

## Assessing human resource capacity needs to meet the MDG targets on water and sanitation in Ghana

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### Abstract

Achieving the MDG targets for water and sanitation (WatSan) has gained much attention in the run-up to the year 2015. While the cost of achieving these targets are known, the human resource capacity needs to do same is unexplored. In an attempt to fill this knowledge gap, this study, generally, was to test a methodology for assessing the human resource requirements to meet the WatSan MDG targets in Ghana. Consultative stakeholder meetings, structured questionnaires and key informant interviews were employed to elicit information regarding the existing human resource capacity, supply of human resource from training institutions and human resource demand for the sector. A total of 45 organisations comprising of 6 public sector institutions, 6 NGOs 14 private sector organisations and 19 training institutions were involved in the study. The study points out that, the MDG target deficit for sanitation coverage is approximately 8 times more than that of water. The private sector (46%) and NGOs (9%) are more involved in the water sector based on employee distribution as opposed to the sanitation sector which is dominated by the public sector (82%). There is a high demand for Administration and Finance and Social Development personnel for the water sector contrary to the sanitation sector where a high demand exists for Technical WatSan and Other Technical personnel to meet the MDG targets. The human resource assessment method was found to be useful. The study proposes development of recruitment policies and training plans that align with the short and long-term targets of the WatSan sector and more private sector and NGO involvement in the sanitation sector.

**Keywords:** Human resource capacity, water, sanitation, coverage, Millennium Development Goals

### 1. Introduction

Improving access to potable water and basic sanitation, as enshrined in MDG Target 10, has gained much attention in global development discourses and agenda over the past two decades. This is against the background that meeting this target has been widely demonstrated (WHO, 2004; Asian Development Bank, 2004; Kushner, 2009; WaterAid, 2011) to play a crucial role in achieving other MDGs, particularly poverty alleviation. In fact, it forms the pivot of all other MDGs. Although the cost of achieving the MDG drinking water and sanitation targets have been extensively investigated (Hutton & Haller, 2004; Lenton *et al.*, 2005; World Water Council, 2006; Hutton & Bartram, 2008), the same cannot be said about the human resource capacity requirements. Meanwhile, the availability of sufficient and well-trained human resource is crucial to the attainment of this targets as well.

To achieve the health related MDGs, the WHO, in 2006 indicated that an estimated 4.3 million extra health workers would be required globally. Further, the UN education agency, in 2010, estimated that 10.3 million new teachers would be needed to reach the MDG target on achieving universal primary education (DFID/IWA, 2011). It is therefore expedient that the human resource (HR) capacity needs of the water and sanitation (WatSan) sector is also determined to provide a firm basis for developing personnel recruitment strategies and capacity building programmes for the sector.

In line with this, this study broadly assesses the human resource requirements to meet the MDG water and sanitation targets in Ghana using a methodology developed by International Water Association (IWA). Within this overall purpose, the specific objectives of this study was to assess the existing human resource capacity in the WatSan sector; estimate human resource requirement to meet the MDG water and sanitation targets based on current and future WatSan coverage; estimate supply of HR from training institutions into the sector and identify possible HR shortages. These would provide the basis for making pertinent recommendations that would be useful for decision makers to develop policies and action plans to address the HR shortages in the sector. The study forms part of a Human Resource Capacity Gap Assessment for Water Supply and Sanitation Sector supported by the International Water Association (IWA) conducted in Tanzania, Bangladesh, Timor Leste, Mali, South Africa and Zambia.

## 2. Methodology

The methodological framework for the study was based on a revised version of the framework for Human Resource Capacity Assessment developed by IWA. This framework has been adapted and is shown in Figure 1.

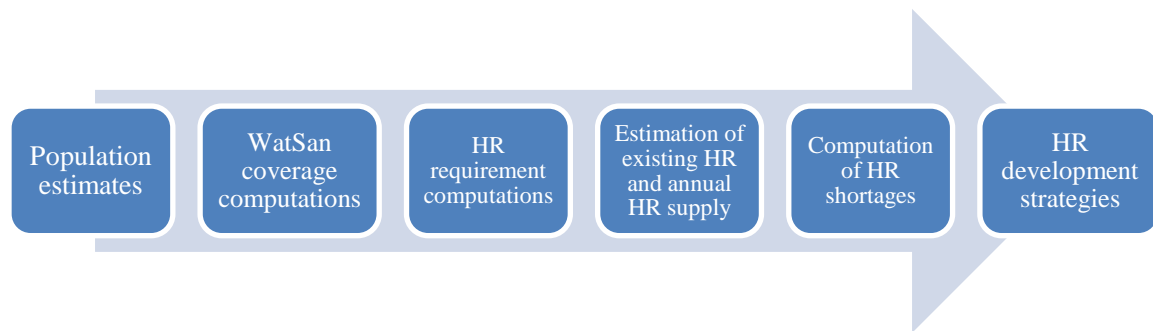


Figure 1: Methodological framework for WatSan HR capacity assessment

In determining the HR shortage, the following computations were made for the existing HR and demand estimation:

- It is assumed that the existing HRs are involved in both old and new construction, operation and maintenance (O&M) and community mobilisation.
- The existing annual HR supply is involved in construction, O&M and community mobilisation.
- The HR demand was calculated for construction (C), O&M and community mobilisation (Com).
- Quantification of HR shortages for the sector was based on the formula below:

$$HR\ Shortage = \sum HR\ Demand - \sum Existing\ HR - \sum HR\ supply$$

This is based on the assumption that the existing HR and new employees would be involved in constructing new facilities, operation and maintenance and community mobilisation for both old and new facilities.

- Quantification of HR demand for the sector was based on the formula below:

$$HR\ Demand = \left[ \sum \frac{(HR\ demand\ proxies\ (of\ C, O\&M, Com))}{10000} \right] \times MDG\ Target\ population$$

The sum of HR demand proxies per 10,000 for construction, O&M, and community mobilisation for one year work duration was obtained from the survey of organisations. The

number of days worked for a particular category of employees for a specific project were converted into a year and then population served also estimated as per 10,000. For construction and community mobilisation it is for a period, so the duration of work is converted to equivalent of HR working for a year. So the HR proxy for construction and community mobilisation is calculated as follows:

$$HR \text{ Demand Proxy per } 10,000 = \frac{10,000 \times \text{Number of HR}}{\text{population served by HR}} \times \frac{\text{number of months worked}}{12}$$

For O&M work-type, since the same number of employees would be engaged throughout the year, only the population served is considered. The HR demand per 10000 is calculated as follows:

$$HR \text{ Demand Proxy per } 10,000 = \frac{10,000 \times \text{Number of HR}}{\text{population served by HR}}$$

The number of HR refers to the number of employees for a particular category (ie WATSAN Technical Field, Other Technical Field, Management and Finance and Community Mobilisation).

- In computing the HR proxy for sanitation, the values of HR proxies for water and sanitation firms engaged in construction and community mobilisation were used.
- Since supply of unskilled labourer in Ghana is not an issue, the study does not include unskilled workers in the analysis of existing HR and demand.

The study was carried out in Ghana based on purposively sampled organisations from across the ten regions consisting of WatSan institutions from the Public, Private and NGO sectors. However, a good proportion of the study organisations were located in the Northern, Ashanti, Central and Greater Accra Regions of Ghana which are the operational catchment areas of most of these organisations.

The study organisations comprised of 6 WatSan public sector institutions, 6 NGOs and 14 private sector organisations. The operations of all the public sector institutions involved in this study cover all the ten regions of Ghana while that of the NGOs and private sector are limited to only certain regions in the country. The study was constrained by reluctance by some sector institutions to divulge information, particularly the NGO and private sectors. The study was cross-sectional and included organisations involved in the design and construction, community mobilisation and operation and maintenance of WatSan facilities for both urban and rural settings.

Structured questionnaires and key informant interviews were used to elicit information regarding the existing human resource capacity, supply of human resource from training institutions and human resource demand for the sector. These were verified through WatSan consultative stakeholder meetings organized during the course of the study. Secondary data on Ghana's population and WatSan coverage were obtained from the Ghana Statistical Service and the WHO/UNICEF Joint Monitoring Programme respectively.

### **3. Results and Discussion**

#### **3.1 Disaggregated population and WatSan coverage estimates**

In line with the framework, historical records of Ghana's population from the Ghana Statistical Service as published in GSS (2013), were used to estimate the future population in 2015, which marks the deadline for achieving the WatSan MDG targets. The population were disaggregated into five different types based on the population range according to the IWA methodology (Table 1).

Table 1: Settlement types used for the study

Settlement types	Population range
Dispersed Rural community	<5K
Rural village	5-50K
Small town	50K –100 K
Large town	100K- 0.5M
City	> 0.5M

With an estimated population of about 24.6 million and an annual growth rate of 2.5% as per GSS (2013), the projected population for 2015 is estimated as 28.2 million people. These has been disaggregated according to the various settlement types and their respective growth rates as shown in Table 2.

Table 2: Population distribution in Ghana according to settlement types

Settlement types	Estimated population in 2010	Estimated population in 2015	Average annual growth rate (%)
Dispersed rural communities	1,748,655	1,893,096	1.6
Rural villages	4,597,713	4,977,490	1.6
Small towns	5,009,175	5,949,329	3.5
Large towns	4,512,846	5,206,278	2.9
Cities	8,790,434	10,240,087	3.1
National (Total)	24,658,823	28,266,280	2.5

Computation of the national MDG target coverage for water (80%) and sanitation (52%) were based on coverage estimates by the WHO/UNICEF Joint Monitoring Programme (JMP) on Water and Sanitation (WHO/UNICEF, 2012). The coverage figures were disaggregated for each of the settlement types above-mentioned. It must however be pointed out that, in Ghana communities with less than 5,000 people are regarded as rural while those with 5,000 or more inhabitants are considered urban (GSS, 2013). Therefore, rural WatSan coverage figures reported by the JMP were used for only dispersed rural communities while urban WatSan coverage figures were used for all those settlement types that have populations exceeding 5,000 (Tables 3 and 4).

Table 3: Disaggregated water coverage in Ghana according to settlement types

Settlement types	Existing coverage			2015 population	MDG target coverage in 2015*	MDG target deficit in 2010
	2010 population	2010 population served	(%)			
Dispersed Rural communities	1,748,655	1,398,924	80	1,893,096	1,438,753	39,829
Rural villages	4,597,713	4,183,919	91	4,977,490	4,230,867	46,948
Small towns	5,009,175	4,558,349	91	5,949,329	5,056,929	498,580
Large towns	4,512,846	4,106,690	91	5,206,278	4,425,337	318,647
Cities	8,790,434	7,999,295	91	10,240,087	8,704,074	704,779
National (total)	24,658,823	21,206,588	86	28,266,280	22,613,024	1,406,436

\*MDG target coverage for water - National = 80%; Rural = 76%; Urban = 85%

Table 4: Disaggregated sanitation coverage in Ghana according to settlement types

Settlement types	Existing coverage			2015 population	MDG target coverage in 2015*	MDG target deficit in 2010
	2010 population	2010 population served	(%)			
Dispersed Rural communities	1,748,655	139,892	8	1,893,096	956,014	816,121
Rural villages	4,597,713	873,565	19	4,977,490	2,737,620	1,864,054
Small towns	5,009,175	951,743	19	5,949,329	3,272,131	2,320,387
Large towns	4,512,846	857,441	19	5,206,278	2,863,453	2,006,012
Cities	8,790,434	1,670,182	19	10,240,087	5,632,048	3,961,865
National (total)	24,658,823	3,452,235	14	28,266,280	14,698,466	11,246,230

\*MDG target coverage for sanitation - National = 52%; Rural = 50.5%; Urban = 55%

The results indicate that, the national MDG target deficit for sanitation is approximately 8 times more than that of water based on the 2010 coverage estimates (Tables 3 and 4). This implies, that a large number of people require improved sanitation services as compared to improved water services to

achieve the MDG targets in 2015. Moreover, for both water and sanitation, the MDG deficits are relatively higher in urban communities than in rural communities.

### 3.2 Estimation of HR requirements to meet MDG targets

In computing the HR requirements to meet the MDG targets, the different types of WatSan technologies used in both urban and rural communities in Ghana were identified. These categories of technologies were employed to establish the human resource needs for the provision of additional WatSan services to the unserved population in order to meet the MDG targets.

The main types of water and sanitation technologies used in urban and rural areas in Ghana are summarized in Table 5. Generally, rural communities (population <5,000) rely on boreholes and hand dug wells for water supply and dry onsite sanitation facilities for their sanitary needs. On the other hand, urban communities (population >5,000) depend on piped water systems, boreholes and hand dug wells for water supply and both dry- and wet-onsite sanitation facilities for their sanitary needs.

Table 5: Main types of water and sanitation technologies used in Ghana

Settlement types	Technology types	
	Water supply	Sanitation
Dispersed rural communities	Boreholes and hand dug wells fitted with handpump	On-site dry sanitation (pit latrine, VIP)
Rural villages	Piped water system from rivers and streams, boreholes and hand dug wells (mechanized/ fitted with handpump)	On-site wet/dry sanitation (VIP, WC/septic tank, pour flush )
Small towns	Piped water system from rivers and streams, boreholes and hand dug wells (mechanized/ fitted with handpump)	On-site wet/dry sanitation (VIP, WC/septic tank, pour flush)
Large towns	Piped water system from rivers and streams, boreholes and hand dug wells (mechanized or fitted with handpump)	On-site wet/dry sanitation, Decentralised sewerage systems
Cities	Piped water system from rivers and streams, boreholes (mechanized/ fitted with handpump)	On-site wet/dry sanitation, Decentralised sewerage systems

The human resource requirements were categorized into those needed for design and construction, operation and maintenance and community mobilisation. A number of sector organisations were therefore sampled across all these categories to determine the HR employed for these purposes and estimate the HR requirements for additional WatSan services. The HR required were further disaggregated into Technical WatSan Personnel; Other Technical Personnel; Administration and Finance Personnel; and Social Development personnel. This was aimed at determining which professional competencies would be on high demand relative to the others. These four job categories, according to this study, are defined as follows:

- *Technical WatSan personnel* refers to persons professionally engaged in a technical job specifically related to the provision of water and sanitation facilities or infrastructure (i.e. civil/environmental engineers).
- *Other technical personnel* refers to persons professionally engaged in technical job that is required in the planning, design or operation of water and sanitation facilities or infrastructure, but is not WatSan sector specific (e.g. hydro-geologists, mechanical/electrical engineers, environmental scientists, chemists, physicists, etc).
- *Administration and Finance personnel* refers to persons qualified or professionally engaged in the day-to-day administration and management of funds (e.g., Finance, Procurement and HR managers,

- office managers and others with administrative functions. This also includes persons who procure goods and services or a cost planner.
- *Social development personnel* refers to persons qualified or professionally engaged in hygiene promotion or other relevant water, sanitation and health professions in the social sciences (e.g. health promotion specialist, sociologist, community development worker).

Table 6: Future HR required to achieve WatSan MDG target coverage

	Settlement Type	Technical WatSan	Other Technical	Administration & Finance	Social Development
Water	Dispersed Rural communities	419	517	245	423
	Rural villages	1231	1519	719	1244
	Small towns	597	1891	905	2448
	Large towns	522	1655	792	2142
	Cities	1027	3255	1558	4213
	<b>TOTAL</b>	<b>3,796</b>	<b>8,837</b>	<b>4,219</b>	<b>10,469</b>
Sanitation	Dispersed Rural communities	1052	3997	4234	165
	Rural villages	3011	11446	12125	474
	Small towns	16492	83236	66126	1577
	Large towns	14432	72841	57868	1380
	Cities	28386	143268	113818	2715
	<b>TOTAL</b>	<b>63,372</b>	<b>31,4788</b>	<b>25,4171</b>	<b>6,311</b>

The projected HR requirements to meet the WatSan MDG targets, computed from previous WatSan projects points out a high demand for Administration and Finance and Social Development personnel for the water sector while a high demand exists for Technical WatSan and Other Technical personnel for the sanitation sector. The high number of Social Development personnel for the water sector was due to the inclusion into this job category artisans whose work is related to the WatSan sector but cannot be classified as Technical WatSan and Other Technical personnel. These include pipe fitters, meter readers, masons, carpenters, etc. The relatively higher demand for Administration and Finance Personnel in the water sector is due to the fact that they are mostly involved through the design, construction and operation and maintenance stages of water facilities. Conversely, only a few Technical WatSan and Other Technical Watsan personnel particularly remain during the operation and maintenance stage - a greater proportion are needed at the design and construction stage.

In contrast to this study, a similar study in Tanzania by Kimwaga *et al.* (2013) found a high demand for Technical WatSan personnel for the water sector and Social Development personnel for the sanitation sector as Table 7 depicts.

Table 7: Comparative analysis with similar study in Tanzania

Sub-sector	Job category	% Future HR Demand	
		This study (Ghana)	Tanzania*
Water	Technical WatSan	14%	54%
	Other Technical	32%	5%
	Administration & Finance	15%	32%
	Social Development	38%	8%
Sanitation	Technical WatSan	10%	17%
	Other Technical	49%	11%
	Administration & Finance	40%	11%
	Social Development	1%	61%

\*Adapted from Kimwaga *et al.* (2013)

### 3.3 Existing human resource capacity in the WatSan sector

Results from the nationwide assessment of the existing human resource capacity indicates a relatively higher proportion of Technical WatSan personnel (48%) employed in the water sector as opposed to the sanitation sector (Table 8). The sanitation sector rather has the highest proportion of employees being Social Development personnel (78%). Further, the private sector has the highest number of employees (46%) in the water sector, closely followed by the public sector (45%). On the other hand, in the sanitation sector, a substantial proportion (82%) of employees are in the public sector. This could partly explain the relatively higher water coverage (86%) across the country as opposed to sanitation coverage (14%). The private sector and NGOs are more involved in the water sector to augment the government efforts as opposed to the sanitation sector.

Table 8: Existing human resource capacity for the water and sanitation sector (nationwide)

Sub-sector		Technical WatSan	Other Technical	Administration & Finance	Social Development	Total
Water	Public	1347	1251	736	257	3591
	Private	2404	267	887	130	3689
	NGO	100	50	200	375	725
	<b>Total</b>	<b>3851</b>	<b>1568</b>	<b>1824</b>	<b>762</b>	<b>8005</b>
Sanitation	Public	6	53	432	3063	3554
	Private	217	84	84	253	638
	NGO	20	10	40	75	145
	<b>Total</b>	<b>243</b>	<b>147</b>	<b>556</b>	<b>3391</b>	<b>4337</b>

### 3.4 Human Resource supply from training institutions for the WatSan Sector

With regards to the annual graduate outputs, 19 training institutions across the country comprising of universities, polytechnics, colleges and vocational training institutes were used. Estimates of the supply of HR to generally indicate that a relatively high proportion of Administration and Finance graduates are churned out each year nationwide (Table 9). Possibly, this is attributable to the proliferation of financial institutions across the country in recent times (Gyamfi, 2012). Consequently, polytechnics across the country, which were established primarily to produce middle level manpower in science and technical subjects now train a rather greater proportion of students in business and finance-related programmes.



Additionally, since a higher proportion of employees currently exist in water sector due to the diversity of jobs in the sector as compared to the sanitation sector, it is projected that a greater fraction of graduates would enter the water sector in subsequent years if the current trends continue (Table 9).

Table 9: HR Supply from training institutions in Ghana

Type of Training Institution	Annual Graduate Output				
	Technical WatSan	Other Technical	Administration & Finance	Social Development	
University	1000	1000	8000	1000	
Other higher education (Polytechnics, Colleges, etc)	1500	2000	6000	2000	
Vocational and other training institutes	30	30	30	30	
<b>Total</b>	<b>2530</b>	<b>3030</b>	<b>14030</b>	<b>3030</b>	
Water	Proportion entering the sector	0.2	0.2	0.1	0.1
	Total estimate of HR supply to the sector annually	506	606	1403	303
	Total estimate of HR supply in the sector to 2015	2530	3030	7015	1515
Sanitation	Proportion entering the sector	0.1	0.1	0.1	0.05
	Total estimate of HR supply to the sector annually	253	303	702	152
	Total estimate of HR supply in the sector to 2015	1265	1515	3508	758

At the university level, more than 90% of Technical WatSan graduates are trained at the undergraduate level due to the few postgraduate programmes related to this job category. The study also gathered, the public sanitation sector does not attract the required competent personnel as compared to other competing sectors such as the health sector due to among other factors the comparatively superior working conditions, higher remunerations and prestige associated with the latter.

### 3.5 Estimation of HR shortages

The HR shortages for the sector are summarized in Table 10.

Table 10: HR shortage for achieving WatSan MDG target coverage

Sub-sector	Technical WatSan	Other Technical	Administration & Finance	Social Development
Water	-670	4,311	-3,927	7,493
Sanitation	61,868	313,126	246,600	2,162
Total	61,198	317,436	242,673	9,656

Generally, the findings indicate huge HR shortage in the sanitation sector as opposed to the water sector. For the water sector, there is a relatively high shortage of Social Development personnel while

in the sanitation sector a high shortage of Other Technical personnel. This implies that a large proportion of artisans would be needed in the sector in the future both for the construction and operation and maintenance of water and sanitation facilities. This is attributed to the fact that, nationwide, the provision household sanitation facilities is the responsibility of householders and construction of these facilities is done by local artisans mostly with informal training. The Technical WatSan personnel are employed by private consulting firms/contractors with the requisite formal training and competence to construct public and institutional toilet facilities.

The subzero shortages for Technical WatSan and Administration and Finance personnel point out that, if the current supply and employment rates continue, these job categories would be overly supplied to the water sub-sector while other job categories would be in shortage in the WatSan sector.

### **3.5 HR development strategies**

There were some challenges encountered in the use of the method and undertaking the study. Some selected organisations were reluctant to provide the required information due to reasons of lack of readily available data and confidentiality. Most organizations who responded to the request for information delayed in providing them. A number of organisations fail to document the detailed information on the time spent on specific projects and the population served by these projects which were vital for the computation of HR proxies.

From the findings of this study, the following recommendations for improving human resource requirements in the WatSan sector are made:

- Further work of the determination of the HR demand proxies be carried out, since the accuracy of the demand projection depends on the proxies.
- Development of training programmes and recruitment policies and that align with the short and long-term targets of the WatSan sector;
- Improving working conditions in the sanitation sector particularly to attract and retain competent personnel;
- Development of more sanitation related programmes to increase expertise in the sector;
- Creation of an enabling environment for better inclusion of private sector and NGOs in the sanitation sector by the Government of Ghana; and
- Development of capacity building programmes for existing HR in the sector (in-service training).

### **4. Conclusions**

The study was to test a methodology for assessing the human resource requirements to meet the WatSan MDG targets in Ghana. The method was found to be useful and the necessary assumptions and recommendations for improvement are presented. The study clearly points out that there are huge deficits with regards to the MDG targets in sanitation as compared to water; approximately 8 times. This could partly be attributable to the low involvement of the private sector and NGOs in the sanitation sector which is dominated by the public sector and underscores the need for increased participation of the private sector and NGOs. There is a high demand for Administration and Finance and Social Development personnel for the water sector in contrast to the sanitation sector where a high demand exists for Technical WatSan and Other Technical personnel to meet the MDGs targets. For the water sector, the demand is due to the fact that these two job categories are required throughout the lifecycle of water facilities, viz. design and construction, operation and maintenance, community mobilisation. In the sanitation sector, Technical WatSan and Other Technical personnel are required generally for the design and construction of sanitary facilities. Training and staff recruitment programmes need to be in tune with the short and long-term targets of the WatSan sector and would

require institution-specific needs assessment. Involving the private sector and NGOs is key to improving WatSan coverage and would require the Government of Ghana creating the enabling environment to attract more investments from these sectors.

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