

Investigation into the Perceived Neglect of the Volta Region, Ghana, under Millennium Development Goal 7

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Abstract: The Volta Region of Ghana appears to be neglected under the national commitment to the Millennium Development Goals # 7. This impression was informed by the results of a rapid diagnosis of a select group of communities in the region, hence this study. We assessed general government compliance with MDG #7 with specific regard to the Volta Region. We aimed to also help to define the nature and extent of the challenges under MDG #7 facing the region, and propose solutions to implementation difficulties applicable to other regions similarly situated. This assessment was conducted on the legal principle of '*res ipsa loquitur*', the thing speaks for itself without a comparator regional analysis. This approach was to avoid detracting the focus on the issues specific to the Volta Region to the convenience of comparative analysis. The result shows that many households in the region at both rural and urban places and spaces have no built-in toilet facilities. Waste management at the municipal and household level is a challenge. Open defecation and reckless discharge of domestic waste are twin threats to the public health in the region. This study has validated the earlier suspicion that the Volta Region is being neglected in terms of the provision of basic social and communal amenities. The MDG goal #7 would not be attainable with respect to the Volta Region by 2015 or anytime soon due to the perceived and real neglect of the region.

Keywords: Community Diagnosis, Volta Region, Vulnerabilities, Infrastructure, Water and Sanitation, Health and Waste Management, Housing and Income Disparities

1. Introduction

There is the suspicion that the Volta Region of Ghana is being neglected under the MDG # 7. As researchers, we seek to proffer that the suspicion is valid and perhaps, needs to be addressed as a matter of urgency. We sought to validate the suspicion by assessing the regions performance and social assets or resilience under the Millennium Development Goal # 7, but specifically # 7.1 and 7.1. (a), which deal with environmental sustainability as the denominator for a good public health practice [1-3]. The MDGs are widely cited as

the primary yardstick against which advances in international development efforts are to be judged [4]. MDG # 7 seeks to integrate the principles of sustainable development into country policies and programmes and as well reduce by half the proportion of people without sustainable access to safe drinking water [5]. In spite of the strong evidence of cost effectiveness of improved water and sanitation against diarrhoea and support for interventions at the highest international levels, coverage still lags behind the MDG targets, especially for sanitation [6-11]. The MDG made provisions for standards of review for its impact

measurement, which was to be on a national scale [12, 13]. The expectations of the MDG # 7.1 and 7.1 (a) on environmental sustainability, appears to be reiterated by the establishment Act of the Environmental Protection Agency, EPA Act, 1994 (Act 490) Section 2 (a) through (d) delineating the duties of the EPA thus: (a) To advise the minister on the formulation of policies on all aspects of the environment and in particular make recommendations for the protection of the environment; (b) To co-ordinate the activities of bodies concerned with the technical or practical aspects of the environment and serve as a channel of communication between such bodies and the ministry; (c) To co-ordinate the activities of such bodies as it considers appropriate for the purposes of controlling the generation, treatment, storage, transportation and disposal of industrial waste; (d) To secure in collaboration with such persons as it may determine the control and prevention of discharge of waste into the environment and the protection and improvement of the quality of the environment.

Since the Volta Region is an integral part of the jurisdiction of Ghana, the mandate of the EPA covers the Volta Region as well. It is, therefore, expected that the specific modalities of the EPA Act would be part of the standard operating procedure of the region in terms of the environment. In order to identify the differential vulnerabilities of this particular region, it was necessary to conduct a community diagnosis to assess where the region is in relation to specific indicators of the MDGs [13]. Since the MDGs were meant as a seamless continuum or addition to conventional national and governmental developmental processes, where specific standards were absent for the evaluation of the progress under the MDGs, it was generally understood that progress of MDGs can be evaluated and analyzed with conventional tools of development [1]. That is to say, the MDGs had the same impetus as conventional development models. With respect to the issue of environmental sustainability, it appears assessment could be obtained by using simple tools like: access to toilet facilities in the households, water and sanitation, waste treatment and disposal [14, 15].

2. Methods

2.1. Study Area

The study was conducted in seven (07) districts in the Volta Region. The districts included Hohoe and Kpando for the Middle zone, Nkwanta North and South for the Northern zone and Ketu South, North and Central Tongu in the Southern zone. Three districts were selected from the southern zone due to high population density compared with the other zones. The Volta Region is one of the ten administrative regions of Ghana. It is the longest region in the country, and stretches from the Gulf of Guinea through nearly all the vegetational zones found in the country. It shares common boundaries with four major Regions of Ghana namely, Greater Accra on the South West, Eastern on

the West, Brong Ahafo on North West and Northern Regions on the North and international border with Togo on the East. The Region is divided into twenty-five administrative districts/Municipalities with Ho as the Regional capital. Volta Region has a total of 377 health institutions serving a population of 2,225,489 with a growth rate of 2.5%. The Volta Region is divided into three natural geographical belts namely the southern, middle and the northern belts. The middle and northern belts are mainly mountainous, spotting the highest point in the country i.e. Mountain Afadzato at a height of 885metres above sea level. The South is relatively flat with wetlands and sandy portions at Keta, Ketu South, and South Tongu districts. The Middle and Northern belts are drained by rivers Oti, Asukawkaw, Menu, Dayi; all of which stream into the Volta Lake.

The region falls under three major ecological zones; namely the coastal savannah with patches of strand and mangrove in the south, semi-deciduous forest in the middle zone, and semi-savannah woodland in the northern zone. Apart from farming, weaving of Kente cloth and mat is generally practiced in the southern parts of the Volta Region. Pottery and woodcarving is widespread in the middle portions of the region. The predominant economic activity of the people of the region is agriculture (about 60% of total occupation) and consists of farming, fishing, and animal rearing. The major crops grown are cassava, maize, yam, tobacco, shallots and cocoa; fishing is done along the coast and the Volta Lake with cattle rearing in the savannah belts of the south and north. The method of farming is slash and burn, without regard to climate change and its impact. The average farmer in the region does not consider the observed effects of climate variability in designing, preparing, and planting farms, since there is no integrated national platform for climate change adaptation [16].

It is against this background that we carried out this study. We conducted the community diagnosis without regard to the types of regional developmental programs in place and their sources of funding or objectives. We were only concerned with the overall contributions to the underlying infrastructure and improvements to the social, environmental and health determinants within the Volta Region [1, 12]. In this exercise, we adopted community diagnosis as an essential tool to assess the physical, biological and social health status of the Volta Region in relation to MDG # 7.

Community diagnosis allows researchers to define the relative vulnerabilities of the community irrespective of the community's size or wealth. It helps to define the solutions-set and how they can be implemented with the full engagement of the affected community leaders and members, and together with both internal and external collaborators.

We assessed general government compliance with MDG #7 with specific regard to the Volta Region. We aimed to also help to define the nature and extent of the challenges under MDG #7 facing the region, and propose scalable solutions to implementation difficulties applicable to other regions similarly situated. This assessment was conducted on the legal principle of '*res ipsa loquitur*', the thing speaks for

itself without a comparator regional analysis. In other words, there appears to be official negligence in the way and manner in which the Volta Region has been cared for in terms of national development. The perceived neglect is not only attributable to the central government, but also to the local, municipal government, as well as other significant actors such as the chiefs and civil society organizations and the respective communities themselves. This approach was to avoid detracting the focus on the issues specific to the Volta Region to the convenience of comparative analysis.

2.2. Data Collection Using the WHO 30 Cluster Sampling Technique

Names of all districts in a zone were written on pieces of paper and rolled into small balls. This was put in a box and mixed up properly. Individuals were asked to pick two districts per zone. The southern zone has three districts because at the time of this survey North and Central Tongu were one administrative district.

The WHO 30 cluster sampling technique was used to select communities in each of the three zones. In each zone a list of names of all communities were obtained from the health directorate/ District Assembly. The list included the individual community populations. The cumulative population of each community was calculated and written down to arrive at the total cumulative population for each zone. In order to determine a sample interval the total Cumulative Population was divided by 30 Clusters. All decimals were rounded up to the nearest whole number. A random number which was less than or equal to the sample interval was selected. In this regard the last digits of a cedi note were used for the selection of the random number. The first community in which cluster number one was located was done by locating the first community in which the cumulative population equals or exceeded the random number. Then cluster number one was written against that community. In identifying the community in which cluster number two was located, the random number was added to the sampling interval. If the cumulative population listed for that community was equal or exceeds the number calculated then Cluster number two was written against that community. This procedure was used until all the 30 clusters were identified in the three zones for the survey. In each community, seven households were visited and household

heads or any member above 18 years present at the time of the visit and was willing to participate was interviewed.

2.3. Procedure and Method of Data Analysis

Data collected were recorded into a semi-structured questionnaire. Thereafter, the data was entered using Microsoft Excel (2010). The data was later transferred to STATA version 11 for analysis. The Chi-square test and cross tabulation were used to explore important relationship between two categorical variables. Fisher's exact Chi-square test was conducted when one or more of the cells had an expected frequency of five (5) or less and Pearson Chi-square test was also performed when each cell had an expected frequency of five (5) and more. The Wilcoxon-Mann-Whitney (non-parametric) test was carried out based on the assumption that the dependent variable used in the model was not normally distributed and it is analogue to the independent sample t test. Again, STATA version 11 was used. However, the Kruskal Wallis which is the non-parametric version of ANOVA was also used to compare the rank sum or average scores in more than two groups.

2.4. Ethical Consideration

Ethical clearance was sought from the Ethical Review Committee of Ghana Health Service. Permission was also sought from the District Directors of Health Services. Informed consent was obtained from household heads during the household interview. The study was conducted according to guidelines of the Declaration of Helsinki.

3. Results

The respondents in this study came mostly from the informal sector, although in each zone of the region, there was the presence of those engaged in the formal sector, as seen in Table 1. For example, out of the total respondents of 701, only 29(4.14%) came from the Civil Servants or formal sector with 289(41.23%) coming from agriculture or small scale, subsistent farming. In Table 1, below the religious background of the respondents also shows that majority, 515 (73.47%) of the region's residents are of the Christian faith and denomination.

Table 1. Demographic characteristics of respondents by zones in Volta Region.

	Central N=240 (%)	Northern N=160 (%)	Southern N=301 (%)	Total N=701 (%)	Chi2/P-value
Occupation					
Artisan	28 (11.67)	21 (13.13)	44 (14.62)	93 (13.27)	
Civil/Public servant	12 (5.00)	6 (3.75)	11 (3.65)	29 (4.14)	
Farming	85 (35.42)	96 (60.00)	108 (35.88)	289 (41.23)	92.73/0.0001
Trading	65 (27.08)	22 (13.75)	76 (25.25)	163 (23.25)	
Fishing/fish	0	0	36	36	
Mongering	(0.00)	(0.00)	(11.96)	(5.14)	

	Central N=240 (%)	Northern N=160 (%)	Southern N=301 (%)	Total N=701 (%)	Chi2/P-value
Other	50 (20.83)	15 (9.38)	26 (8.64)	91 (12.98)	149.19/0.0001
Religion of respondents					
Christian	233 (97.08)	96 (60.00)	186 (61.79)	515 (73.47)	
Muslim	1 (0.42)	20 (12.50)	4 (1.33)	25 (3.57)	
Traditional African Religion	5 (2.08)	44 (27.50)	111 (36.88)	160 (22.82)	
Other	1 (0.42)	0 (0.00)	0 (0.00)	1 (0.14)	

Table 2. Sources of water supply by zones in Volta Region.

Zone	Borehole N (%)	Dam N (%)	Household pipe N (%)	Public stand pipe N (%)	River N (%)	Well N (%)	Total N (%)	*Chi2/P Value
Central Rural	61 (30.50)	0 (0.00)	17 (8.50)	54 (27.00)	65 (32.50)	3 (1.50)	200 (100.00)	37.32/0.0001
Central Urban	10 (25.00)	0 (0.00)	13 (32.50)	13 (32.50)	0 (0.00)	4 (10.00)	40 (100.00)	
Northern Rural	87 (66.92)	0 (0.00)	0 (0.00)	20 (15.38)	23 (17.69)	0 (0.00)	130 (100.00)	40.16/0.0001
Northern Urban	3 (10.00)	0 (0.00)	2 (6.67)	16 (53.33)	9 (30.00)	0 (0.00)	30 (100.00)	
Southern Rural	20 (9.52)	20 (9.52)	6 (2.86)	78 (37.14)	33 (15.71)	53 (25.24)	210 (100.00)	40.18/0.0001
Southern Urban	2 (2.20)	0 (0.00)	11 (12.09)	36 (39.56)	2 (2.20)	40 (43.96)	91 (100.00)	
Overall Rural	168 (98.80)	20 (100.00)	23 (46.94)	152 (70.05)	121 (91.67)	56 (56.00)	540 (77.03)	100.58/0.0001
Overall Urban	15 (8.200)	0 (0.00)	26 (53.06)	65 (29.95)	11 (8.33)	44 (44.00)	151 (22.97)	

Table 2 shows that there is inadequate supply of pipe born water to households in all the three zones in the region. The situation is more acute in rural communities in all the zones registering percentages from 0.00%-8.50%. In the same vein, water supply from boreholes in rural communities in all the

three zones ranges from 9.52%-66.92%. The question is what type of water supply source will be appropriate for the rural and urban population? Is it well water, harvested rain water or water from rivers and streams?

Table 3. Sanitation Scores of Zones by Rural and Urban Communities Two sample Wilcoxon Rank-sum (Mann-Whitney) test.

Zone	Number (N)	Rank sum	Expected	
Overall Rural	540	182813.5	189540	z -3.035
Overall Urban	161	63237.5	56511	p 0.0024
Overall Combined	701	246051	246051	
Central Rural	200	23347	24100	z -1.911
Central Urban	40	5573	4820	p 0.056
Central Combined	240	28920	28920	
Northern Rural	130	10249.5	10465	z -0.962
Northern Urban	30	2630.5	2415	p 0.336
Northern Combined	160	12880	12880	
Southern Rural	210	29024.5	31710	z -4.093
Southern Urban	91	16426.5	13741	p 0.0001
Southern Combined	301	45150	45451	

*N means number of respondents. Sanitation was scored and then Wilcoxon test was performed to compare the score between rural and urban for each zone. Higher rank-sum value means good sanitation

In ranking the communities with improved sanitation, the overall picture is not encouraging in either the rural or the urban setting. The data in Table 3 shows that in the urban setting of the entire region; out of the total 701 respondents polled, 161 reported having unimproved sanitation. The

results appear to show that those in the rural and the peri-urban setting rather have better access to improved sanitation with 540 of the respondents reporting having access to improved sanitation. This outcome is repeated in each of the three ecological zones of the Volta Region that we studied.

Table 4. Toilet facility availability in houses by zones in Volta Region.

Zone	Yes N (%)	No N (%)	Total	Chi2/P value
Central Rural	63 (31.50)	137 (68.50)	200(83.33)	0.03 /0.852
Central Urban	12 (30.00)	28 (70.00)	40(16.67)	
Northern Rural	37 (28.46)	93 (71.54)	130(81.25)	0.04/ 0.844
Northern Urban	8 (26.67)	22 (73.33)	30(18.75)	
Southern Rural	35 (16.67)	175 (83.33)	210(69.77)	12.55/0.0001
Southern Urban	32 (35.16)	59 (64.84)	91(30.23)	

Zone		Yes N (%)	No N (%)	Total	Chi2/P value
Overall	Rural	135(72.19)	405(78.79)	540(77.03)	3.38/0.066
	Urban	52(27.81)	109(21.21)	161(22.97)	

*Pearson χ^2

3.1. Households with Toilet Facilities

The figure for households with toilet facilities was very low when considering the total population of the Volta Region at the same time. Although in the Southern zone there appears to be some sort of parity between households with toilet facilities in both the urban (32/301 households) and rural (35/301 households), in percentage terms, the parity vanishes with rural registering 16.67% only and the urban having 35.16%. The urban south households without toilet facility in real terms were 59 [64.84], with 175 [83.33%] of rural households having no access to improved toilet facilities which was statistically significant. Please see Table 4 for details.

3.2. The Private Cost of Ablutions

It appears there is little or no government support to the respective communities in the provision of toilet facilities, where again due to, perhaps, the neglect of Town and Country Planning, housing developers and private home owners did not provide for toilets in the house. User charges for the commercial or public toilet facilities (if such places can be referred to as such) are too exorbitant for the average farmer or un-employed youth to be able to afford to use it. In Table 5, Public Latrine Charges are provided in both the rural and urban settings.

Table 5. Public Latrine Charges by zones in Volta Region.

Zone		10P N(%)	20P N(%)	50P N(%)	Free of charge N(%)	Total N(%)	P value
Central	Rural	7 (7.78)	14 (15.56)	0 (0.00)	69 (76.67)	90 (100.00)	0.000*
	Urban	8 (32.00)	3 (12.00)	8 (32.00)	6 (24.00)	25 (100.00)	
Northern	Rural	1 (5.88)	0 (0.00)	0 (0.00)	16 (94.12)	17 (100.00)	0.000*
	Urban	3 (25.00)	8 (66.67)	0 (0.00)	1 (8.33)	12 (100.00)	
Southern	Rural	1 (1.67)	0 (0.00)	0 (0.00)	59 (98.33)	60 (100.00)	0.000*
	Urban	7 (25.93)	11 (40.74)	1 (3.70)	8 (29.63)	27 (100.00)	

* Fisher's exact

3.3. Solid Waste Treatment and Disposal in the Volta Region

In Table 6 the nature of the region's solid waste disposal modalities or protocol is presented. Methods used for waste disposal are: burning in pits, burying in pits, crude dumping,

open burning, public dumping and collection sites, and other more insidious means of waste disposal approaches are indulged in by the residents. This problem seems to be significantly bigger to the community in the Southern part of the region compared to the other regions.

Table 6. Solid Waste Disposal practices by zones in Volta Region.

Zone		Burning in a pit N(%)	Bury in a pit N(%)	Crude dumping N(%)	Open burning N(%)	Public dumping/ collection site N(%)	Other N(%)	Total N(%)	Chi2	P value
Central	Rural	3 (1.50)	11 (5.50)	32 (16.00)	19 (9.50)	102 (51.00)	33 (16.50)	200 (100.00)	7.9388	0.160**
	Urban	1 (2.50)	0 (0.00)	3 (7.50)	1 (2.50)	27 (67.50)	8 (20.00)	40 (100.00)		
Northern	Rural	1 (0.77)	10 (7.69)	1 (0.77)	15 (11.54)	68 (52.31)	35 (26.92)	130 (100.0)	4.6530	0.460**
	Urban	9 (4.31)	13 (6.22)	111 (53.11)	28 (13.40)	41 (19.62)	7 (3.35)	209 (100.00)		
Southern	Rural	8 (8.79)	2 (2.20)	31 (34.07)	8 (8.79)	42 (46.15)	0 (0.00)	91 (100.00)	29.4642	0.000**
	Urban									

*Pearson χ^2

Table 7. Methods of Bath water disposal by zones in Volta Region.

Zone		Channel into a gutter N(%)	Open drain N(%)	Soak away N(%)	Other N(%)	Total N(%)	Chi2	P value
Central	Rural	11 (5.50)	124 (62.00)	36 (18.00)	29 (14.50)	200 (100.00)	16.1709	0.001
	Urban	7 (17.50)	12 (30.00)	12 (30.00)	9 (22.50)	40 (100.00)		
Northern	Rural	1 (0.77)	80 (61.54)	33 (25.38)	16 (12.31)	130 (100.00)	3.9310	0.269
	Urban	1 (3.33)	15 (50.00)	7 (23.33)	7 (23.33)	30 (100.00)		
Southern	Rural	4 (1.90)	181 (86.19)	12 (5.71)	13 (6.19)	210 (100.00)	4.7354	0.316
	Urban	2 (2.20)	71 (78.02)	7 (7.69)	11 (12.09)	91 (100.00)		

In Table 7, it is noticed further that the ecosystem of the Volta Region in both the urban and rural settings are fraught

with environmental degradation and daily assault through the disposal of both solid and liquid waste, which is more

significant in the Central part of the region. Waste water from bath houses (Bath water) is readily discharged into open gutters that lead to larger open gutters that run through the respective towns and cities until it is emptied into lagoons, estuaries of the Volta Lake and the ocean.

4. Discussion

MDG # 7 seeks to integrate the principles of sustainable development into country policies and programmes and as well reduce by half the proportion of people without sustainable access to safe drinking water [5]. The expectations of the MDG # 7.1 and 7.1 (a) on environmental sustainability coincided squarely with national law on environmental sustainability and protections. Going by the focus of the MDGs, it may appear that Ghana is now preparing to launch a national platform on environmental sustainability, but this is not so. According to WHO and UNICEF, Ghana is currently off-track in terms of achieving the MDGs for access to improved toilet facilities [8]. The Environmental Protection Agency, EPA Act, 1994 (Act 490) Section 2 (a) through (d) delineating the duties of the EPA predates the MDGs by more than a decade. The EPA Act of 1994, section 2 subsections (a) to (d) are quite explicit about the need for the nation to protect the environment through research and co-ordination of technical activities among stakeholders so as to obtain the best evidence for decision making. It also calls for the control and management of waste in the nation through collaboration and to ensure that the nation enjoys environmental protections that are equal or superior to any. Indeed, the legal framework for environmental protections in Ghana could be the envy of many in the sub-region. The nation's legal framework on the environment consists of: (a) the various EPA regulations, Act of 1994, legislative instrument and executive instrument. There are also (b) the Local Government Act and the By-laws of the various district assemblies; and (c) the Ozone Protection Act and other occupationally related laws such as the Factories, Offices and Shops Act, and the Mining Act. All these pieces of legislation provide the environmental protections and regimen Ghana has designed for itself. At any rate, the 1994 EPA Act in Ghana was quickly endowed with its Legislative Instrument in 1999: LI 1652, then the LI 1703 of 1999 for Environmental Assessment, which was amended by LI 1652 to introduce processing fees and other administrative matters. Attempts were made to develop an Environmental Action Plan from 1991 through 2000, until finally in 2012 the Action Plan was presented to the public. On paper, therefore, there is a great deal of activity to safeguard the environment for all in Ghana in terms of the development of the legislative framework. Even so, even in this area, there are many gaps such as the lack of environmental ethics. The Volta Region suffers the same environmental shocks and stresses due to the lack of ethical environmental practices across the board, the absence of systematic regional programs, rent-seeking behaviour of some of its leadership and leadership with capacity. Despite

this, the administrative and legislative activities described in the preceding paragraphs were impressive. They gave a new impetus to the expectation that operational efficiencies for the protection of the environment would be improved en masse in Ghana over time and reduce the threat of communicable or epidemic prone diseases with proximal nexus to the environment in terms of its occurrences such as cholera, which seems to be endemic in Ghana.

From the results, we have also noticed that the region is challenged in sanitation management. When we consider the number of people practicing open defecation, or the number of households engaged in the dumping of domestic waste at unauthorized locations, it is difficult to accept the notion that the population is aware of the health implications of these activities. There appears to be disconnection between the environmental legal framework of the nation and the operational outcomes of the framework. This makes the MDGs even more important and novel and timely.

5. Conclusion

It would be inappropriate not to conclude that the differential vulnerabilities identified in the Volta Region are as a result of systematic, socially produced outcomes of both national and municipal government policies and programs. The vulnerabilities are not random, but show a wide regional distribution across geographical and economic lines. We agree with the scientific literature that such inequalities are modifiable and therefore call on both the municipal, regional and national governments to arrest the persistent deterioration of social and other services in the Volta Region.

Recommendations

1. We recommend to the various districts/municipalities in the region and particularly those within the study areas as mentioned in this paper, that in the cluster of communities without adequate sources of potable water, a mechanized borehole is sunk in strategic locations to improve access and use of potable water.

2. We recommend to the municipal EPA representative to work in collaboration with the municipalities and the regional executives to install multi-seater modern water-closets in strategic locations, which is maintained by the households in the communities in turns on a weekly basis to encourage total community ownership, maintenance and operation. It should be financed by the municipality as part of its services to the community. This would discourage open defecation and improve the overall health of the communities.

3. To the local chiefs, we recommend and take this opportunity to humbly remind them that part of their mandate emanates from their responsibility to galvanize the communities over which they are chiefs into communal civic duties such as periodic cleaning of gutters in their locals to forestall flooding in the rainy seasons, to clean the environment, to arrest the habit of open defecation and indiscriminate disposal of domestic waste at unauthorized

locations, and to contribute to the overall health of the communities. The chiefs need to reengage their respective communities on matters of health, security and development by coming out with innovative approaches to address problems in their communities. Such activities do not need money to initiate and even accomplish. What such endeavours need is leadership, which by their positions are already thrust and mandated by the people to lead. There is a need to institute community peer review on sanitation under various paramountcy's in traditional areas in the region.

4. To the National Government, we recommend that development attention be focused on the Volta Region and design an intervention program similar to the Savannah Accelerated Development Agency designed for the three Northern Regions to ensure that the many developmental gaps, some of which have been identified in this paper, be addressed in a holistic way and help improve the economic performance of the region. For this end, we suggest the Volta Rejuvenation Agency with the mandate and financial resources to implement among other goals:

(a) The provision of mechanize boreholes in all potable water deprived communities,

(b) The provision of multi-seater modern water-closets free to the public and operated and managed by the respective households in the community concerned,

(c) Build community incinerators and composting sites to recycle waste that can be recycled and incinerate what cannot be recycled;

(d) Charge with monthly community cleaning exercise;

(e) Prepare the communities against flooding, and carry out other health promotion programs to reduce the incidence of avoidable diseases such as cholera;

(f) Map out development gaps within the region to inform municipal, regional and national policies and to build public-private-partnership for the rapid acceleration of developments in the region.

Authors' Contributions

FNB conceived the study and partially financed the data collection; MK financed the remainder of the cost for data collection and also participated with data input, design of tables and analysis; MPK, GKA, PA and EO designed the study, collected and inputted the data; WT did the preliminary analysis of the data; IDN did the zero draft of the paper; MPK also finalized the revision of the paper for submission and subsequent follow-up to get the paper published. All authors approved the revised manuscript.

References

- [1] S. D. Vordzorgbe, R. Bhavnani, M. Owor and F. Bousquet, Report on the Status of Disaster Risk Reduction in the Sub-Saharan African Region, Commission of the African Union, UNISDR, World Bank, Nairobi, pp. 1-84, 2008.
- [2] Action Aid International, Climate change, urban flooding and the rights of the urban poor in Africa. Key Findings from six African Cities. A report by Action Aid, October, 2006.
- [3] S. Asthana, and R. Oostvogels, Community participation in HIV prevention: Problems and prospects for community-based strategies among female sex workers in Madras, 1996.
- [4] J. Karver, C. Kenny, and A. Summer, MDG 2.0: What goals, targets, and timeframe, pp. 1-57, 2012. Available: <http://onlinelibrary.wiley.com/doi/10.1111/j.20400209.2012.00398.x/abstract>.
- [5] A. Attaran, An immeasurable crisis? A criticism of the millennium development goals and why they cannot be measured, pp. 955, 2005. Available: <http://dx.plos.org/10.1371/journal.pmed.0020318>.
- [6] K. O. Boadi, and M. Kuitunen, Environmental Health Impacts of Household Solid Waste Handling and Disposal Practices in Third World Cities: The case of the Accra Metropolitan Area, Ghana, Journal of Environmental Health, Vol. 68, pp. 32-35, 2005.
- [7] Water and Sanitation sector monitoring platform (WSMP) Ghana, Briefing note; use of improved sanitation facilities in Ghana, 2008.
- [8] UNICEF, and WHO, A snapshot of Sanitation in Africa, UNICEF/WHO Joint monitoring programme, prepared for the African conference in Durban, South Africa, 2008.
- [9] T. Clasen, and S. Sugden, Water and sanitation; the scope of Public Health: Oxford textbook of Public Health, vol. 1, pp. 159-1176, 2009.
- [10] T. Getahun, E. Mengistie, A. Haddis, F. Wasie, E. Alemayehu, D. Dadi, T. Van Gerven, and B. Van der Bruggen, Municipal solid waste generation I growing urban areas in Africa: current practices and relation to socioeconomic factors in Jimma, Ethiopia, Vol. 184, pp. 6337-6345, 2012.
- [11] UNICEF, and WHO, Progress on sanitation and drinking water, JMP, 2013.
- [12] I. D. Norman, O. Alhassan, F. Zotor, E. K. Derbile, F. Cudjoe, M. Sahnoon, and B. M. Awiah, Ghana Report on Urbanization and Climate Change: The case of Ho, Tamale, Ashaiman and Sodom & Gomorrah. RILab, West Africa Region, Resilient Africa Network, University of Health and Allied Sciences, Ho, Volta Region, 2013.
- [13] W. N. Adger, T. P. Hughes, C. Folke, S. R. Carpenter, and J. Rockstrom, Social-ecological resilience to coastal disasters, Science, vol. 309(5737), pp. 1036, 2005.
- [14] R. Harrington, P. Carroll, S. Cook, C. Harrington, M. Scholz, and R. J. McInnes, Integrated constructed wetlands: water management as a land-use issue, implementing the 'Ecosystem Approach', pp. 2929-2937, 2011. Available: <http://www.iwaponline.com/wst/06312/wst063122929.htm>.
- [15] J. R. Lori, S. Rominski, J. Richardson, B. P. Agyei, N. E. Kweku, and M. Gyakobo, Factors influencing Ghanaian midwifery students' willingness to work in rural areas: A computerized survey, pp. 834-841, 2012. <http://www.sciencedirect.com/science/article/pii/S002074891200051X>.
- [16] United Nations Human Settlements Program (UN-HABITAT), Ghana: Ho City Profile, Regional Technical Cooperation Division. ISBN Number: 978-92-1-132172-2, 2009.