Public Health Classics

This section looks back to some ground-breaking contributions to public health, reproducing them in their original form and adding a commentary on their significance from a modern-day perspective. John Thompson & Sandy Cairncross review the 1972 book *Drawers of water: domestic water use in East Africa* by Gilbert White, David Bradley, & Anne White, an extract of which is reproduced by permission of The University of Chicago Press.

Drawers of water: assessing domestic water use in Africa

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The public health classic reproduced on the following pages is an extract from the first thorough study of water use in a developing country from the consumer's point of view. It was a seminal starting point for many of those professionals, gradually increasing in number during the International Drinking Water Supply and Sanitation Decade (1981–90) and beyond, who devoted their careers to extending water supply and sanitation services to the unserved millions in the developing world. In awakening the appetite of many of its readers to the excitement of interdisciplinary research in this field, *Drawers of water* (*1*) has done more to improve water supplies for the poor than any standard engineering or social science textbook.

Although more than thirty years have passed since the fieldwork was conducted, *Drawers of water* is still relevant and informative. Numerous studies have deliberately imitated its approach (*2–4*). According to Sydney Rosen & Jeffrey Vincent of Harvard University (*5*): "Knowledge of household water supply and productivity ... is limited to a handful of original studies, which continue to be cited and recycled in the literature. Foremost among them is *Drawers of water* ... *Drawers of water* remains the most comprehensive and compelling account available [of] ... water use in ... Africa."

East Africa was chosen as the study location because the diversity of landscape, climate, hydrology and geology allowed for analysis of domestic water use under different environmental conditions. The region also possessed dispersed settlements in which many people lived in scattered compounds or households. This allowed for analysis of individual decision-making in domestic water use. Finally, it was home to a wide assortment of ethnic groups, which provided an opportunity to analyse the different cultural dimensions.

The data reported in *Drawers of water* were acquired between 1966 and 1968 by interviews and observations at 34 study sites in Kenya, Uganda, and the United Republic of Tanzania. Thirteen field workers (students from East African universities) assisted in collecting the information in over 740 households. Twelve of the sites were in rural areas, while the other 22 were in and around towns and cities; water was piped to the houses at 15 urban sites, but carried to the houses at all the other sites.

The researchers examined the use of water for basic consumption, hygiene and amenities in domestic life. They also assessed the social cost of obtaining water in terms of direct monetary costs as well as less readily measured costs in energy and time. Quantities of household water use were recorded and the factors affecting variations in use were assessed.

Drawers of water was to yield important findings that influenced water policy and practice on a number of fronts. First, a typology of water-related diseases was presented in *Drawers of water* that was based on their transmission routes in the environment, rather than on the taxonomic or clinical characteristics of the pathogens as is more traditional in medical texts. The strength of that classification system (Table 1) is that it indicates almost immediately the types of intervention that are likely to be effective in reducing the incidence of water-related diseases. As a result, a modified version of this typology has by and large set the agenda for thought about water interventions and diarrhoea for the last 30 years, precisely because it focused on the objects of such interventions.

Second, it suggested that increasing the quantity of water used per capita could be more important for a household's

Table 1. **The Bradley classification of water-related diseases**[a]

Category	Example
I Waterborne	
(a) Classical	Typhoid
(b) Nonclassical	Infectious hepatitis
II Water-washed	
(a) Superficial	Trachoma, scabies
(b) Intestinal	Shigella dysentery
III Water-based	
(a) Water-multiplied percutaneous	Schistosomiasis
(b) Ingested	Guinea worm
IV Water-related insect vectors	
(a) Water-biting	Gambian sleeping sickness
(b) Water-breeding	Onchocerciasis

[a] Source: (*1*) Table 6.7, p.163.

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health and well-being than improving its quality. Because faecal–oral diseases have multiple transmission routes — hands, food, utensils and flies as well as drinking-water — they are more likely to be water-washed than waterborne. If a household has only a small quantity of water to use, it is likely that all aspects of hygiene — from bathing and laundry to washing of hands, food and dishes — will suffer. Subsequent research has confirmed the truth of what in 1972 was a bold and radical assertion (*6*), and led to an increasing interest in the study of hygiene behaviour (*7*).

A third important contribution of *Drawers of water* was to suggest that the addition of a closer but still distant water source, such as a centrally located standpipe or well, would not necessarily increase household water use. White, Bradley & White found that if water must be carried, the quantity brought home varies little for sources between 30 m and 1000 m from the household. The understanding of this inelasticity of demand — the so-called "plateau effect" — remains an important consideration in the selection of levels of water supply service.

Fourth, *Drawers of water* raised incisive questions about the desirable intermediate goals needed to meet demand for water in both rural and urban areas. The study showed that rural water supply provision needed a more flexible response to demand, rather than a supply-driven approach, and argued for greater support for community-based and individual initiatives. In urban water supply, it suggested that more attention be given to single-tap levels of service and the provision of more standpipes for low-income communities. Over the past three decades, planners and engineers did not always take on board these insights regarding levels of service, but gradually they have come to be accepted as good practice.

The crux of the book may well be epitomized in the authors' own words as follows. "The way people respond to present and improved supplies and the effect this has on community health and welfare should be examined for the whole range of theoretically possible improvements. Increased volume of use does not necessarily bring proportionate gains in health. Neither does the construction of additional safe supplies necessarily result in increased use by those people who most need them."

In addition to its own intrinsic value, the *Drawers of water* study has made a further contribution to our understanding in recent years. The original field data were carefully preserved by Gilbert White and Anne White and donated to the archives of the Office of History of the US Army Corps of Engineers' Institute for Water Resources in Alexandria, Virginia (*8*).[a] This has enabled a new research team, this time with senior African researchers playing a prominent role, to revisit the original sites and carry out a longitudinal, cross-sectional study of changes in domestic water use. By comparing the two datasets, the Drawers of Water II Team has been able to build up a detailed picture of how water supply and water consumption have changed in East Africa over the last three decades. The findings contain some surprises.

During this period, there have been significant changes in water use and environmental health in East Africa. In particular, the population of the region has increased nearly threefold. Much of that growth has been in towns and cities, where municipal authorities have found it hard to cope with rising demand for water supply and sanitation systems and service. Private companies, parastatal organizations, nongovernmental organizations and community water users' associations have taken over responsibility for service provision from the state in several study sites in the three countries. The difference between "rural" and "urban" sites has become less well defined, as have the distinctions between "piped" and "unpiped" households.

From the late 1960s to the late 1990s, water use by unpiped households almost doubled (from 11 litres to over 19.7 litres per capita per day (lcd), on average), but that of piped households has dropped by about 50% (from 128 to 66 lcd). This has produced a decline in overall consumption per capita across the region of 30% (from 61.4 to 39.6 lcd). Though the increase for unpiped households is small (under 9 litres) it should bring significant environmental health benefits, because any surplus over drinking requirements (around 4 lcd) tends to be used for bathing, laundry or cleaning. This has taken place in the absence of any regional or countrywide hygiene promotion initiatives, and in spite of the fact that the mean distance to the water source for unpiped households has changed little over the three decades.

Piped households continue to use over three times as much water as unpiped ones, although the follow-up study found that the reliability of piped water supplies has declined. Many piped households now receive water for only a short period each day. Households have responded by storing water in the home (90% now do this as opposed to only 3% in 1967) and by seeking alternative sources, many of which are either unimproved (and therefore a health hazard) or private (and therefore frequently expensive).

A set of papers based on the Drawers of Water II study was published by the International Institute for Environment and Development, London, in December 2001, including a summary report and three country studies (*9*). A comprehensive report of all of the main research results will be published in 2002. ■

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6. Kolsky PJ. Water, sanitation and diarrhoea; the limits of understanding. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 1993; 87(Supplement 3):51-4.
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8. Gilbert F. White Collection (http://www.wrsc.usace.army.mil/IWR/Maass-White/WhiteHTML.htm).
9. Thompson J, Porras I, Katui-Katua M, Mujwahuzi M, Tumwine J, Johnstone N, et al. *Drawers of water II: thirty years of change in domestic water use and environmental health in East Africa — Summary.* London: International Institute for Environment and Development; 2001 (http://www.iied.org/agri/proj_dwu.html).

[a] Interested scholars can arrange to view the original *Drawers of water* material at the Arthur Maass–Gilbert F. White Reference Room of the US Army Corps of Engineers, Institute for Water Resources, 7701 Telegraph Rd., Casey Building, Alexandria, VA 22315-3868, USA.