ANALYSING WATER, SANITATION AND HYGIENE DATA TO GUIDE SECTOR RESOURCE ALLOCATION.

A Case Study of Ghana

by

SELASI E. AMEKUDZIE

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Supervisor: Andrew P. Cotton BSc, PhD, CEng, MCIWEM

Water, Engineering and Development Centre
Department of Civil and Building Engineering

DEDICATION

This dissertation is dedicated to the **LORD GOD ALMIGHTY** for HIS grace and mercies brought me through.

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Last but not the least; I am thankful to my family for their essential prayers and encouragement during the research and master's programme.

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Abstract

Despite the significant political and financial commitments to the water and sanitation sector, the Global Analysis and Assessment of Sanitation and Drinking-Water Survey (GLAAS), 2012 revealed that, as much as 83% and 70% of the countries that participated in the survey are falling behind their national access targets for sanitation and drinking-water respectively. This raises the issue of whether the resources are being targeted to the areas needed to improve access. The research therefore explored how the analysis of household Water, Sanitation and Hygiene (WASH) data can help in allocating resources more equitably using Ghana as a case study. The research employed the disaggregation of Ghana's Demographic and Health Survey (DHS) WASH data (for 1998 & 2008) by regions, rural/urban areas, wealth quintiles and gender groupings. The Spearman's rank correlation test was used in assessing the relationship between per capita aid disbursement to the sector and WASH facilities coverage. A similar test was used in assessing the relationship between annual % Gross Domestic Product (GDP) expenditure on WASH and WASH facilities coverage for both rural and urban areas. The disaggregation revealed high disparities in access among the classifications considered. The extent to which household WASH data may be disaggregated to aid in the geographic targeting of resources to areas in most need is limited to the regional level. Results from the correlations test were largely insignificant and inconclusive. The insignificance of the correlations may imply that, improved targeting is more likely to have effect on access rather than the measure of sector investments or expenditure on WASH.

Keywords: |resource allocation| |equity| |Ghana| |WASH facilities coverage| |data analysis|

Executive Summary

i. Introduction

The World Health Organisation/United Nations Children's Fund- Joint Monitoring Programme on Water Supply and Sanitation (WHO/UNICEF-JMP) through its annual water, sanitation and hygiene (WASH) sector progress reports, has consistently drawn the attention of sector stakeholders to existing inequities in access among gender groups, geographic locations (e.g. rural/urban), wealth/income groups, etc. However, national planners are responsible for developing strategies to effectively allocate resources to bridge these inequities. On the other hand, despite the huge financial investments into carrying surveys such as the Demographic and Health Survey (DHS), the WASH related data collected seem to be used for only progress reporting purposes if used at all in developing countries. This study therefore explored how such data could be useful in allocating resources more equitably using Ghana as a case study. Since resource allocation forms part of the wider sector planning, some aspects of sector planning were also looked at.

ii. Research Objectives:

To achieve the above aim, the research was built around following objectives:

- to investigate the resource allocation mechanisms used in WASH sector planning
- to determine the extent to which existing household WASH data can be used to target future resource allocation
- to assess the extent to which existing household WASH data can identify relationships between sector investments/expenditure and WASH facilities coverage
- to provide guidance to government and national sector agencies on how to equitably allocate sector resources

iii. Methodology

Research methods used in the study included literature review, analysis of WASH facilities data, questionnaire administration and key person interviews. The literature review gathered relevant information on the approaches used in WASH sector resource allocation and equity from a broad perspective and narrowing down to Ghana. The questionnaires and key person interview were used to obtain further insights into the resource allocation and targeting approaches used by Ghana's WASH sector institutions. The WASH data analysis was in two parts. The first involved disaggregating Ghana's DHS WASH facilities coverage data (for 1998 & 2008) by wealth quintiles, regions, rural/urban areas and gender using SPSS. This, in addition to exploring the extent to which the data could be disaggregated, assessed the inequities in access among the categories over the period (1998-2008). In assessing the relationship between sector investments/expenditure and WASH facilities coverage (second part of data analysis), the Spearman's rank correlation test was used. The test assessed the relationship between Ghana's total WASH sector aid disbursements (from 2002-2012) and WASH facilities coverage. Linear regressions were used in estimating access to WASH facilities from 2003-2012. The relationship between GDP expenditure on WASH (from 2008-2011) and WASH facilities coverage for both rural and urban areas was also tested. Results from the correlation test were tested for their statistical significance. The aid disbursement and expenditure figures were obtained from Organisation for Economic Co-operation and Development (OECD)'s online database and WaterAid's publication on '*Financing of the water, sanitation and hygiene sector in Ghana'* respectively.

iv. Results and Discussions

The literature review identified the following as the methods for allocating resources in the WASH sector:

- *Institutional* - involves individual ministries, departments and NGOs negotiating on their own behalf for funds. There is however little or no coordination between these institutions and allocations are often based on historical trends.

- *Sector Investment Plan (SIP)* – with this, sector institutions take part in a Sector Wide Approach (SWAp). Key stakeholders' meetings are held regularly to develop integrated sector policies, plans and budgets. Donor support is often allocated across different sector institutions.
- *Programme Based Budgeting* – the programmes are designed with specific outputs and targets with corresponding resources allocations (WELL, 2005).

The use of these approaches is however country specific. In Ghana, response from WASH sector institutions revealed that, although a mix of all approaches had been used, the institutional approach is progressively becoming the approved option. The little coordination which comes with this approach presents a major limitation to Ghana's WASH sector especially in the case where different ministries are responsible for WASH. Furthermore, the effective implementation of this approach requires a well decentralised system which is lacking in Ghana's WASH sector.

Although no specific principle was found in literature guiding the resource allocation or targeting, WELL (2005) indicates that a good resource allocation approach should ensure the efficient use of resources as well as its equitable use (e.g. providing better sanitation to the people in the poorest areas, women and children, rural areas, slums etc.). Response from the key person interview and literature showed that, little attention is paid to equity in the allocation and targeting of resources in Ghana. For example, budgetary allocations from CWSA's national headquarters to the regional offices do not take into account the level of donor aid in the region (World Bank, 2008). Furthermore, allocations to all regions are of similar amounts with no preference for those lagging in access (ibid).

The extent to which household WASH facilities' data may be disaggregated by geographic location is limited to the regional and rural/urban levels. Also, further disaggregating regional/provincial level data by wealth quintiles may be statistically inaccurate since the sampling frame of such representative surveys is not large enough. With these limitations, identifying districts and possibly communities in most need and adequately allocating resources becomes a major challenge especially in Ghana's case where sector resources are allocated from the national level, through the regions and to the districts.

The data disaggregation reflected Ghana's little attention being paid to achieving equity among the categories considered. For e.g., the Upper East, Upper West and Northern regions who had the highest open defecation (OD) prevalence in 1998 still had exceptionally high rates after ten years (see table 1 below). The disparities in access between the rich and the poor were evident at the national and rural/urban levels. Females bear the majority of the burden of fetching water. Amongst the poor households, females

bear 86% of this burden. The burden however decreased with increasing wealth (see figure 1 below). The established link between poverty and access to WASH facilities was also observed. For example, the three northern regions with the highest OD prevalence are the poorest in Ghana as well.

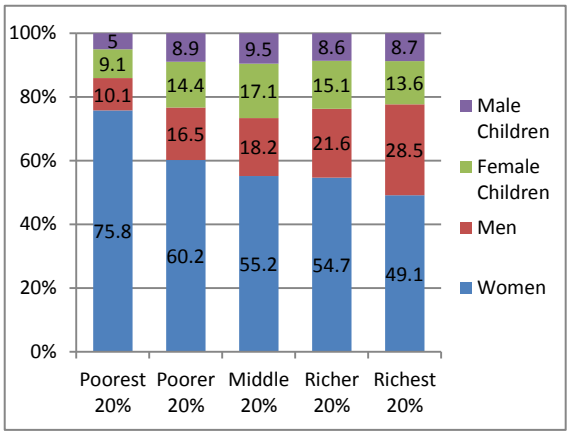

Figure 1: Burden of Water Collection by Wealth Quintiles

Considering the limitation of the extent of data disaggregation as well as the inequities in access observed, resources could be allocated based on population to ensure equity. In doing this, the total funds available to the sector could be divided by the entire national population to get the per capita funding (amount). The allocation to a particular geographic location (region/district/community) is therefore calculated as *a product* of the population of location and the per capita WASH sector funding.

A faster alternative to bridge the inequities in access would be to apply weights on the population. With the weights dependent on the 'degree of need', the allocations are biased towards the groups in most need. Resource allocation for administrative purposes may however be separated from the bulk allocation. Table 2 below presents an example of how regional populations were weighted based of open defecation prevalence. The allocation to a particular geographic location is therefore calculated as *a product* of the weighted population of location and the per capita WASH sector funding.

Table 1: Allocating Resources across Regions by Weighted Population

Region	OD Prevalence (2008)	Regional Ranking	Weight[1]	Population NPHC (2010)	Weighted Population
Western	4.90%	1	0.1	2,376,021	237,602
Central	9.10%	5	0.5	2,201,863	1,100,932
Greater Accra	5.70%	2	0.2	4,010,054	802,011
Volta	20.00%	7	0.7	2,118,252	1,482,776
Eastern	8.10%	4	0.4	2,633,154	1,053,262
Ashanti	6.90%	3	0.3	4,780,380	1,434,114
Brong Ahafo	14.00%	6	0.6	2,310,983	1,386,590
Northern	72.30%	9	0.9	2,479,461	2,231,515
Upper East	86.20%	10	1	1,046,545	1,046,545
Upper West	65.10%	8	0.8	702,110	561,688

No significant correlation was observed between aid disbursement to WASH disbursements and WASH facilities coverage from 2002-2012. A similar result was obtained for the GDP expenditure on WASH and WASH facilities coverage assessment in

[1] Calculated as ranking for a particular region divided by the total number of regions

urban areas. Although significant correlations were observed between GDP expenditure and WASH coverage in rural areas, no substantial conclusion could be drawn. It may however be harsh to conclude that ODA disbursements and urban level expenditure on WASH have not had any significant impact on access to WASH facilities over the period. The justification for this lies in the fact that, access (number of households that use a facility) remains the same even if an additional facility is provided. Secondly, using the linear equation in estimating access results in a pre-defined ranking of the coverage variables (highest to lowest or vice versa). This may have a direct influence on the result since the Spearman's test relies on ranks instead of actual values.

v. Conclusion and Recommendations

The main approaches used in allocating resources in the WASH sector include institutional, sector investment plan and programme-based budgeting approaches. Although there are no binding principles guiding resource allocation, a good one should ensure efficient and equitable allocation of resources. The little attention given to equity in allocating resources in Ghana's WASH sector is evident in the inequities in access among gender, wealth and geographic groups. The disaggregation of household WASH data is limited with regards to its use in aiding national resources allocation. Disaggregating data and hence allocating resources by geographic location, is only possible at the regional and rural/urban levels. The largely insignificant and inconclusive nature of the results from the Spearman's rank correlation could imply that, improved targeting is more likely to have effect on access rather than a measure of sector investments (for e.g. GDP). However, the possibility of sector expenditure/investment not having any correlation with access to WASH facilities cannot also be ruled out. The findings of this research may be limited by the exploratory nature of the analyses; future research is therefore required to establish the findings especially with the correlation analysis.

The following recommendations have been made based on the above findings and discussions and in part addressed the last research objective:

- the formation of an effective sector working group consisting of all WASH related Ministries, Department and Agencies (MDAs) and other stakeholders in Ghana to coordinate all activities including resource allocation,
- effective institutional decentralisation (both administrative and fiscal) of Ghana's WASH sector agencies (CWSA, EHSD and GWCL) to the district level, and
- geographic targeting of resources. The allocations per geographic location (region or districts) could be based on un-weighted or weighted populations. The latter is however most preferred. With the weights dependent on the 'degree of need', an adequate definition of 'need' should be developed and agreed on by the sector institutions and incorporated into sector policies.

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LIST OF ABBREVIATIONS

AfDB	-African Development Bank
AICD	-Africa Infrastructure Country Diagnostics
CAGD	-Controller & Accountant's General Department
CWSA	-Community Water and Sanitation Agency
DAC	-Development Assistance Committee
DACF	-District Assemblies Common Fund
DHS	-Demographic and Health Survey
GDP	-Gross Domestic Product
GLAAS	-Global Analysis and Assessment of Sanitation and Drinking-Water
GoG	-Government of Ghana
GSS	-Ghana Statistical Service
GWCL	-Ghana Water Company Limited
IDA	-International Development Agencies
JMP	-Joint Monitoring Programme
MDAs	-Ministries, Departments and Agencies
MDG	-Millennium Development Goals
MICS	-Multiple Indicator Cluster Survey
MIG	-Municipal Infrastructure Grant
MLGRD EHSD	-Ministry of Local Government and Rural Development- Environmental Health and Sanitation Directorate
MMDAs	-Metropolitan, Municipal and District Assemblies
MoFEP	-Ministry of Finance and Economic Planning
MTBF/MTEF	-Medium-Term Budget Framework/ Medium-Term Expenditure Framework
MWRI	-Ministry of Water Resources and Irrigation (of South Sudan)
MWRWH-WD	-Ministry of Water Resources Works and Housing-Water Directorate
NESSAP	-National Environment Sanitation Strategy and Action Plan
NGO	-Non-Governmental Organisations
O&M	-Operation and Maintenance
OD	-Open Defecation
ODA	-Official Donor Assistance
OECD	-Organisation for Economic Co-operation and Development
RCC	-Regional Coordinating Councils
SIP	-Sector Investment Plan
SPSS	-Statistical Package for Social Sciences
SWAp	-Sector-Wide Approach
UNDP	-United Nations Development Programme
UNICEF	-United Nations Children's Fund
USAID	-United States Aid
VIP	-Ventilated Improved Pit
WASH	-Water, Sanitation and Hygiene
WEDC	-Water, Engineering and Development Centre
WHO	-World Health Organisation
WSMP	-Water and Sanitation Monitoring Platform
WSP	-Water and Sanitation Programme
$1 USD	-2,575.7851 UGX (Ugandan Shilling)

1. INTRODUCTION

1.1 Background

Despite the significant political and financial commitments to the water and sanitation sector, as much as 83% and 70% of the countries that participated in the Global Analysis and Assessment of Sanitation and Drinking-Water Survey (GLAAS) 2012 are falling behind the progress needed to meet their national access targets for sanitation and drinking-water respectively (WHO, 2012). This raises the issue of whether the resources are being targeted to the areas needed improve access and by extension the areas in most need.

Until recently, the approach for estimating improved Water, Sanitation and Hygiene (WASH) facilities coverage (see box 1.1) taking into consideration some poverty indicators has been by disaggregating WASH facilities data into urban and rural categories with the latter considered as the poorer. This was however limited. For example, the estimates for improved water and sanitation coverage in urban areas include those living in urban slums and as a consequence, the statistics tend to mask the deprivation found in these slums (WHO/UNICEF, 2004).

Improved water facilities include:
- Piped water into dwelling, yard or plot
- Public tap or standpipe
- Tubewell or borehole
- Protected spring
- Protected dug well
- Rainwater collection

Improved sanitation facilities include:
- Flush/pour flush to:
  piped sewer system
  septic tank
- - pit latrine
- • Ventilated improved pit (VIP)
- • Pit latrine with slab
- • Composting toilet

Box 1-1: Improved Water and Sanitation Facilities as defined by WHO/UNICEF

In an attempt to unmask such hidden details, WHO/UNICEF-Joint Monitoring Programme on Water Supply and Sanitation (JMP) in its 2012 Progress Report on Drinking Water and Sanitation introduced the option of further disaggregating data (estimates) by wealth quintile or index. According to the report, this offered some insight into potential existing disparities and where they were most acute. As seen in the figure 1.1 below, there is a significant difference in water coverage among the poorest and richest in both rural and urban areas. It is therefore not farfetched to conclude that resource allocations have mostly benefitted the rich. This situation is not peculiar to water, but to sanitation as well. Similar disparities are likely to be observed in other developing countries such as Ghana.

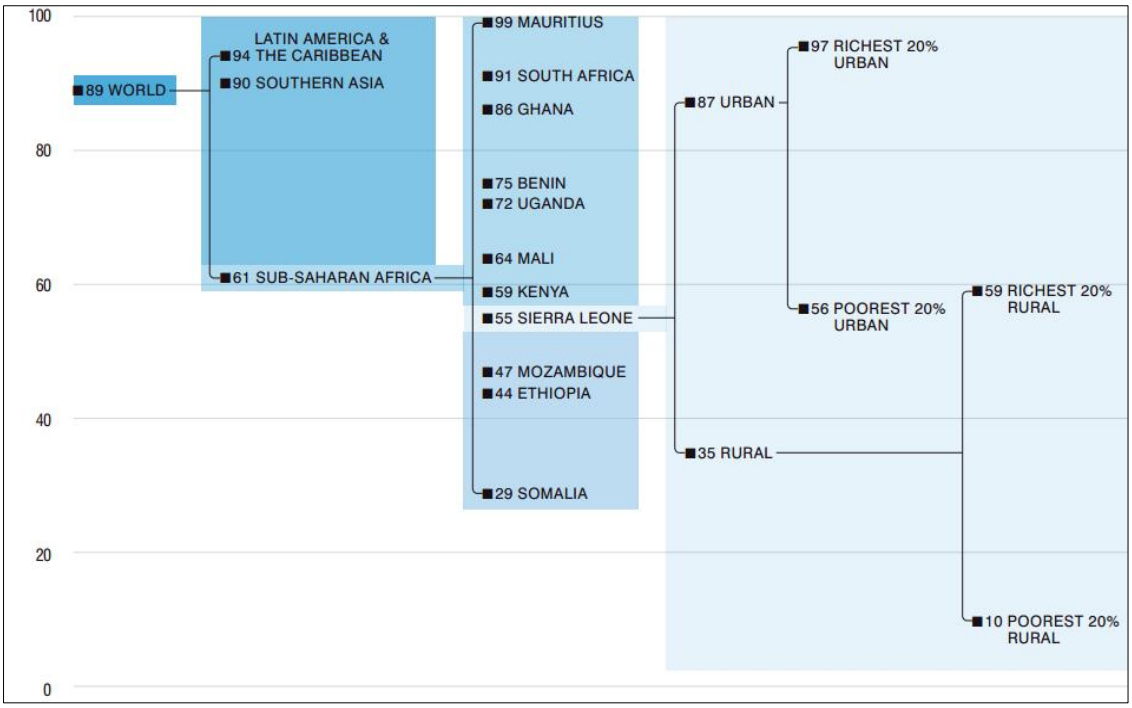

Figure 1-1: Drinking Water Coverage in Selected Countries in Sub-Saharan African and Urban/Rural Coverage among the Poorest and Richest Households in Sierra Leone (%)
Source: (WHO/UNICEF, 2012)

1.1 Problem Statement

Although the WHO/UNICEF-JMP 2012 report has drawn the attention of sector stakeholders to the issue of equity, the means of closing the equity gaps lies on national WASH sector planners. Identifying the critical areas and efficiently allocating resources presents the greatest challenge. On the other hand, despite the huge financial investments into carrying out data collection surveys such as the Demographic and Health Survey (DHS) and Multiple Indicator Cluster Survey (MICS), WASH related data collected from these surveys have not been fully optimised in terms of usage in national sector planning especially in developing countries.

It is on this backdrop that this project is based, to explore how Ghana Country WASH data can aid in allocating sector resources equitably. Equity in this context refers to disparities in access to WASH facilities, among geographic locations (e.g. regions, rural/urban areas), wealth/income levels and gender. It is hoped that, the output of the research would aid sector planners and managers especially in Ghana, in allocating resources.

1.2 Aim and Objectives

1.2.1 Research Aim

The research aims to explore how the analysis of existing national WASH data can aid more equitable resource allocation using Ghana as a case study.

1.2.2 Objectives

To achieve its aim, the research is built around four main objectives under each of which guiding questions to be addressed are listed.

1. To investigate the resource allocation mechanisms used in WASH sector planning
    - ✓ *What principles govern WASH sector resource allocation*
    - ✓ *How are resources allocated in the WASH sector?*
    - ✓ *How differently are resources allocated in other sectors (for e.g. the health sector)?*
    - ✓ *What sector resource allocation mechanisms are used in sub-Saharan Africa?*
    - ✓ *How are resources allocated in Ghana's WASH sector?*
2. To determine the extent to which existing household WASH data can be used to target future resource allocation.
    - ✓ *What information can be derived from the existing household WASH data based on the following aspects:*
        - ♦ *Geographic (regional/rural-urban)*
        - ♦ *Need of the population for e.g. poverty (wealth/income index)*
        - ♦ *Gender*
3. To assess the extent to which existing household WASH data can identify relationships between sector investments/expenditure and WASH facilities coverage.
    - ✓ *How do the WASH sector aid disbursements correlate with WASH facilities coverage?*
    - ✓ *How does the national sector expenditure correlate with WASH facilities coverage?*
4. To provide guidance to government and national sector agencies on how to equitably allocate sector resources
    - ✓ *In what way can resource allocation be improved?*
    - ✓ *What critical aspects does the data analysis reveal?*
    - ✓ How can data disaggregation support existing government sector policies - for e.g. poverty targeting?

1.3 Scope of Study

Since resource allocation forms part of the wider sector planning, the study lightly touches on some aspects of WASH sector analysis but within the context of resource allocation.

1.4 Outline of Dissertation

Chapter one of the dissertation presents the project genesis and spells out its need and potential benefit. Chapter two provides a literature review of the thematic areas of the

research topic (resource allocation, equity and WASH data analysis). Chapter three follows with a documentation of the methodologies used in the study. Chapter four presents the results of the data analysis and a summary of responses from the administered questionnaires/key person interviews whilst chapter five discusses these results and findings. Chapter six then concludes the dissertation by presenting what has been learnt from the study and providing some suggestions to guide sector resource allocation.

2. LITERATURE REVIEW

2.1 Introduction

This section is in three parts. The first is a summary of how relevant literatures were collected and analysed. The second part presents a general overview of resource allocation in the WASH sector beginning from a broad perspective and narrowing down to Ghana. The final part highlights how averages mask important disparities in access to WASH facilities and examples of efforts being made to bridge these equity disparities. The review mainly addressed *objective 1* of the study (to investigate sector resource allocation mechanisms).

2.2 Literature search strategy

Information on the following guided the scope of the literature search:

- General and WASH sector specific approaches to resource allocation/investment (at both global and local (Ghana) levels)
- Resource allocation in the health sector
- Definitions and concepts of equity
- Approaches to WASH data analysis (disaggregation)
- Correlation assessment.

A mind map of the potential sources of information identified the WEDC knowledgebase, library catalogue (LC) and LC Plus, ProQuest, Google/Google Scholar, bibliographies and websites of sector specialised institutions (e.g. UNICEF, WHO, OECD, etc.). Justifications for these sources have been included in Annex 1. As the search progressed, it became evident that owing to the specialised nature of the research, Google/Google scholar search engine and the websites of sector specialised institutions provided the most relevant documents. Keywords used in the search included |resource allocation|, |resource investment|, |sector planning| |equity|, |WASH sector investment|, |WASH coverage|, |access to water and sanitation|, |water and sanitation in sub-Sahara|, '|Water and Sanitation in Ghana|, |resource allocation in health sector|, etc.

In refining searches, keywords were either substituted (e.g. allocation for investment), added/combined, removed or truncated (e.g. invest*). In other cases their positions were changed (e.g. Investments in WASH sector in Ghana –Ghana WASH Sector investments). An example of how these keywords were used in refining searches and the search results can be found in Annex 1

The "snowball" approach (looking at the references and bibliographies of identified documents to trace out other related ones) also proved to be a useful technique for identifying related literature.

2.3 Analysing the Identified Literature

In evaluating the literature gathered, five main issues were initially considered; i.e. content, reputation of author(s), audience, number of references and relevance to research topic. However as the evaluation progressed, three of the issues- author, references and audience become less significant since most of the authors identified were reputable sector institutions (e.g. WHO/UNICEF, WaterAid, World Bank, etc). A reasonable number of references were also indicated in their reports (both published and unpublished).

Relevance of the literature was hinged on whether the literature had much detail related to any of the aspects of the research topic (resource allocation/investment, equity, analysis of WASH data). A critical and detail review to fish-out relevant information was done since a significant number of the literature, had in each of them information related to almost all the thematic aspects of the research. With WHO/UNICEF being the only institution to have extensively used a similar approach in analysing WASH data, an extensive methodology review was limited.

2.4 Sector Planning and Resource Allocation

2.4.1 Sector Planning

Planning is defined as a basic management function involving formulation of one or more detailed plans to achieve optimum balance of needs or demands with the available resources (WebFinance Inc., 2013). According to Amooti (2006), sector plans describe the route, difficulties, traps and side roads that would lead to the achievement of policy goals/objectives of a given sector or sub-sector. Closely related to the use and concepts of sector planning in WASH sector, is strategic planning. Griffin (2007), describes strategic plans as general plans outlining decisions about resource allocation, priorities and steps taken to reach goals. Yet in reality, sector plans are often developed on the basis of a political vision and not grounded in an understanding of the cost implications of achieving targets (OECD, 2009a). Strategic planning for the WASH sector should therefore involve selecting realistic objectives, checked against available resources and agreed in a multi-stakeholder policy dialogue (ibid). This study however focuses on the concepts of resource allocation and prioritisation to achieve not only WASH sector goals but also ensure equity.

2.4.2 Resource Allocation

The term resource allocation is defined as the process of dividing up and distributing available limited resources, to competing alternative uses that satisfy unlimited wants and needs (Economic Glossary, 2008). Coming from a government and health sector perspective, Green, et al. (2000), define it as allocating resources to decentralized management areas within the government health service. Another often used and related term is Sector Investment although it further includes a focus on the benefits or returns

derived from allocating financial resources into a sector or project. It is often used interchangeably with resource allocation which is also the case in this dissertation.

2.4.3 Need for Efficient Resource Allocation Mechanisms as part of WASH Sector Planning

The competing demand for the limited amount of investment requires clearly defined mechanisms to decide how money should be spent and where resources should be allocated within the WASH sector (WELL, 2005). For example, between urban and rural water, water for domestic use and water for production, and between infrastructure investment and maintenance of existing facilities (ibid).

For Mehta (2003), financing water and sanitation is not just an issue of mobilizing the required investment but also putting in place appropriate institutional arrangements, developing related capacity, and selectively targeting expenditure towards intended beneficiaries. The effective, efficient, and transparent use of resources therefore presents the real financing challenge to the WASH sector in the new millennium (ibid).

Establishing the link between resource allocation and sector planning, WaterAid (2011, p.6), specifies that, “strengthening planning and increasing resource allocation are essential starting points, but real results will only be delivered if these go hand in hand with improved targeting of investment to the countries and communities that need them most and if these investments are built to last”.

2.4.4 General Overview of WASH Sector Resource Allocation

2.4.4.1 Principles of Resource Allocation

Although there are no binding principles with regards to sector resource allocation, selected sector stakeholders have identified some general characteristics or indicators of good resource allocation mechanisms. For WELL (2005), good sector resource allocation should lead to:

- efficient use of resources e.g. providing more people with safe water per unit cost of money invested,
- effective use of resources (e.g. improving hygienic practices in a greater number of homes and
- equitable use of resources (e.g. providing better sanitation to those people in the poorest 10% of households, women and children, rural areas, slums etc.).

According to WaterAid (2011, p.14), “in terms of public policy, equity implies that available resources should be allocated on the basis of need, rather than means [*ability to access*

resources]". The challenge is however how to effectively identify and ensure that the resources reach those in most need.

Mehta (2003), also points out that, funding (allocation of resources) should be linked to sector outputs and outcomes to guarantee financing in the sector actually generates maximum benefits. Adding to this, WELL (2005), advices that, evaluation mechanisms consistent with the resource allocation approaches would have to be developed to be able to assess their (allocation of resources) impacts. While transparency is imperative in allocating resources, resource allocation approaches should also be able to generate enough revenue for sustainability (ibid).

Thompson, 2003 also identified a list of factors to be considered in allocating resources within and between WASH sub-sectors (see table 2.1 below).

Table 2-1: Factors to consider in WASH Sector Resource Allocation

Between sub-sectors	Within sub-sectors
• Contribution to sector objectives of poverty reduction, economic growth etc. • Gaps between actual and target levels of performance in sub-sectors • Relative costs of technology • Scope for additional funding from donors • Scope for raising income through user fees etc. • Value for money of investments • Resource allocations in other countries	• Contribution to sub-sector objectives • Equity of resource split • Balance between capital and recurrent costs • Balance between staff costs, capacity building, administration etc. • Value for money of investments • Resource allocations in other countries

Source: (Thompson, 2003)

In summary, satisfying these mix of characteristics and factors, makes resource allocation one of the most difficult tasks in sector planning. Thus, depending on a country's WASH sector policies and strategies, appropriate mechanisms for allocating resources would have to be developed to meet the country's target. This view is substantiated in WELL (2005) where it is indicated that, although there are many factors to consider when assessing how to allocate resources between and within WASH sub-sectors, there is never one 'right' answer.

2.4.4.2 WASH Sector Resource Allocation Methods

Most of the contents of this section is based on (WELL, 2005) and (Mehta, 2003). Theoretically, there are two main methods or approaches of sector resource allocation i.e. Sub-sector driven approach and Sector-objectives driven approach. Both approaches have been defined based on the *process* followed to achieve the sector targets.

With the sub-sector driven approach, focus is placed on the relative importance of each sub-sector, i.e. the sub-sectors drive the allocation process. Figure 2.1 presents an example of the stages involved in this approach and some factors considered.

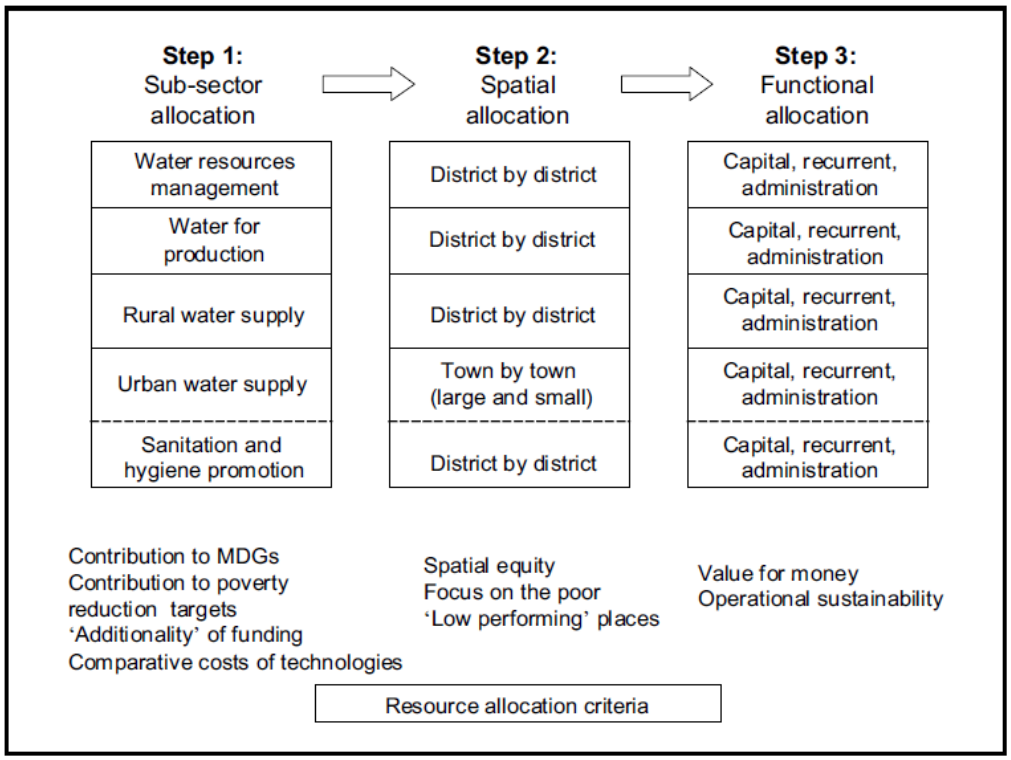

Figure 2-1: Stages in a Sub-sector Driven Approach
Source: (WELL, 2005)

The main challenge associated with this approach is the difficulty in making rational judgements on the weighting of different allocation criteria in step 1 to reflect the real needs of the WASH facilities users (WELL, 2005).

With the Sector-objectives driven approach, resource allocation is based on the objectives and targets of the sector as a whole, investing where the gaps are greatest. Strong commitment to a sector-wide approach (SWAp) that prioritises investment on the basis of where the gap between current service coverage and national targets is greatest is a pre-requisite for this method. Although this approach ensures a much clearer linkage between sector investment and desired objectives, the main hurdle from the researcher's view lies in the identification of these gaps. Figure 2.2 shows the process involved in this approach.

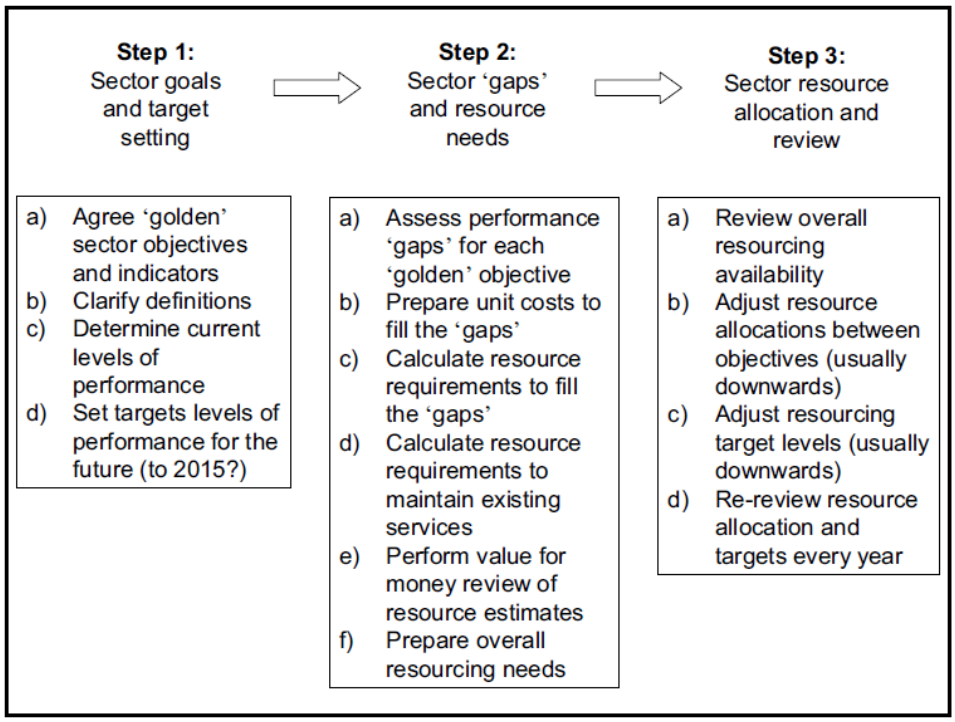

Figure 2-2: Stages in the Sector-objectives Driven Approach
Source: (WELL, 2005)

According to WELL (2005), while the above approaches are mainly theoretical, in practise, the following allocation methods are often followed:

- *Institutional* - involves individual ministries, departments and NGOs negotiating on their own behalf for funds. There is however little or no coordination between these institutions and allocations are often based on historical trends.
- *Sector Investment Plan (SIP)* – with this, sector institutions take part in a Sector Wide Approach (SWAp). Key stakeholders' meeting are held regularly to develop integrated sector policies, plans and budgets. Donors' support is often allocated across different institutions. This approach follows the theoretical Sub-sector driven approach earlier discussed.
- *Programme Based Budgeting* – The programmes are designed with specific outputs and targets with corresponding resources (financial) allocations. A lead institution is identified and tasked with an overall supervisory role. This approach follows the sector-objectives driven approach.

Mehta (2003), also identifies three sets of financing mechanisms for providing incentives for sector reforms that would address the ineffective and inefficient use of existing resources (one of the three key problems that characterise the water supply and sanitation financing agenda) (see box 2.1).

These financing mechanisms she says include:

- *"Decentralisation-linked fiscal mechanisms* - largely through the conventional public finance systems linked to budget allocations and fiscal transfers
- *Special fund mechanisms*- often developed independently of the regular government financing arrangements, at local, regional, national, or global levels.
- *Programmatic approaches*- including a variety of program-linked financing arrangements and loan instruments."

1. "Bedevilment of the WASH sector by institutional frameworks and financing policies that result in ineffective and inefficient use of existing resources"
2. "Inadequate availability of public resources to meet the costs of sustained enhanced coverage"
3. "The poor often do not benefit from increased coverage and the existing WSS services"

(Mehta, 2003) pp. 10-11

Box 2-1: Problems that Characterize the WASH Sector Financing

These approaches vary in terms of reliance on existing public finance mechanisms. Table 2.2 presents the relationship between the practical resource allocation approaches by WELL (2005) and Mehta (2003) and a summary of the ideal conditions and associated challenges of the approaches.

Table 2-2: Conditions for Use and Associated Challenges of Resource Allocation Approaches

Resource Allocation Mechanism	Ideal Conditions for Use	Challenges
Institutional/ Decentralisation-linked fiscal approach	• Sector funding from a centralised government financial institution e.g. Ministry of finance to other ministries trickling down to various WASH related departments in these ministries as well as other local sector institutions	• Difficult to integrate spending and to ensure overall sector priorities are achieved since these ministries and departments develop their budgets independently • Weak financial and technical capacity of local institutions, aggravated by administrative blockages in the downward passage of funds (OECD, 2009a). This usually results in local budgets for sector being under-spent and money returned to the centre due to the differences between central and local priorities for use of the money (ibid).
Sector Investment Plan/Special fund approach	• Presence of an effective and efficient Sector Working Group with representatives from several government departments, NGOs and other members of civil society with the responsibility of developing an integrated SIP for WASH that sets out overall targets and resource allocations for a given period.	• Given the multi-sectoral nature of this approach and the complexity of the WASH sector, this approach may result in inadequate understanding and focus in the fund operations on critical sector issues. • The competition for the same resources by the various sectors may also lead to neglect of some sectors who may not be able to argue out their cases well enough although they may be relevant to the improvement of WASH
Program based-budgeting or programmatic approach	• National sector targets are defined into specific programs with very clear objectives and needed resources made available. The programme is time bound (usually 4 years). A lead agency is tasked to monitor performance which determines how much money is allocated over the period.	• Requires a significant level of country commitment and capacity of lead sector institutions • Strong Results-Based Monitoring and Evaluation (R-B M&E) and alignment with national decentralisation scheme

Source: compiled from (WELL, 2005) and (Mehta, 2003)

Use of Resource Allocation Mechanisms

Although the programmatic approach has been used over the years in providing aid to most African countries by International Development Agencies (IDAs), the trend is changing with Institutional approach or Sector Investment Plan becoming the main channels for budget support to recipients (Fonceca & Diaz, 2008). This, they say is as a result of principles such as the Paris Declaration for Aid Effectiveness which advocates for more ownership by the aid beneficiaries, on decision making with regards to administration and spending of the aid. Furthermore, sector budget (SIP approach) is effective for aid allocation since it makes full use of the recipient country's resource allocation mechanisms to its own sector development plan and also has low transaction cost (WHO, 2012).

Nevertheless, irrespective of the resource allocation mechanism used, there is a growing preference for Medium-Term Budget Framework (MTBF) (WELL, 2005). This allows for a better coordination of sector activities and prioritisation of resource allocation; and also involves rolling of a multi-period budget prepared for each government ministry and department (ibid). It is reviewed annually (ibid).

2.4.4.3 Overview of Health Sector Resource Allocation

This section explores how resources are allocated in the health sector with the aim of identifying useful lessons that may be applied in the WASH sector.

For the health sector, the institutional/decentralisation-linked and sector investment approaches are often used in allocating resources. Green et al (2000), indicate that, owing to the decentralised nature of the health system, adopting an effective resource allocation mechanism is vital. They further point out that, not only does decentralization provide the opportunity to effectively meet the needs of the local people but also operates within a national equity framework for allocating resources. The focus of the health sector on often curative treatment rather than preventive treatment makes it less reliant on other sectors and hence the easy adoption of the institutional approach in allocating resources. For the WASH sector, responsibilities often cut across several national ministries and agencies (for e.g. water, environment, local government, health, education, etc.) and therefore require some inter-sectoral coordination.

Countries like Zambia have adapted a SWAp Programme in which donors participate in planning resource allocation (McIntyre, et al., 2007). The engagement of key stakeholders in the planning and implementation process is reported to have facilitated equitable allocation of resources (ibid).

Similar to the MTBF in the WASH sector, the Medium –Term Expenditure Framework (MTEF) has been in use in the health sector. McIntyre et al (2007), identify it as crucial in allocating resources equitably. They indicate that, the MTEF allows health institutions to plan ahead and allocate resources across geographic areas within the given time frame.

The topical issue with respect to the allocation of resources in the health sector is how to ensure equity- provide adequate service to those that need it most. Zere et al (2007, p.3) define equity as “equal access to a basic package of services for equal need” with need as “the ‘capacity to benefit’ and the ‘severity of illness’; and - access the barriers, mainly financial and geographical, faced by potential users”. These definitions define the two aspects of equity in the health sector – vertical and horizontal. While the vertical equity is

based on the capacity of health service to benefit those in need, the horizontal equity is simply based on access with need as the size of the problem (Zere, et al., 2007).

The focus on the needs-based approach has resulted in the use of formulas ranging from simple weightings to complex mathematical equations in allocating resources. Briscombe et al (2010) point out that, these allocation formulas help in redressing the inequities in the sector by systematically and objectively incorporating needs-based criteria in decision making. Using such formulas represents an initial step in bridging inequities in the system irrespective of how imperfect the underlying data or weighting formula is (ibid).

Table 2.3 presents a summary of need indicators identified by Pearson (2002) and Diderichsen (2004), often used in developing the needs-based allocation formula. For Pearson (2002), these indicators should reflect the reasons why health needs vary.

Table 2-3: Indicators used in Need-based Resource Allocation in the Health Sector

Category of Indicator	Indicator
Demographic	• Population size –*a greater number of people will present a greater health needs* • Age and sex profiles of populations- *the very young and very old have greater health needs than the general population, women have greater health needs than men* • Ethnicity- *in terms of race, citizenship, or country of birth*
Socio-economic	• Degree of relative/absolute poverty- *poverty causes ill health and vice versa* • Employment status • Marital status and cohabitation- *are strongly related to health and utilization* • Education, occupation, income- *these three variables are strongly linked and therefore applying one of them is sufficient*
Geographic	• Geographical factors might be relevant either because they catch variation in need factors on aggregate level (e.g., mortality rate) or because they influence market forces influencing the cost of providing care or because the effects of demographic and socioeconomic factors are modified by location. The problem is that geographical effects often are strongly confounded by supply factors.

Source: compiled from (Pearson (2002) and Diderichsen (2004))

While these indicators essentially cover all the broad aspects of equity, conspicuously missing is an indicator for the disabled or physically challenged even though they routinely seek medical attention.

Though the need-based approach is progressively being used in developing countries such as Kenya, Zere et al (2007) identify the following as the main challenges that confront its use in developing countries:

- lack of reliable and timely data,

- tendency to create perverse incentives, e.g. that exaggerate the size of the population or to seek to influence other factors that make up any allocation formula,
- the exclusion of certain services from the formula (for example some essential services may be considered national services, whereas others may be considered as regional or district services) and
- the definition of what is contained in the basic package of services may be difficult (it may be the case that the package does not address the needs of the poor contrary to the principle of equitable resource allocation).

Taking a more precautionary approach, Green et al (2000) suggest that in view of these challenges especially the lack of good information, countries considering the adoption of such formulas may need to start with the very basic population-based allocative formulas. Overtime, they may adopt the more sophisticated formulas which incorporate indicators of need (ibid). They further suggest that such indicators could be used as simple weights on population to reflect differing levels of need in similar-sized populations.

On the other hand, Briscombe et al (2010) despite acknowledging the shortcomings associated with adopting an extensive data-reliant resource allocation approach such as the needs-based, they also see it as an opportunity to raise awareness of data gaps and motivate stakeholders to develop more accurate and timely data. To them, this includes development partners who may be willing to closely coordinate activity funding and information sharing with potential recipients once they identify the recipient's need for timely data.

Pearson (2002), after a review of sector resource allocation mechanisms in some countries, identified some key issues (see Box 2.2) to consider when selecting a resource allocation approach.

1. "The resource allocation process must be developed around sectoral goals with clear targets; the actual allocation of resources can be an extremely good indicator of whether countries are adopting pro-poor policies
2. Effective implementation requires that:
   - the definition of equity at a macro level is consistent with any existing pro-poor health policy (recognising that a needs-based approach is not necessarily pro poor);
   - the definition can be translated from a national to a provincial or district level;
   - data exists at the lower level for the formulae to be reliably calculated;
   - there is a political willingness to deliver at all levels
3. Any approach to the reallocation of resources should be fully reflected in any medium-term expenditure framework. It has to be recognised that the reallocation process may take longer than the period covered by existing financial frameworks
4. Formulaic approaches are more objective and more transparent than alternatives, making the process less subject to negative external influence.
5. Formulae require accurate and timely data which are rarely, if ever, present in low income countries.
6. Developing an appropriate resource allocation formula is important but it does not absolve central government from its responsibility for ensuring systems are in place to make sure that the resources are put to good use.
7. Design of an allocation formula should take into account other financing approaches, such as user fees, to ensure consistency with overall goals for the health sector.
8. Hospital services pose particular problems and may require different approaches
9. Formula-based approaches are most useful for predicting the relative levels of resources required to meet the needs of larger populations over broader groups of services".

(Pearson, 2002, pp. 17-18)

Box 2-2: Key Issues to Consider in Selecting Resource Allocation Approaches in the Health Sector

2.4.4.4 Brief Overview of Global WASH Sector Financial Flow

WASH sector financing

The main sources of WASH sector funding include taxes, tariffs and direct transfers. Due to the sensitive nature of financing to the effectiveness of the WASH sector, an appropriate mix of these sources, depending on the country's economy is required if a sustainable financing mechanism it to be achieved (OECD, 2009b). Public transfers are the most common funding source for especially WASH sector capital expenditure. However, as countries develop economically and improve WASH status, there is a shift towards more use of commercial finance (taxes and tariffs), (OECD, 2011). In France, tariffs represent 90% of direct financial flows to the sector while they account for only account for about 40%, 30% and as little as 10% in Korea, Mozambique and Egypt respectively (ibid)

For the purposes of planning and reaping optimum benefits from investments in WASH, resources from these sources should be consistent. A cross-country analysis by WaterAid in 2011, revealed that the allocations are not only inconsistent (in terms of amount), but also vulnerable to external events. For e.g.in most developing countries, the 2008 international financial crisis reduced government budget revenues and hence a cut in sector budget spending (ibid) (see table 2.4).

Table 2-4 : Water and Sanitation Expenditure, % of GDP

Country	2008	2009	2010
Angola	0.48%	0.86%	0.65%
Bangladesh*	0.26%	–	–
Burkina Faso	0.86%	0.71%	1.85%
Cambodia	0.32%	–	–
Central African Republic	–	0.62%	0.21%
Cote d'Ivoire	–	0.06%	–
Ethiopia	0.60%	0.56%	0.46%
Ghana	0.38%	0.28%	0.29%
India*[30]	0.57%	0.54%	0.45%
Kenya*	1.10%	1.28%	0.86%
Lesotho*	2.59%	2.88%	2.57%
Liberia*	0.23%	0.28%	–
Malawi*	0.46%	0.69%	0.40%
Mali	0.69%	0.58%	0.41%
Madagascar	0.14%	0.46%	0.28%
Mozambique	0.88%	–	1.53%
Nepal*	0.80%	0.70%	0.79%
Niger	–	1.36%	1.13%
Nigeria	–	–	0.18%
Pakistan	0.22%	0.20%	–
Papua New Guinea	–	–	0.17%
Rwanda	0.67%	0.64%	0.59%
Senegal	–	0.81%	–
Sierra Leone	–	–	0.83%
Tanzania	1.01%	1.03%	0.94%
Timor Leste	–	0.63%	2.03%
Uganda	0.42%	0.41%	–
Zambia	0.73%	0.33%	0.56%

*Fiscal years: green = increase in expenditure projections, red = decrease
Source: (WaterAid, 2011).

WASH Sector Spending Patterns

WASH sector expenditure has been biased towards capital investments (provision of new facilities and services). The WHO (2010), indicates that, total associated cost for rural water supply constituted 25% current costs and 75% recurrent costs. On the contrary, in the WHO's 2012 report, data from eleven External Support Agencies revealed that, 57% of their aid to drinking-water and sanitation is disbursed for new services, whereas only 7% is for maintaining or replacing existing services (see figure 2.3). WaterAid (2011) attributes the focus on increasing access to the global drive to meet the MDG targets.

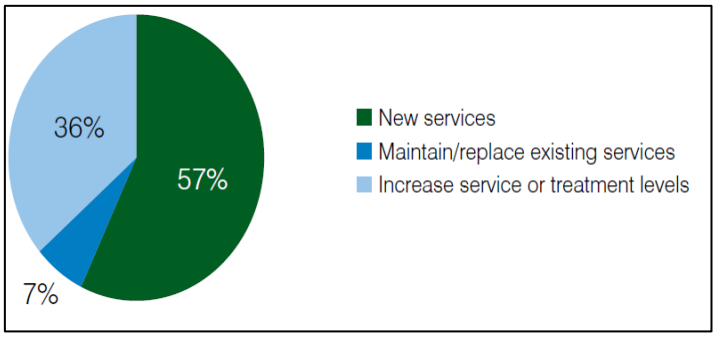

Figure 2-3: Breakdown of Development Aid Objectives
Source: (WHO, 2012)

Water and Sanitation Split

Though the large expenditure on water as compared to sanitation may be justified due to the huge capital and O&M cost associated with providing facilities such water treatment plants, drilling of boreholes, etc., poor sanitation and hygiene practices pose a relatively greater threat to human health. Besides, each US$ 1 invested in sanitation yields an average benefit of between US$ 5.5 –US$ 8 while water yields US$ 2 (i.e. about 3 to 4 times less than sanitation) (Beyond2015, 2013). "Compared to water supply, the benefits of which are largely private, the safe disposal of human waste and household wastewater has large external benefits to society, which is the justification for public subsidies to sanitation, especially if targeted at poor communities" (OECD, 2009a, p. 21).

The absence of an established benchmark for what is an adequate percentage spend on gross domestic product (GDP) may also be a potential holdup in bridging the gap between water and sanitation resource allocations. In Africa for example, while the eThekwini declaration indicates a minimum of 0.5% of GDP (WaterAid, 2013c), the World Bank's Africa Infrastructure Country Diagnostics (AICD) indicates 0.9% of GDP (ibid). Moreover, the basis of eThekwini's 0.5% estimation is unclear.

2.4.4.5 Targeting the Poor

The subsidization of water and sanitation service costs is the most common means of reaching out to the poor. For Mehta (2003), the motive for subsidization is related to the concept of universal access which she says are justified on the following grounds:

- the consideration of water and sanitation as merit good,
- the positive externalities generated by water supply and sanitation and
- political concerns for equity across consumers and regions

However, the use of subsidies as the main channel for reaching to the poor seems not to be accomplishing its intended purpose. Based on a study by WEDC and Hydroconseil in 2010, rural subsidy of capital cost of sanitation in Uganda, Mozambique and Burkina Faso when mapped with sanitation outcomes revealed that, the number of people practising open defecation (OD) fell substantially only in Uganda although it had the least subsidy (6%) as compared to Mozambique's 60% and Burkina Faso's 100% subsidy. Mehta (2003) points out the hidden nature, poor targeting and the lack of clarity of these subsidies as likely causes for the failure of subsidies in reaching out to the underprivileged.

The type of resource allocation mechanism may to some extent influence the provision of services to the poor. For example, the decentralisation-linked/institutional (sub- sector driven) approach incorporates the concepts of equity and access to the poor at *stage 2* of the process (spatial allocation) – refer to figure 2.1, the definition of who the 'poor' is as well 'equity' is therefore critical for effective targeting. The proneness of the institutional

resource allocation mechanism to political influence may also threaten the effective targeting of resources to the poor.

The lack of coordination between sector agencies is also likely to result in individual sectors having different priority targets for the poor. In a situation where an urban poor community has been identified as a priority area by the sanitation sub-sector and thus provided with flush toilet facilities, a reciprocating selection by the water sub-sector as a priority area is required if the community is to fully benefit from the sanitation investment. In such situations, the sector investment plan approach (sector objectives driven) is more likely to be successful in targeting the poor due the extensive sector coordination that comes with the approach.

While information concerning poverty levels, infrastructure, service levels and financing are pre-requisites for effective planning and allocating resources to populations in most need (WHO, 2012), identifying those in the most need remains challenging. To achieve this, the Kenya Water and Sanitation Trust Fund uses geographical mapping combined with a water-specific situation analysis (includes existing level of WASH investment and access) to identify needs (WHO, 2010). According to the report, although the trust fund has developed transparent criteria for equity, inadequate funds results in the criteria not applied to all. Table 2.5 present some examples of targeting mechanisms and their associated limitations.

Table 2-5: Targeting Methods

	Targeting Method	Advantages	Risks	Suitable contexts
Administrative Targeting	**Geographic Targeting** Areas identified as poor are prioritised and households in those areas are selected	Cheap, Simple to administer, Reduces bias towards vocal communities	Misses poor households in better-off areas Subsidises the better-off living in poor areas i.e. two possible types of targeting error.	Low-income households known to be concentrated in specific areas (e.g. poverty map in place) Low inequality within geographic zones Useful for identifying broad areas to target, e.g. for infrastructure expansion
	Targeting by household Characteristics Households are selected by characteristics believed to correlate with poverty, e.g. housing type.	Discriminating: Targets individual households in any location Cheaper than full means testing	Misses "non-typical" households (in terms of the selected characteristics)	Clear differences between households of different income groups (based on good information) Significant inequality within geographic areas.
	Income-based means testing Households are selected based on household income	The most accurate targeting approach, if done well	Expensive to administer Income data is difficult and expensive to collect Will miss poor households which move location, fall into poverty or migrate to the city, unless information base is continually updated Possible stigma attached to being classified as "poor"	Sophisticated social targeting mechanisms including means testing already exist, of which water/sanitation can make use High capacity and adequate financial resources.
	Community-based Community leaders, Community organisations or civil society organisations select poor households in their community.	Potential to be highly accurate as draws on in-depth knowledge of communities	Subjective and possibly non-transparent Risk of bias (and it may be difficult to recognise or control this)	Trusted community-level organisations with good understanding of communities.
	Self-targeting Households select from a range of service levels at different prices (e.g. household connection or standpipe) OR the first volumes of water used are subsidised and households (in theory) self-target by consumption level.	Households set their own cost/service priorities	Households may be missed if the range of options does not meet their needs, or the range is too narrow (e.g. if no options are affordable for the poorest)	Utility has the capacity to respond to household requests and provide different service levels (which may be simple e.g. shared versus single connections).

Source: (Newborne, et al., 2012)

2.4.5 Overview of WASH Sector Resource Allocation in Sub-Saharan Africa

With Sub-Saharan Africa home to a significant number of the world's poorest and fragile nations and by implication those in the most need of WASH facilities and services, this section presents a brief overview of sector resource allocation in some randomly selected countries in the sub-Saharan Africa region (see figure 2.4 below).

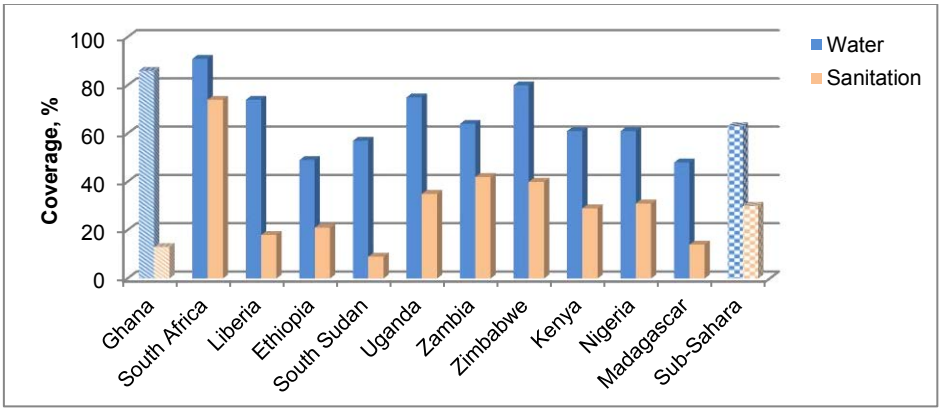

Figure 2-4: Improved Water and Sanitation Coverage (%) in Selected Sub-Saharan Countries
Source: Coverage estimates obtained from (WHO/UNICEF, 2013a)

2.4.5.1 WASH Sector Planning and Coordination in Sub-Saharan Africa

The SWAp in WASH sector planning appears to be popular in most of the countries reviewed. However, its use varies. Though it has been in use for some time in South Africa and Uganda, Nigeria and Liberia are yet to adopt it. In Uganda for example, the Water and Sanitation Sector Working group (WSSWG)- includes all stakeholders for e.g. development partners, NGOs and civil society, meets quarterly to agree on a comprehensive SIP in which projects are prioritised in accordance to the National Development Plan objectives (WaterAid, 2013a). South Africa's SWAp goes further by translating the plans into budgets and also monitors spending against budgets to achieve a high level of spending (WSP-World Bank, 2010a)

2.4.5.2 Resource Allocation Approaches in Sub-Saharan Africa

The WASH sector resource allocation mechanisms among the sub-Saharan countries are mainly country context specific. In ensuring consistency with local reforms in South Africa, sector-based grants from government are consolidated into a two grants system (capital grant and an unconditional operating grant) which are then allocated equitably to local governments as budget support (WSP-World Bank, 2010a). This resource allocation system implies the use of both the sector-based resource allocation mechanism (at government level) and the institutional/decentralisation-linked resource allocation mechanism (at the local level). This approach would thus require a highly independent and organised local government system to ensure the successful delivery of WASH facilities and services.

In Madagascar, the government is considering adopting a programmatic approach in which most donor support would be channelled through the ministry of finance (AfDB, 2011). The potential challenge of this approach would be the multiplicity of programme-based projects which would require a lot of expertise for successful implementation. Additionally, the sustainability and success of such programmatic approaches greatly relies on the political stability of countries since some programmes may span beyond a given presidential term of office. The implementation plan and strategy of these programmes would need to have some political immunity.

Nigeria has a formula-based Revenue Allocation System at the national level which shares revenues from the Consolidated Fund to state and local governments however; no established formula is used in allocating water supply and sanitation funds to the states (WSP-World Bank, 2010b). For South Sudan as a result of its transitional state, only a small proportion of donor projects are funded through the Ministry of Finance and Economic Planning (MoFEP) with the remaining managed on bilateral basis (MWRI, 2011). Sector coordination and monitoring would therefore be very much limited in such situations. There is also a high probability of the poor being marginalised since there is no binding sector policy to guide investments.

In Ethiopia, public finance for WASH from federal level to regions comes in two ways;

a. Channel 1- general transfer to regions and Woredas (local government levels) based on the equity formula developed by the House of Federation as block grants and
b. Channel 2 - special purpose grant allocated to the federal ministries, regional bureaus and selected Woreda WASH offices (WaterAid, n.d.).

Most external (donor) assistance has been through channel 2 with the regions receiving a larger proportion (95%-97%) since they are directly responsible for providing services (ibid). The remaining 3% to 5% is allocated to the federal government to cover its administrative expenses (ibid). This approach of allocating resources was as a result of Ethiopia's country size, its inhospitable geography and the dispersed settlement of the country as it ensures the timely funding of local water supply and sanitation (WSS) initiatives (WaterAid, n.d.). Similar to South Africa, Ethiopia's resource allocation system is technically both institutional (channel 1) and sector-based (channel 2). The innovative mechanism of allocating 3%-5% of sector-based grants to the federal government provides some level of immunity to the sector from political interference. Whilst Ethiopia's resource allocation mechanism is commendable 'on paper' actual implementation would be a much greater achievement.

Although the MTBF is used in Uganda's WASH sector budgeting, the major setback as indicated by Thompson (2003) is that, future allocations between sub sectors seem not to be linked to specific targets and performance measures and thus immediate investment plans would not necessarily address areas of greatest need. This point by Thompson (2003) draws back on the need of resource allocation mechanisms to be built around clearly defined sector objectives as indicated by Pearson (2002) if the poor are to be effectively targeted.

2.4.5.3 Brief Overview WASH Sector Financial Flow in Sub-Saharan Africa

WASH Sector Financing

Consistent with other developing parts of the world, donor funding constitutes a significant source of funding for the sector in the region. There is however a significant variance among the countries. In Madagascar for example, it constituted about 40% of the total funding for WSS over 2002-2006 (AfDB, 2011) while in Kenya over 60% of the Water Services Trust Fund in 2008/09 was contributed by development partners(ibid). Although as much as 90% of sector expenditure is through foreign financing in countries such as Zambia, the use of grants from donors and external loans is insignificant compared to the total government investment to the sector in South Africa (UNDP, 2011; WSP-World Bank, 2010a).

Budgetary Allocation to WASH

In Uganda, despite the fact that the National Development Plan for the water and environment sector allocated an average of 4.1% of the national budget to meet its MDG target, the sector budgetary allocation has rather been on the decreasing side since the 2004/05 financial year (see figure 2.5) (WaterAid, 2013a). According to the report, when expressed in terms of GDP, 2010/11 disbursements represented 31% less of GDP than in 2007/8.

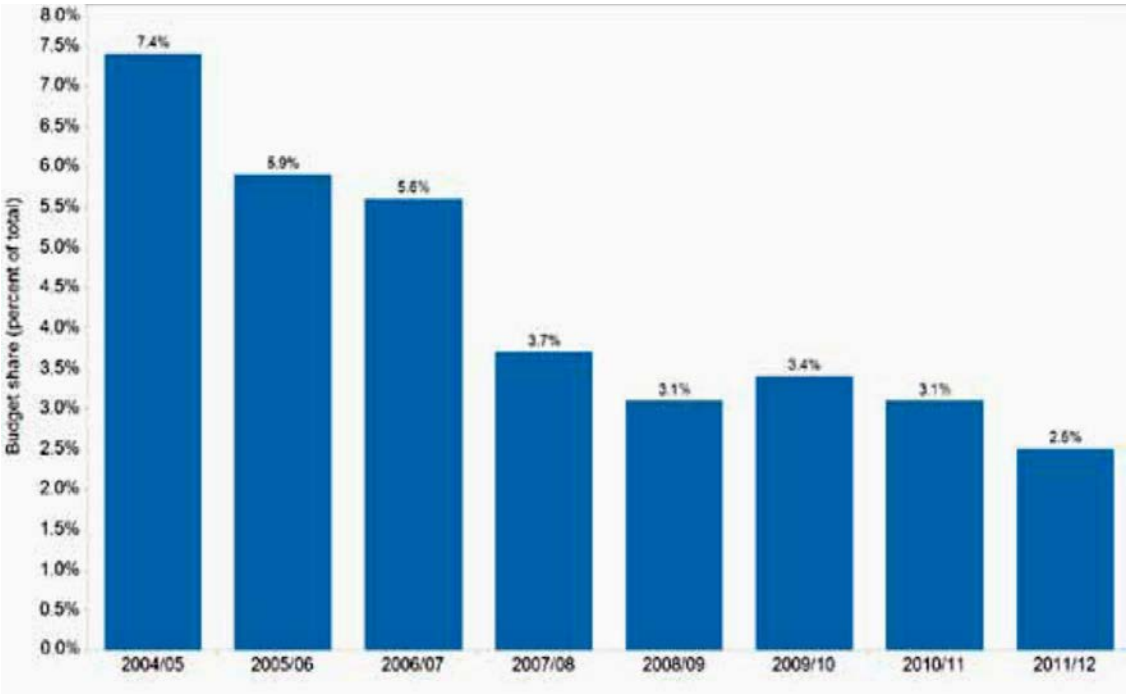

Figure 2-5: Water and Environment Sector Share of Total National Budget 2004/05-2011/12
Source: (Ministry of Water and Environment, MWE Annual Performance Report, 2012; as cited by (WaterAid, 2013a))

For Nigeria, although annual state budgetary allocation to water and sanitation ranges from 4.8%-5.7% and 0.7%-3.1% respectively, only about 60% of this is disbursed and in some cases as low as 10% (WSP-World Bank, 2010b). In addition to the existing wide gap between the allocations for water and sanitation (averagely 3.5%), this low disbursement rate further worsens the plight of sanitation. For individual states such as Cross River State, consistently high levels of disbursements (above 90% in some years) have been noticed (WSP-World Bank, 2010b). The justification for this preferential treatment is however unknown but raises issues about equity in the disbursement funds to the states.

For Zambia, national budget allocation to WASH ranged from 1%-4% in 2006 -2008 (UNDP, 2011). Much worse than Nigeria, actual disbursements were around 9% of the total approved budget (ibid).

WASH Sector Spending Patterns

As observed in the global WASH expenditure, sector investments in sub-Saharan have been skewed towards capital investments. Figure 2.6 below shows the extremely wide variations between recurrent and capital investments in Uganda.

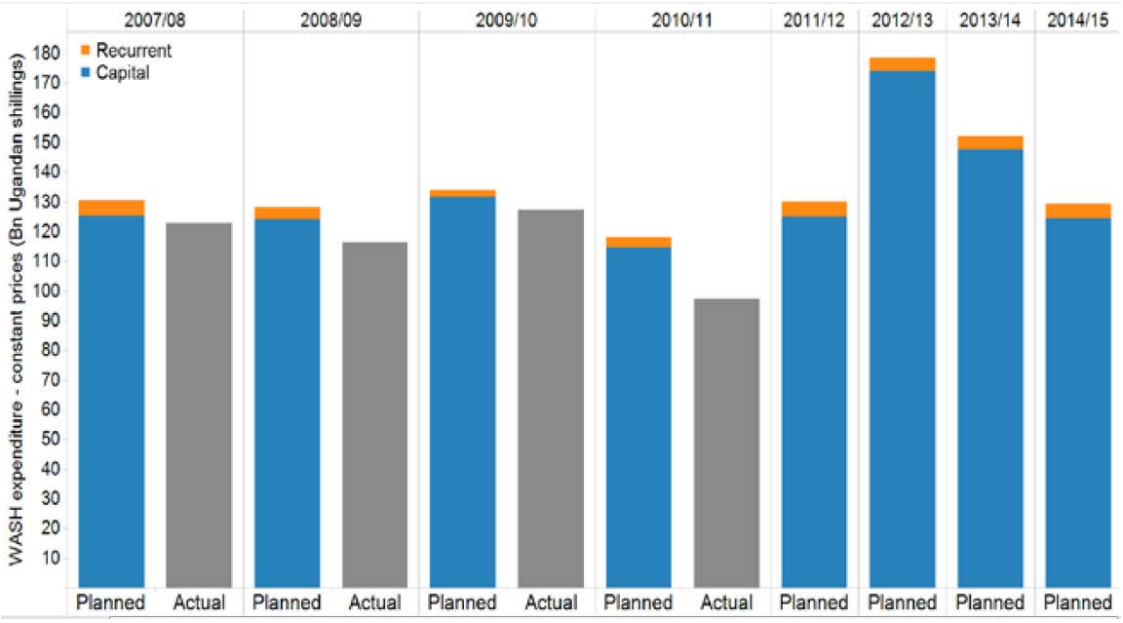

Figure 2-6: Planned and Actual Water and Sanitation Expenditure 2007/08 to 2014/15 (Bn Ugandan shillings[2])
Source: (MWE Annual Performance reports (2007/08 to 2010/11); Budget Speech 2012/13 (2011/12 to 2014/15), as cited by (WaterAid, 2013a))

In South Africa, existing evidence supports the fact that there is inadequate spending on the maintenance and rehabilitation of water assets in urban areas leading to the deterioration of these assets over time (WSP-World Bank, 2010a). Ethiopia also has its largest share of the water supply budget at the regional level allocated to capital expenditure while communities are required to bear the more expensive operation and maintenance (recurrent) costs (WaterAid, n.d.).

With regards to the Water and Sanitation split, the former appears to be receiving more attention in the selected countries. In Ethiopia, there is no clear budget line for sanitation at any government level neither is there any specific policy document on sanitation (WaterAid, n.d.). According to Colin &Thomson (2003) as cited by Thomson (2003), out of the estimated US$ 30 million spent annually on urban water and sanitation in Uganda, only about US$ 2.1 million (14.3%) is allocated to urban sanitation. In Nigeria, although the Federal Ministry of Water Resources (FoMWR) is mandated to provide access to adequate potable water supply, the responsibility for sanitation is less clear (Amakom, 2008).

2.4.5.4 Targeting the Poor in sub-Saharan African Countries

Most of the countries considered rarely apply any equity measure in allocating resources justifying the equity disparities in terms of access to WASH facilities in these countries. In two separate projects *(Improved National Access to Water, 2000-2002* and the *Constituency Water Supply Project Supply and Sanitation, 2005-2007*) undertaken by the

[2] 2,575.7851 UGX=$ 1 USD

federal government of Nigeria, resources were allocated regardless of the differing needs of the benefitting states (WSP-World Bank, 2010b). Even among the few countries that consider equity in allocating resources, the considerations are not always applied.

In Uganda, resource allocation is primarily based on population levels with factors such as poverty and coverage levels of water and sanitation services as additional considerations (WELL, 2005). Sadly, the allocation formula principles are ignored at the district local government level in allocating grants although the District Water and Sanitation Development Grant takes into consideration equity of the underserved sub-counties in administering its grants (WaterAid, 2013a). While the allocation of resources primarily on population may be related to the horizontal equity concept in the health sector, the use of factors such poverty and WASH facilities coverage levels may be linked to the vertical equity (ability to benefit the poor).

In Ethiopia where a universal access approach to reach every citizen has been developed, there is the temptation at the Woreda (local government) level to provide access to the 'easy-to-reach' communities to the detriment of the more secluded and poor communities (WaterAid, n.d.).

Although South Africa's grant system of allocating resources to municipalities is equitable, there are some technical issues related to the formula design (WSP-World Bank, 2010a). Josie (2008) in a review of South Africa's Municipal Infrastructure Grant (MIG) system, from which funds for providing basic infrastructure including water and sanitation are made available to local governments, indicated that, the allocation formula did not take into account all input cost factors. This, the author explains is an important component in the design of grant systems and accounts for cost differences in the resources required to achieve comparable service levels. The differences in cost may be due to demographic, geographic and socio-economic disparities among sub-regions (ibid). Other issues related to the MIG raised by Josie (2008) include:

- the MIG being a project based allocation arrangement does not provide the transparency and budget predictability which are necessary for planning and a constitutional legal requirement and
- the expectation of local municipalities to submit project applications in line with the MIG preconditions is unrealistic in South Africa due to little or lack of in-house capacity to plan and prepare proposals. This may disadvantage 'poorer' local governments

The issues raised by Josie (2008) re-echo the need for transparency in the allocation of resources and impact of local variations on the allocated resources in achieving equitable facilities and services.

2.4.6 Sector Planning and Resource Allocation in Ghana

2.4.6.1 Country Profile

With a population of about 26,131,336, the 2013-JMP progress report indicates Ghana's improved water and sanitation coverage (in 2011) is at 86% and 13% respectively. As much as 59% of Ghana's population share sanitation facilities (one of the highest worldwide) (WHO/UNICEF, 2013a). Despite, the high piped water coverage, supply is often irregular and inadequate. About 80% of all diseases in Ghana are reported to be as a result of unsafe water and poor sanitation (WaterAid, 2013b). Table 2.6 below presents a list of the national WASH sector institutions. The Ministry of Health is however occasionally involved in some hygiene related programmes. As seen in the table below, the delivery of sanitation is shared between the CWSA and EHSD latter is however the lead institution. This presents a challenge in the accountability and monitoring of the sanitation sector especially when there is no effective sector coordination.

Table 2-6: Ghana WASH Sector Institutions and Their Responsibilities

Institution	Responsibility
Ministry of Water Resources Works and Housing-Water Directorate (MWRWH-WD)	Policy development and implementation, planning, financing and monitoring (for Water)
Ministry of Local Government and Rural Development-Environmental Health and Sanitation Directorate (MLGRD-EHSD)	Lead in Policy development and implementation, planning, financing and monitoring (for sanitation)
Community Water and Sanitation Agency (CWSA)	Water and related sanitation services provision in rural communities and small towns under community ownership and management. CWSA activities are funded by government with donor support under the National Community Water and Sanitation Program (NCWSP).
Ghana Water Company Limited (GWCL)	Provision of water to urban areas. Self-finances its recurrent costs, with capital investment for expansions from government funds.
Metropolitan, Municipal and District Assemblies (MMDAs)	Plan, operate and maintain water and sanitation facilities under their jurisdiction.
Public Utility Regulatory Commission (PURC)	Regulates charges to be built into water tariffs

Source: Adapted from (WaterAid, 2013c)

2.4.6.2 Government (National) Level Resource Allocation

As with Nigeria, national resource allocation follows the institutional/decentralisation-linked approach with the Ministry of Finance and Economic Planning (MoFEP) being the responsible state institution. It is mandated to prepare, mobilise and allocate financial resources to all Ministries, Departments and Agencies (MDAs), Regional Coordinating Councils (RCC) and MMDAs although in reality it only reviews and approves allocations for

MDAs and RCCs (King, et al., 2003). Budget guidelines with ceilings are issued to MDAs and RCCs annually to guide in the development of their annual budgets. As a result of adopting the 3-year Medium-Term Expenditure Framework (MTEF), programmatic resource allocation/budgeting (within the national budget system) is being piloted in some MDAs (MoFEP, 2011). Allocations to MMDAs are however based on a weighting formula approved by parliament (see table 2.7).

Table 2-7: Criteria and Formula for Allocation of District Assemblies Common Fund (DACF)

Factor	Objective	Figure (%)
Need factor	This is to address the imbalance in development and infrastructure among the districts. The level of need is determined from the GDP per capita.	50
Equalizing Factor	This factor is aimed at ensuring that districts have a minimum allocation from the Fund.	35
Responsiveness Factor	This is a rewarding factor for assemblies that have done well in revenue collection in terms of per capita revenue collected	5
Service Pressure Factor	This factor serves to compensate for population pressure on facilities.	5
Poverty Factor	To provide more focus on the poor	5

Source: adapted from (King, et al., 2003)

A critical look at this weighting system reveals that 'poor' or largely rural districts would effectively benefit from only 40% (35%- equalising factor and 5% poverty factor).The need and service pressure factors would effectively go to the largely urbanised districts due to the infrastructure demand needed to support their large populations compared to the less developed rural districts. Furthermore, the urban districts who have better facilities and resources (including human resources), are more likely to meet their revenue targets than the rural districts hence would attract a larger portion of the funds associated with responsiveness.

2.4.6.3 Ghana WASH Sector Resource Allocation

In Ghana, most of sector funding is through the national government inter-ministry budget allocation (institutional approach). Funds released to the sector ministries (i.e. MLGRD and MWRWH) from MoFEP are shared between the various directorates in the ministry. No detail of the criteria or guidelines for the allocations between the directorates could be traced in literature. The less common programmatic approach has been used in some cases (for e.g. World Bank's Urban Environment Sanitation Project (UESPII)-Component 2 (2004-2012). The institutional resource allocation approach further deepens the existing weak cooperation between the main sector ministries and agencies. This makes achieving and monitoring of entire WASH sector targets difficult.

With offices in all ten regions, budgetary allocations from CWSA's national headquarters to the regional offices do not take into account the level of donor aid in the region (World Bank, 2008). Furthermore, all regional offices receive similar allocations (ibid). Despite

concerns raised about the fairness of this system, little has been done (ibid). Improving access in the very deprived areas or regions is difficult with such horizontal allocations (without any prioritisation).

All the WASH sector agencies (GWCL, CWSA and EHSD) however have clearly defined strategic investment plans with estimates of funding needed to meet their respective national targets. These have further been broken down into medium-term and long-term plans consistent with the government's 3-year MTEF. Unfortunately, there is little inter-sectoral (sanitation and rural/urban water) linkage between these plans.

2.4.6.4 Ghana WASH Sector Financial Flow

WASH Sector Financing

As with most of the other sub-Saharan countries, Ghana's WASH sector is mainly financed through direct transfers with a large proportion from donors-includes creditors (see figure 2.7 below). With CWSA for example, donor assistance increased by 382% and accounted for 90% of its budget over 2001 to 2006 (World Bank, 2008). The GWCL is the only sector agency that finances part of its operations (recurrent costs) through social tariffs which are even not designed to recover full cost (WaterAid, 2013c). Capital investment costs are borne by the government. The huge reliance on direct transfers especially from donors as mentioned earlier limits planning, since donor aids are often unpredictable.

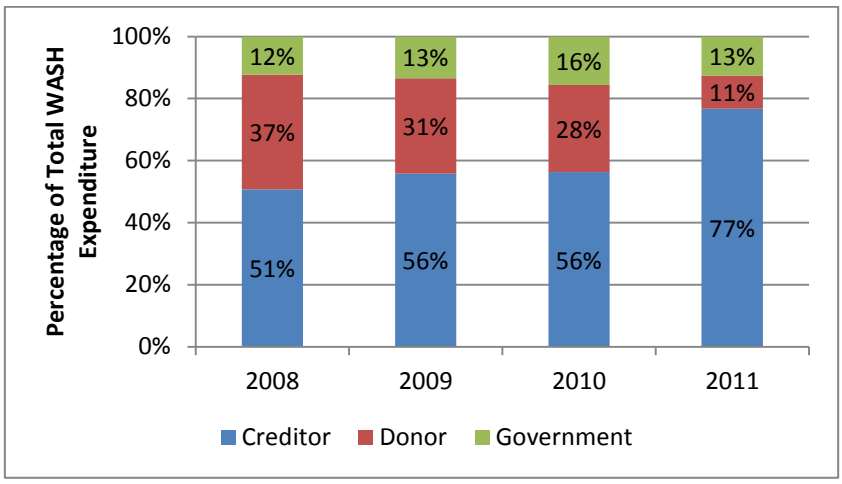

Figure 2-7: Ghana Creditor, Donor and Government WASH Expenditure as a Percentage of Total Sector Expenditure (actual)
Source: Adapted from (WaterAid, 2013c)

Budgetary Allocation to WASH

Government continues to pay lip service in terms of sector budget allocations. As seen in figure 2.8, budgetary allocation to even the MWRWH as a whole has never reached 5% of the national budget and has barely increased over the six year period compared to health and education. Government's own contribution to sector investment according to the WSP-

World Bank (2010d) has rather declined despite the nominal GDP growth seen in recent years (see table 2.8). A quick search of the existence of any specific guideline or criteria by the international donor community to regulate inter-sectoral spending in recipient countries revealed no such thing. Allocations are therefore left to the discretion of the national governments. Hence, sectors that can 'shout loudest' or have the ability to attract high 'political points' tend to receive more attention.

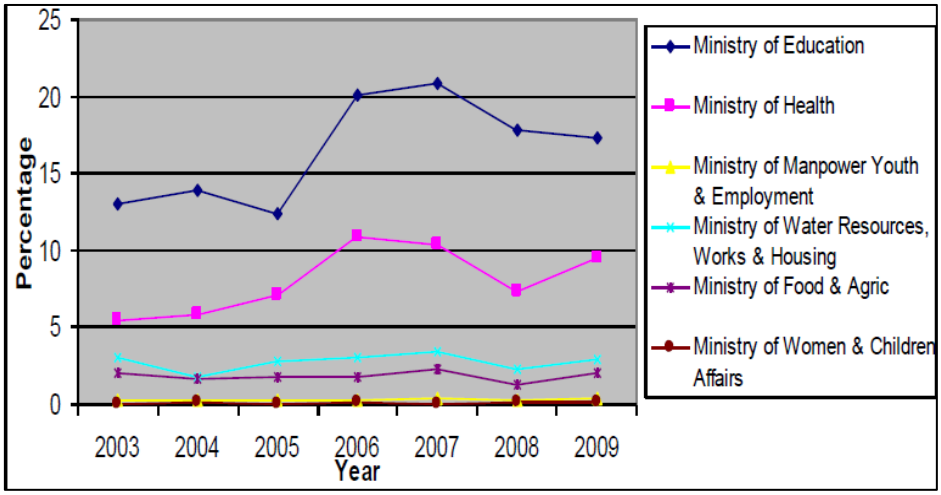

Figure 2-8: Government Allocations as a % of Total Budget 2003-2009
Source: (MoFEP, MLGRD & MWRWH, 2010)

Table 2-8: Budget Allocation to Water Sector, 2006-2010

	Water Sector Annual Budget Amount (US$)				
Description of fund type	**2006**	**2007**	**2008**	**2009**	**2010**
Grand Total	191,366	170,236	102,802	173,395	102,124
Annual (nominal) GDP	12,553,611	15,100,151	17,055,342	16,365,700	19,622,194
WSS allocation as % of GDP	1.52%	1.13%	0.60%	1.06%	0.52%

Source: (The World Bank, MINÉE, MINFI, as cited in (WSP-World Bank, 2010d))

Another worrying issue as with Nigeria is the wide gap between allocations and actual disbursements. The gap ranged from about 25% in 2006 to about 90% in 2009 (MWRWH, 2009). The gravity of the situation is revealed in the fact that, since 2007, Government of Ghana (GoG) has not been able to fully disburse its approved budget to GWCL (ibid). These notwithstanding, World Bank (2008), brought to notice the shortfall in the implementation capacity of the sector and hence the need to increase its absorptive capacity to efficiently match up with the magnitude of funding.

The funding reserved for sanitation projects under the District Assemblies Common Fund (DACF), is so small it can hardly meet the demand of the individual districts (World Bank, 2008). In 2004, while the DACF represented less than 5% of total national budget expenditure, less than 5% of it was spent on water and sanitation projects (ibid).

WASH Sector Expenditure Patterns

As with the global and sub-Saharan trends, capital investments take a larger chunk of the sector allocations in Ghana. Between 2008 and 2011 recurrent expenditure never exceeded 2.4% of total sector expenditure, while only about a third of the boreholes installed between 1994 and 2011 had been rehabilitated (WaterAid, n.d.). As earlier indicated, the global WASH sector drive to meet the MDG target may be in part, responsible for this trend which undermines the sustainability of these investments.

WaterAid (2013c) reports that, external funding (accounts for 87% of sector funding) have influenced the bias towards water and urban investments as compared to sanitation and rural investment respectively. As indicated in the report, donor expenditure in urban areas increased to almost nine-tenths of the total allocation over 2008-2011 (see figure 2.9). However, GoG's own expenditure has been balanced with respect to urban versus rural investment whereas sanitation has benefitted more since 2008 (WaterAid, 2013c). Despite the GoG's focus on sanitation in recent years is commendable, its allocation constitutes a very small portion (13%) of the total sector allocation and therefore still leaves sanitation under-funded (see figure 2.10) though being a signatory to the e-Thekwini declaration (0.5% of GDP should be allocated to sanitation).

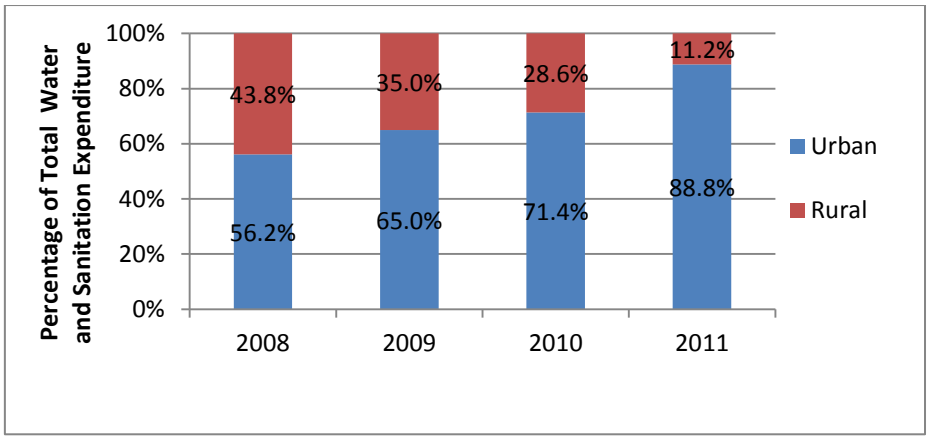

Figure 2-9: Proportion of Total actual Water and Sanitation Expenditure going to Urban and Rural areas.
Source: Adapted from (WaterAid, 2013c)

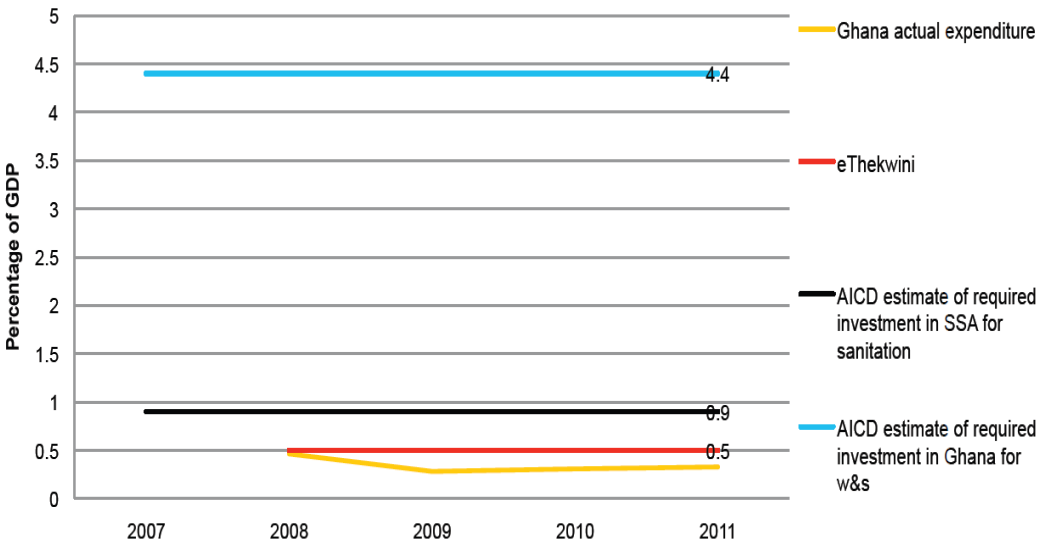

Figure 2-10: Ghana's Actual WASH Expenditure as Percentage of GDP

Source: (WaterAid, 2013c)

On the effectiveness of sector funding, the World Bank (2008) pointed out that, even though Ghana invested a total amount of approximately US$ 134 million as compared to Burkina Faso's US$ 92 million over a six year period (2001-2006), Ghana's water coverage reached 53% below Burkina Faso's 60% by 2006. From the researcher's view, although factors like population (see table 2.9) over the period are likely to affect coverage levels, investments over the period may not have been necessarily targeted to facilities only but human resource capacity development. Nonetheless, such comparisons highlight the issue of whether sector investments are actually reflecting into improved access to water and sanitation.

Table 2-9: Access to Improved Water Sources in Ghana and Burkina Faso (2001, 2003 & 2006)

Year	2001		2003		2006	
	National Pop. x1000	Pop. with Improved drinking water source	National Pop. x1000	Pop. with Improved drinking water source	National Pop. x1000	Pop. with Improved drinking water source
Burkina Faso	12,648	7,811	13,396	8,767	14,622	10,375
Ghana	19,632	14,277	20,611	15,646	22,171	17,844

Source: compiled from (WHO/UNICEF, 2013b)

2.4.6.5 Targeting the poor

Targeting of the poor and those in most need has been inadequate. For CWSA, prospective project regions are selected based on low water and sanitation coverage, and the affiliation of donors to certain geographical zones (World Bank, 2008). For instance, over 2001-2006 CWSA's investment has largely benefitted the Ashanti, Brong Ahafo, Northern and Greater Accra Regions who supposedly had the lowest coverage in 2001

(ibid). This was to the detriment of Upper East and Upper West Regions where coverage rather decreased (UER: - 11 % and UWR: -2.5 % from 2001 to 2006) (ibid). A good look at the beneficiary regions reveals that, they are highly populated and urbanised whereas the Upper East and West regions are the poorest in the country defeating CWSA's basis for targeting. This therefore suggests that, population alone cannot effectively target the poor. Furthermore, districts and regions with no donor affiliation would also be left disadvantaged.

With urban water supply, the PURC is leading the effort in targeting the poor instead of the GWCL. As indicated in its policy statement - *targeting investment for low income groups*, the PURC is mandated to ensure urban water utilities (GWCL) includes pro-poor criteria when undertaking investments in water supply projects (PURC, 2005). However the implementation of this mandate is far from reality. Further worsening the plight of the urban poor is the fact that they are located on the hard-to-reach fringes of the urban areas which are not defined as rural areas and as such out of CWSA's jurisdiction (Ainuson, 2010). They are therefore left at the mercy of private tanker operators who charge as much as four times the GWCL/PURC service charges (ibid). Surprisingly, the PURC recognises the role of these providers in its social policy but reluctant to regulate their operations and charges.

For sanitation, although the need to meet the requirements of specific target groups such as the poor and most vulnerable is mentioned in the National Environment Sanitation Strategy and Action Plan (NESSAP) (MLGRD-EHSD, 2010), it does not provide any detailed guidance on how to achieve this.

2.4.6.6 Variations in Data on WASH Facilities

An efficient harmonised data collection system forms the basis for effective monitoring and evaluation. Ghana's WASH sector is however lacking in this regard. The WSP-World Bank (2010d) points out that, in addition to the different data collection methods, differences exist in the definitions of terms used by the sector institutions and global monitoring bodies such as the JMP. For example, acceptable water supply from the GWCL's perspective includes a quantity indicator of between 80-140 litres/capita/day whereas it not considered in JMP's definition of access to adequate/improved water source at all (ibid).

The MWRWH (2009) cites the difference in the definitions of rural and urban areas as another example. It indicates that, whereas the Ghana Statistical Service (GSS) and hence household user surveys, classify urban areas as communities with population above 5000, some of these communities have been classified as rural by CWSA simply because they fall under CWSA's jurisdiction. It is therefore difficult to compare data from the two sources (national service providers and GSS/JMP) based on rural/urban categories.

Such distortions may account for disparities in Ghana's improved water coverage estimates seen in figure 2 11 below

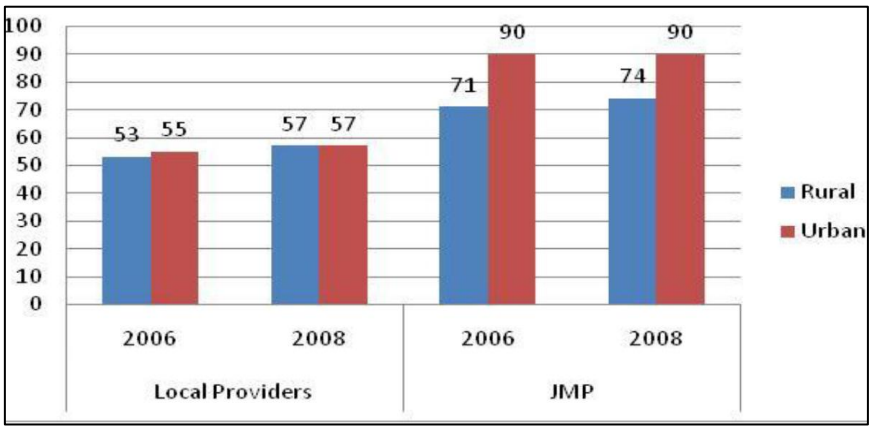

Figure 2-11: Disparities in Improved Water Coverage Estimates between National Service Providers and JMP in 2006 and 2008
Source: (WSMP, Ghana as cited by Addai, et al., 2011)

For sanitation, such comparisons are limited since the GSS data is based on access facility types as compared to JMP improved/unimproved categorisation. Although some baseline data on sanitation facilities was collected during the preparation of the NESSAP, the data is yet to receive the backing of sector stakeholders.

2.5 Mainstreaming Equity in Sector Resource Allocation

In addition to maintaining a balance between the discussed aspects of sector resource allocation (water and sanitation split, capital and recurrent expenditure, etc.), ensuring equal access and non-discrimination are imperative.

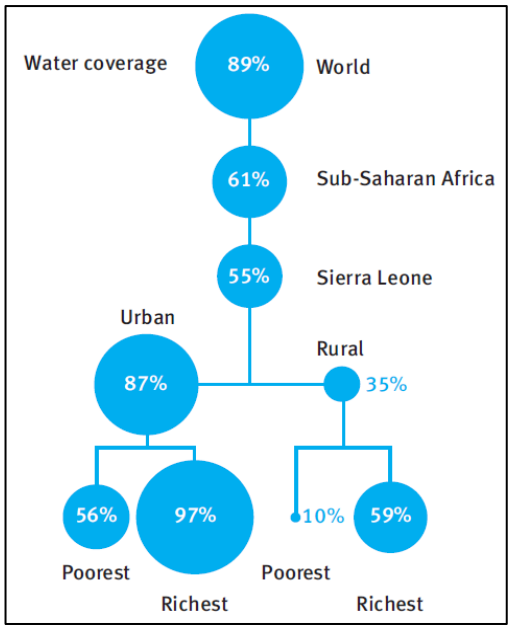

Figure 2-12: Regional and Country averages mask Huge Disparities
Source: (JMP 2012 and Sierra Leone DHS 2008, as cited by WaterAid, 2013d)

2.5.1 Unmasking Important Equity Disparities

In recent years, WHO/UNICEF-JMP through its annual sector report has consistently drawn the attention of sector stakeholders to the issue of inequities in access to improved WASH facilities. The aspects of these equity disparities often highlighted include, geographic/regional, gender, rural-urban, wealth/income, caste and more recently disability. Although a number of countries do make reference to the disabled in their sector policies, consideration as part of projects seems to be the responsibility of NGOs (WHO,

2010). Figure 2.12 above shows an example of how these disparities have been unmasked through data disaggregation. Table 2.10 also presents of some equity disparities from selected reports.

Table 2-10: Examples of Inequities across Regions and Countries

Inequity Category	Country/Region	Disparity
Income/wealth (poverty)	South Asia	Poor people are 13 times less likely to have access to sanitation than the rich (WaterAid, 2011)
	Sub-Saharan Africa	Poor people over 15 times more likely to practise open defecation (WaterAid, 2011)
Geographic	Bangladesh	35% of the 31 million people in urban areas live in slums where there is no legal framework to ensure access to water and sanitation services. People without official address or the legal right to own property have no right to a water connection, so only 5-10% of slum-dwellers in Dhaka have access to a legal water supply (WaterAid, 2013d)
Rural/Urban	Global	Five times more people in rural areas live without clean water than in urban areas (WaterAid, 2011)
Gender	Sub-Saharan Africa	25 countries indicated that around 71% of the water collected is done by women and girls. In these countries alone, it is estimated that women spend a combined total of at least 16 million hours every day collecting water (WaterAid, 2013d)
Caste	Andhra Pradesh	Low-caste women are allowed to collect water from wells in high-caste villages, but are not allowed to draw water by themselves—people from higher caste do the drawing resulting into long waiting times (UNDP, 2006)

WaterAid (2011) identifies the following as potential causes of such disparities:

- political prioritisation - leads governments to favour other sectors, improve places already served, or exclude poor and marginalised groups and
- poor aid coordination- aids are loosely targeted according to need constraining its effectiveness.

Ginneken, et al., (2011) also recognise natural constraints such as scarcity of water resources and scattered settlements as possible causes of inequities

In an effort to address such inequities, the UN Human Rights Council in 2010, recognised access to safe drinking water and sanitation as a human right (see box 2.3). However, its impact on the poor especially, is yet be fully realised. According to WHO (2012), it is imperative for countries that have recognised this right to respect, protect and fulfil them. Whereas respecting and protecting these rights are relatively easier to achieve, fulfilling them is difficult.

> The UN Human Rights Council "recognizes the right to safe and clean drinking water and sanitation as a human right that is essential for the full enjoyment of life and all human right"
>
> (UN, 2010, p. 2)

Box 2-3: UN's Recognition of Water and Sanitation as a Human Right

Another limitation of the right approach is that, it fails to bring hygiene to the fore although it may be assumed to be part of sanitation. Recognising it noticeably as a right would have further given it some audience in the sector.

To address the above issues, Beyond2015 (2013) as part of recommendations for post 2015 sector monitoring suggested the following:

- Governments showing more commitment to identifying groups that face discrimination or particular barriers in realising their rights,
- Government ensuring that development efforts are designed and implemented in a way that focuses on removing barriers and closing existing gaps, and
- Developing stronger and more inclusive monitoring systems that ensure the availability of credible disaggregated information at the global, regional, national and local levels. Monitoring systems must include data on people living in informal settlements, who are often disregarded.

2.5.2 Using Data Analysis as a Tool for Equitable Resource Allocation

Sub-Saharan countries including Angola and Ethiopia have adopted the use of WASH data analysis to identify those in the most need for allocating resources (WHO, 2012). The report indicates that, this targeting approach has resulted in significant progress in meeting the needs of the poor and most vulnerable groups in these countries. The Angolan Information System for the Water and Sanitation Sector (SISAS) was initiated in 2005 with the aim of:

- determining the current state of water and sanitation services by highlighting the challenges associated with meeting the need for improved access to water and sanitation,
- facilitating planning, policy/strategy development and monitor sector progress and investments, and
- providing a common database for reliable, up-to-date and timely WASH data (sisas-angola, n.d.).

Although detailed information on how the database is applied in targeting resources could not be traced, the information gathered from the surveys conducted so far (see table 2.11) indicate it has quite detailed information which could make the adoption of the needs-based approach used in the health sector applicable. If efficiently managed, it allays the issue of lack of reliable and timely data which according to Zere et al (2007) is one of the main challenges that confront the use of the needs-based approach in the health sector. The surveys on schools and hospitals are particularly helpful since the conventional household surveys (e.g. DHS) rarely capture WASH data on these institutions. Capturing data at the communal and locality levels further enhances targeting of resources to the deprived (poor) in these areas since they can clearly be mapped out.

Table 2-11: Surveys undertaken in Angolan Information System for the Water and Sanitation Sector (SISAS)

Survey Type	Details of Survey
Water system survey	Carried out in over 500 communities in 161 municipalities, with a total of over 17000 separate records generated. Data set covers all municipalities, communities and localities in the country. However, 75% of these records show no existing water systems
Sanitation survey	Carried out in just under 300 communities in over 100 municipalities, with a total of over 800 records generated
Family / household survey	Covered over 9100 households in 18 provinces
Schools survey	3200 schools in 18 provinces
Health units survey	Captured data in over 1400 health units in 18 provinces of a total of just over 2000.

Source: (sisas-angola, n.d.)

East Timor's rural WASH sector uses the Sector Planning and Reporting Tool (SPT) and the Rural Water Information System (SIB) for monitoring (ISF-UTS, 2011). The tool is designed to collect information on planned, in progress and completed activities against high level numeric indicators (ibid). Information collected include access to water and sanitation, number of households with handwashing facilities, number of school facilities, number of women involved in management and access for disabled people (ibid). The Water Information System covers about 96% of rural communities providing information on coverage, gaps and functionality with the aim to improve resource allocation decision in Timor-Leste (ibid). The system however misses out on the wealth/income (poverty) related equity aspect.

Also in Malawi, WaterAid's water point mapping (WPM) as a tool, maps the (in)equity of water point distribution by geographic area using quantitative data thereby decreasing reliance on subjective and qualitative assessments (McGarry, et al., 2008); which are often politically biased. Details of how the tool is used is indicated in Box 2.4

> "Using a database of improved water points generated through a GPS-based survey of several districts, population data from a recent census WPM provides water point densities (WPD); "water density profiles" are then calculated and graphed to compare the equity of services for planning and budgeting purposes".
> (McGarry, et al., 2008, p. 72)

Box 2-4: Application of Water Point Mapping Tool in Malawi

Whilst the review has identified some examples of how inequities in access to WASH facilities have been unmasked through data disaggregation, there is little or no information with regards to the extent to which existing WASH data collected from household surveys such as DHS may be disaggregated (*gap 1-related to research objective 2*). Furthermore, the use of WASH data for equitable allocation/targeting of resources as seen in the

examples above have mainly relied on new data sources. Information on how existing WASH data from household surveys may be used in targeting of resources is limited (*gap 2-related to research objective 2*). No literature assessing the relationship between sector investment/expenditure and progress in access to WASH in Ghana was also found (*gap 3-related to objective 3*). Little information on the inequities (geographic, wealth/poverty and gender) in access to WASH facilities for Ghana could be traced (*gap 4*).

The next chapter (methodology) shows how DHS WASH data (1998, 1993 and 2008) was analysed to help address objective 2 of the research as well as the identified gaps in literature (1, 2 and 4). The approach used in assessing the relationship between sector expenditure and progress in access to WASH facilities is also shown (objective 3-*gap 3*).

3. METHODOLOGY

3.1 Introduction

This section describes the methods used in data collection and analysis. Figure 3.1 presents a flow chart of the approach used in the study.

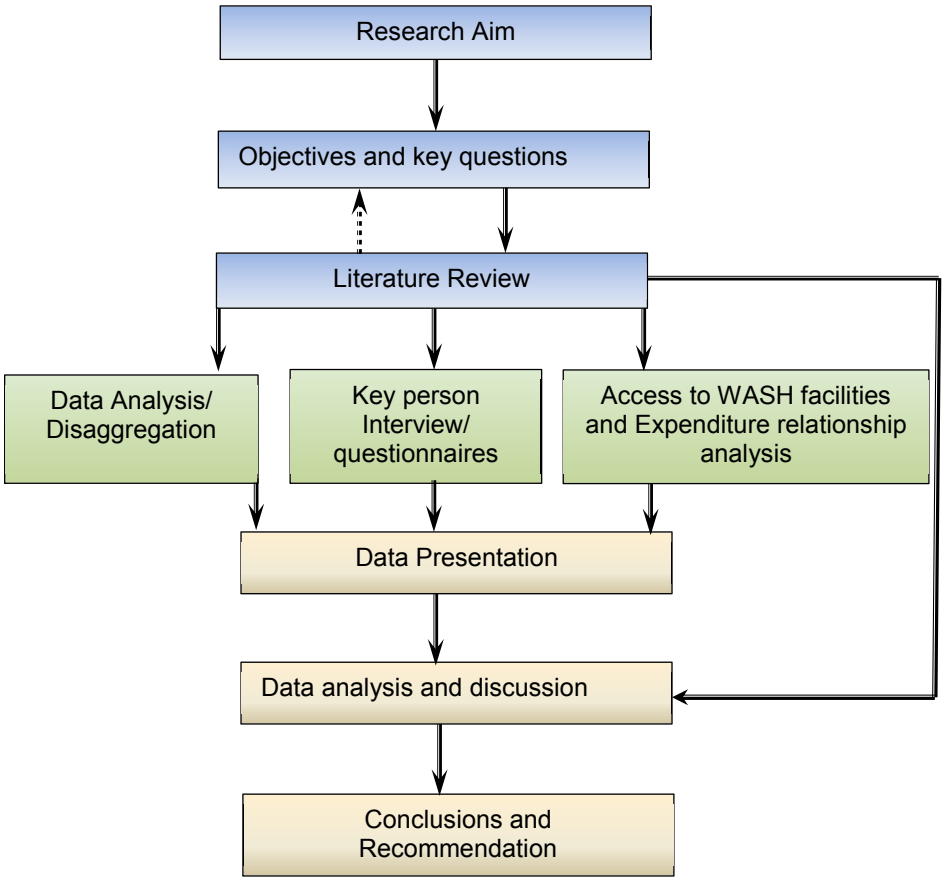

Figure 3-1: Structure of Research Study

3.2 Data Collection

Primary and secondary data sources were relied on for the study. The primary data was collected through questionnaires and key person interviews whiles the secondary data included literature, DHS household data sets and WASH sector Official Development Assistance (ODA) aid disbursement figures

3.2.1 Literature Review

As pointed out by Naoum (2007), literature review helps to bridge gaps between related research topic areas and identify the central issues in a field. Due to the different aspects of the study (equity, resource allocation and data analysis), the literature review was fairly extensive in order to as much as possible, cover and bring together the central issues related to the thematic aspects. Details of the approach used in collecting and analysing relevant literature have been indicated in Annex 1. The review in addressing *objective 1* of

the research study, helped to identify other issues which were initially not considered (e.g. reviewing resource allocation in the health sector). Through the literature review, a good understanding of the approach used by WHO/UNICEF-JMP, in analysing (disaggregating) WASH data was achieved. Data for assessing the relationship between sector investment and progress in WASH facilities coverage as well as the most appropriate method for analysis were obtained from the literature review.

3.2.2 Acquisition of Ghana's Demographic Health and Survey (DHS) Data

The DHS is a nationally-representative survey held at the household level and provides data for a wide range of monitoring and impact evaluation indicators in the areas of population, health nutrition and WASH (MEASURE DHS/ICF, 2013a). It forms part of the data sets used by the WHO/UNICEF-JMP in estimating access to WASH facilities globally. This justified its use for the study. To have access to entire data sets, from which the WASH related data was extracted, a request indicating the intended purpose for use was sent to Measure DHS-USAID (data right owner). Data sets used in the study spanned 10 years (1998, 2003 and 2008). Data were obtained in SPSS format.

3.2.3 Data on ODA Aid Disbursement to WASH (2002-2011)

Figures for the total aid disbursement to Ghana's WASH sector from 2002-2011 at *constant prices*[3], were obtained from OECD online database[4]. The disbursement figures were used because of the paucity of data on Ghana's WASH sector expenditure as well as the sector's high reliance on donor aids. The data were used in assessing the relationship between sector expenditure and WASH facilities coverage. The other source of financial data (i.e. % GDP spent on water and sanitation- 2008-2011) used in the assessment was found in WaterAid's publication on *Financing of the water, sanitation and hygiene sector in Ghana* (WaterAid, 2013c) with the original source cited as Appropriations Acts 2008,2009,2010,2011, Controller & Accountant's General Department (CAGD) and CWSA.

3.2.4 Questionnaires and Key Person Interview

Although key person interviews (via Skype/phone) was deemed to be the most suitable since it offers an opportunity for further detailed information, some respondents (MLGRD-EHSD, GWCL) were not receptive to this option. This resulted in development of questionnaires. Nonetheless, questionnaires according to Denscombe (2007, pp. 154-155), are adaptable across a wide spectrum of research situations and are effective when the information being sought is relatively straightforward and uncontroversial. He further indicates that, they can be used when the information sought are related to either 'facts' or 'opinions'. In the case of this study, the 'facts' were related to method of resource allocation

[3] factors changes over time in the values of flows or stocks of goods and services into two components reflecting changes in the prices of the goods and services concerned and changes in their volumes (OECD, 2013)

[4] http://stats.oecd.org/Index.aspx?DataSetCode=CRS1#

in the responsible state institutions while questions related to the effectiveness of the resource allocation mechanisms were mainly expressed opinions. The questionnaires have been attached as Annex 2.

A key person interview was used in the case of MWRWH-WD. A list of the questions to be asked was sent to the respondent prior to the interview to offer some background information. The interview was semi-structured to allow for additional questions as well as exclusion of less relevant ones.

The questionnaires and key person interview were used as means of further probing into the resource allocation and targeting approaches in Ghana's WASH sector. No response was obtained from CWSA. The questionnaires were sent out as email attachments.

3.3 Data Analysis

3.3.1 DHS WASH Data Disaggregation

The data disaggregation for both water sources and sanitation facilities was done based on the following aspects:

- geographic location (national, regions, rural and urban areas)
- wealth/Income groups'

The burden of collecting water was analysed based on gender. The analysis (disaggregation) was done at the national and rural-urban levels; and among the wealth/income groups.

3.3.1.1 Definition of Key Terms

Owing to the differences in meanings of some of the WASH related terms as mentioned in the literature review, it is helpful to define the following terms as used in this research.

- *Access/coverage*- as used by the JMP, access/coverage refers to availability of a drinking water source or sanitation facility 'within reach' of the household/user.
- *Wealth Index (Quintiles)* - this is an indicator for the income/wealth status of a household. It has five increasing ranks - poorest (lowest), poorer (second), middle, richer (fourth) and richest (highest). It is calculated based on data on a household's ownership of selected assets (e.g. televisions and bicycles; materials used for housing construction; and types of water access and sanitation facilities) and a useful tool for identification of problems specific to the poor (MEASURE DHS/ICF, 2013b).
- *Rural/Urban areas*- as used by the GSS, rural areas/communities refers to areas with population less than five thousand (5000) while urban areas have populations above 5000. Figure 3.2 shows the percentage of the population in rural and urban areas across the various regions and the nation (all regions).

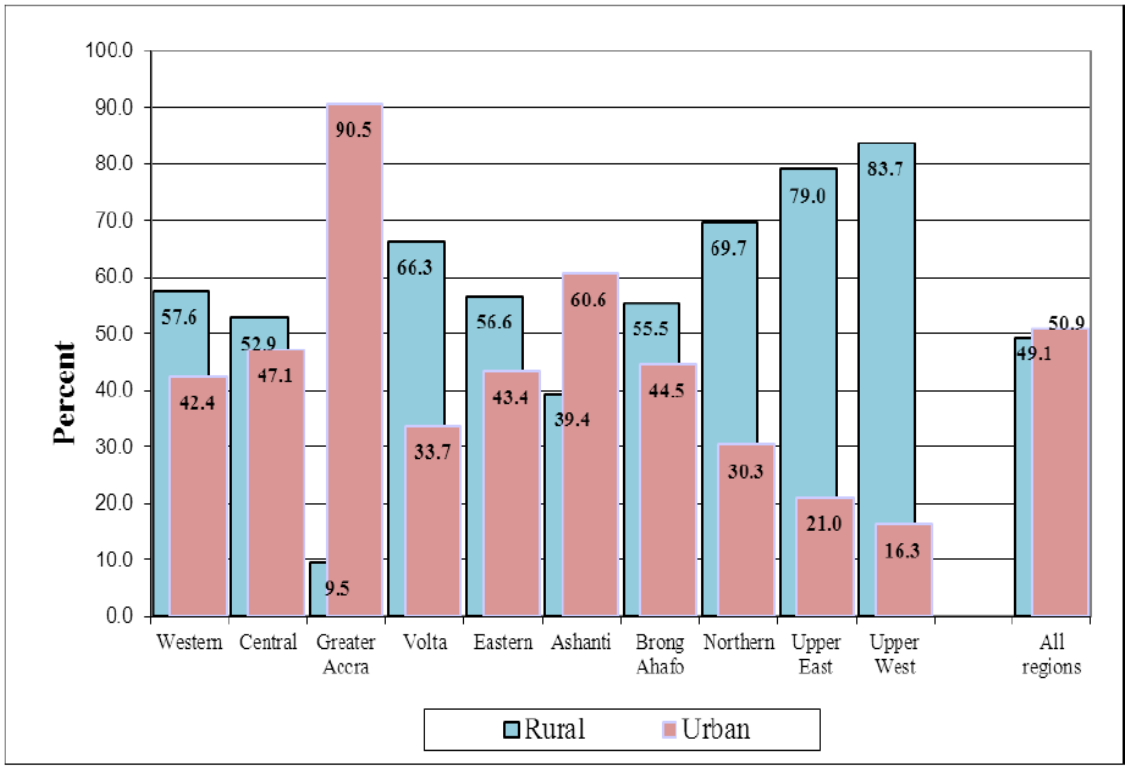

Figure 3-2: Population by type of Locality (Rural and Urban)
Source: (GSS, 2012)

- *Regions*- these refer to the next level of governance from the central government. Ghana has ten (10) administrative regions with Greater Accra home to the administrative capital, Accra. Ashanti is the most populous while the three (3) northern regions (Northern region, Upper East and Upper West) have the highest poverty levels.
- *Gender:* categories considered were men, women (all above 17 years), female and male children (below 17 years). For gender, data analysis was only done for 2008. Data set for 1998 had entirely different categories while no information on the person (bearing the burden of) fetching water could be traced in the 2003 data set.

3.3.1.2 Regrouping and Recoding of Water and Sanitation Facilities

There was a need to regroup the facility types since the categories used in the DHS data set for a particular year differed from the other (refer to Annex 3). Concerns raised by sector stakeholders about the justification of the WHO/UNICEF-JMP's grouping (improved or unimproved) influenced the decision to group facilities based on the main water sources and sanitation facility/technology types (see table 3.1). For example, the WHO/UNICEF-JMP categorizes shared sanitation (facility shared by more than one household) as unimproved due to the health and hygiene related risks that come with sharing. In disagreement, Wolf et al (2013) after undertaking a study on the exploration of multilevel modelling for estimating access to drinking-water and sanitation as part of their conclusion said that, there is lack of evidence to substantiate the ambiguity around the health impacts

of shared sanitation. They further indicate the need for more information on the proportion of shared sanitation and the condition of the facilities.

Table 3-1: Categorisation of WASH Facilities Used in Data Analysis

Water	Sanitation
• ***Piped water;*** All piped water • ***Ground water:*** Protected/Unprotected dug well, springs, boreholes, tube wells • ***Surface water*** River, dam, lake, pond, stream • ***Rainwater:*** • ***Other:*** Tanker, cart with small drum etc.	• ***Flush toilet***: Of all types • ***VIP*** • ***Pit latrines***: with or without slabs • ***Bucket/Pan latrines*** • ***No facilities/Bush*** ***Other-*** Composting toilets etc

In further justification of this study's grouping approach, for sanitation for example, the classification used is consistent with the conventional WASH sector 'sanitation ladder' as well as that of the GSS' national population and housing census.

The re-grouping of facility types resulted in the recoding of the water and sanitation variables for each data set. Result tables were generated in SPSS and exported to excel for further organisation and representation in charts for easy visualising. Owing to the volume of the result tables generated from the SPSS and the page restriction for such dissertations, the tables have been archived.

3.3.1.3 Use of Regression line

According to Moore & McCabe (2003 p.135), regression lines can be used to identify the relationship between two variables in the context where one variable helps to predict the other. The linear equation (developed from the regression- see figure 3.3) relating the two variables – year and water/sanitation facilities coverage, was used to estimate coverage levels of the facilities from 2002-2012. A similar approach is used by the WHO/UNICEF-JMP in estimating national coverage levels between and beyond national surveys. The estimates were used in the analysis of the extent to which existing WASH data could identify relationships between sector investments/expenditure and WASH facilities coverage (*objective 3 of research*) using the Spearman's rank correlation coefficient test.

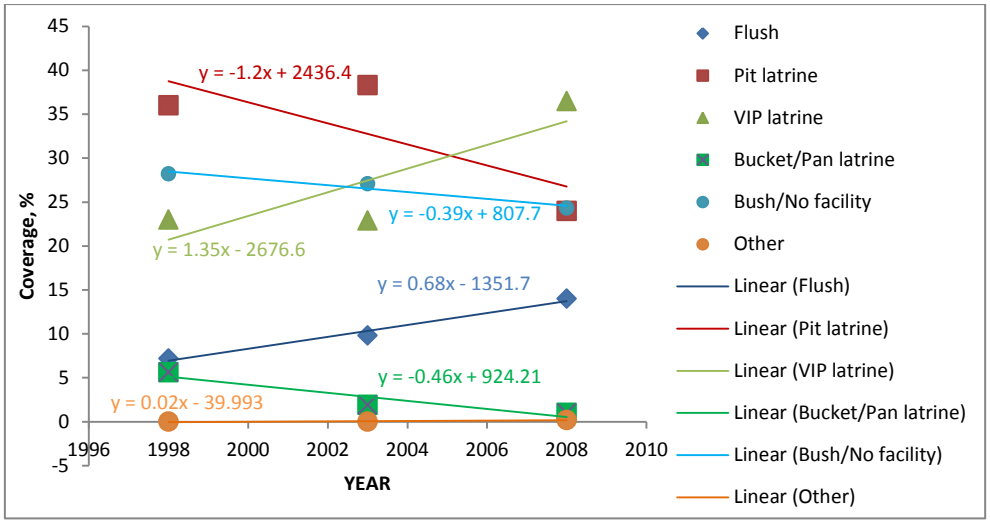

Figure 3-3: Linear Regression for Estimating National Sanitation Facilities Coverage

3.3.2 Assessing the Relationship between Sector Investment/Expenditure and WASH Facilities Coverage

3.3.2.1 Spearman's Rank Correlation Coefficient (r_s)

In addressing *objective 3*, the Spearman's rank correlation coefficient *(r_s)* test was used to measure the strength of the relationship between:

i. per capita aid disbursement[5] to WASH sector and WASH facilities coverage (in population) (for national level analysis) and

ii. % of GDP spent on water and sanitation and WASH facilities coverage (in %) (for urban and rural level analysis)

The choice of the Spearman's rank correlation test as against other widely used methods like the Pearson's Product Moment Correlation Coefficient includes:

- can be used for any data that can be ranked from the smallest to largest;
- measures whether data are in the same order – e.g. does highest investment coincide with highest WASH facilities coverage - rather than using actual values;
- not valid if there are a lot of ties (e.g. several pairs of having the same amount of investment and coverage level); and
- easy to calculate for small data sets, but unwieldy for large data sets (Brown, n.d.)

Unlike the Pearson's correlation coefficient, the Spearman's rank correlation is non-parametric (makes fewer assumptions about variables) and therefore applicable in a wide variety of contexts (Bryman & Cramer, 2001). On the other hand, the Pearson's correlation coefficient assumes that, the data has equal intervals between points on a scale, has a linear relationship, and is normally distributed (Field, 2009, p. 177). Since the purpose of this study, was to test the monotonic relationship between the paired variables (tendency of

[5] Calculated by dividing the yearly total aid disbursement to Ghana's WASH sector by the corresponding year's population. Yearly population estimates used were obtained from JMP's Ghana country file available at http://www.wssinfo.org/documents-links/documents/?tx_displaycontroller[type]=country_files

the coverage estimates to either increase or decrease as per capita aid disbursement/% GDP expenditure increased), the assumptions associated with the Pearson's correlation test (linear relationship and normal distribution) provided some limitations and hence was not used.

In pairing variables it was assumed that per capita aid disbursement/% of GDP spent on WASH in a particular year was reflected in the WASH facility coverage of the following year. For example, an expenditure figure for 2002 was paired with piped water coverage in 2003. Table 3.2 presents a list of the facilities for which this assessment was carried.

Table 3-2: List of Facilities Considered in the Correlation Analysis

Water Source	Sanitation Facility
Surface water Ground Water Piped water	Open defecation (OD) Pit Latrine VIP latrine Flush latrine

In calculating r_s for per capita donor aid disbursements and the prevalence of open defecation (OD) (population equivalent[6]) for example, the variables were ranked and the difference in the ranks between the paired variables d (i.e. $d=d_1-d_2$) calculated (see in table 3.3 below). d^2 for each pair was then calculated (e.g. 5*5 = 25) and subsequently $\sum d^2$ (sum of all d^2). With n representing the number of paired variables ($n=10$), the Spearman's correlation coefficient (CORREL r_s) was then calculated using the formula:

$$r_s = 1 - \frac{6(\sum d^2)}{n(n^2-1)}$$

Table 3-3: Ranking of Paired variables in the Spearman's Correlation Coefficient Test

No. of Paired Variable (n)	Per capita ODA Disbursement -d_1	Rank- d_1	Population Equivalent practising OD- d_2	Rank-d_2	d (d_1-d_2)	d^2
1	3.11	6	5,468,071	1	5	25
2	2.77	8	5,520,745	2	6	36
3	3.03	7	5,572,250	3	4	16
4	3.42	5	5,622,453	4	1	1
5	3.67	4	5,671,287	5	-1	1
6	5.49	1	5,718,334	6	-5	25
7	5.36	2	5,763,123	7	-5	25
8	2.53	9	5,805,254	8	1	1
9	3.92	3	5,844,498	9	-6	36
10	1.94	10	5,880,675	10	0	0
					$\sum d^2$	**166**
				CORREL (r_s)		**0.0061**
				Critical Value (n=10, 0.05 significance level, 2 tailed test)		**0.648**

[6] Population equivalent was used instead of % coverage figures to reflect population growth over the period.

The r_s values usually range from -1 to +1 with a correlation coefficient of -1 indicating a perfect negative relationship while +1 indicated a perfect positive relationship (see figure 3.4 and box 3.1 below). The positive (+) and negative (-) signs indicated the direction of correlation. The positive sign for example, meant that, an increase in a pair of the variables resulted in an increase in the corresponding pair whereas a negative sign implied a decrease in the corresponding pair.

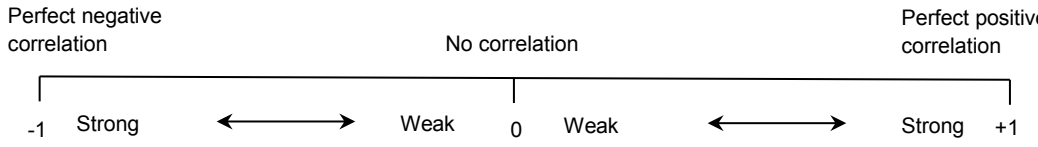

Figure 3-4: Strength and direction of correlation coefficients

Source: (Bryman & Cramer, 2001)

Therefore in table 3.3 above, a very weak positive correlation (0.0061) is observed between per capita aid disbursement and OD prevalence.

0.00-0.19 "very weak"
0.20-0.39 "weak"
0.40-0.59 "moderate"
0.60-0.79 "strong"
0.80-1.0 "very strong"

Box 3-1: Interpretation of the Correlation Coefficient values (r_s)

Since the OECD aid disbursement figures for water and sanitation are lumped as one (total WASH sector aid disbursement) the same per capita aid disbursement figures were used for both water and sanitation facilities coverage. A similar approach was used at the rural level analysis since % of GDP expenditure was lumped for both water and sanitation.

3.3.2.2 Correlation Significance Testing

A further test (significance of the correlation) was needed to make the results of the Spearman's rank correlation coefficient test statistically valid. To do this and using the example above (refer to table 3.3- i.e. per capita aid disbursement and OD prevalence) the hypotheses below were first given:

***H_0**: there is **no** correlation between the per capita aid disbursement and OD prevalence (null hypothesis)*

***H_1**: there is **some** correlation between the per capita aid disbursement and OD prevalence* (*alternative hypothesis)*

In testing for the statistical significance of the r_s, the *critical value* based on the number of paired variables (*n*) and significance level of 0.05[7] under 2-tailed test (due to the nature the *H_1-non-directional*), was checked on the Spearman's rank significance table (see Annex 4).

[7] Means there is 95% (0.95) probability of the results (correlation) obtained from the significance testing not to have occurred by chance

In cases where the absolute value (ignoring -/+signs) of $|r_s|$ is smaller than the critical value, the *null hypothesis (H_0)* is accepted (Brown, n.d.). The r_s value (0.0061) obtained in the table 3.3 above is less than the critical value (0.648) and hence the null hypothesis was accepted and concluded that there is no statistically significant correlation between per capita aid disbursement and OD prevalence over the period. The correlation was considered significant if $|r_s|$ was greater than or equal to the critical value (i.e. H_1 accepted and H_0 rejected). A similar procedure was followed in testing the significance of correlations observed between per capita aid disbursements and the coverage estimates of the WASH facilities considered.

In testing the correlation significance between % of GDP expenditure and WASH coverage estimates, a significance level of 0.1 was used since no critical value could be obtained using the limited number of paired variables (n=4) at a significance level of 0.05 (refer to Spearman's correlation table in Annex 4).

3.4 Result Presentation

The results from the analysis have been presented in three parts in the next chapter. The first is a chart representation of the data disaggregation and the second, results of the Spearman's rank correlation coefficient test. A summary of the responses from the questionnaires formed the last part of the results presentation.

3.5 Reliability of Data and Results

A major challenge associated with the use of secondary data (in this case aid disbursement figures, DHS data and % of GDP expenditure on WASH figures) is the inability to confirm data accuracy. However, with the sources (OECD, MEASURE DHS/ICF and MoFEP/CAGD-Ghana) being internationally and nationally credible, a degree of accuracy is expected but cannot be guaranteed. The total ODA disbursement figures, used in the correlation analysis may have some percentage disbursed to water resources and solid waste management. Since the percentage of these investments usually forms a relatively smaller proportion of the total aid allocation to the sector, it may not significantly affect the results especially in using the Spearman's correlation which does not rely on the actual figures but the ranks.

Aside the limitation of further probing that comes with the use of questionnaires; Denscombe (2007, p.171) identifies the limited capability of checking the truthfulness of answers given by the respondent. Responses from the questionnaires where possible, were crosschecked with findings from literature review as a means of triangulating both sources of information. Also as a means of data validation, in a particular instance, an email was sent to a respondent for further clarification on response to a question.

Guidance from the Mathematics Education Centre-Loughborough University and UNICEF's Senior Statistics and Monitoring Specialist in the DHS data analysis provided some quality assurance to the process. For example, with regards to the application of weights as used in some analysis, enquiry from the Mathematics Education Centre indicated it is less relevant in such analysis. Guidance on data disaggregation while maintaining its statistical significance was provided by UNICEF's Senior Statistics Specialist.

3.6 Limitations of Chosen Methods for Data Analysis

A potential limitation to study is the use of survey data sets from 1998-2008. The most recent survey data (i.e. 2010 National Population and Housing Census) is yet to be fully compiled by the country's statistical service making the DHS 2008 data set the most recent.

A major limitation of correlation testing methods such as the Spearman's correlation test is that, they do not show causality. This implies that, trends in aid disbursement/expenditure may not fully account for WASH facilities coverage but may be related. This limitation was taken into consideration in discussing results.

3.7 Chapter Summary

This chapter has highlighted four sources of data used in this research. These include literature, Ghana DHS data, aid disbursement estimates from the OECD and questionnaire responses from national WASH sector institutions. Data on WASH facilities were analysed by disaggregating data by regions, wealth quintiles, rural/urban stratifications and gender. The Spearman's rank correlation coefficient test was used in testing the relationship between sector investment/expenditure and progress in access to WASH facilities. Results were then tested for their statistical significance. Linear regressions were used in estimating access to WASH facilities from 2003-2012.

Guidance from UNICEF's Statistics Specialist and the Maths Education Centre-Loughborough University provided some credibility to the approach used in the data disaggregation. Imports from the key person interview and responses from the questionnaire provided further information on sector resource allocation in Ghana. Although the researcher was limited with regards to the limitation associated with using correlation tests such as the Spearman's (i.e. they do not indicate causality), this limitation was considered in interpreting the findings

4. Presentation of Results

4.1 Introduction

This section presents the results of the WASH data analysis (disaggregation), sector investment (expenditure)/ WASH facilities coverage correlation assessment and a summary of responses from WASH sector institutions.

4.2 WASH Data Analysis

Owing to the nature of the data sets, three levels of data disaggregation was possible (see figure 4.1). A detail of the extent to which existing household WASH data may be disaggregated is discussed in the next chapter. As shown in figure 4.1 below, the first level of data disaggregation involved the analysis of access to WASH facilities at the national level. Level 2 then followed with the estimation of coverage by regions, urban/rural distinction and wealth/income. The final level was a further disaggregation of the urban/rural estimates by wealth/income index. The burden of collecting water was also analysed (by gender) at the national, rural-urban levels and by wealth index.

Notice should be taken of the fact that, the charts presented do not necessarily reflect the trend in growth between the two years (1998-2008), but only gives an indication of the coverage estimates in 1998 and 2008. The sum of the coverage estimates in few cases, are +/- 0.1% (i.e. 99.9%/100.1%). This originates from the primary data source (DHS data). For others (e.g. regional), due to scale of the graphs the figures had to be rounded up to the nearest whole number and therefore resulted in the sum being +/- 1%. These differences however do not have any significant effect on the coverage estimates and patterns observed in the charts.

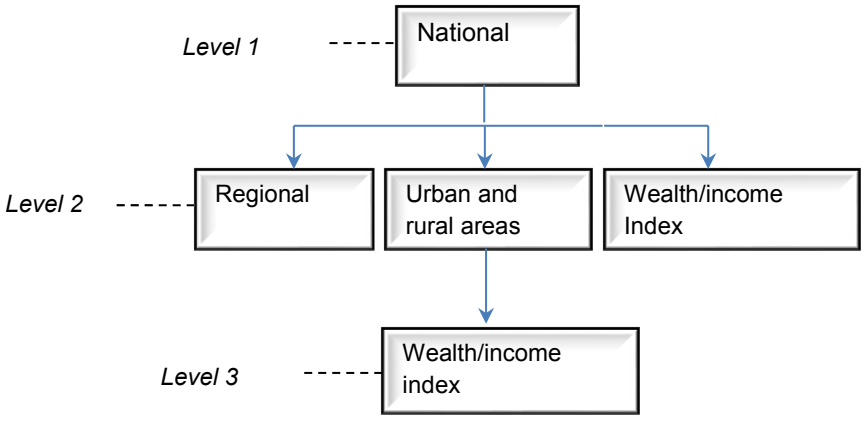

Figure 4-1: Levels of WASH Facilities Data Disaggregation

4.2.1 Geographic Disaggregation

4.2.1.1 National WASH Facilities Coverage

For sanitation, as shown in figure 4.2 below, while households that have access to flush latrines doubled (7.2% -14%) over the ten year period (1998-2008), there was only about 4% decrease (from 28.2% -24.3%) in those who had no toilet facility or practised open defecation (OD) raising the issue of whether resources were targeted to the critical areas. VIP and Pit latrine coverage appeared to have had a reciprocating effect on each other. Whereas there was an approximately 12% decrease in pit latrine coverage, VIP coverage increased by a similar margin.

For water (see figure 4.2), the households having access to ground water sources (wells, boreholes, springs, etc.) remained fairly unchanged over the period. Households that relied on piped water sources (made up nearly half of all water sources in 2008) increased by about 12%. There was a decrease of a similar margin with the coverage of surface water (rivers, streams, dams etc.). For water, although it may be concluded there has been some improvement, for households that relied on piped water sources, issues with the reliability of supply may nullify this improvement. There was no significant change in rainwater usage.

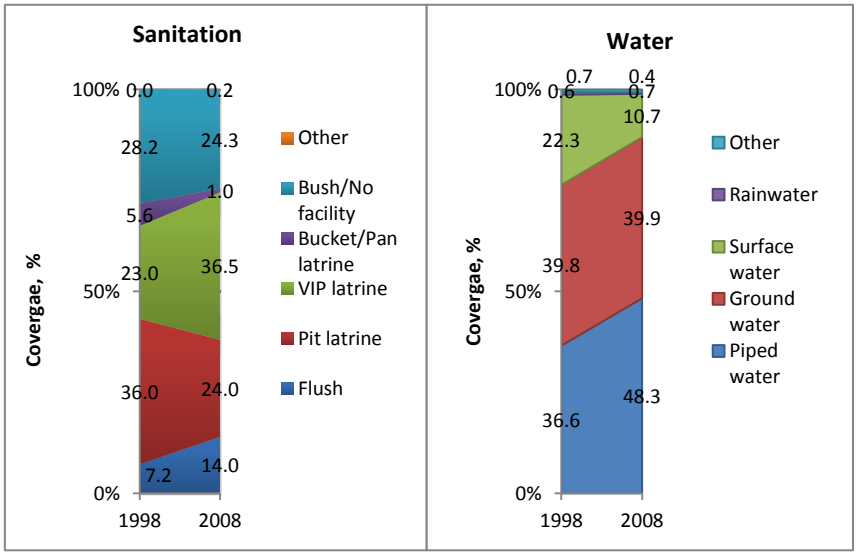

Figure 4-2: Water and Sanitation Facilities Coverage in Ghana

4.2.1.2 Rural-Urban WASH Facilities Coverage

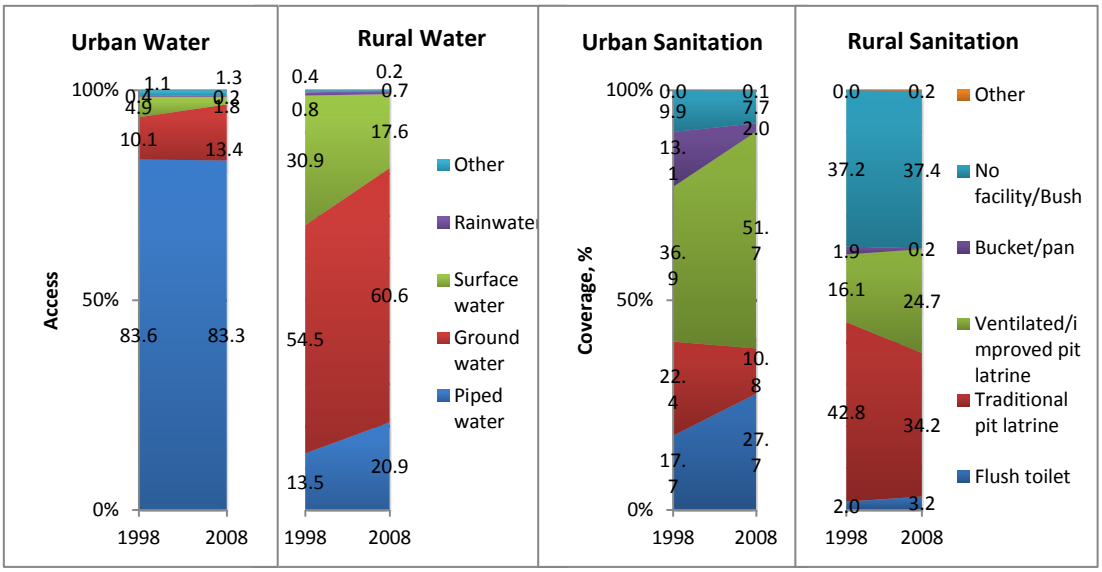

Figure 4-3: Water and Sanitation Facilities Coverage in Urban and Rural Areas

As may be anticipated, piped and ground water sources were the most relied on sources in the urban and rural areas respectively (see figure 4.3). Furthermore, whereas piped water sources represented about half (48.3%) of all water sources nationally and 80% in urban areas, only a fifth of rural households had access to it. Nonetheless, access to piped water increased by about 7% in rural areas over the ten years though it remained constant in urban areas. The no significant change in urban access to piped water sources could infer that, the resources allocated over the period was just enough to meet the demands of the ever increasing urban population. About 51% of the Ghana's population live in urban areas (GSS, 2012). The nearly 50% (31%-17.6%) decrease in surface water use over the period could be attributed to CWSA focus on small scale water supply schemes in small towns and rural areas.

Majority (over 50%) of households in urban areas in 2008 had access to VIP. For rural areas, the majority (37.4%) of households practised OD. As shown in table 4.1, though there was an increase in OD practice in rural areas over the ten years, it may be seen to have only kept up with population growth. Whereas about 27.7% of urban households had access to flush latrines, only 3.2% of rural households had access to the same facility in 2008. Access to VIP and pit latrines have increased and decreased respectively, in both rural and urban areas and may indicate that households using pit latrines are progressively turning to using VIP.

Table 4-1: Open Defecation Prevalence in Rural Areas

Year	Rural Population	Population Practising OD
1998	10,526,923	3,916,015
2008	12,120,471	4,533,056

4.2.1.3 Regional WASH Facilities Coverage.

As shown in figure 4.4 below, the poorest regions (i.e. Northern, Upper East and Upper West), have seen little improvement in access to sanitation over the period. Households, without access to any facility ranged from 65%-86% in these regions although the corresponding figures in other regions did not exceed 20% in 2008. Thus, these regions may either have been side-lined in resource allocation or targeting not effective. Such revelations drive home the importance of such geographic disaggregation.

As expected, households in the Greater Accra region (home to the capital, 90.5% urbanised), have the highest flush latrine coverage (43%). This figure when compared to the national average of 14% suggests that about half the people who have access to flush facilities are in the Greater Accra Region. The use of pan/bucket latrine however declined over period with Greater Accra who had the highest in 1998 (15%) reducing to 4%. Bucket/pan latrines are surprisingly uncommon in the three northern regions although they have the highest OD prevalence. It may have been expected to see traces of usage based on the 'sanitation ladder' concept.

With the three northern regions largely rural (averagely 77% rural- refer to figure 3.2.), the high OD prevalence in these regions corresponds with its prevalence in rural areas (37.4%) inferring that, more effective targeting of resources to rural areas may likely reduce the spate of OD in these regions.

For water, the three northern regions have the highest number of households relying on ground water sources (see figure 4.5). An analysis of ground water sources (at national level) in 2008 revealed that about 93% of the sources are protected. However, the arid climate in the northern regions may result in significant decreases in volume especially in the dry seasons when the groundwater is used for agricultural purposes as well. Access to piped water sources fairly improved over the period with the Volta region recording the highest improvement (39%) (see figure 4.5).

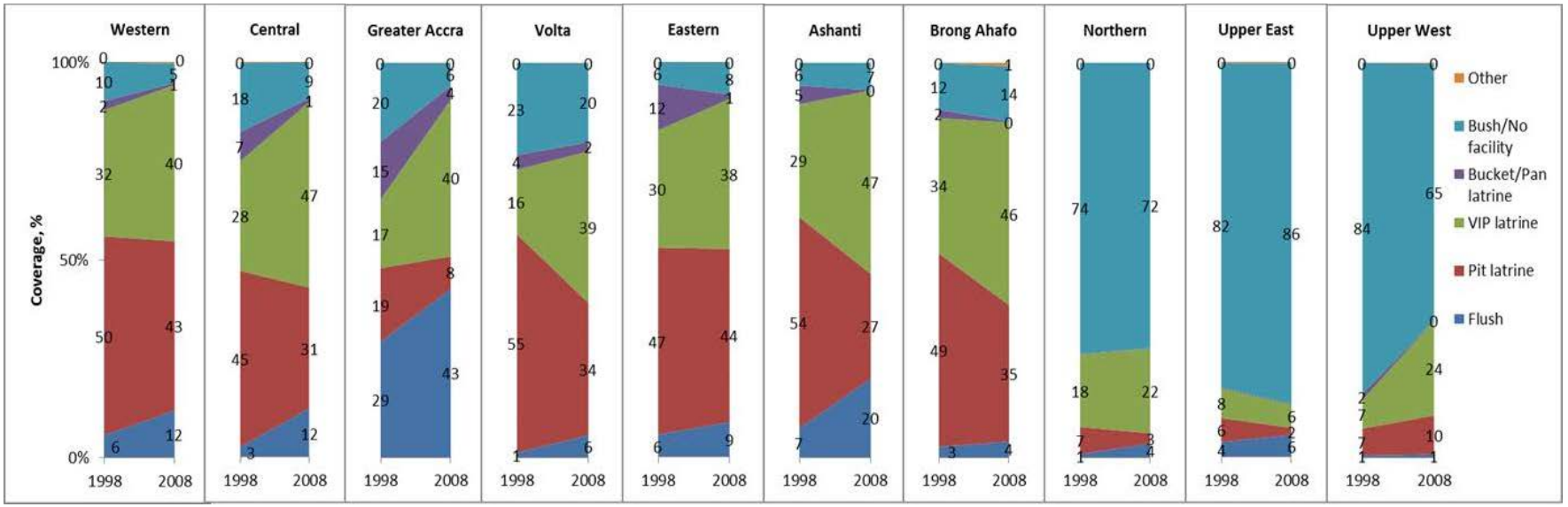

Figure 4-4: Regional Sanitation Facilities Coverage

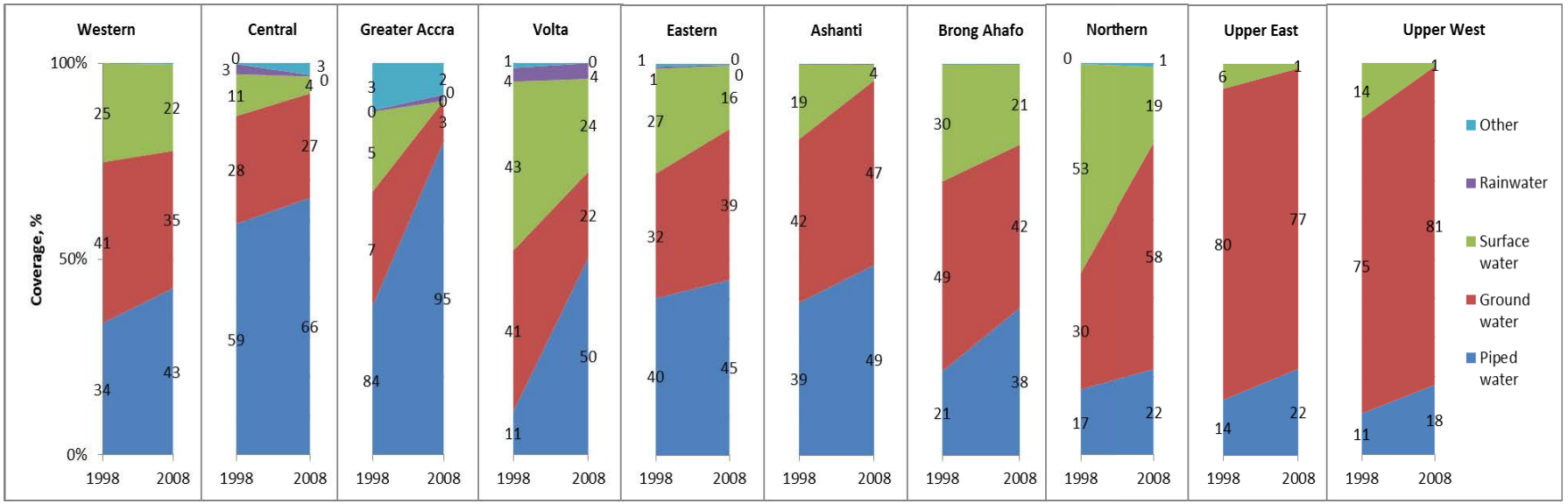

Figure 4-5: Regional Water Source Coverage

4.2.2 Wealth/Income level Disaggregation

Disaggregation by wealth/income index was done at the national and rural urban levels.

4.2.2.1 National WASH Facilities Coverage by Wealth Index

Figure 4.6 below shows a strong correlation between access to flush toilet facilities and poverty/wealth. For the rich, access to flush toilets ranged from 3% (middle 20%) to as high as 56% (richest 20%). Conversely, OD increased by about 6% over the same period among poorest households. This glaring disparity once more raises the issue of whether the critical areas are being targeted and the extent to which equity is being considered in allocating resources. The stark difference in OD practise (72%) between the poorest and the national figure of 24.3% buttresses the issue of how such national level averages mask important disparities. Consistent with the regional trend, the use of pan latrines was only practised amongst the top 3 quintiles with the richest 20% of households having a coverage of 17% in 1998. This reduced significantly to 2% by 2008 but may not be attributed to effective resource allocation since it could be assumed that the richest households out of self-esteem are more likely to improve their own facilities. On the other hand, significant urban investments may account for the reduction in the use of pan latrines. This would be looked up in the sector investment/access to WASH facilities correlation assessment (in section 5.) to see if there was any evidence of public sector investment in urban sanitation that could account for the fall in the use of pan latrines. Access to VIP also generally increased with wealth income with only 5% of the poorest households having access.

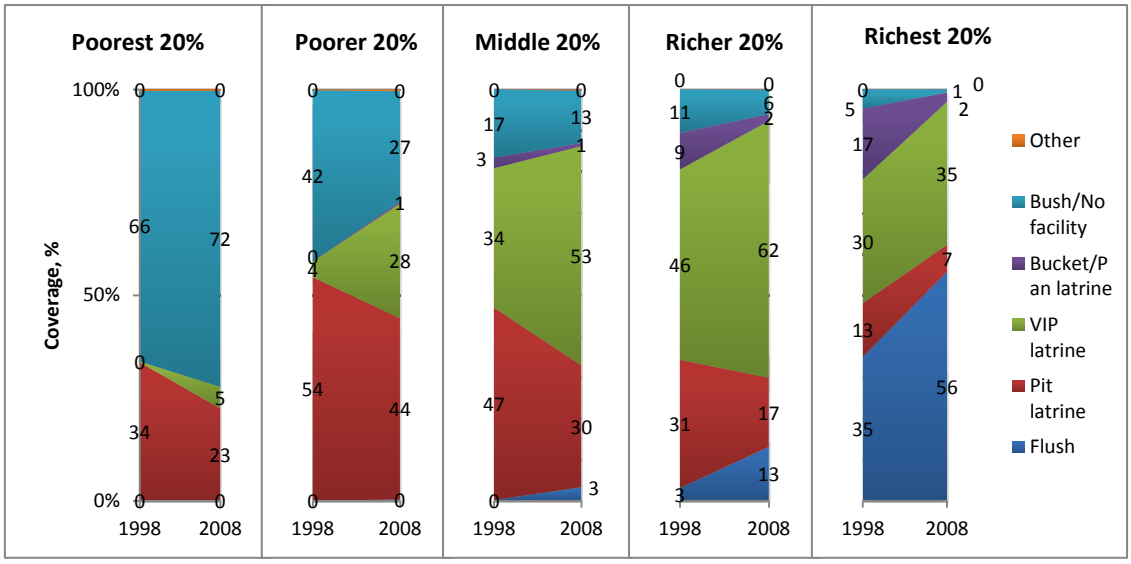

Figure 4-6: Sanitation Facilities Coverage by Wealth Quintiles

In the case of water, less than 5% of the poorest households had access to piped water sources though the richest had almost universal access (see figure 4.7) in 2008. The national coverage was however close to 50%. With majority of richest households likely to

be in urban areas, the high piped water coverage observed in urban areas (83.3% in 2008) and among the richest 20% (93% in 2008) may be justified. There was a significant decrease in the number households that relied on surface water sources among the poorer and poorest households. This decrease reflected as an increase in ground water and piped water sources for the poorest 20% and poorer 20% respectively. Reliance on ground water sources decreases with increasing wealth.

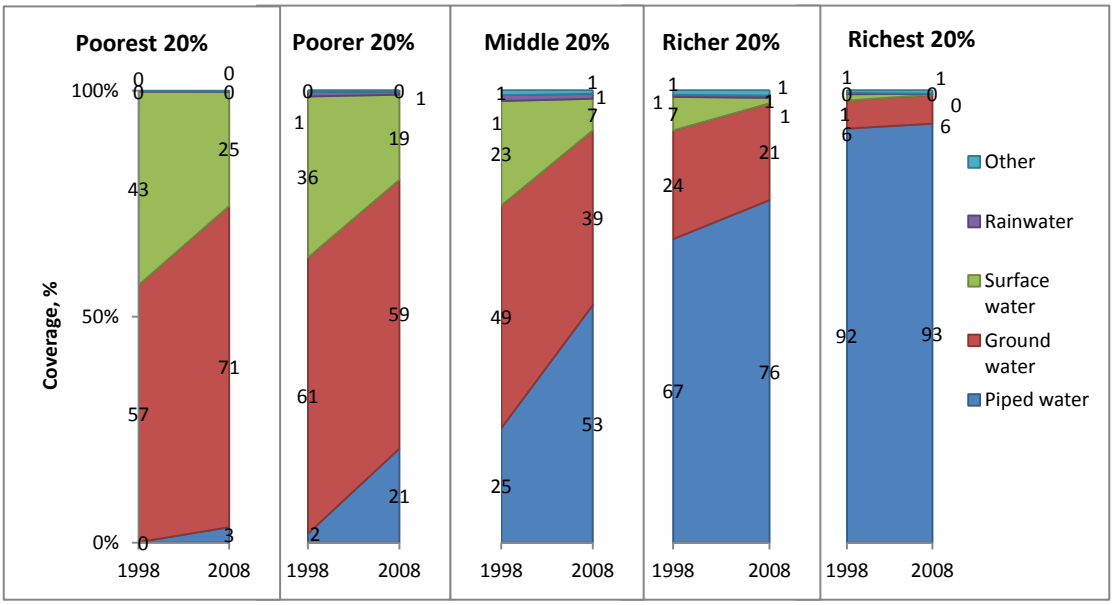

Figure 4-7: Water Source Coverage by Wealth Quintiles

4.2.2.2 Rural-urban WASH Facilities Coverage by Wealth Index

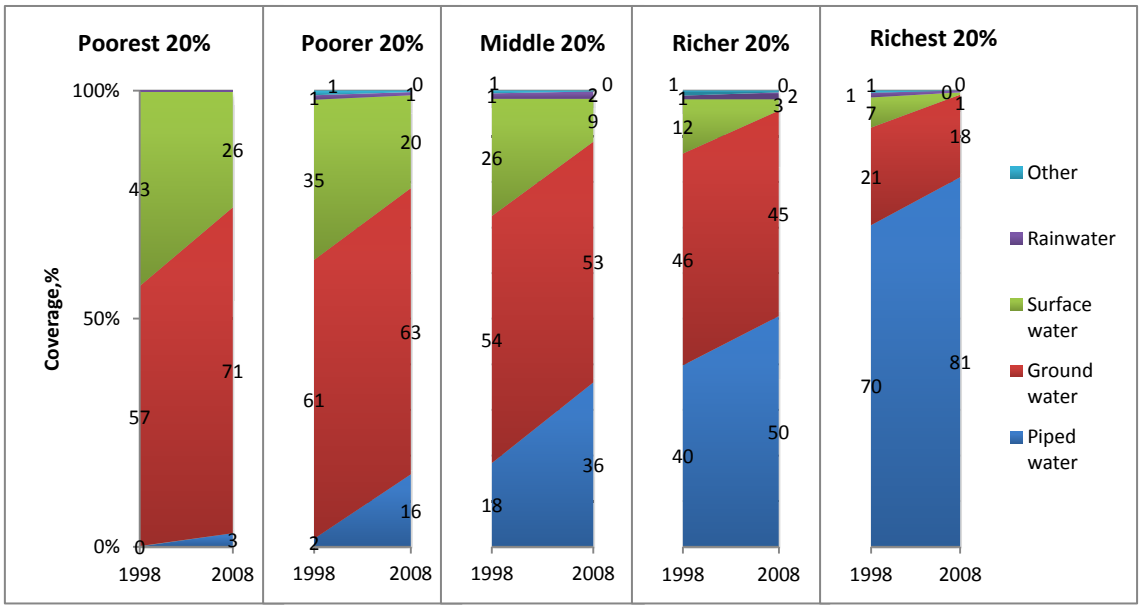

Figure 4-8: Rural Water Source Coverage by Wealth Quintiles

The rural water coverage estimates by wealth quintile over the period correlates with the trend seen at the national level (see figures 4.7 & 4.8 above). This may imply that, effective

poverty targeting in the allocation of resources at the national level, may be reflected at the rural level as well. Similarly, both urban and rural sanitation by wealth quintile reflect the same pattern as the national coverage by wealth quintile (see figures 4.6, 4.9 & 4.10).

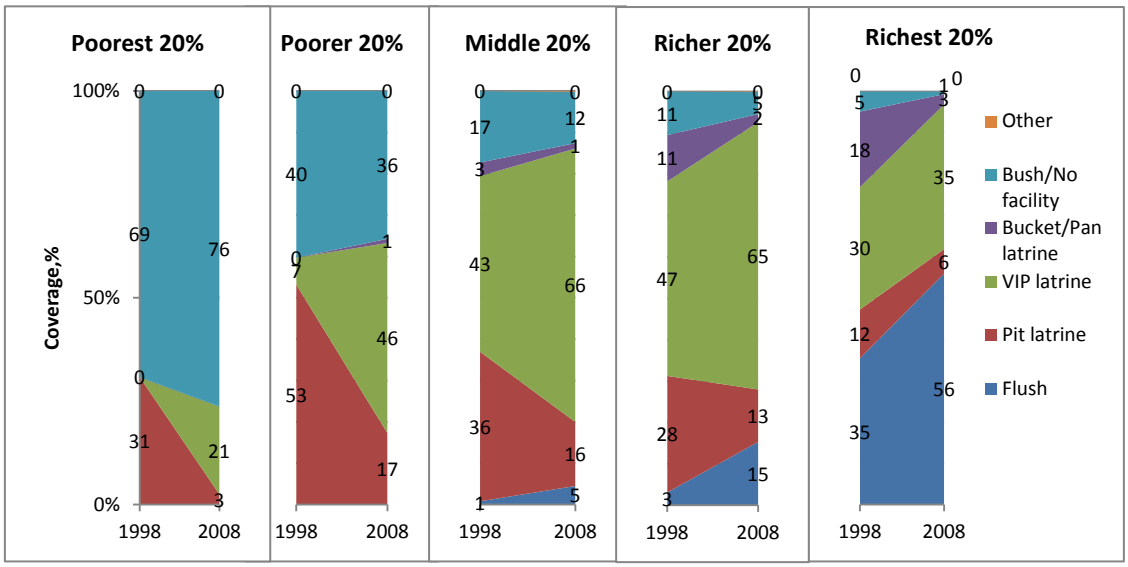

Figure 4-9: Urban Sanitation Coverage by Wealth Quintiles

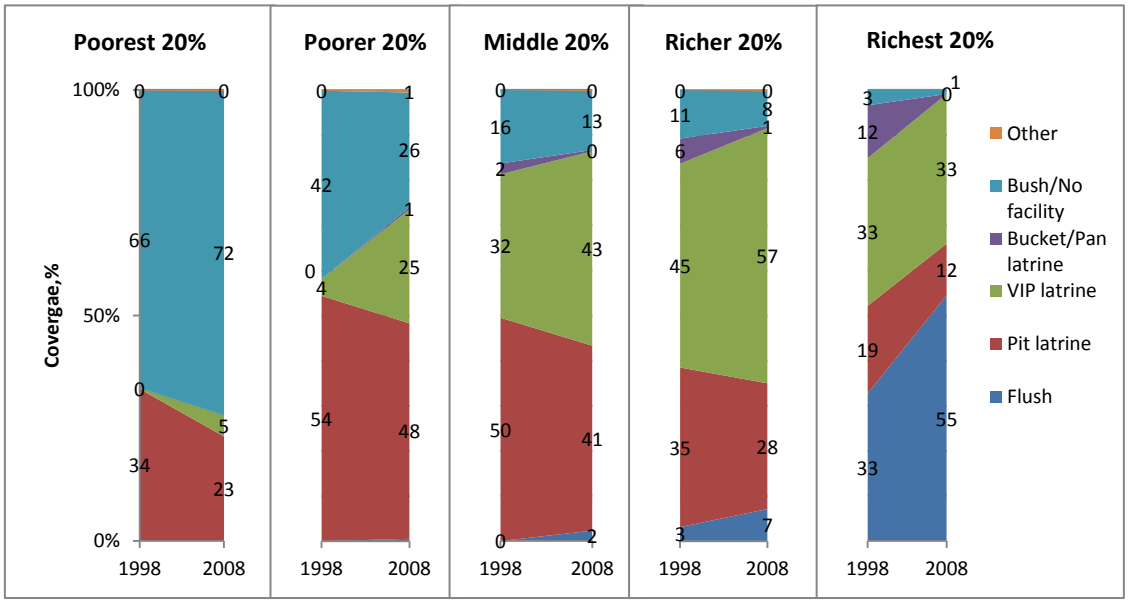

Figure 4-10: Rural Sanitation Coverage by Wealth Quintiles

4.2.3 Data Disaggregation by Gender

Data disaggregation was done at the national, rural-urban levels and by wealth/income index.

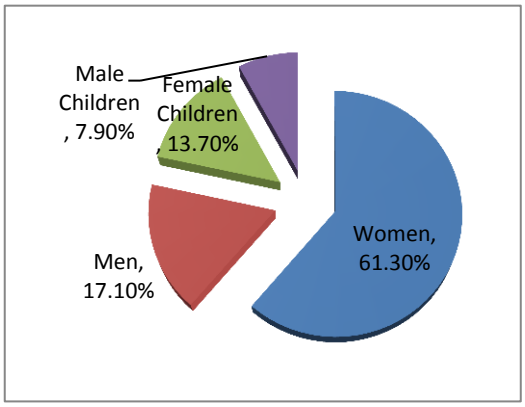

Figure 4-11: Burden of Water Collection in Ghana, 2008

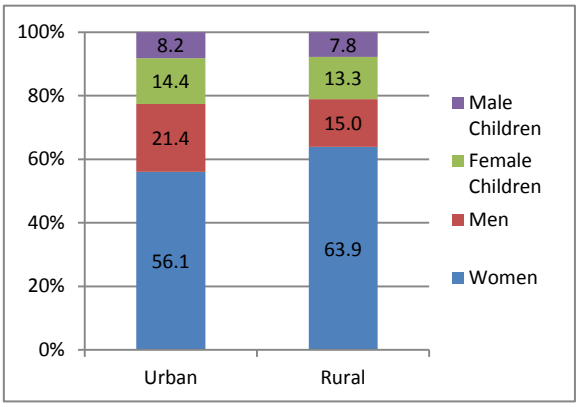

Figure 4-12: Burden of Water Collection in Rural and Urban Ghana, 2008

As shown in figure 4.11, at the national level, females (women and female children) bear about 75% of the burden of fetching water. Though a similar pattern is reflected in rural areas (77.2% see figure 4.12), women alone in the poorest 20% households bear almost the same value (i.e. 75.8%-see figure 4.13). The decrease in the burden of collecting water among women alone in urban areas (56.1%) as compared to the national and rural values (61.3% and 63.9% respectively), corresponds with the marginal increase in men in urban areas.

Also in figure 4.13 below, while there is a decreasing trend in the burden of women with increasing wealth/income, the reverse is seen for men. The decreasing burden of women is reflected in the increase in the burden of men. Although across all the levels of data disaggregation majority of the burden is borne by females, further disaggregation by wealth quintiles has revealed the varying magnitude of the burden with poverty.

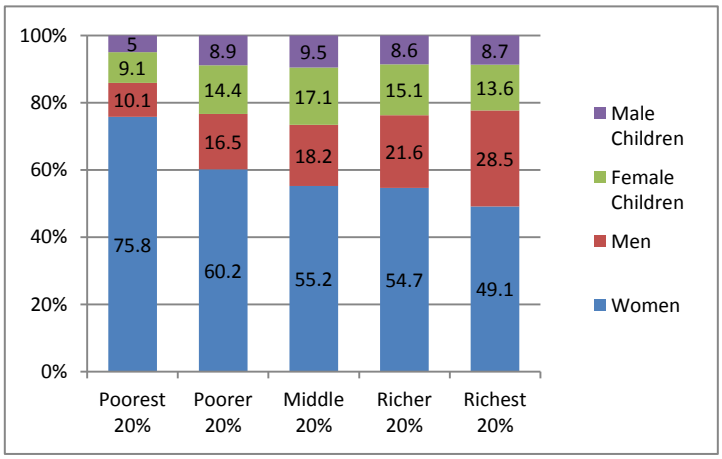

Figure 4-13: Burden of Water Collection by Wealth Quintiles, 2008

The higher burden of fetching water by females may be attributed to socio-cultural norms and beliefs. The responsibility of fetching water has been the singular duty of women especially in rural areas where these norms are more or less entrenched.

4.3 Relationship between Sector Investment/Expenditure and WASH Facilities Coverage

This section presents the results of the Spearman's correlation and significance tests. The detailed tables for the analysis have been included in the Annex 5. Extreme caution should be taken in interpreting the results since such correlation analysis do not reflect any 'cause and effect' relationship. This caution should be particularly considered in the % GDP expenditure on WASH and facilities coverage analysis where the barest minimum number of paired variables (n=4) for Spearman's correlation test was used.

4.3.1 Relationship between WASH sector per capita ODA Disbursements (2002-2011) and WASH Facilities Coverage (2003-2012)

In this assessment, all the correlations found were not only very weak, but also statistically insignificant (see table 4.2). Surface water and pit latrines showed a negative correlation and could possibly imply that, as per capita ODA increased, there was a decrease in the number households that relied on surface water sources and pit latrines although the correlations were statistically insignificant.

Table 4-2: Results of the Spearman's Rank Correlation Coefficient Test between per Capita ODA and WASH Facilities Coverage in Ghana

Facility Type	Spearman's Correlation Coefficient (r_s) value	Interpretation	Critical Value (n=10, 0.05 significance level, 2 tailed test)	Statistical Significance of r_s
Surface water	-0.0061	very weak negative correlation	0.648	No significant Correlation
Ground water	0.0061	very weak positive correlation	0.648	No significant Correlation
Piped water	0.0061	very weak positive correlation	0.648	No significant Correlation
OD/Bush/No Latrine	0.0061	very weak positive correlation	0.648	No significant Correlation
Pit Latrine	-0.0061	very weak negative correlation	0.648	No significant Correlation
VIP Latrine	0.0061	very weak positive correlation	0.648	No significant Correlation
Flush Latrine	0.0061	very weak positive correlation	0.648	No significant Correlation

4.3.2 Relationship between % of GDP expenditure on WASH (2008-2011) and Facilities Coverage (2009-2012)

This assessment was done for both urban and rural areas. As with the preceding assessment, there was no statistically significant correlation between % of GDP expenditure on WASH and access to WASH facilities coverage in urban areas. Instead, stronger correlations ranging from moderate (0.4) to high (0.8) were observed. Surface

water, piped water, VIP latrines and flush latrines had negative correlations with % GDP expenditure. Conversely in rural areas, all the correlations were significant and very strong with only surface water and pit latrines indicating positive correlations.

Table 4-3: Results of the Spearman's Rank Correlation Coefficient Test between % of GDP spent on WASH and WASH facilities Coverage in Urban Areas in Ghana

Facility Type	Spearman's Correlation Coefficient (r_s) value	Interpretation	Critical Value (n=4, 0.1 significance level, 2 tailed test)	Statistical Significance of r_s
Surface water	-0.400	moderate negative correlation	1.00	No significant correlation
Ground water	0.400	moderate positive correlation	1.00	No significant correlation
Piped water	-0.400	moderate negative correlation	1.00	No significant correlation
OD/Bush/No Latrine	0.800	very strong positive correlation	1.00	No significant correlation
Pit Latrine	0.800	very strong positive correlation	1.00	No significant correlation
VIP Latrine	-0.800	very strong negative correlation	1.00	No significant correlation
Flush Latrine	-0.800	very strong negative correlation	1.00	No significant correlation

Table 4-4: Results of the Spearman's Rank Correlation Coefficient Test between % of GDP spent on WASH and WASH facilities Coverage in Rural Areas in Ghana.

Facility Type	Spearman's Correlation Coefficient (r_s) value	Interpretation	Critical Value (n=4, 0.1 significance level, 2 tailed test)	Statistical Significance of r_s
Surface water	1.00	very strong positive correlation	1.00	The correlation is significant
Ground water	-1.00	very strong negative correlation	1.00	The correlation is significant
Piped water	-1.00	very strong negative correlation	1.00	The correlation is significant
OD/Bush/No Latrine	-1.00	very strong negative correlation	1.00	The correlation is significant
Pit Latrine	1.00	very strong positive correlation	1.00	The correlation is significant
VIP Latrine	-1.00	very strong negative correlation	1.00	The correlation is significant
Flush Latrine	-1.00	very strong negative correlation	1.00	The correlation is significant

4.4 Resource Allocation and Targeting in Ghana's WASH Sector

This section presents further information on resource allocation and targeting in Ghana based on responses from sector institutions.

Currently, resource allocation in the MLGRD is based on the ministry's short term priority focus areas which include environmental sanitation, decentralisation, rural and urban development. However, no special consideration is given to sanitation. Budget allocation from the MLGRD to the EHSD only covers the administrative costs of the directorate and its ten (10) regional offices. Institutional /decentralisation-linked fiscal transfer accounts for 41%-60% of all allocations to the EHSD, sector investment plan approach accounts for 0%-20% while the programmatic approach accounts for 21%-40%. Inadequate consultation among sector stakeholders is a major challenge to the efficiency of the resource allocation methods and hence the engagement of various sector stakeholders and the MoFEP was proposed as the way forward.

For the MWRWH, resource allocation to its directorates is determined by the extent to which the directorate's planned annual activities buy into the ministry's priority areas. The ministry's priority areas include on-going projects, government priority areas, counterpart funding (funding commitments resulting from partnership with donor agencies on specific projects) and emergencies. No specific consideration is given to the water directorate (WD). The new MTEF requires that, project grants from donor agencies are channelled through MoFEP and therefore captured as part to the national budget allocation to the WD. Although aid beneficiaries are determined through a consensus between MoFEP, donors and MWRWH-WD, donors sometimes have pre-selected beneficiaries. Similarly, politics does influence the choice of beneficiaries. Direct donor support (does not pass through MoFEP-sector-based investment) to the WD are usually related staff capacity development.

The response from GWCL indicated that, the provision of water services to communities is demand driven with the community having to make a formal request for services to the District Assembly to which it belongs. From the District Assembly, the request is forwarded to the MLGRD and then to the MWRWH. The MWRWH then forwards it to the GWCL Regional Offices before ending up at GWCL Head Office. The requests are then compiled in anticipation of GoG financing. With water considered as a social good, all communities have the same priority, and hence no criterion is applied in prioritising potential beneficiary communities.

4.5 Chapter Summary

The chapter has identified the extent to which household WASH data may be disaggregated. The multi-level (three 3 stage) WASH data disaggregation in addition to revealing how some national averages mask important disparities, has compared progress in access to WASH facilities over the period (1998 to 2008). Figure 4.14 gives an example of the scale of OD across the levels of disaggregation as well as the change in coverage over the period (1998-2008, *shown in italics*). The Upper East, Upper West and Northern regions who in 1998 were the most deprived still had the least progress in access to WASH facilities raising questions about equity and whether resources are being targeted to the areas in most need. High disparities between the rich and the poor were evident at the national and rural/urban levels. Females bear the majority of the burden of fetching water. Amongst the poor households, females bear 86% of this burden. The burden decreased with increasing wealth.

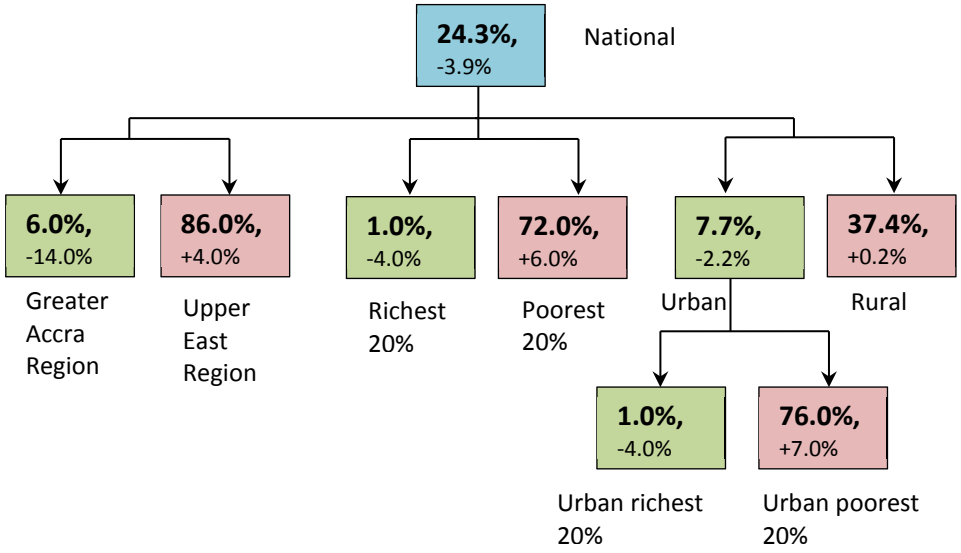

Figure 4-14: OD Prevalence across Different Aspects of data Disaggregation

No significant correlation was observed between per capita ODA disbursements and progress in access to WASH facilities. A similar trend was observed between % of GDP expenditure on WASH and access to WASH facilities in urban areas. On the other hand, in rural areas, significant correlations were observed.

The next chapter therefore discusses these findings in the broader context of the research.

5. DISCUSSIONS

5.1 Introduction

In context of the research objectives, this section discusses aspects of the literature review and the findings from data analysis. The discussions are presented under the following headings:

- Extent to which existing data sources can be disaggregated
- Implication of Ghana's resource allocation mechanisms on access to WASH facilities
- Potential for applying the health sector resource allocation concepts in Ghana's WASH sector
- Using WASH data to target future investments
- Correlation between sector expenditure/investments and access to WASH facilities
- Limitations of existing household WASH data

5.2 Extent to which National Household Data Sources can be disaggregated

The main objective of the WASH data analysis was to provide relevant information to guide the targeting of sector resources. In doing this, data disaggregation was based on three aspects – geographic location, wealth/income and gender (burden of collecting water). With the geographic disaggregation, the DHS household data on access to WASH facilities allows for national, regional/provincial and rural-urban level disaggregation. The wealth/income and gender based disaggregation which are mainly indicative of equity, may be acceptable (statistically representative) at the national and rural-urban levels since the sample size are fairly large at these levels. The gender disaggregation could also be done across the wealth index groups as well. Further disaggregating regional/provincial level data by wealth index may however be highly inaccurate since the sampling frame of such representative surveys is not large enough. Based on a discussion with UNICEF's statistical specialist, for DHS data sets for example, a minimum sample size of 50 may be loosely acceptable but with extreme caution.

As shown in table 5.1 in the case of this study, there were quite a number of cases (in 1998) where the total number of a particular facility was below the 50 mark after disaggregating by regions. Although in 2008, most of the figures are likely to be above the 50 mark, to ensure maximum statistical accuracy, it is ideal that data disaggregation by regions, using such representative household data is limited to only facility types as done in this study. Further disaggregation of regional data by wealth index may be more statistically representative when using census data since these cover the entire country.

Table 5-1: Sample Size (Number of Households) after Disaggregating by Sanitation Facility Type and Region, 1998

Regions	Flush toilet	Pit latrine	VIP latrine	Bucket/ pan	No facility/Bush	Other	Total
Western Region	34	301	191	14	59	0	599
Central Region	14	242	151	40	95	1	543
Greater Accra Region	224	143	133	112	153	0	765
Volta Region	6	284	84	19	120	0	513
Eastern Region	43	361	226	88	43	0	761
Ashanti Region	70	503	270	44	54	0	941
Brong Ahafo Region	13	238	167	10	58	0	486
Northern Region	4	33	87	1	350	0	475
Upper West Region	2	27	29	6	333	0	397
Upper East region	20	32	39	1	430	1	523
Total	**430**	**2164**	**1377**	**335**	**1695**	**2**	**6003**

(Source: GDH 1998 Household Survey) NB: Cells shaded red indicate the number of households is below the minimum of 50 mark

While sector resources usually flow from the national level via the regional/provincial level to the district government level, disaggregation of WASH data is only possible down to the regional level. The existing household data is not collated at the district level presenting a major setback to both targeting of resources and monitoring at the district level. Such limitations with disaggregation of data and hence its use, may in part be responsible for the need to collect new data sets as done in projects like WaterAid's Water Point Mapping project, Malawi earlier discussed in the literature review. Figure 5.1 presents a diagram of the extent to which existing national household data on access to WASH facilities may be disaggregated with confidence due to the sample sizes in representative surveys such as DHS.

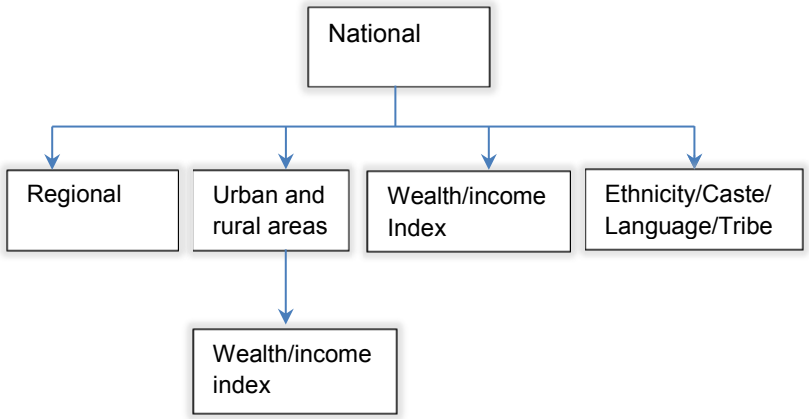

Figure 5-1: Proposed Levels for Disaggregating National Household Access to WASH Facilities Data

5.3 Implication of Ghana's Sector Resource Allocation Mechanisms on Access to WASH Facilities

Although ensuring equity, be it geographic, gender or wealth status is a fundamental requirement in allocating resources, Ghana's WASH sector institutions appear not to be doing much to achieve this. For CWSA this is evident in the fact that its allocation of resources does not take account of the level of donor aid or on-going projects in regions. Furthermore, allocations to all regions are of similar amounts with no preference for those lagging in access. The issue of donor agencies sometimes influencing how resources should be allocated or determining the aid beneficiaries may further deepen the inequities in access.

The little attention being paid to equity is evident in the results from the data disaggregation. At regional level for example, the three northern regions which in 1998 had the highest OD prevalence (more than three times that of the next highest region –Volta Region-refer to figure 4.4) still remained the top 3 with the highest OD prevalence in 2008. The Upper East Region had an even higher figure in 2008. For water, since the WD has no specific criteria to guide the allocation of resources between GWCL and CWSA (responsible for providing water in urban and rural areas respectively), while about 83% of urban households have access to piped water, 18% of rural households still relied on surface water in 2008.

Further disaggregating urban water coverage by wealth reveals that, GWCL's 'equal access to all' approach may have been somewhat effective. In figure 5.2 below, piped water coverage among the bottom three wealth quintiles increased significantly whereas the top two decreased marginally. The neglect of gender criteria in the targeting resources is also reflected in females having to bear the larger share of the burden of fetching water with the burden further increasing with decreasing wealth (refer to figure 4.13 above).

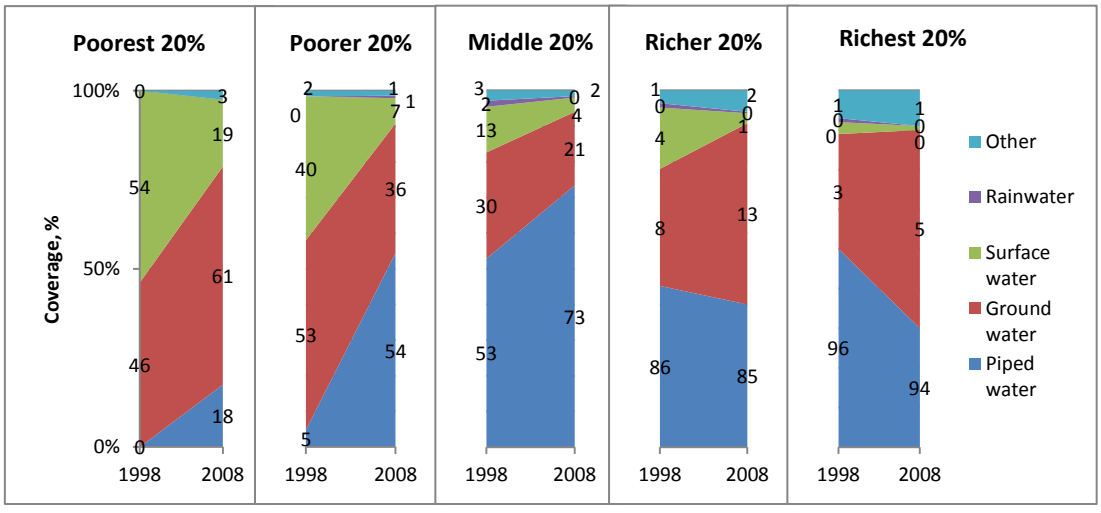

Figure 5-2: Urban Water Source Coverage by Wealth Quintiles

The impact of the institutional approach can also be seen in the disparity (see table 5.2.) in national progress between the water and sanitation sectors. Since with the institutional approach each sector would have to bargain for its own resources, the more outspoken water sector (WD) is more likely to attract enough funds to meet its targets as compared to the weaker sanitation sector. According to the World Bank (2008), the EHSD has a weak capacity in managing, coordinating and regulating sanitation programs. In 2006, GoG's total budget to the EHSD (the lead institution for sanitation) was around US$ 380,000 whereas that of CWSA alone was about US$ 2,366,206 (ibid).

The divided front of sanitation (both CWSA and EHSD share responsibility) may contribute to its weakness. Also, with EHSD's responsibilities inclusive of solid waste management which is a major problem in Ghana, adequate attention may not be given to sanitation and hence no distinct 'sanitation sector'. A clear definition of roles as well as allocation of sanitation related resources between the CWSA and EHSD is needed. The existence of a sector working group as Uganda's WSSWG may be effective in addressing this problem. Having a benchmark to guide the investments into water and sanitation sectors may give an added value especially in the case where donor aids to the sector are sometimes lumped together.

Table 5-2: Relative Performance of the Water and Sanitation Sector

Facility Type	1998	2008
% of Households with access Piped Water	36.6	48.3
% of Households that use Flush toilet	7.2	14.0
% of Households that rely of surface water sources	22.3	10.7
% of Households without access to toilet facility/OD/Bush	28.2	24.3
	2011	
% of population with access to improved sanitation (JMP)	13	
% of population with access to improved water sources (JMP)	86	

Source: compiled from Ghana DHS data sets 1998 & 2008 and (WHO/UNICEF, 2013a)

5.4 Potential for Applying the Health Sector Resource Allocation Concepts in WASH sector

As mentioned in the literature review, the health sector's focus on curative measures rather than preventive measures detaches it from other sectors making it relatively easy to adopt the institutional resource allocation approach. Focusing on preventive measures for example, in dealing with waterborne and sanitation related diseases would necessitate collaborating with the WASH sector and therefore the need for a SWAp. The WASH sector by its nature requires the cooperation of different sectors in some cases as many as four (i.e. health, education, water and sanitation (if separated)). Much synergy is therefore needed among the individual sector policies and strategies, and sometimes budget allocations. Achieving such inter-sectoral cooperation is particularly difficult in developing countries where individual ministries are still developing.

The highly decentralised nature of the health sector encourages effective coordination and also develops the capacity of local governments. In Ghana, the health sector is decentralised to the community level with the national, regional and district levels having fiscal powers. The WASH sector on the other hand, although reaches the district level (District Water and Sanitation Team of CWSA and District Environmental Health and Sanitation Department of EHSD) are often weak and without much fiscal powers. The national Health Service Council is responsible for the implementation of national policies for health delivery, increasing access to improved health services and efficient management of available resources (GHS, undated-d, as cited by Salisu & Prinz, 2009). With this role similar to Uganda's WSSWG, irrespective of the resource allocation approach used, the council is able to coordinate all activities. The progressive use of central budget support by donor agencies in providing aids, gives the well decentralised health sector an added advantage. Such organisational differences influence the extent to which the health sector's resource allocation concepts can be introduced into the WASH sector.

According to Zere et al 2007, the definition of equity influences the measures taken to achieve equitable allocation of resources. Unlike the health sector where the horizontal and vertical concepts of equity are used in allocating resources (Zere et al, 2007); the WASH sector does not have such distinct equity concepts. The horizontal equity implies that, two individuals with the same complaint must be dealt with in the same way whereas the vertical equity indicates that, preference or more weighting should be given to the highly disadvantaged areas (Zere, et al., 2007). The WASH sector's focus on targeting resources to those that need it most (i.e. poor and vulnerable) could be likened to the health sector's vertical equity. The vertical equity approach offers a faster opportunity to bridge the inequity gaps as compared to the horizontal equity (Zere, et al., 2007). A clear definition of equity and the people in the most need in national policies would be a useful guide in targeting resources. The disaggregation of WASH data as done in the previous chapter therefore becomes useful in identifying those in the most need especially if disaggregation is possible down to the lowest level of governance. Having a benchmark ratio for the number of people per facility (depending on the facility type) would also be helpful in estimating need.

With regards to the use of needs-based formula in allocating resources, its feasibility in the WASH sector has been proven with countries like Uganda having adopted it. The following indicators could be considered in the development of the needs-based formula in the WASH sector.

Table 5-3: Suggested Indicators for WASH Sector Needs-based Resource Allocation Formula

Category of Indicator	Indicator
Demographic	• Weighted Population size –highly populated places would require more resources. The application of weights would factor in equity • Gender – females bear the largest burden of water and use the WASH facilities more frequently as compared to men • Aged and physically challenged: due to physical limitations they should be prioritised in the allocation of resources. The facilities should be accessible and usable. • Ethnicity/caste- citizens seen as low class as a result of tribe/language affiliations
Socio-economic	• Wealth/income status- poor, poorest, medium, rich and richest.
Geographic	• Rural//Urban areas • Regions/Province- deprived regions should be prioritised • Slums • Areas with limited alternative water resources
Health	• Areas with frequent WASH related disease (cholera, diarrhoea, etc.) outbreaks

As pointed out by Pearson (2002), the main challenge with the formula based allocation is its reliance on adequate data. The highly decentralised nature of the health sector encourages the easy collation and update of data from the community level upwards. For WASH, this may be relatively difficult with most countries heavily relying on household surveys such as the MICS and DHS. In Ghana for example, the sector is yet to undertake a nationwide WASH sector focused survey. Simple weighted population allocative formulas would be a good starter for the WASH sector. It may latter evolve into more complex ones based on its effectiveness in addressing the inequities in access and national targets. The key issues identified by Pearson (2002) in box 2.2 of the literature review would have to guide the adoption of a formula-based system.

5.5 Using WASH Data to Target Future Investments in Ghana

Based on its popularity in the WASH sector as well as the amount of information that can be derived from data analysis, geographic targeting of resources would be a preferred option. In Ghana's case, owing to the paucity of information on actual WASH facilities; disaggregating WASH access data by local government levels (regions and districts) to identify those in the most need for effective targeting of resources offers the quickest option. The data disaggregation done above gives a clear indication of the regions (the three northern regions) in the most need and hence requires more resources. The limitation of using the household data sets is the fact that, it does not extend below the regional level.

To ensure fairness and also avoid political interference, the amount of resources (money) could be based on population. In doing this the total funds available to the sector could be divided by the entire national population to get the per capita funding (amount). The allocation to a particular geographic location (region/district/community) is therefore

calculated as a *product* of the population of location and the per capita WASH sector funding. This approach is identical to the health sector's horizontal equity concept.

Whereas the above approach would ultimately bridge the inequities, a faster alternative would be to use weighted population which is also identical to the health sector's vertical equity concept. With this approach, geographic locations are assigned weights with the location with lowest coverage level and therefore the most in need, having the highest. Table 5.4 presents how this approach could be used in allocating funds across the regions with regards to sanitation.

Table 5-4: Allocating Resources across Regions by Weighted Population

Region	OD Prevalence (2008)	Regional Ranking	Weight	Population NPHC (2010)	Weighted Population
Western	4.90%	1	0.1	2,376,021	237,602
Central	9.10%	5	0.5	2,201,863	1,100,932
Greater Accra	5.70%	2	0.2	4,010,054	802,011
Volta	20.00%	7	0.7	2,118,252	1,482,776
Eastern	8.10%	4	0.4	2,633,154	1,053,262
Ashanti	6.90%	3	0.3	4,780,380	1,434,114
Brong Ahafo	14.00%	6	0.6	2,310,983	1,386,590
Northern	72.30%	9	0.9	2,479,461	2,231,515
Upper East	86.20%	10	1	1,046,545	1,046,545
Upper West	65.10%	8	0.8	702,110	561,688

It should be noted that ranking is done in the reverse order with the region with the highest OD prevalence having the lowest rank. The weight for each region is then calculated by dividing the rank of the region by the total number of regions. The weighted population is obtained by multiplying the population by the assigned weight. The allocation to each region is thus calculated as a *product* of weighted population of location (region) and the per capita WASH sector funding. This biases the allocations towards the more needy regions (geographic locations).

As well-known and based on the results from the data disaggregation, areas with low access to WASH facilities are among the poorest as well (for .e.g. the three northern regions). Therefore, effectively targeting these areas is likely to be reflected in the inequities in wealth and gender. Allocations for administrative purposes may be separated from allocations for providing facilities and services. This follows the approach used in Ethiopia where 3% to 5% of sector-based grants are allocated to the federal government to cover its administrative expenses.

In the future, in addition to either of the approaches, special allocations of the total funds available to the sector could be assigned to the following need and equity indicators;

- Gender (Population of females)
- Disability (Population of physically challenged)
- Poverty (Population of people/households in the poor and poorest wealth/income index)
- Population of people living in slum areas.

The per capita value of each of these indicators is calculated by dividing the national population of people in each category by the amount allocated. The amount allocated to each region (location) is therefore dependent on the population of the category in the particular region or location. A similar approach could be used in allocating resources to the districts and possibly communities. This would be dependent on the availability of WASH data on access for further disaggregation to these levels.

The geographic targeting is particularly useful in Ghana's situation where the institutional resource allocation method is gradually becoming the preferred option. With all the sector institutions having regional and district level offices, it would be relatively easy to adopt. Developing both the administrative and financial management capacity of the district level offices is vital. Routine WASH data disaggregation (assuming the data is regularly updated) by wealth index and gender across the local government levels, may be useful in testing the effectiveness of these approaches.

5.6 Relating Ghana's WASH Sector Investment to Progress in Access

By linking both financial and access data, the correlation test gives an indication of how investments trends have impacted or impact access to WASH facilities. In interpreting these correlations, it is recognised that these tests do not identify 'causality effect' hence it cannot be fully concluded that, the trends in access to WASH facilities are entirely as a result of ODA disbursement to WASH or GDP expenditure on WASH.

In the ODA disbursement 'versus' access to WASH facilities analysis, although all the correlations were very weak and insignificant (refer to table 4.2), it may be very harsh to conclude that ODA disbursements have not had any significant impact on access over the period. Firstly, a different trend may be seen if the disbursements were tested against the actual facilities rather than access to households. The justification for this lies in the fact that, access (number of households that use a facility) remains the same even if an additional facility is provided. This analogy also holds for the %GDP expenditure and access to WASH facility analysis. Such issues stress the need for facility- based information as well. Secondly, using disbursement figures exclusive to water or sanitation may have offered a better relationship and possibly a different trend.

Ignoring the statistical significance, the negative correlation between surface water and per capita ODA disbursement (refer to table 4.2) implying that surface water usage reduced with increasing ODA disbursement relates with the over 50% decrease in surface water reliance from 1998-2008 (refer to figure 4.2) although the correlation test spanned from 2003-2012. The reduction is also in line with the water sector's generally good performance as compared to sanitation where a positive correlation was observed between ODA disbursement and OD (means there was no decrease in OD prevalence even when ODA disbursements increased) (refer to table 4.2). The decreasing trend in the use of pit latrines over 1998-2008 (refer to figure 4.2) also matches the correlation between ODA disbursement and pit latrine access (as ODA disbursements increased, use of pit latrines decreased- refer to table 4.2). The limitation of these comparisons is however the fact that, the percentage of total sector investment represented by ODA is unknown.

The %GDP expenditure and access to WASH facilities assessment showed much stronger relationships and significant results (in the rural level analysis) (refer to tables 4.3 and 4.4). Although the number of paired variables (n=4) and the significance level of 0.1 used may have influenced this, actual expenditure (i.e. % expenditure) on WASH represents a more direct relationship as compared to ODA disbursements which only indicate the aids allocated to the sector and not necessarily how much was spent.

Piped water's negative correlation with % GDP expenditure in urban areas (refer to table 4.3) may denote expenditure on WASH have not reflected in increased access. The very strong positive correlation between OD and % GDP (refer to table 4.3) expenditure may be indicative of the fact that expenditure on WASH did not have any impact on reducing OD prevalence. The urban poor therefore become the most disadvantaged since the data disaggregation reveals about 76% OD prevalence among the poor as compared to the urban richest' 1.0% prevalence in 2008 (refer to figure 4.14). The strong positive correlation between pit latrine and % GDP expenditure in urban areas seems to match the sharp decline in pan latrine usage earlier discussed in *section 4.2.2.1*. This is because; following the 'sanitation ladder' concept, the next stage of transition after pan latrine is pit latrine. Therefore, effective urban investment into pit latrines may have reduced pan latrine usage. The very strong negative correlation for VIP and flush latrines may also depict expenditure has not reflected in access in urban areas (refer to table 4.3). These generally poor correlations between sanitation facilities and % GDP expenditure on WASH may be due to the issue of sanitation being a household issue hence such national % expenditure figures may not include household expenditure figures.

At the rural level analysis all the correlations were strong and significant (refer to table 4.4). The use of the lumped % GDP expenditure on WASH figure may have influenced this. Surface water showed a strong positive correlation (refer to table 4.4) with % GDP expenditure. This may be interpreted as GDP expenditure not to have had any impact on reducing the reliance on surface water in rural areas from 2009 to 2012 and therefore resource allocation not reaching where it is needed most. The negative correlation between piped water and %GDP expenditure may be justified in that; rural areas are less likely to have access to pipe water sources (refer to table 4.4). Since rural areas depend mostly on ground water sources, a positive correlation with % GDP expenditure was expected contrarily a negative correlation was observed. This perhaps accounts for the positive relation observed in the case of surface water (refer to table 4.4) since it becomes the only alternative in rural areas.

The negative correlation of % GDP expenditure with flush latrine may be expected since rural areas are less likely to use flush latrines whereas the strong positive correlation between % GDP expenditure and access to pit latrine may be because it is more affordable to the poorer rural areas (refer to table 4.4).

The use of the linear equation to estimate access to WASH facilities may have had some influence on these trends. For example, using the linear equation in estimating access results in a pre-defined ranking of the coverage variables (highest to lowest or vice versa). Though the Spearman's test is silent on this, it may have a direct influence since it relies on ranks instead of actual values. Nonetheless, the possibility of there not being any relationship between per capita ODA disbursement/% GDP expenditure (urban level); and access to WASH facilities cannot be ignored. The insignificance and inconclusive nature of the correlations may therefore indicate that, improved targeting is more likely to impact on access rather than the measure of sector investments such GDP expenditure on WASH.

5.7 Limitations of Existing Household WASH data

Since the study focuses on how existing household WASH data could aid in allocating resources, it is useful to highlight some of the limitations associated with its use. These limitations would have to be taken into consideration in allocating resources based on household WASH coverage data.

The household data do not have any specific indicator for the quantity and quality of water. The issue of quantity is of particular interest with regards to Ghana because it is responsible for the existing disparities in coverage estimates from the local service providers and the JMP (refer to figure 2.11). Quantity of water is of prime importance because, having access to a particular water source does not necessarily guarantee its

adequacy or availability and would therefore influence how allocations should be made to provide sustainable services. Agreeing on a benchmark for water quantity would further present a good reflection of need. People in rural areas have limited alternatives unlike those in urban areas who may have alternatives such as tanker services to supplement their demands. The poor will also be the most affected even if such alternatives are available since the may not be able to afford these alternatives due to their meagre earnings.

Although the household data do have some proxy indicators for quality (e.g. water source facility being protected or not, pit latrines covered or not, etc.); findings of JMP's pilot Rapid Assessment for Drinking Water Quality (RADWQ) between 2006 and 2010 prove that such proxy indicators are not sustainable (see figure 5.3). With rural households and possibly the poor largely dependent on the ground water sources, resource allocation would have to take into consideration costs associated with household water treatment if good health is to be ensured .

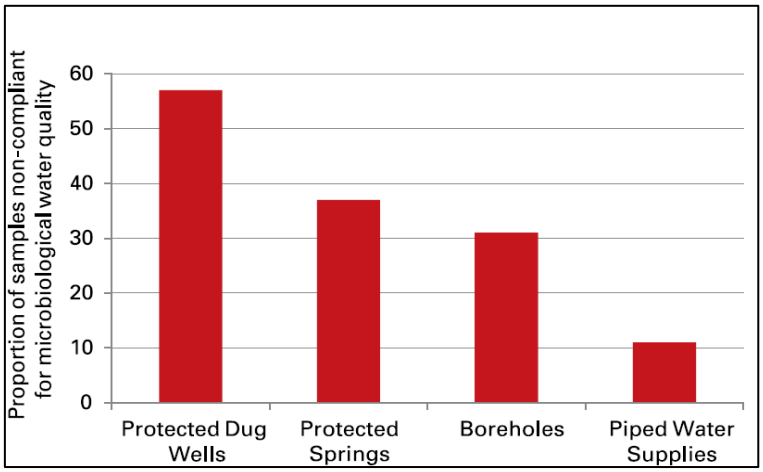

Figure 5-3: Non-Compliance with Microbiological Water Quality Guideline Values by Improved Drinking Water Source Type
Source: (WHO/UNICEF, 2011)

Although recent household surveys have incorporated some information on the time or distance taken to access water facilities, it does not capture that of sanitation. For sanitation both the availability and time taken to access the facility is of critical importance. Unlike water where the time to collect water depends on the household/individual, the individual has less control with regards to when to use a sanitation facility. Individuals may therefore resort to OD if they have to travel long distances to access the facility. Information on these would give a clearer indication of whether the facilities are indeed accessible or not.

The data sets do not also capture any information on functionality which is directly related to availability of the facilities. For sustainable services, information on functionality is key and would further determine how resources should be allocated between capital investments and maintenance costs. In the absence of any information on the functional status, the approach of estimating coverage by linear progression may be very misleading since the facilities are assumed to be functional. It may however be argued that, the installation of new facilities may cover-up for the limitation of this assumption. Nevertheless, information on functionality would be best.

Data on WASH facilities in institutions such as schools and hospitals is also missed out. This information is relevant because; the institutions at times serve as temporary residents. Besides, in Ghana for example, most of these institutions are government owned and would have to be considered in sector investments.

The recent cry for equity and inclusion requires some information on access to facilities for the disabled or physically challenged. There is also no indication of multiple-use of facilities by households. Central to resource allocation and sector planning is information on expenditure. The household data lacks in this as well.

Another major limitation of the use of coverage (households with access to facilities) data as compared to the facility-based data (number of facilities) is that, it may not adequately reflect the progress being made in the provision of facilities. For example, the number of households and by extension population having access to a particular facility remains the same even if an additional facility is added over a given period especially if there are no new births. This masks government's or service providers' efforts in improving service. Both categories of information (access and facility based) are important to give a true reflection of progress and hence how resources should be allocated.

5.8 Chapter Summary

The lack of district and community level information that come with household WASH data limits geographic targeting of resources to only the regional/provincial level. The results from the multilevel data disaggregation reflect Ghana's inadequate attention given to equity. Resource targeting has been generally ineffective in bridging the inequities in access among geographic locations, wealth index and gender groups. There is also a considerable link between geographic, wealth and gender inequities and hence effectively targeting resources to the areas in most need is likely to be reflected in wealth and gender inequities.

To be able to adopt the health sector's approach for targeting and allocating resources, the WASH sector would have to embark on an effective administrative and fiscal decentralisation. The implementation of the needs-based formula as in the health sector is dependent on the availability of adequate data on access to WASH facilities.

The insignificant relationship between WASH sector investments and access although may be due to the use of linear equation, does not rule out the possibility of sector investments not having any relationship with WASH facilities coverage.

Using household WASH data to target resources comes with some limitations. These limitations would have to be considered if resource allocation is to be based on WASH coverage data.

6. Conclusion and Recommendations

This section presents a reflection on the research objectives and also some suggestions to government and national WASH sector agencies on how resources can be allocated more equitably.

6.1 Conclusions

In addressing the first objective (to investigate resource allocation mechanisms in the WASH sector), the literature review identified the institutional/decentralisation-linked approach, sector investment plan (SIP) and programmatic approaches as the main resource allocation mechanisms in the WASH sector. The institutional/decentralisation-linked approach involves the sector institutions negotiating on their own behalf for funds whereas in the SIP, the institutions engage in a sector-wide approach. The resources are allocated across the different institutions. In the programmatic approach, programmes are designed with specific outputs and targets with corresponding resource (financial) allocations.

Even though no specific principles guiding the sector resource allocation was found in the review, a good resource allocation mechanism should ensure the efficient use and equitable allocation of resources. The use of the resource allocation approaches is country specific with some countries adopting more than one approach. In Ghana the WASH sector is progressively adopting the institutional approach due to government's 3-year Medium-Term Expenditure Framework budgeting approach and recent trend of sector aids coming in the form of central budget support. Ghana's sector resource allocation and targeting approaches give little attention to equity be it geographic, wealth/income or gender related as compared to other sub-Saharan countries like Uganda and South Africa.

In determining the extent to which household WASH data can be used to target future resource allocation (research objective 2), the data disaggregation revealed that, the household WASH data is limited with regards to its use in aiding national resources allocation. Disaggregating data and hence allocating resources by geographic location, is only possible at the regional and rural/urban levels. Further disaggregation by wealth index and gender (burden of collecting water) to identify the inequities is also limited to the national and rural/urban levels. These limitations prevent the identification of areas in most need that often exist as small communities. Disaggregating data to the district level (and possibly community level) and further by wealth index or gender, would give a much clearer picture of the areas in most need making resource targeting easier.

The disaggregation of Ghana's household WASH data reflects the little attention given to equity. Areas in the most need saw little or no improvement in access over ten years

(1998-2008). For example, the three northern regions of Ghana who happen to be the poorest and in the most need as at 1998 still had OD levels of 3-4 times that of the region with the next highest prevalence (i.e. Volta region, 20%). The observed relationship between geographic location, poverty and access, makes geographic targeting (allocation of resources based on areas in most need) an appropriate option. Effective geographic targeting is likely to reduce the burden of collecting water on females.

Using household WASH data as a guide in sector planning comes with limitations some of which include;

- data do not have any specific indicator for the quantity and quality of water
- no indication of time taken to access sanitation facility
- no information on the functionality of facilities
- lack of information on WASH facilities in institutions such as schools and hospitals
- no indication of multiple-use of facilities by households
- absence of information on expenditure (capital, O&M and household expenditure on sanitation).

These limitations in one way or the other have significant impacts in estimating WASH facilities coverage and would have to be considered if household WASH data are to be relied upon in allocating resources.

Using the Spearman's correlation test to identify the relationship between sector investments/expenditure and WASH facilities coverage (research objective 3), no significant correlation was observed between ODA disbursement and facilities coverage. A similar result was obtained for GDP expenditure on WASH and facilities coverage in urban areas. Though in rural areas the correlations were significant, no definite pattern and thus conclusion could be drawn. In as much as factors like the linear equation and the small sample size used in estimating access may have influenced the results, it does not rule out the possibility of sector expenditure/investment not having any correlation with access to WASH facilities. The insignificance of the correlations may imply that, improved targeting is more likely to have effect on access rather than a measure of sector investments (for e.g. GDP).

Section 6.2 below addresses the last objective (to provide guidance to government and national sector agencies on how to equitably allocate resources) by outlining some recommendations on how sector resource allocation can be improved in Ghana. Sub-section 6.2.3 specifically outlines some proposals to ensure equity in resource allocation.

6.2 Recommendations

Though the research sought to explore how WASH data analysis can help in allocating resources more equitably, resource allocation forms part of the broader WASH sector planning. The recommendations made below, therefore additionally include some aspects of sector planning.

6.2.1 Recommendations for Institutional Reform

Drawing back from the importance of sector coordination and the successes of countries like Uganda in resource allocation, the formation of an effective sector working group consisting of all WASH related MDAs and other stakeholders in Ghana should form the basis of an effective resource allocation system. It is recommended among other likely tasks, that the group be responsible for:

- coordinating all sector activities at the national level
- drawing together the individual WASH sector policies to guide resource allocation within and in-between sector institutions
- negotiating national budget allocation to WASH on behalf of the entire WASH sector, with MoFEP and also be responsible for its administration.

The MWRWH and MLGRD together with sector development partners should lead this effort.

With effective decentralisation key to the efficient allocation of resources, Ghana's WASH sector agencies (CWSA, EHSD and GWCL) would have to embark on an effective institutional decentralisation to the district level. This would involve devolution of administrative and fiscal authority to possibly the district offices. This brings resource allocation to the door step of the potential beneficiaries and would better ensure effective targeting and equity since the most deprived communities would be best known to districts. Whereas the districts offices would be responsible for the provision of services/facilities, the regional offices would play supervisory roles. The successful implementation of these however requires developing the capacity of the local offices and hence the government committing adequate resources.

6.2.2 Recommendations for Data Collection and Monitoring

In adopting a resource allocation system dependent on WASH data, data quantity and quality must be guaranteed. The following recommendations are therefore made:

- the WASH sector together with GSS jointly undertake a nation-wide WASH facilities survey (facilities count). The survey should also consider the limitations identified with the household data
- annual update of the facilities' data by sector institutions

- the sector stakeholders (GSS inclusive) agree on indicators to be used for coverage estimation

6.2.3 Recommendations for Resource Allocation and Targeting

Depending on the effectiveness of the decentralised system, geographic targeting is recommended. The allocations per geographic location (region or districts) could be based on un-weighted or weighted populations. The latter is most ideal since it offers a faster alternative in bridging inequities in access. With the weights dependent on the 'degree of need', the allocations are biased towards the more needy groups. An adequate definition of 'need' should be developed by the sector institutions and incorporated into sector policies. The definition should however consider the following indicators:

- Gender – females bear the largest burden of collecting water and use the WASH facilities more frequently than men.
- Age and physical disability - due to physical limitations, facilities should be easily accessible and useable
- Wealth/income status- facilities/services should be accessible and affordable to the poor.
- Deprived geographic locations- rural areas, northern regions, slums
- Availability of alternative water sources
- Areas with high WASH related disease outbreaks

6.2.4 Recommendations for Future Research

Although on paper, the proposed resource allocation by weighted populations looks feasible, a further investigation into the technical implications of adopting it would be expedient. Due to the exploratory nature of this research, a detailed study into the applicability of the approach used in data disaggregation is useful if to be adopted as part of sector monitoring. An in-depth statistical investigation of the validity of using the Spearman's correlation test as used in this study is needed. This is essential because, using the linear equation results in a pre-defined ranking of the coverage variables (highest to lowest or vice versa) which has direct bearing on the Spearman's test since it uses ranks instead of actual values. The investigation would prove its suitability as a tool for assessing the relationship between sector investment and coverage.

6.3 Reflections on Research Process

Granting the useful insights from the correlations analysis, doing it requires a substantial amount of financial data. Although the minimum of four sets is acceptable, about fifteen sets would be better. Using the linear equation in estimating access may have influenced the results of the correlation analysis. Actual coverage values (based surveys) if it were available would have been more suitable. Disaggregating data by language/tribe was

excluded in this analysis since tribal/language differences has little influence on access in Ghana. However, it may be incorporated in countries that caste/religion/tribal affiliations influence access to WASH facilities.

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ANNEXES

1. Detailed Account of Literature Search Strategy and Analysis
2. Questionnaires for National WASH Sector Institutions
3. Categorisation of Facility Types
4. Critical Values of the Spearman Rank Order Correlation Coefficients
5. Spearman's Rank Correlation Tests

ANNEX 1: Detailed Account of Literature Search Strategy and Analysis

The initial step taken in the literature search was to identify the key issues to be discussed in the literature review. Information on the following guided the scope of the literature search;

- General and WASH sector specific approaches to resource allocation/investment (at both global and local (Ghana) levels)
- Resource allocation in the health sector
- Definitions and concept of equity
- Approaches to WASH data analysis (disaggregation)
- Correlations assessment
- Key institutions involved in the area of study.

A mind map of the potential sources of information revealed the sources identified in Table A1. However as the search progressed, it became evident that as a result of the specialised nature of the research Google/Google scholar search engine, and the websites of sector specialised institutions such as WHO, UNICEF, Organisation for Economic Co-operation and Development (OECD), etc. provided the most relevant documents. Keywords used for the search included, 'resource allocation', 'resource investment', 'financial investment', 'financial planning', budgeting, equity, 'WASH sector investment', 'WASH coverage', 'access to water and sanitation', sub-Sahara, Africa, 'Water and Sanitation Ghana', 'resource allocation in health sector', etc.

The "snowball" approach (looking at the references and bibliographies of identified documents to trace out other related ones) proved to be a useful technique for identifying related literature. The related documents were then searched for using Google/Google scholar search engine. Some of these documents where finally traced down to the identified sector specialised websites. Literatures that were downloadable were saved on the computer whilst the web-addresses of the non-downloadable ones were noted. The same approach (snowballing and Google search) was applied to the newly identified documents to identify others.

Although the Water, Engineering and Development Centre (WEDC) Resources Centre and Pilkington Library did not provide much literature, the few identified by using the respective databases (WEDC Knowledgebase and Library Catalogue Plus (LCP)) where followed up and skimmed through (e.g. reading through abstracts/executive summary where provided) to ascertain their relevance to the research. For example, a book traced of at the WEDC resources centre *"Water sector planning & associated investment program 2002-2011"* was found to be mainly centred on cost recovery which was not quite relevant for the purposes

of this study. Table A1 below presents a summary of the literature search approach and outcomes.

Table A1: Literature Search Strategy and Outcomes

Source of Information	Search Strategy	Justification and Outcome
WEDC Knowledgebase	Keywords were entered into the search field. The keywords were refined using techniques as indicated in Table A2 below. Using the collections category, and selecting 'MSc dissertations', the list of the dissertations were noted and quick scan was done at the resources centre	Provided an up to the minute source of both e-copy (soft copy) and hardcopy literature (published or unpublished) on WASH. The database was useful in locating documents (those without web links) at the WEDC resources centre. Shelf numbers of the relevant documents were noted and followed up later. Although literature produced by the search results were largely not related to the research topic, a WEDC briefing note; *'Allocating national resources in the water and sanitation sector' ("WELL BN 11")* identified through this search happened to be among the key sources of information.
Library Catalogue (LC) and LCP	Starting with the LC search, the keywords were entered into the search. The LCP option using advanced search (refined by title) was used to locate literature with the keywords in the title.	The LCP a more versatile database was very useful in refining searches. Identified articles and book references were recorded using e-shelf (stores a list of marked items). The LCP provides an added advantage of refining the searches by literature type e.g. books, journals, articles, etc. as well by publication data. These options were rarely used because of the very limited number of relevant data found.
ProQuest	A similar approach as in the LCP search was used. Using the advanced search, literature could be refined with publication dates, peer reviewed, title etc.	Made up 32 different databases including WASH related ones such as Aqualine, this database helped in identifying a few related documents which were mostly downloadable (in pdf).
Google/Google Scholar	Using the keywords and the various techniques, these searches provided vast amount information. Several pages of the search results had to be viewed.	Google search identified the most significant number of related literature. The web links of the documents identified by the Google search helped to map out the web addresses of some of the less pronounced WASH sector institutions who had some relevant information on their site.
Bibliographies	Scanning through the references and bibliographies of literature identified from the above	This approach provided the easiest and fastest way to identify reliable literature.

Source of Information	Search Strategy	Justification and Outcome
	searches helped in tracking other important related literature.	
Other websites	Websites of WHO, UNICEF, Water and Sanitation Programme (WSP), OECD, World Bank, Water and Sanitation Monitoring Platform-Ghana (WSMP), African Ministers' Council on Water (AMCOW), WaterAid, Ministry of Finance and Economic Planning – Ghana (MoFEP), etc. were accessed	As a result of the specialised nature of the research area, accessing the websites of the key sector players provided the opportunity to identify other literature e.g. field reports, conference reports/papers, etc. amongst other information limited to their websites.

In refining searches, keywords were either substituted (e.g. allocation for investment), added/combined, removed or truncated (e.g. invest*). In other cases their positions were altered (e.g. Investments in WASH sector in Ghana –Ghana WASH Sector investments). The application of such techniques for e.g. addition/combination of words/phrases such as 'sub-Saharan Africa' and 'Ghana' to 'WASH sector investment' or 'water and sanitation sector investment' narrowed the identified literatures from the global level, to sub-Saharan Africa and to Ghana respectively. The search results of examples of such techniques in refining the search are presented in Table A3 below. During the search, literature found were categorised into core (very important), relevant (important) and peripheral (less important) and key points on each literature noted. This helped the researcher to easily locate literatures to focus on more or less during in-depth review. Table A2 presents a summary of the number of literature reviewed.

Table A2: Summary Literature Reviewed

Literature Category	Number	Literature Type	Number
Core	86	Books	67
Relevant	32	Journals	10
Peripheral	10	Grey Literature (reports etc.)	44
Total	128	Briefing Note	2
		Dissertation	2
		Webpages	3

Table A3: Examples of Keyword Combinations used in Literature Search

Search Engine/database	Keywords	Search results
Library Catalogue	'Resource allocation'	82
	'Resource allocation' water and sanitation	1
LCP	'water and sanitation investment'	11,280
LCP (advanced search) +refined by title	'water and sanitation investment' (in title of document)	9

Search Engine/database	Keywords	Search results
Google search	'WASH sector resource allocation WASH sector resource allocation + sub-Saharan Africa + Ghana	2,690,000 219,000 116,000
WEDC Knowledge base	Equity + resource allocat*/allocat? Equity + water and sanitation	4,572 10,165

In evaluating the literature gathered, five main issues were initially considered; i.e. content, reputation of author(s), audience of the literature, number of references and relevance to research topic. However as the evaluation progressed, three of the issues- author, references and audience become less significant since most of the authors identified were reputable institutions specialised (e.g. WHO/UNICEF JMP, WaterAid, World Bank, etc) in the research area. A reasonable number of references were also indicated in their reports (both published and unpublished). Items looked out for in the content evaluation was mainly ease of comprehension of the document and the document setting- i.e. either professional (related to WASH, Economic, Financial and Monitoring sector specialists) or just a general literature setting. Most of the literatures however had professional a setting.

Relevance of the literature was hinged on whether the literature had much detail related to any of the aspects of the research topic (resource allocation/investment, equity, analysis of WASH data). It was observed that, a significant number of the literature for which in-depth review was done, had in each of them information related to almost all the thematic aspects of the research. Thus, requiring a critical and detail review to be able to fish-out the relevant information. With WHO/UNICEF-JMP being the only institution to have extensively used a similar approach in analysing WASH data, an extensive methodology review was limited. Furthermore, most of the literatures were observed to have used either the WHO/UNICEF JMP's approach in data analysis or its data (results). Evaluating literature by using date of publication was not strictly applied since the thematic aspects of the research became topical issues in recent times (i.e. post the setting of the Millennium Development Goals (MDG) in 2000).

ANNEX 2: Questionnaires for National WASH Sector Institutions

Questionnaire on Targeting of WASH Facilities and Service Beneficiaries in the Community
Water and Sanitation Agency

Research Topic: ***"Analysing Water, Sanitation and Hygiene (WASH) Data to Guide Sector Resource Allocation– A Case Study of Ghana".***

Background:

While the investments in Ghana's water and sanitation sector appears not to fully correspond with improvements in access to water and sanitation services and facilities, achieving equity (regional, rural/urban, income, etc.) is even much more challenging. This research therefore aims to demonstrate how the analysis of existing national water and sanitation data (from Demographic Health Survey and Multiple Indicator Cluster Survey) can aid more equitable resource allocation by identifying the equity gaps and how to target resources to bridge the gap. Among the issues to be investigated is how resources are allocated in Ghana's water and sanitation sector. This questionnaire is therefore intended to provide the researcher relevant first-hand information to this issue. **Your assistance is appreciated and will be acknowledged in the report. Any information provided will be used only for the purposes of this research and will be treated in strict confidence if requested**.

a. Selection of service/facilities beneficiary communities/areas

1. Kindly explain how service/facility beneficiary communities are selected?

2. Are there any criteria used in prioritising these beneficiary communities/areas? If there are, kindly list them below.

3. Are there any challenges with your current way of selecting service/facility beneficiaries? If there are, please provide further details?

b. **Equity (fairness) in the allocation of financial resources**

4. Kindly explain the extent to which the following are considered in the allocation financial resources.
   i. Regional equity
   ii. Rural and Urban equity
   iii. Poor (for e.g. people living in very remote areas/slums) and Rich
   iv. Kindly indicate if there are any other equity considerations.

5. In what way do you think resources can be better allocated to ensure equity?

Thank You.

Questionnaire on Targeting of Urban Water Service Beneficiaries by the Ghana Urban Water Limited

Research Topic: ***"Analysing Water, Sanitation and Hygiene (WASH) Data to Guide Sector Resource Allocation– A Case Study of Ghana".***

Background:

While the investments in Ghana's water and sanitation sector appears not to fully correspond with improvements in access to water and sanitation services and facilities, achieving equity (regional, rural/urban, income, etc.) is even much more challenging. This research therefore aims to demonstrate how the analysis of existing national water and sanitation data (from Demographic Health Survey and Multiple Indicator Cluster Survey) can aid more equitable resource allocation by identifying the equity gaps and how to target resources to bridge the gap. Among the specific objectives of the study are to investigate how resources are allocated in Ghana's water and sanitation sector and to identify the implications of resource allocation on the current status of access to water and sanitation facilities and services. This questionnaire is therefore intended to provide the researcher relevant first-hand information to address these objectives. **Your assistance is appreciated and will be acknowledged in the report. Any information provided will be used only for the purposes of this research and will be treated in strict confidence if requested**.

1. Kindly explain how communities/areas are selected for providing of water?

2. Are there any criteria used in prioritising these beneficiary communities/areas? If there are, kindly list them below?

3. Are there any challenges with your current way of selecting service/facility beneficiaries? If there are, please provide further details?

4. Kindly explain the extent to which the following are considered in the allocation financial resources.
   i. Regional equity
   ii. Urban equity
   iii. Poor (for e.g. people living in very remote areas/slums) and Rich
   v. Kindly indicate if there are any other equity considerations.

5. In what way do you think resources can be better allocated to ensure equity?

Thank You.

Questionnaire/List of questions on Allocation of Resources sent to the Water and Environmental Health and Sanitation Directorates.

Research Topic: ***"Analysing Water, Sanitation and Hygiene (WASH) Data to Guide Sector Resource Allocation– A Case Study of Ghana".***

Background:
While the investments in Ghana's WASH sector appears not to fully correspond with improvements in access to WASH services and facilities, achieving equity (regional, rural/urban, income, etc.) is even much more challenging. This research therefore aims to demonstrate how the analysis of existing national WASH data (from Demographic Health Survey and Multiple Indicator Cluster Survey) can aid more equitable resource allocation by identifying the equity gaps and how to target resources to bridge the gap. Among the specific objectives of the study are to investigate how resources are allocated in Ghana's WASH sector and to identify the implications of resource allocation on the current status of access to WASH facilities and services. This questionnaire is therefore intended to provide the researcher relevant first-hand information to address these objectives. **Your assistance is appreciated and will be acknowledged in the report. Any information provided will be used only for the purposes of this research and will be treated in strict confidence if requested**

1. Are there any factors/criteria that guide the allocating of resources (financial) to the various Directorates within the Ministry? If yes, kindly provide further details.

2. Are there any 'special considerations' in allocating resources to the Environmental Health and Sanitation Directorate in particular? If there, kindly list them indicating how they are applied.

3. Are there any equity considerations (regional, urban-rural, poor/low income) in the Directorate's budget expenditure? Kindly provide details if there are.

4. How would you grade on a scale of 1-5 (1-very poor, 2-poor, 3-average, 4-good and 5-very good), the Directorate's resource allocation process of being effective in;
   (a) reaching the intended beneficiary groups)

Grade:
Kindly provide a brief justification for your answer.

   (b) populations where the need is demonstrably the greatest? (Kindly provide some justification for your answer)

Grade:
Kindly provide a brief justification for your answer.

5. In what way do you think resources can be better allocated to ensure effective targeting and efficient use of resources (value for money)?

6. What percentage of the directorate's annual resources allocations (budget) is administered through the following resource allocation channels?
   i. ***Institutional****- largely through the conventional public finance systems linked to budget allocations and fiscal transfers from MoFEP*
   ii. ***Sector Based****- funding often developed independently of the regular government financing arrangements, at local, regional, national, or global levels.*

iii. ***Program Based****- includes a variety of program-linked financing arrangements and loan instruments*

Resource Allocation Channel	Percentage (%) of resource allocation/budget				
	0%-20%	**21%-40%**	**41%-60%**	**61%-80%**	**81%-100%**
Institutional					
Sector-based					
Program-based					

Note: You may select more than one resource allocation method if more than one is used ***but should total 100%***

7. Are there any reasons that you consider are responsible for the use the selected method(s) in allocating resources to the Directorate?

8. Do you think there are any challenges (limitations) with the use of these methods? Please provide further insights if there are.

9. In what way do you think these challenges can be addressed?

THANK YOU

ANNEX 3: Categorisation of Facility Types

Categories of facility in DHS data set (1998)	Categories of facility in DHS data set (2008)	WHO/UNICEF JMP Grouping	Grouping in research
		Water	
• Piped into residence • Public tap/neighbours house • Borehole • Well in residence • Public well • Spring • Rainwater • River/stream • Dam • Pond/lake • Tanker truck • Dug out	• Piped into dwelling/yard or plot • Public tap • Stand pipe • Tube well/Borehole • Protected dug well • Protected spring • Unprotected spring • Unprotected dug well • Rainwater • Bottled/sachet water • Surface water • Tanker/cart with drum	• ***Piped water on premises***: Piped household water connection located inside the user's dwelling, plot or yard. • ***Other improved drinking water sources***: Public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs, rainwater collection. • ***Unimproved drinking-water sources***: Unprotected dug well, unprotected spring, cart with small tank/drum, surface water, bottled water • ***Surface drinking-water sources:*** River, dam, lake, pond, stream, canal, irrigation channels.	• ***Piped water;*** All piped water • ***Ground water:*** Protected/Unprotected dug well, springs, boreholes, tube wells • ***Surface water*** River, dam, lake, pond, stream • ***Rainwater:*** • ***Other:*** Tanker, cart with small drum etc. (*NB: Bottled and sachet water were added to piped water category since in the JMP 2012 report, survey data showed that most people who use bottled water as their main source of drinking water also have piped water on premises as a secondary source).*
		Sanitation	
Categories of facility in DHS data set (1998)	**Categories of facility in DHS data set (2008)**	**WHO/UNICEF JMP Grouping**	**Grouping in research**
• Own flush toilet • Share flush toilet • Ventilated pit latrine • Traditional pit latrine • Bucket/pan • No facility	• Flush to piped sewer • Flush to septic tank • Flush to pit latrine • Flush to don't know where • Flush to elsewhere • VIP • Pit latrine with slab • Pit latrine without slab/open pit • Bucket /pan toilet • Composting toilet • No facilities • Other	• ***Improved sanitation facilities:*** They include the following facilities: • Flush/pour flush to: - piped sewer system - septic tank - pit latrine • Ventilated improved pit (VIP) latrine • Pit latrine with slab • ***Shared sanitation facilities***: Sanitation facilities of an otherwise acceptable type shared between two or more households. Only facilities that are not shared or not public are considered improved. • ***Unimproved sanitation facilities***: Include pit latrines without a slab or platform, hanging latrines and bucket latrines.	• ***Flush toilet***: Of all types • ***VIP*** • ***Pit latrines***: with or without slabs • ***Bucket/Pan latrines*** • ***No facilities/Bush*** • ***Other-*** Composting toilets etc.

Categories of facility in DHS data set (1998)	Categories of facility in DHS data set (2008)	WHO/UNICEF JMP Grouping	Grouping in research
		• ***Open defecation: when human:*** Faeces are disposed of in fields, forests, bushes, open bodies of water, beaches or other open spaces or disposed of with solid waste.	

ANNEX 4: Critical Values of the Spearman Rank Order Correlation Coefficients

		Level of Significance for		
		One-Tailed Test		
	0.05	0.025	0.01	0.005
		Level of Significance for		
		Two-Tailed Test		
N	0.1	0.05	0.02	0.01
4	**1.000**			
5	0.900	1.000	1.000	
6	0.829	0.886	0.943	1.000
7	0.714	0.786	0.893	0.929
8	0.643	0.738	0.833	0.881
9	0.600	0.700	0.783	0.833
10	0.564	**0.648**	0.745	0.794
11	0.536	0.618	0.709	0.755
12	0.503	0.587	0.671	0.727
13	0.484	0.560	0.648	0.703
14	0.464	0.538	0.622	0.675
15	0.443	0.521	0.604	0.654
16	0.429	0.503	0.582	0.635
17	0.414	0.485	0.566	0.615
18	0.401	0.472	0.550	0.600
19	0.391	0.460	0.535	0.584
20	0.380	0.447	0.520	0.570
21	0.370	0.435	0.508	0.556
22	0.361	0.425	0.496	0.544
23	0.353	0.415	0.486	0.532
24	0.344	0.406	0.476	0.521
25	0.337	0.398	0.466	0.511
26	0.331	0.390	0.457	0.501
27	0.324	0.382	0.448	0.491
28	0.317	0.375	0.440	0.483
29	0.312	0.368	0.433	0.475
30	0.306	0.362	0.425	0.467
31	0.301	0.356	0.418	0.459
32	0.296	0.350	0.412	0.452
33	0.291	0.345	0.405	0.446
34	0.278	0.340	0.399	0.439
35	0.283	0.335	0.394	0.433
36	0.279	0.330	0.388	0.427
37	0.275	0.325	0.383	0.421
38	0.271	0.321	0.378	0.415
39	0.267	0.317	0.373	0.410
40	0.264	0.313	0.368	0.405
41	0.261	0.309	0.364	0.400
42	0.257	0.305	0.359	0.395
43	0.254	0.301	0.355	0.391
44	0.251	0.298	0.351	0.386
45	0.248	0.294	0.347	0.382

ANNEX 5: Spearman's Rank Correlation Tests

Table A5.1: Spearman's Correlation Assessment of per capita ODA and Water facilities (sources) Coverage.

Year	ODA Disbursment (US$)	Per Capita ODA (US$)	% of HH Coverage/access (Surface water)	Population Equivalent with access to Surface water	No of Paired Variables (n)	Rank (per capita ODA Disbursment (US $))	Rank (population with access to surface water)
2002	62,613,800.00	3.11	18.4	3,701,042	1	6	1
2003	57,098,165.00	2.77	17.2	3,545,074	2	8	2
2004	64,091,956.00	3.03	16.1	3,400,306	3	7	3
2005	74,108,918.00	3.42	14.9	3,224,331	4	5	4
2006	81,337,853.00	3.67	13.7	3,037,366	5	4	5
2007	124,679,120.00	5.49	12.6	2,861,763	6	1	6
2008	124,805,880.00	5.36	11.4	2,652,116	7	2	7
2009	60,237,423.00	2.53	10.3	2,453,913	8	9	8
2010	95,608,076.00	3.92	9.1	2,219,656	9	3	9
2011	48,323,310.00	1.94	7.9	1,972,299	10	10	10
2012	-	-	6.8	1,737,124			
						CORREL (rs)	**-0.006060606**
						Critical Value (n=10, 0.05 signifcance level, 2 tailed test)	**0.648**

Year	ODA Disbursment (US$)	Per Capita ODA (US$)	% of HH Coverage/access (Ground water)	Population Equivalent with access to Ground water	No of Paired Variables (n)	Rank (per capita ODA Disbursment (US $))	Rank (population with access to Ground water)
2002	62,613,800.00	3.11	41.1	8,264,991	1	6	10
2003	57,098,165.00	2.77	41.1	8,471,079	2	8	9
2004	64,091,956.00	3.03	41.1	8,682,395	3	7	8
2005	74,108,918.00	3.42	41.1	8,898,288	4	5	7
2006	81,337,853.00	3.67	41.1	9,118,750	5	4	6
2007	124,679,120.00	5.49	41.1	9,343,883	6	1	5
2008	124,805,880.00	5.36	41.2	9,573,208	7	2	4
2009	60,237,423.00	2.53	41.2	9,806,124	8	9	3
2010	95,608,076.00	3.92	41.2	10,042,114	9	3	2
2011	48,323,310.00	1.94	41.2	10,280,923	10	10	1
2012	-	-	41.2	10,522,372			
						CORREL (rs)	**0.006060606**
						Critical Value (n=10, 0.05 signifcance level, 2 tailed test)	**0.648**

Year	ODA Disbursment (US$)	Per Capita ODA (US$)	% of HH Coverage/access (Piped water)	Population Equivalent with access to Piped water	No of Paired Variables (n)	Rank (per capita ODA Disbursment (US $))	Rank (population with access to Piped water)
2002	62,613,800.00	3.11	39.2	7,892,875	1	6	10
2003	57,098,165.00	2.77	40.4	8,328,863	2	8	9
2004	64,091,956.00	3.03	41.6	8,781,659	3	7	8
2005	74,108,918.00	3.42	42.8	9,251,017	4	5	7
2006	81,337,853.00	3.67	43.9	9,737,308	5	4	6
2007	124,679,120.00	5.49	45.1	10,241,023	6	1	5
2008	124,805,880.00	5.36	46.3	10,762,008	7	2	4
2009	60,237,423.00	2.53	47.4	11,299,914	8	9	3
2010	95,608,076.00	3.92	48.6	11,854,426	9	3	2
2011	48,323,310.00	1.94	49.8	12,425,487	10	10	1
2012	-	-	50.9	13,013,101			
						CORREL (rs)	**0.006060606**
						Critical Value (n=10, 0.05 signifcance level, 2 tailed test)	**0.648**

Table A5.2: Spearman's Correlation Assessment of per capita ODA and Sanitation facilities Coverage

Year	ODA Disbursment (US$)	Per Capita ODA (US$)	% of HH Coverage/access (OD)	Population Equivalent practising OD	No of Paired Variables (n)	Rank (per capita ODA Disbursment (US $))	Rank (population practising OD)
2002	62,613,800.00	3.11	26.9	5,414,786	1	6	10
2003	57,098,165.00	2.77	26.5	5,468,071	2	8	9
2004	64,091,956.00	3.03	26.1	5,520,745	3	7	8
2005	74,108,918.00	3.42	25.8	5,572,250	4	5	7
2006	81,337,853.00	3.67	25.4	5,622,453	5	4	6
2007	124,679,120.00	5.49	25.0	5,671,287	6	1	5
2008	124,805,880.00	5.36	24.6	5,718,334	7	2	4
2009	60,237,423.00	2.53	24.2	5,763,123	8	9	3
2010	95,608,076.00	3.92	23.8	5,805,254	9	3	2
2011	48,323,310.00	1.94	23.4	5,844,498	10	10	1
2012	-	-	23.0	5,880,675			
						CORREL (rs)	**0.006060606**
						Critical Value (n=10, 0.05 signifcance level, 2 tailed test)	**0.648**

Year	ODA Disbursment (US$)	Per Capita ODA (US$)	% of HH Coverage/access (VIP Latrine)	Population Equivalent with access VIP	No of Paired Variables (n)	Rank (per capita ODA Disbursment (US $))	Rank (population with access to VIP Latrine)
2002	62,613,800.00	3.11	46.1	9,276,743	1	6	10
2003	57,098,165.00	2.77	47.5	9,786,054	2	8	9
2004	64,091,956.00	3.03	48.8	10,314,965	3	7	8
2005	74,108,918.00	3.42	50.2	10,863,183	4	5	7
2006	81,337,853.00	3.67	51.6	11,431,139	5	4	6
2007	124,679,120.00	5.49	52.9	12,019,404	6	1	5
2008	124,805,880.00	5.36	54.3	12,627,795	7	2	4
2009	60,237,423.00	2.53	55.6	13,255,897	8	9	3
2010	95,608,076.00	3.92	57.0	13,903,339	9	3	2
2011	48,323,310.00	1.94	58.4	14,570,050	10	10	1
2012	-	-	59.7	15,256,035			
						CORREL (rs)	**0.006060606**
						Critical Value (n=10, 0.05 signifcance level, 2 tailed test)	**0.648**

Year	ODA Disbursment (US$)	Per Capita ODA (US$)	% of HH Coverage/access (Pit Latrine)	Population Equivalent with access Pit Latrine	No of Paired Variables (n)	Rank (per capita ODA Disbursment (US $))	Rank (population with access to Pit Latrine)
2002	62,613,800.00	3.11	14.0	2,811,988	1	6	1
2003	57,098,165.00	2.77	12.8	2,632,012	2	8	2
2004	64,091,956.00	3.03	11.6	2,441,462	3	7	3
2005	74,108,918.00	3.42	10.4	2,239,720	4	5	4
2006	81,337,853.00	3.67	9.1	2,026,389	5	4	5
2007	124,679,120.00	5.49	7.9	1,801,094	6	1	6
2008	124,805,880.00	5.36	6.7	1,563,353	7	2	7
2009	60,237,423.00	2.53	5.5	1,312,725	8	9	8
2010	95,608,076.00	3.92	4.3	1,048,848	9	3	9
2011	48,323,310.00	1.94	3.1	771,444	10	10	10
2012	-	-	1.9	480,264			
						CORREL (rs)	**-0.006060606**
						Critical Value (n=10, 0.05 signifcance level, 2 tailed test)	**0.648**

Year	ODA Disbursment (US$)	Per Capita ODA (US$)	% of HH Coverage/access (Flush latrines)	Population Equivalent with access to Flush toilet	No of Paired Variables (n)	Rank (per capita ODA Disbursment (US $))	Rank (population with access to Flush latrines)
2002	62,613,800.00	3.11	9.7	1,943,047	1	6	10
2003	57,098,165.00	2.77	10.3	2,131,167	2	8	9
2004	64,091,956.00	3.03	11.0	2,327,414	3	7	8
2005	74,108,918.00	3.42	11.7	2,531,857	4	5	7
2006	81,337,853.00	3.67	12.4	2,744,715	5	4	6
2007	124,679,120.00	5.49	13.1	2,966,240	6	1	5
2008	124,805,880.00	5.36	13.7	3,196,498	7	2	4
2009	60,237,423.00	2.53	14.4	3,435,479	8	9	3
2010	95,608,076.00	3.92	15.1	3,683,165	9	3	2
2011	48,323,310.00	1.94	15.8	3,939,606	10	10	1
2012	-	-	16.5	4,204,862			
						CORREL (rs)	**0.006060606**
						Critical Value (n=10, 0.05 signifcance level, 2 tailed test)	**0.648**

Table A5.3 Spearman's Correlation Assessment of % ODA Expenditure on WASH and WASH facilities Coverage in Urban Areas

Year	% of GDP Spent on Urban water	Rank	Year	% of HH Coverage/access (Surface water)	Rank
2008	0.264	2	2009	1.11	1
2009	0.186	4	2010	0.8	2
2010	0.218	3	2011	0.49	3
2011	0.291	1	2012	0.18	4
				CORREL	**-0.4**
				Critical Value (n=4, 0.1 signifcance level, 2 tailed test)	**1**

Year	% of GDP Spent on Urban water	Rank	Year	% of HH Coverage/access (Ground water)	Rank
2008	0.264	2	2009	16.31	4
2009	0.186	4	2010	16.64	3
2010	0.218	3	2011	16.97	2
2011	0.291	1	2012	17.3	1
				CORREL	**0.4**
	-			**Critical Value (n=4, 0.1 signifcance level, 2 tailed test)**	**1**

Year	% of GDP Spent on Urban water	Rank	Year	% of HH Coverage/access (Piped water)	Rank
2008	0.264	2	2009	80.69	1
2009	0.186	4	2010	80.66	2
2010	0.218	3	2011	80.63	3
2011	0.291	1	2012	80.6	4
				CORREL	**-0.4**
				Critical Value (n=4, 0.1 signifcance level, 2 tailed test)	**1**

Year	% of GDP Spent on Urban Sanitation	Rank	Year	% of HH Coverage/access (OD/Bush)	Rank
2008	0.0304	1	2009	7.31	1
2009	0.0198	3	2010	7.09	2
2010	0.0248	2	2011	6.87	3
2011	0.0003	4	2012	6.65	4
				CORREL	**0.8000**
	Critical Value (n=4, 0.1 signifcance level, 2 tailed test)				**1**

Year	% of GDP Spent on Urban Sanitation	Rank	Year	% of HH Coverage/access (Pit latrine)	Rank
2008	0.0304	1	2009	12.46	1
2009	0.0198	3	2010	11.3	2
2010	0.0248	2	2011	10.14	3
2011	0.0003	4	2012	8.98	4
				CORREL	**0.8**
	Critical Value (n=4, 0.1 signifcance level, 2 tailed test)				**1**

Year	% of GDP Spent on Urban Sanitation	Rank	Year	% of HH Coverage/access (VIP)	Rank
2008	0.0304	1	2009	51.82	4
2009	0.0198	3	2010	53.3	3
2010	0.0248	2	2011	54.78	2
2011	0.0003	4	2012	56.26	1
				CORREL	**-0.8**
	Critical Value (n=4, 0.1 signifcance level, 2 tailed test)				**1**

Year	% of GDP Spent on Urban Sanitation	Rank	Year	% of HH Coverage access (flush latrine)	Rank
2008	0.0304	1	2009	28.4	4
2009	0.0198	3	2010	29.4	3
2010	0.0248	2	2011	30.4	2
2011	0.0003	4	2012	31.4	1
				CORREL	**-0.8**
	Critical Value (n=4, 0.1 signifcance level, 2 tailed test)				**1**

Table A5.4: Spearman's Correlation Assessment of % ODA Expenditure on WASH and WASH facilities Coverage in Rural Areas

Year	% of GDP Spent on Rural water & Sanitation	Rank	Year	% of HH Coverage/access (Surface water)	Rank
2009	0.169	1	2009	18.23	1
2010	0.075	2	2010	16.9	2
2011	0.064	3	2011	15.57	3
2012	0.036	4	2012	14.24	4
				CORREL	**1**
	Critical Value (n=4, 0.1 signifcance level, 2 tailed test)				**1**

Year	% of GDP Spent on Rural water & Sanitation	Rank	Year	% of HH Coverage/access (Ground water)	Rank
2008	0.169	1	2009	61.99	4
2009	0.075	2	2010	62.6	3
2010	0.064	3	2011	63.21	2
2011	0.036	4	2012	63.82	1
				CORREL	**-1**
	Critical Value (n=4, 0.1 signifcance level, 2 tailed test)				**1**

Year	% of GDP Spent on Rural water & Sanitation	Rank	Year	% of HH Coverage/access (Piped water)	Rank
2008	0.169	1	2009	19.16	4
2009	0.075	2	2010	19.9	3
2010	0.064	3	2011	20.64	2
2011	0.036	4	2012	21.38	1
				CORREL	**-1**
	Critical Value (n=4, 0.1 signifcance level, 2 tailed test)				**1**

Year	% of GDP Spent on Rural water & Sanitation	Rank	Year	% of HH Coverage/access (OD/Bush)	Rank
2008	0.169	1	2009	38.25	4
2009	0.075	2	2010	38.27	3
2010	0.064	3	2011	38.29	2
2011	0.036	4	2012	38.31	1
				CORREL	**-1**
	Critical Value (n=4, 0.1 signifcance level, 2 tailed test)				**1**

Year	% of GDP Spent on Rural water & Sanitation	Rank	Year	% of HH Coverage/access (Pit latrine)	Rank
2008	0.169	1	2009	36.26	1
2009	0.075	2	2010	35.4	2
2010	0.064	3	2011	34.54	3
2011	0.036	4	2012	33.68	4
				CORREL	**1**
	Critical Value (n=4, 0.1 signifcance level, 2 tailed test)				**1**

Year	% of GDP Spent on Rural water & Sanitation	Rank	Year	% of HH Coverage/access (VIP)	Rank
2008	0.169	1	2009	22.54	4
2009	0.075	2	2010	23.4	3
2010	0.064	3	2011	24.26	2
2011	0.036	4	2012	25.12	1
				CORREL	**-1**
	Critical Value (n=4, 0.1 signifcance level, 2 tailed test)				**1**

Year	% of GDP Spent on Rural water & Sanitation	Rank	Year	% of HH Coverage access (flush latrine)	Rank
2008	0.169	1	2009	2.99	4
2009	0.075	2	2010	3.11	3
2010	0.064	3	2011	3.23	2
2011	0.036	4	2012	3.35	1
				CORREL	**-1**
	Critical Value (n=4, 0.1 signifcance level, 2 tailed test)				**1**