two full months of labor, collecting water (WSP 2010, 9). These over-burdened community members have less time for other activities, which lead to gender inequities at school and in the workforce, leading to economic inequities among gender. On a social level, high carrying times simply diminish the quality of lives of women and children, contributing to gendered social inequities.

Defining the total acceptable collection time under 30 minutes transforms this indicator into both a monitoring and an equity indicator in addition to providing information about the quality of service provision. This is much more useful than a simple indicator monitoring who has access to drinking water. This data can be acquired through household surveys administered to collect the information in the first section of the indicator, with little added expense or time.

Sustainability Indicator

Measuring the sustainability of a service is more of a challenge than measuring its overall progress. As previously mentioned, the WASH sector suffers from a high rate of service failure. Access to a safely managed drinking water source at the time a survey is conducted does not guarantee access in the future, its reliability, or its quality. For example, handpumps are a popular drinking water source for rural communities in sub-Saharan Africa, yet their high failure rate and limited lifespan raises concerns of sustainability of service for those who rely on them. A 2009 survey of wells in Sub-Saharan Africa found that of 345,071 handpumps surveyed, over a third were non-functioning (RWSN 2009, 1-1). In Sierra Leone, over half of the handpumps were broken at the time of the survey. In the case of handpumps, long-term maintenance and funding are rarely considered in project planning, which is a dangerous oversight coupled with their rate of failure. More often than is acceptable the community users are not involved in the project implementation, and have no way to contact the companies who have provided the service once it has broken down. Considering the degree of technology involved, stakeholders must either treat the resource as a temporary fixture or one that requires frequent maintenance instead of a permanent resource that they can build and ignore. In order to improve the sustainability of service for handpumps, a few things must occur. One, there must be long-term maintenance plans for the service and funding allocated for these plans. Two, the community and

users of the service must be involved in these plans and know to whom to communicate lapses in service if one occurs. Three, there must be a network of people who have been trained to maintain the service when lapses in service occur.

Water for People has an admirable model for their projects concerning sustainability that grades their project based on long term operation, maintenance, and financial planning for water points. A few of these metrics include: “financial records show evidence of a capital maintenance (savings) fund or regular loan payment for capital costs”, “spare parts are available in or near the community”, and “there is a person who has been trained to provide water point/system operation and maintenance available” (WFP 2014, 1). In addition, their previous process included multiple year timelines for each of their water points.

One important question that comes up when discussing sustainability is who bears the responsibility of maintaining a water service. Often these handpumps are built by well-meaning development agencies without input from local communities or governments. That is unacceptable as a practice. Governments and the users of the service should be involved on every level of its implementation. If the local or federal governments are not involved and the development agency is unable to allocate funds for its maintenance, then the project will ultimately fail when the service breaks down and the funds should be allocated in a different way. If the issue is the cost of maintenance, a local government can help to secure low-cost tariffs from the users to extend the service. Low-quintile populations are notorious for paying large portions of their salaries for basic services like water provision. Many countries have alleviated the cost to the poor with a combination of taxes and tariffs. With tariffs proportional to the user’s income this can create equity in service provision and lower costs for impoverished, rural users. However, this is an ideal situation that requires functional governing structures and

agencies present to track and maintain water points and collect tariffs. It is my opinion that national governments must be involved in water provision to a greater extent, particularly in areas such as Sub-Saharan Africa, where large portions of the population lack service and where governing agencies have let outside agencies take a greater responsibility in WASH service provision than is appropriate, whether they supply large urban communities or small rural communities. Without the appropriate agencies and indicators to track and monitor service provision, the nations' commitment to providing clean drinking water to their citizens is dubious. This issue is systematic and is complicated to address using indicators. However, perhaps the UN can help motivate governments committed to providing drinking water, which will ultimately aid in the progress of sustainable drinking water service provision, using indicators such as: "governing agencies in place to monitor and track drinking water service provision".

An indicator addressing any information on sustainability of a service would be an improvement over the MDGs. This information can be conveyed on a local scale by surveying the community about accessible plans and funds for repair of a water service. This addresses the problem on the basic level of funding allocation and will help motivate stakeholders to consider the allocation of funds for post-project needs as a part of service provision. On a larger scale, the indicator identifying governments that have functional monitoring and tracking agencies in place can be used to ensure that governments are taking responsibility for the lack of service of their citizens. To speak broadly, this, as any other WASH or Development issue, is fundamentally an issue of governance. Solving this issue at the root requires government involvement. At the very least, the presence of agencies to monitor water points, which will truly demonstrate that these governments have a vested interest in providing sustainable water services for their rural poor.

Health Indicators

Ensuring that drinking water is available does not demonstrate that it is clean and sanitary. To truly ensure that a population is safe from waterborne disease, water quality testing is a necessary evil. Water quality testing identifies pathogens and contaminants, such as fecal coliform bacteria and metals, which lead to increased mortality. Faecal contamination of drinking water supplies remains an issue, even with sources that were considered "improved" under the standards of the MDGs. A 2012 WHO analysis indicates that 1.9 billion people worldwide use either an unimproved source or an improved source that is faecally contaminated (WHO 2014, 4). Unfortunately, due to the costs, equipment, and trained technicians involved to implement, water quality testing is unrealistic in some scenarios, which is why the MDGs excluded it altogether. I believe that it has a place within the SDGs.

To cover areas where water quality testing is not an option, Household Water Treatment (HWT) is an imperfect substitute. There are a few ways of treating household water supplies; the most common being boiling, filtration, chlorination, and solar disinfection (WHO 2014, 4). There is varying data on the effectiveness of HWT, because there are a variety of additional factors involved, including unsafe storage and handling, and consistency of use. Sources agree that while the health benefits of HWT are overestimated in literature, overall HWT is linked with a 35-44% (UNICEF 2011, 1-2-64){{210 UNICEF and World Health Organization 2011}}(UNICEF 2011, 1-2-64)reduction in diarrheal disease (UNICEF 2011, 1-2-64). An indicator on HWT, such as the proportion of households where HWT is performed daily, would serve to suggest the eradication of pathogens and indicate high quality water for users in locations where water quality testing is too costly to perform. Stipulating that it is performed daily ensures that it is performed consistently, which is the key to the success of HWT and

should cover all water carried or piped onto the premises. This data is accessible through household surveys.

In urban areas, it is more common for one single water source to provide for thousands of people. In this case, the cost and complications involved in water quality testing are outweighed by the risks to public health. These areas are more likely to have the equipment and trained technicians capable of performing testing, or if they lack them currently they have the ability to support them. For impoverished nations with fewer resources, it is more reasonable to request that water quality testing be triggered for water sources that supply a certain number of people. This number can be quantified by the individual nation, based on their capabilities. There is value in collecting information about the quality of a drinking water supply other than its availability, particularly after heavy rainfall events, which can bring polluted runoff into water sources. Where available, health indicators that identify potential microbial and chemical contaminants should be used at a regular frequency.

The most basic test for pathogens in a water supply is a test for total coliform bacteria. Coliforms are easy to identify organisms that generally indicate the presence of other, more dangerous pathogens. Because of this, they're considered "indicator" organisms, which make them useful in water quality testing. Fecal coliform, in particular, is a coliform that is specifically found in mammals and gives more information than a test for total coliforms. It can indicate the contamination of a water supply with human faeces, which greatly increases the risk of contracting a waterborne disease such as cholera or dysentery. Positive coliform tests can be reported to the users so that they can perform increased measures to keep their water safe.

Testing for chemical contamination is also costly, but it is necessary in certain areas of the globe where there is a high probability of contaminants. WHO suggests that drinking water sourced from groundwater should be testing for the following naturally-occurring chemicals: fluoride, arsenic, selenium, and nitrate, since the presence of these chemicals cause negative health impacts (Thompson et al. 2007). Over 130 million people are at a risk from arsenic in groundwater (UNICEF 2011, 1-2-64). Arsenic poisoning in the long-term has a laundry list of health impacts that ultimately leads to death. High fluoride concentrations are found in the groundwater of Africa, China, the Eastern Mediterranean, and Southern Asia, and can lead to severe skeletal problems (UNICEF 2011, 1-2-64). Given the environmental factors that affect the distribution of these chemical contaminants and the cost of testing, it is difficult to present it in a neat universal indicator. My suggestion is that a certain number of groundwater drinking supply sources are tested for chemical contaminants at random, and a positive sample will trigger further testing of other supply sources in the area. While the "proportion of drinking water sources that are tested for naturally-occurring chemical contaminants" is an undoubtedly an inadequate indicator, it is a stepping stone. Testing every drinking water source is highly difficult to enforce, but getting an idea of how many sources are tested gives enough information to determine if chemical contamination is an issue in the region and if it should be further investigated.

For rural communities, collecting data on household water treatment can be used as a substitute for testing each individual drinking water source. Including an indicator on household water treatment, with methods including boiling, water filtration, straining, bleaching, and solar disinfection, has a positive impact for vulnerable groups often in the lowest wealth quintiles. When an individual water source supplies a high number of people, the contamination of that

source can lead to the spread of waterborne diseases. In this case, water quality testing for fecal coliform should be a standard practice that can alert its users and quickly mitigate disease outbreaks. Despite the high costs of water quality testing, the individual country can determine "a number of people per water source" that they would balance the costs of testing and the risks involved in providing potentially contaminated water to large groups of people. These two sets of indicators serve to cover water quality for both rural and urban populations.

Target 6.2

- *by 2030, achieve access to adequate and equitable sanitation and hygiene for all, and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.*

Considering the lack of progress in sanitation service supply during the MDGs, achieving "access to sanitation and hygiene for all" will be a far more difficult goal than achieving "access to drinking water for all". Currently, an estimated 2.4 billion people lack access to improved sanitation facilities. This accounts for 32% of the world's population (UNICEF and World Health Organization 2015, 1-2-90). The majority of these people are in the poorest quintile of wealth distribution. In the next fifteen years, the major struggle for developing countries will be to close this equity gap in sanitation access and ensure that every household has access to an improved sanitation facility with a hygiene facility. Sanitation services on a household level are generally a more sustainable service with less "moving parts" than drinking water supply, but there is still a need to focus on sustainability, particularly in terms of ensuring that populations do not revert back to open defecation as a practice.

Access to Sanitation and Hygiene on a Household Level

Sub-target 6.1.1	Indicators	
• Access to improved sanitation at a household level.	Monitoring / Health / Equity Indicators:	• **Percentage of population using a safely managed sanitation service.** • **Percentage of the population practicing open defecation.**
	Sustainability Indicators:	• Percentage of the population using a facility that is used by no more than one household. • Percentage of latrines that are replaced when full.
	Equity Indicator:	• Percentage of the population using a facility that provides sufficient privacy to its users.

Sanitation Indicators

For the MDGs, the JMP used the following indicator: The proportion of the population using an improved sanitation facility. In this case, the definition of an "improved sanitation facility" is "one that hygienically separates human excreta from human contact". The UN's proposed monitoring target for sanitation is the "proportion of the population using a safely managed sanitation facility". While the definition is similar, it contains a few key differences. A safely managed sanitation facility is "an improved sanitation facility that separates human

excreta from human contact, and that is shared by no more than 5 households or 30 persons, whoever if fewer, if the users know each other" (UNICEF 2014, 8). The definition maintains that an improved facility is one that separates human excreta from human contact, but it adds that the facility can be shared and still be considered improved.

The MDG's original definition stated that an improved sanitation facility must be used by only one household. The rationale behind this was the tendency for shared sanitation facilities to be improperly maintained. The new definition allows for more sanitation facilities to be considered improved, which will lead to progress in sanitation coverage for the least developed countries, of which 16% of the population used shared facilities (Rheinlander et al. 2015, 509). The practice is highest in Sub-Saharan Africa, where 19% of the population uses shared sanitation facilities (Rheinlander et al. 2015, 509). The increased use of shared facilities is also strongly correlated with urbanization, a trend which will continue to grow into the future. While it is more difficult for facilities that are used by multiple households to properly maintain a facility, a 2015 paper published by WHO argues that shared sanitation should not be automatically assumed to be unimproved. It is important to note that these facilities are not public toilets. They are facilities where the users know each other, which adds an element of accountability if the facility is improperly maintained. If the facility passes visual surveys that indicate that it is cleaned and well-maintained, it should be considered part of the network of safely managed sanitation services.

There are two components that I would add to the definition of a safely managed sanitation facility. One, the facility must be free of visible fecal matter, which is a clear, easy-to-monitor, demonstrable standard that human excreta is indeed being separated from human contact. This would fortify the monitoring indicator as one that protects its users from disease.

Two, the facility must provide sufficient protection to its users. A facility must demonstrate that it can protect their users so that the risk to their safety is minimized. A facility that provides sufficient protection for its users is constructed in an area where the user can be protected from physical harm and the facility must be constructed in a way that limits the user from exposure. In other words, it must be located in a safe environment and must have walls and a way to shield the user from prying eyes. Women find alternate ways to relieve themselves if they do not feel safe in their environment. In urban environments in Kenya, for example, women often use polythene bags in lieu of improved, available facilities, due to the perceived risk to their safety (WSP 2010, 9). A facility that lacks these components is not safe for their users. A facility that has visible fecal matter does not aid in the prevention of disease reduction, and therefore should not be counted towards the SDG goals. A facility that is unsafe goes unused by women, which leads to the increased health risks within this demographic. Neither are acceptable, and thus these terms should be included in the definition of a safely managed sanitation service.

My proposed definition for a safely managed sanitation service is the following. An improved sanitation facility that:

1. separates human excreta from human contact,
2. is free of visible fecal matter,
3. is shared by no more than 5 households or 30 persons, whoever if fewer, if the users know each other,
4. and the facility provides sufficient protection for its users.

This definition allows for multiple components to be covered under a single indicator. It covers health impacts and equity in addition to monitoring goals. No sanitation facility should be

considered safely managed unless it properly protects its users from health impacts and provides enough coverage for its users to feel physically safe.

Monitoring Open Defecation

An additional component to monitor is the number of people who practice open defecation. The target 6.2 seeks to eliminate this practice completely under the terms of the SDGs, considering its connection to the spread of waterborne disease. The MDGs made progress towards this goal, but eradicating the practice of open defecation is highly connected to cultural norms and will not end without behavior change measures. Current reports estimate 1.1 billion people globally practice open defecation, and over half of these people live in India (UNICEF 2015, 6). The practice is linked with the incredibly high numbers of diarrheal deaths among children in India, with 188,000 children per year succumbing to the illness (UNICEF 2015, 6). In recent years, this practice has reduced from 54 to 48 percent, due to a combination of behavior change programs and increased access to sanitation services. Studies show that in India, the majority of the people who were interviewed in Bihar state wanted a toilet and had taken steps to get one (UNICEF 2015, 6). Improving access to sanitation facilities and the continued use of behavior change programs to change cultural norms will continue to reduce open defecation. An indicator on behavioral change programs would not be able to reflect enough data to be useful, in my opinion, so the indicator as it is currently should stand. The WASH sector could use overall monitoring trends in open defecation to target areas that are not seeing improvements in open defecation to implement programs.

Sustainability Indicators

It is understandable why the agencies involve want to include a broader definition of a sanitation facility to monitor progress, including multiple households. It becomes more difficult

to foster a sense of ownership over a facility the more users that are involved, and ownership leads to sustained maintenance of a facility. The expanded definition of safely managed sanitation facilities is useful in extending service provision, particularly for the lowest quintile users, but for sustainability of service, the ultimate goal in the sector is for each household to have an individual sanitation facility and this goal should not be abandoned entirely. Thus, I propose continuing to monitor sanitation facilities per household as a separate sustainability indicator, which does not impede the monitoring goal but add to it.

In addition, in order to monitor how sustainable the efforts against the practice of open defecation have been, I propose the monitoring of pit latrines. Rarely do lower quintile populations go from practicing open defecation to using toilets with piped waste. Instead, the alternate to open defecation is almost always the use of pit latrines. For this reason, I believe that it is important to monitor the continued use of pit latrines through an indicator measuring if they are being replaced when full. Pit latrines are not a permanent technology. They fill at a rate depending on geophysical and biological factors, but most latrines need to be emptied or replaced every 5-9 years (Still and Foxon 2012, 1). If they are replaced, it implies that the users have not returned to the practice of open defecation. Proof that pit latrines are being replaced when full demonstrates the community's commitment towards sustaining safely managed sanitation services.

Equity Indicators

Creating safe, equitable spaces for women and children is critical to reducing open defecation among this population, as described earlier. This is a particular issue in urban spaces, where women often chose to defecate into bags or use unimproved facilities instead of approved facilities, due to the increased risk to their health. To emphasize this point, I believe that

specifically monitoring the trends of gender and open defecation is critical to improving equity in sanitation supply. Reducing open defecation among this population indicates that the problems of safety are being addressed.

Summary

While the original indicators were sufficient under the Millennium Development Goals, the added emphasis of sustainability and equity means that we should revisit and improve the indicators under the Sustainable Development Goals. The definition of a "safely managed sanitation facility" allows for the inclusion of multiple households, which expands access to populations where social norms include the sharing of facilities, as long as health standards are upheld. To make it equitable, it must provide sufficient privacy and protection for its users, a concern for women and children, who often choose open defecation over improved facilities. Monitoring the long-term sustainability of pit latrines speaks volumes about the effectiveness of open defecation prevention measures. Ultimately, the inclusion of equity, sustainability, and health impacts make this a more sufficient set of indicators for the SDGs.

Access to Hygiene on a Household Level

Sub-target 6.1.2	Indicators	
• Access to hygiene on a household level.	Monitoring / Health Indicator:	• **Percentage of population with a handwashing facility with soap and water at the home.** • **Number of units of soap a household purchases per month.**

While the sanitation and hygiene goals have been separated for clarity in this paper, in the SDGs they have been included within the same target to emphasize their interconnectivity. The use of safely managed sanitation facilities is critical to removing and isolating human waste, which is the source of many harmful diseases. To see the full benefits of disease reduction, however, it is important to encourage hygiene practices after the use of a sanitation facility to eliminate any waste that may be present on the user's hands. If the user does not wash their hands, harmful pathogens may then come in contact with the household's food or water supply, which can have devastating consequences, especially if there are young children present in the household. As previously mentioned, diarrhea is the leading cause of death for children under the age of five in developing countries. These deaths can be reduced with appropriate hygiene interventions. Handwashing with soap after the use of a sanitation facility has been shown to reduce the risk of diarrhea by 44% (Ensink , 5). Including handwashing with soap as an indicator motivates stakeholders to emphasize these low-cost initiatives as tools for disease reduction.

Monitoring hygiene on a household level is a particular challenge in the WASH sector. Self-reported data on positive behavioral practices tends to be inflated when compared to observed data, meaning that people report performing a good behavior more than they actually perform that behavior (Contzen, De Pasquale, and Mosler 2015, December 20, 2015-e0136445). This has shown to be true with hand washing practices and has led to issues in monitoring hygiene (Contzen, De Pasquale, and Mosler 2015, December 20, 2015-e0136445). Household surveys on hand washing practices are therefore an inaccurate gauge, and for the purposes of the SDGs, unacceptable. An alternative way to track proper hand washing practices is twofold. One can observe if there are hand washing facilities with soap present in proximity to the sanitation facility. If a handwashing facility is present, it is implied that the users are aware of the benefits

of its use and that it is being used. This is qualitative data that helps stakeholders target areas that lack handwashing facilities. In order to monitor the sustainability of the hand washing facility through time, a second indicator can be utilized that monitors how often the household buys soap. While this depends on an honest answer, the added degree of separation between the behavior and its users helps minimize inflated responses. The number of units of soap purchased per household is much less personal than inquiring about hand washing after using a sanitation facility, but it gives quantifiable data on handwashing frequency that can act as a substitute for handwashing practices per person.

Universal Access to Wash Services

The 193 countries that comprise the United Nations have decreed that drinking water and sanitation access are both universal rights, and thus each nation has an ethical obligation to provide these services to their citizens. The Millennium Development Goals principally focused on providing these services on a household level. However, SDG 6 uses specific terminology in target 6.1 and 6.2 that suggests that these services should be provided outside the home. For example, target 6.1 is: “By 2030, achieve *universal* and equitable access to safe and affordable drinking water for all” with an emphasis on “universal”. The Inter Agency and Expert Group on Sustainable Development Goal Indicators (IAEG-SDGs), an agency working towards developing appropriate indicators, has determined that “universal” access to drinking water “implies all settings including households, schools, health facilities, workplaces, etc.” (WHO 2015, 1). Target 6.2’s language is slightly different, but carries the same implications: “achieve access to adequate and equitable sanitation and hygiene *for all*”.

The inclusion of settings outside the home across the WASH sector, particularly of schools and health facilities, has the potential for large impacts in terms of disease reduction since these locations service people vulnerable to waterborne and diarrheal diseases. According to the World Health Organization, "1.6 million people die every year from diarrheal diseases attributable to lack of access to safe drinking water and basic sanitation and 90% of these are children under 5, mostly in developing countries" (WHO 2015, 1). This is a staggering number of preventable deaths per year. There is no doubt that the inclusion of health care facilities and schools in water, sanitation, and hygiene services would help protect these children and others from WASH-related diseases.

Access to Drinking Water at Schools and Hospitals

Sub-target 6.1.2	Indicator
• All schools and health care facilities have onsite access to safely managed drinking water sources by 2030.	• Proportion of primary and secondary schools with a safely managed drinking water source on premises. • Proportion of health care facilities with a safely managed drinking water source on premises.

Currently, 38% of health care facilities lack improved water sources and a global estimate of schools showed that 69% lack access to adequate drinking water (WHO 2015, 1-2-52)(UNICEF 2015, 9). The goal is for 100% of these facilities to have service coverage by 2030. Creating an indicator to monitor the progress of service provision will help bridge the gaps in service. In this case, the chosen monitors are the proportion of schools and health care facilities with a safely managed drinking water source on premises. These indicators are informative and

can easily be collected with the aid of visual surveys to ensure that they are operating as reported.

Access to Hygiene and Sanitation outside the Home

Sub-target 6.1.3,4	Indicators	
• Universal access to improved sanitation. • Universal access to hygiene services.	Monitoring Indicator:	• **Percentage of students enrolled in primary and secondary schools that provide gendered sanitation facilities and hand washing services.** • **Percentage of patients using health care facilities providing basic sanitation and hand washing facilities.**
	Equity Indicators:	• Percentage of students enrolled in public schools that provide areas for Menstrual Hygiene Management. • Percentage of students enrolled in public schools that provide Menstrual Hygiene Management training.

According to WHO, 19% of health care facilities lack improved sanitation and 35% do not have water and soap for handwashing (WHO 2015, 1-2-52). At schools, 66% lack adequate sanitation (UNICEF 2015, 9). As with the target for drinking water, the goal is to have 100% service provision by 2030. Using indicators to ensure that adequate sanitation and hygiene facilities are available is essential. Unlike in the universal drinking water target, these indicators track the users rather than the facilities, because of the added cultural and behavioral factors involved in using sanitation and hygiene facilities. The users may have a preference for open defecation or may not be knowledgeable about how to use a handwashing facility. If these

services are utilized, then it means that they are not only present and fully operational, but that the cultural and behavioral hurdles that may be present in society have been overcome by the user.

A particular struggle in this area is gender equity. Sanitation coverage in schools is often lower for girls than for boys, with an average rate of 51% coverage for girls and 58% coverage for boys (UNICEF 2015, 9). In extreme cases, such as in Tanzania, 99% of schools provide sanitation facilities for boys while only 20% provide facilities for girls (UNICEF 2015, 9). This is a discrepancy that can be improved by monitoring gendered sanitation facilities at schools, and in this case has been built into the monitoring indicator.

Menstrual Hygiene Management

Addressing menstrual hygiene as a component of WASH is of increasing global concern that has been largely ignored from dialogues in the past. Women spend an average of 3000 days menstruating over their lifetime, and during this time they have a greater need for clean water, sanitation, and hygiene services (Patkar 2015, 1). Ignoring the needs to women and girls during this period of their life has led to gender inequities. This is particularly evident within the educational system. For example, in a study in Nepal, over half of the female students surveyed reported being absent from school at some time due to a lack of menstrual hygiene management facilities at their schools (Mahon and Fernandes 2010, 99-100-113). This is not a unique statistic. Globally, it has been shown that addressing menstrual hygiene improves school attendance and graduation rates for female children. In addition, poor menstrual hygiene has been linked to severe health consequences such as infections and higher rates of anemia and infertility (Patkar 2015, 1). Because of its obvious link to gender equity, menstrual hygiene should be a covered as a component of hygiene under Target 6.2 of the SDGs.

There are two major hurdles to covering menstrual hygiene. One, is the lack of menstrual hygiene management facilities and two, is the social taboos that surround menstruation that would prevent the use of these facilities even if they are available. It is important to address the issue at its source, which means disassembling social taboos surrounding menstrual hygiene. Despite being a natural, biological process that occurs to half of the world's population, many people view menstruation as an impure, unclean act, to the point where in some cultures women are isolated during this period. By ensuring that menstrual hygiene education is a component of education from a young age, it eliminates the social stigmas and taboos surrounding it and aids in the formation of healthy behaviors and views, by both women and men. This can be accomplished by creating an indicator that tracks the number of students who are enrolled in public schools that provide menstrual hygiene management training. Two, providing information is not enough. Schools must also provide Menstrual Hygiene Management facilities where the users can manage their menstruation with a space for washing and the safe disposal of materials. Thus, an indicator to track this goal would be the percentage of students enrolled in schools that provide areas for Menstrual Hygiene Management. These two methods, the dissemination of information within public schools in addition to the provision of MHM facilities, will improve public health, reduce social taboos, and create gender equity for female students.

Conclusion

The Sustainable Development Goals Target 6.1 and 6.2 provide a variety of interconnected benefits to human health, equity, and economy. Providing sufficient, clean water is an essential human right. Instructing that it must be collected within a certain time frame

ensures that the household does not have to choose between having enough water for drinking or maintaining good hygiene. This also protects the lives of women and children, who disproportionately bear the burden of water collection, many of which sacrifice time at school or forgo work to collect water for their families. Safely managed sanitation services protect its users and the local water sources from fecal contamination, protect women and children from physical harm, and prevent the practice of open defecation. Proper hygiene practices, such as handwashing after the use of a sanitation service, eliminate pathogens in food preparation, which can reduce diarrheal diseases and death in infants. Appropriate indicators must be in place to monitor these goals in order for progress to be made within these targets.

The Millennium Development Goals had two simple indicators to track progress of their water and sanitation goals. The Sustainable Development Goals, with their focus on sustainability and equity, will need to expand their indicators to address these concerns. In addition to monitoring indicators, indicators that address the limited lifespan of drinking water supply technologies and indicate if there are plans and funds for reparation in case of failure help keep the progress sustainable. Indicators that monitor locations where vulnerable populations frequent, such as schools and hospitals, are critical in improving public health. Indicators that address wealth inequities in service and the unbalanced role of gender in WASH services help to identify and eliminate these issues. In terms of sanitation and hygiene, focusing on menstrual hygiene is critical to improving the lives of and improving school attendance for female students. Adding handwashing indicators is a cheap, effective way to reduce diarrhea and improve public health among vulnerable populations.

By creating indicators that target the focus of the WASH sector, the critical issues can be addressed more easily. Going forward, the UN has a chance to adopt a set of indicators that truly

outline the issues within Water, Sanitation, and Hygiene development, such as sustainable service provision, wealth and gender inequities, and protecting vulnerable populations outside the home. The balance is creating a set of indicators that are effective and targeted but also relatively easy to monitor. I believe the indicators outlined above are effective, achievable, and address sustainability, equity, and health impacts. The success of the SDGs depend on a solid set of indicators such as these.

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