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Editorial

PLOS Medicine and Water, Sanitation, and Hygiene: A Committed Relationship

The *PLOS Medicine* Editors*

World Water Day falls on the 22nd of March each year. This year the focus will be on water and energy (http://www.unwater.org/worldwaterday). Throughout 2014, the United Nations and its member states will be prioritizing the important relationship between water and energy, particularly in addressing inequities for the "bottom billion" who live in slums and impoverished rural areas and who survive without access to safe drinking water, adequate sanitation, sufficient food, and energy services [1].

Water and energy have crucial direct and indirect impacts on poverty alleviation. For example, hydroelectricity is the largest renewable source for power generation, yet currently, a staggering 1.3 billion people worldwide still lack access to electricity, and roughly 2.6 billion still use solid fuels for cooking [2]. As for the statistics for access to clean water and improved sanitation, in 2011, 768 million people did not use an improved source of drinking water, and 2.5 billion people did not use improved sanitation [2].

One of the targets of Millennium Development Goal (MDG) 7, finally agreed upon in 2006, is to halve the proportion of the population without sustainable access to safe drinking water and basic sanitation between 1990 and 2015 [3]. But there are key problems with this goal. As with all of the MDG targets that include proportions of the population, the notion that a target can be deemed reached when half of the population that needs access to clean water and sanitation is still without is simply unacceptable from a human rights point of view. And although MDG 7 is frequently perceived as the "environmental MDG," access to clean water and sanitation has an impact on all other MDGs— poverty reduction, education, gender empowerment, and reducing child and maternal mortality and infectious diseases (http://www.un.org/millenniumgoals/)—and, given the profound effects on health, should arguably be perceived as a "health" MDG.

Although the diverse role of water in energy production, as highlighted by World Water Day 2014, and in economic growth is important, the core function of clean water in improving health remains fundamental. And not just water alone, but also the three key components of the WASH agenda that have been the focus of a global campaign for over a decade—water, sanitation, and hygiene [4].

PLOS Medicine has long been committed to highlighting the key role of WASH in improving health. In 2009, we argued that clean water should be recognized as a human right [5]. We maintain our stance that ensuring access to clean water could substantially reduce the global burden of disease; that the privatization of water—which exploits the view that water is a commodity rather than a public good—does not result in equitable access; and that climate change, population growth, agricultural development, and industrial pollution are all leading to increasing water scarcity, threatening the quality of the current water supply. We remain of the view that a human rights framework could galvanize international recognition, concerted action, and targeted funding to help ensure that water is safe, affordable, and accessible to everyone [5].

Then in 2010 we published our landmark series (organized by Jamie Bartram, Sandy Cairncross, and colleagues) on water and sanitation (http://plos.io/1dvtfOy). The series highlighted that although water, sanitation, and hygiene are development priorities, the ambition of international policy on drinking water and sanitation was inadequate and that the active involvement of health professionals in hygiene, sanitation, and water supply was crucial to accelerating and consolidating progress for health [6], factors still pertinent to 2014. The series concluded with a rallying call for all to recognize WASH as one of the key intervention strategies for reducing morbidity, mortality, and health care costs [7]. The series also gave some targeted action points, such as how research funding agencies should consider how they could improve their support for critical research on WASH and health [7], a point that still holds true.

Our commitment to WASH has held steadfast in subsequent years. In 2011, we published an important study from Bangladesh, conducted by Stephen Luby and colleagues, which suggested that in contrast to current guidelines, handwashing with water alone could still significantly reduce childhood diarrhea, although handwashing with soap was preferable [8]. And in the same year, a study from Viet Nam, conducted by Wolf-Peter Schmidt and colleagues, showed that people living in rural villages, without access to tap water, had the highest risk of contracting dengue fever, thereby highlighting the critical role of improving water supplies in dengue control efforts [9].

Citation: The *PLOS Medicine* Editors (2014) *PLOS Medicine* and Water, Sanitation, and Hygiene: A Committed Relationship. PLoS Med 11(3): e1001614. doi:10.1371/journal.pmed.1001614

Published March 18, 2014

Funding: The authors are each paid a salary by the Public Library of Science, and they wrote this editorial during their salaried time.

Competing Interests: The authors' individual competing interests are at http://www.plosmedicine.org/static/editorsInterests.action. PLOS is funded partly through manuscript publication charges, but the *PLOS Medicine* Editors are paid a fixed salary (their salaries are not linked to the number of papers published in the journal).

Abbreviations: MDG, Millennium Development Goal; WASH, water, sanitation, and hygiene.

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Provenance: Written by editorial staff; not externally peer reviewed.

The importance of sanitation was highlighted in a systematic review and meta-analysis, conducted by Kathrin Ziegelbauer and colleagues, which we published the following year [10]. This study suggested that access to sanitation was associated with a reduced risk of transmission of helminthiases to humans, leading the authors to conclude that access to improved sanitation should be prioritized alongside other interventions to achieve a sustainable reduction of the burden of helminthiases [10].

Last year, we published a key negative randomized controlled trial from India, conducted by Sophie Boisson and colleagues, that suggested that treating water with chlorine tablets had no effect in reducing diarrhea in young children and other household members, thereby questioning the health impact of household water treatment [11]. Interestingly, as with a negative randomized controlled trial from Bolivia on solar drinking water disinfection, conducted by Daniel Mäusezahl and colleagues, which we published several years ago, poor compliance with the intervention was a key issue [12]. And bringing us right up to date, we have recently published a systematic review and meta-analysis by Matthew Freeman and colleagues that highlights the importance of WASH in trachoma elimination strategies and the need to develop standardized approaches to measuring WASH in trachoma control programs [13].

Moving forward, our commitment to WASH remains central to *PLOS Medicine*, especially in light of the next chapter of international development efforts as the world transitions from the MDGs into the post-2015 Sustainable Development Goals [14], in which WASH should play a pivotal role.

The importance of water, sanitation, and hygiene has not changed over the millennia—all have, are, and always will be the foundations of human health. *PLOS Medicine* continues to welcome all appropriate WASH submissions over the coming years, particularly randomized controlled trials of WASH interventions and evaluations of implementation strategies, which help to determine how best to meet the goal of access to clean water, improved sanitation, and suitable hygiene practices for all.

Author Contributions

Wrote the first draft of the manuscript: RM. Contributed to the writing of the manuscript: LC RM LP AR PS MW. ICMJE criteria for authorship read and met: LC RM LP AR PS MW. Agree with manuscript results and conclusions: LC RM LP AR PS MW.

References

1. United Nations Industrial Development Organization, United Nations University (2014) World Water Day 2014: water and energy. Available: http://www.unwater.org/worldwaterday/about-world-water-day/world-water-day-2014-water-and-energy/en/. Accessed 6 February 2014.
2. United Nations Industrial Development Organization, United Nations University (2014) Facts and figures. Available: http://www.unwater.org/worldwaterday/campaign-materials/facts-and-figures/en/. Accessed 6 February 2014.
3. United Nations (2013) Goal 7: ensure environmental sustainability. Available: http://www.un.org/millenniumgoals/environ.shtml. Accessed 6 February 2014.
4. Water Supply and Sanitation Collaborative Council (2010) WASH advocacy: campaigns and events—Global WASH Campaign. Available: http://www.wsscc.org/wash-advocacy/campaigns-events/global-wash-campaign. Accessed 6 February 2014.
5. The PLoS Medicine Editors (2009) Clean water should be recognized as a human right. PLoS Med 6: e1000102. doi:10.1371/journal.pmed.1000102
6. Bartram J, Cairncross S (2010) Hygiene, sanitation, and water: forgotten foundations of health. PLoS Med 7: e1000367. doi:10.1371/journal.pmed.1000367
7. Cairncross S, Bartram J, Cumming O, Brocklehurst C (2010) Hygiene, sanitation, and water: what needs to be done? PLoS Med 7: e1000365. doi:10.1371/journal.pmed.1000365
8. Luby SP, Halder AK, Huda T, Unicomb L, Johnston RB (2011) The effect of handwashing at recommended times with water alone and with soap on child diarrhea in rural Bangladesh: an observational study. PLoS Med 8: e1001052. doi:10.1371/journal.pmed.1001052
9. Schmidt WP, Suzuki M, Thiem VD, White RG, Tsuzuki A, et al. (2011) Population density, water supply, and the risk of dengue fever in Vietnam: cohort study and spatial analysis. PLoS Med 8: e1001082. doi:10.1371/journal.pmed.1001082
10. Ziegelbauer K, Speich B, Mäusezahl D, Bos R, Keiser J, et al. (2012) Effect of sanitation on soil-transmitted helminth infection: systematic review and meta-analysis. PLoS Med 9: e1001162. doi:10.1371/journal.pmed.1001162
11. Boisson S, Stevenson M, Shapiro L, Kumar V, Singh LP, et al. (2013) Effect of household-based drinking water chlorination on diarrhoea among children under five in Orissa, India: a double-blind randomised placebo-controlled trial. PLoS Med 10: e1001497. doi:10.1371/journal.pmed.1001497
12. Mäusezahl D, Christen A, Pacheco GD, Tellez FA, Iriarte M, et al. (2009) Solar drinking water disinfection (SODIS) to reduce childhood diarrhoea in rural Bolivia: a cluster-randomized, controlled trial. PLoS Med 6: e1000125. doi:10.1371/journal.pmed.1000125
13. Freeman ME, Ogden S, Haddad D, Addiss DG, McGuire C, et al. (2014) Effect of water, sanitation, and hygiene on the prevention of trachoma: a systematic review and meta-analysis. PLoS Med 11: e1001605. doi:10.1371/journal.pmed.1001605
14. United Nations (2013) Beyond 2015: overview. Available: http://www.un.org/millenniumgoals/beyond2015. Accessed 6 February 2014.