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**TRANSFORMATION TOWARDS SUSTAINABLE
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Methodological challenges of measuring impacts of WASH on educational and health outcomes

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Evidence on the impacts of improved Water, Sanitation and Hygiene (WASH) on health and educational outcomes continues to grow and is being used to advocate for an integrated approach to WASH programming. This paper shows that recent analytical work by the United Nations Children's Fund (UNICEF) at the Eastern and Southern Africa Regional Office (ESARO) WASH section in Nairobi has revealed that there is a methodological challenge in building a robust evidence on the impacts of improved WASH on educational and health outcomes. The paper reveals that there remain large gaps in data collection and monitoring processes and that as a result inhibit efforts to make concrete inferences on the impacts of WASH on educational and health outcomes.

Background and context

One of the key activities of the UNICEF is to build a strong evidence base to advocate for improved WASH in institutions. In 2015 the WASH section in ESARO conducted an assignment to explore evidence on the impacts of WASH on educational and health outcomes in schools and health care facilities respectively, in the Eastern and Southern Africa Region (ESAR). The aim was to support country programmes to develop effective sector advocacy strategies by strengthening the evidence base in the region. The assignment set out to undertake analytical work to explore the relationships between the level of provision of WASH in institutions and educational and health indicators. Before the beginning of the assignment, UNICEF had established that the level of WASH coverage in the institutions across the region was lowⁱ and it was therefore necessary to advocate for better WASH services to improve educational and health outcomes. Within this context, an educational outcome is defined as the achievement of learning and development goals through the acquisition of knowledge and skills while in health it is a change in health status for individuals or a given population for improved well-being.

Much of the literature reviewed during the assignment support the hypothesis that improved WASH has positive impacts on the educational and health outcomes (e.g. Jasper and Bartram 2012; Deroo, et al 2015. Mbatha. 2010). However, a closer scrutiny shows that the literature lacks a robust methodology for inferring impacts of WASH on educational and health outcomes. This paper aims to highlight practical challenges that have been encountered when conducting the analytical work on the impacts of WASH on educational and health outcomes. It proposes the need to develop a methodological framework for this kind of analysis which can be used by WASH scholars and practitioners anywhere in the world. It summarizes accounts of the way the analysis was done and the key challenges that were faced and how they might be overcome in future.

Collating data and conducting analyses to infer impacts

Much of the existing evidence on the educational and health benefits of WASH in institutions comes from multiple sources- including empirical studies in different settings; scholarly work such as systematic reviews, monitoring and evaluation exercises and systematic data collected through management and information systems. These sources use a variety of methods for inferring the benefits of improved WASH

in institutions. For the assignment, the initial step involved identifying data sources for the analysis through liaising with UNICEF country offices in the ESAR.

Linking WASH in schools with educational outcomes

The initial challenge encountered was the difficulty of finding datasets with essential information which could be collated and used for the analysis. Hence out of the 21 countries in ESAR, only one qualified for the analysis, namely Zambia because it had a complete education management information system (EMIS) database collectedⁱⁱ from over 10,000 schools in 2012. However, there was a further challenge because EMIS is a general educational database which contains over a hundred variables most of which were not necessarily useful for analysing WASH linkages with educational outcomes. Since the focus was testing the hypothesis that improved WASH in schools would lead to better learning outcomes the most relevant variables available and selected for the analysis include: school type (e.g. public, private, community), enrolment, repetition and drop-out rates by gender, availability and type of water supplies and number and type of toilets. Other essential WASH indicators such as functionality of the facilities, availability of handwashing facilities and soap, access and level of use were missing from the database.

Despite the challenge, it was still possible to carry out the analysis using the available variables. The analysis was disaggregated by gender and grade (1-12). The gender disaggregation was important to determine whether the lack of water or sanitation had a more significant impact on enrolment, repetition and drop-out rates for girls than for boys. A disaggregation by grade was important to determine whether there were significant differences for specific age groups, which may have a link to menstrual hygiene management (MHM).

According to the government policy of Zambia, toilet to student ratio should be 1:20 and taking this into account, schools were categorized as follows: Schools with 20 students per toilets; schools with 100 students or more per toilet; schools with no toilets. Further categories were done in accordance with their water situation as follows: schools with no source of water at all; schools with a piped water system (e.g. water from the mains supply or piped from a mechanized borehole); schools with an improved water source on site (e.g. protected well or pumped borehole); and schools with an unimproved source (e.g. unprotected well or untreated surface water).

The Analysis

Firstly, a situation analysis was done on the proportion of schools with and without adequate WASH facilities (e.g. no toilets/water, at least one toilet for 20 students etc.), disaggregated by school type (e.g. public, private) and location (rural or urban). In the next step of analysis, the different WASH situations (e.g. no toilets, not water) were linked with each of the three educational indicators - enrolment ratios, repetition and drop-out rates and outputs were presented on line graphs as disaggregated with gender and age (see Figure 1 below). To interpret results, a *t-test* was used to determine whether there were significant gender differences statistically at 95% confidence level ($P=$ or < 0.05). For example, results showed that more girls dropped out of schools with no toilets. However, important issues such as quality and functionality of the facilities, accessibility, level/frequency of use were missing from the databases. This may have influenced results and the ability to make strong conclusions linkages between lack of toilets and dropout rates especially for girls.

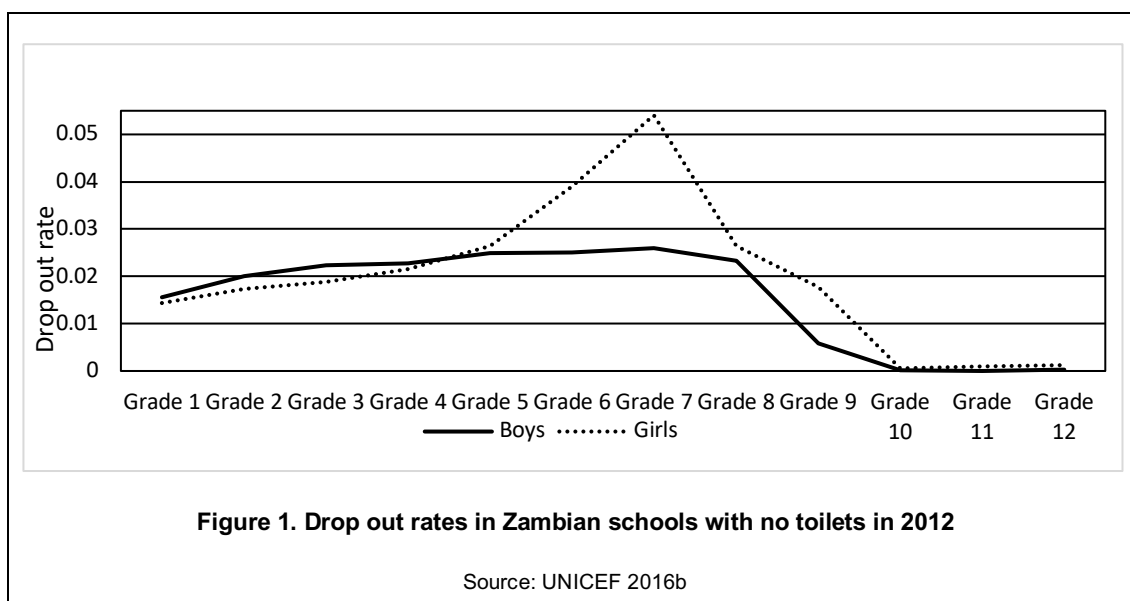


Table 1. Selected sources of data for WASH within Health facilities in Eastern and Southern African Region

	Angola	Botswana	Burundi	Comoros	Eritrea	Ethiopia	Kenya	Lesotho	Madagascar	Malawi	Mozambique	Namibia	Rwanda	Somalia	South Africa	South Sudan	Swaziland	Tanzania	Uganda	Zambia	Zimbabwe
Health Mgt Information System (HMIS)	X	X	X	X	✓	✓	✓	X	X	✓	✓	✓	✓	X	✓	X	✓	✓	✓	X	X
Health Facility Surveys (HFS)	✓	✓	X	X	X	✓	✓	X	✓	✓	✓	✓	✓	X	X	X	X	✓	X	X	X
Service Availability and Readiness Assessment (SARA) report	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	✓	✓	✓	✓
Service Provision Assessment (SPA)	X	X	X	X	✓	✓	✓	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Annual Health Statistics	X	X	X	X	X	X	X	X	X	X	X	X	✓	✓	X	X	X	X	X	X	X
The National Health Care Facilities Audit	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	✓	X	X	X	X	X

Linking WASH in health care facilities with health outcomes

Several countries in the ESAR identify water-borne and water related diseases as a cause of mortality and morbidity in healthcare facilities. Diseases such as diarrhoea, cholera, typhoid and dysentery are listed as a cause of child and maternity deaths in healthcare facilities. Unfortunately, it was not possible to find sufficient data to analyse linkages between WASH and health outcomes. Instead, a thorough review of

literature was conducted on multiple sources of data. Over ten different databases were reviewed for the 21 countries in ESAR, as these contain data collected through health-related surveys and assessments and health care facility audits (Table 1).

Although WASH is recognized in health care monitoring and assessment processes across the ESAR as shown in these databases, the focus tends to be on availability of medical equipment, drugs, human resources and other medical aspects. Little attention is paid to important WASH indicators such as quality of WASH facilities, functionality, level of usage, gender and accessibility. Consequently, monitoring of WASH in health care facilities in ESAR is largely inadequate as revealed in the review.

Academic studies on WASH linkages with health indicators in different contexts was also reviewed (e.g. Anaissie et al. 2002, Campbell et al 2015, Decker and Palmore 2014) and most show that poor WASH in healthcare facilities causes maternal and child mortality. However, such studies on WASH in health care facilities were found to be short-term and of small-scale covering only small geographical areas. More importantly, these studies lack methodological vigour within their analyses affirming the challenge of generating a good evidence base on linkages between WASH and health outcomes in health care facilities in the ESAR. Consequently, it is difficult to make concrete conclusion on the extent to which WASH facilities and services influence health outcomes in the ESAR.

Conclusions and recommendations

This paper highlights methodological challenges associated with building evidence-base on the ways in which WASH influence educational and health outcomes. In summary:

- There is no single work (or data source) on linkages between WASH, health and educational outcomes which sufficiently includes all the necessary indicators required to build a robust evidence. For example, WASH indicators such as functionality of the facilities, affordability, access etc. are often not well explored (is the toilet or water supply working? who is entitled to access and when?). With regards to health indicators, much evidence is anecdotal in nature with a lot of assumptions, for example, poor student's performance is due to poor sanitation which causes incidences of diarrheal diseases. In health care facilities settings, indicators which connect WASH and infectious diseases are seldom explored sufficiently.
- In relation to the above point, systematic data collection on WASH indicators is often limited particularly at the national levels. For example, a close look at the educational management systems (EMIS) and health and management information systems (HMIS) in many of the countries in ESAR shows that their designs are not appropriate to collect data on causality- i.e. better toilets leads to increased enrolment and retention rates. In short, such databases are not yet useful in collecting robust data sets that can infer impacts of WASH on education and health.
- Lastly, much of the work on linkages between WASH, health and educational outcomes fail to recognize (or acknowledge) other factors at play. Although the analysis of WASH in schools in ESARO showed that WASH influenced enrolment, drop out and repetition rates, the biggest challenge was the need to control for other factors which may have been at play. In health care facilities, it remains a challenge to find health indicators which consider temporal dimensions- i.e. At what point did an infection occur to an in-patient at a health care facility? Was it after they had been admitted to the facility for other ailments?

From these experiences, this paper proposes a search for a robust methodological framework which can be used to build evidence on the interlinkages between WASH, health and education in ESAR. The framework should be systematic involving all the steps required in the design of methods and tools in collecting and analyzing data. The framework will be useful in many ways including supporting planning for a resilient integrated WASH programming as well as enhancing efficiency in financing.

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Notes

ⁱ 53% of schools had access to adequate water supply; 45% of schools have access to adequate sanitation; and only 13% of schools have access to hand washing facilities.

Similarly, in many countries in ESAR less than 50% of health centres have adequate water supply and sanitation services

ⁱⁱ The EMIS data were collected through surveys designed in the form of questionnaires which were distributed to the schools, completed by the head teachers and then collected afterwards

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