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Original Research Paper

The Role of Women in Global Health Evidence Based Research: Margaret Kweku and the Identification of Cutaneous Leishmaniasis, Ho, Ghana

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This narrative contains the steps taken to identify or discover the incidence and prevalence of cutaneous leishmaniasis in the Volta Region of Ghana. The discovery had implication for the presence of the disease in other regions of Ghana in terms of finding the proper medical nomenclature, identifying the true aetiology of cutaneous leishmaniasis, treatment protocol and contributing to knowledge on disease outbreak and investigation as well as increasing awareness of the disease in the community. It shows a quick overview of some of the impediments that researchers, particularly women in the scientific community, ought to be aware of and how to leverage the support of their male counterparts in their small offices at the district level into the national level for maximum gains for all stakeholders and beneficiaries. This is the account of a female District Director of Health Services in Ghana.

Keywords: Discovery, Cutaneous Leishmaniasis, Ho, Volta Region, Ghana.

INTRODUCTION

"By the end of the Second World War, it is possible to say that almost all of the major practical problems in dealing with infectious diseases had been solved" (Sir McFarland Burnett, 1962)

The above quotation probably sums up the assumptions that researchers still have when working to improve clinical understanding of an infectious disease or conducting drug trials or assessment. The controversy that initially surrounded the Phase-II vaccine trial against the Ebola Virus Disease in Ghana, West Africa recently is yet another display of the relationship between research and controversy. This is to say, the practical difficulties of engaging a community in which to conduct research shall always be with us.

The recurrence of this challenge is due, in part, to the fear of the unknown. On the other part, it is also due to the lack of understanding of scientific work by a broader majority of the populations, and sometimes instigated by outright petty professional jealousies. There are still major practical problems in dealing with infectious diseases today as it has ever been and which have implications for global health (Brachman 2003).

Such practical challenges were faced by a dedicated researcher in Ghana as recently as 2003 in the personality of Margaret Kweku, MD and the District Director of Health Services at the Hohoe Municipal Hospital. At the beginning of the last quarter of 2002, Margaret had been at her new post barely a year when rumors of a 'mysterious' skin disease started to permeate the health facility where she worked and other facilities and the communities in the Volta Region. In emerging economies such as Ghana, diseases whose aetiology are not well established, and whose medical nomenclature are not well known by the nationals are often considered as mysterious. The health seeking behavior of the population is largely driven by superstition (Norman et al. 2015a; 2015b; 2012; Payer 1988).

The available resources are unevenly applied to the disease burden of nations (Vetter 1998). In Ghana, malaria cases take about 70% of the health budget, followed by maternal/child focus programs (Ghana Health Service Annual Report 2012; 2013; 2014). The management and care of HIV/Aids sufferers on antiretroviral treatment together with

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cases of tuberculosis and drug resistant tuberculosis cases also receive a great deal of attention. Not out of neglect or wanton disregard for proper disease outbreak and investigation, but diseases that receive on the clock monitoring and surveillance are the ones whose protocols are well established (Ghana Statistical Survey 2008; Ghana Statistical Survey 2011).

Leishmaniasis is one of the major infectious diseases affecting the poorest regions of the world and afflicts the world's poorest population. Leishmaniases threaten 350 million women, men and children in 88 countries around the world, 72 of which are developing countries. Leishmaniasis is described as a polymorphic protozoan disease of the skin caused by a number of species of the genus Leishmania. The disease is transmitted by the bite of an infected female phlebotomine sandfly. Animal reservoir host primarily infects Sandflies. The life cycle starts when a parasitized female sandfly takes a blood meal from a human host. As the sandfly feeds, promastigote forms of the leishmanial parasite enter the human host via the proboscis. Although people are often bitten by sandflies infected with leishmania protozoa, most do not develop the disease; those who are immune-suppressed quickly evolve to full clinical presentation of severe leishmaniasis

In humans, the commonest presentation can be in the form of cutaneous leishmaniasis. It can produce many skin ulcers on exposed skin, causing serious disability and permanent scarring when they heal. Visceral leishmaniasis is the most severe form of leishmaniasis and is characterized by irregular bouts of fever, substantial weight loss, swelling of the spleen and liver, and anaemia. Mucocutaneous leishmaniasis produces lesions which destroy the cavity of the nose, mouth and throat. In Africa, cutaneous leishmaniasis is caused by: *Leishmania major* - occurs in Sudan, Senegal, North Africa, Cameroon and Burkina Faso and Nigeria. *Leishmania tropica* - has been reported in Morocco. *Leishmania aethiopica* - found in Ethiopia and Kenya.

PROFILE OF THE OUTBREAK SITE

It is important to put into context the outbreak site. Unfortunately, no spatial distribution of cutaneous leishmaniasis was conducted. 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. These are the coastal strands and mangrove swamps, the interior forest zones and the northern savannah grassland. The Volta Region lies on a longitudinal layout extending from latitude 5 degrees 45 N to 8 degrees 45 N. It shares common boundaries with four major Regions of Ghana, namely, Greater Accra, Eastern, Brong Ahafo and Northern Regions and an international border with Togo.

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%. It occupies a land area of 20,570 sq km making up 8.6% of the land of Ghana and consists of 27% urban and 73% of the rural population, implying that the region is mainly rural and with a density of 79.5 per sq km. 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. Mt. Afadzato at a height of 885metres above sea level. The South is relatively flat with wetlands and sandy portions at Keta, Ketu, 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 rivers Volta, Alabo, and Tordzi drain the Southern belt. A major economic activity is weaving of Kente cloth and mat, which is generally practised in the southern parts of the Volta Region. Pottery and woodcarving are 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 (Ghana Health Service, 1998). This so far tells us that the Volta Region is not a rich industrial area thus far. Good health care tends to vary inversely with the need for it in the population served (Hart 1971). Where the bulk of the people in a given area is perceived as poor or is indeed poor, it is not hard to note that official attention to disease outbreak and investigation would lag behind the attention paid to other resources dominant in the communities (Vetter 1998).

Public Health practice is both an art and a craft. Good craftsmanship dictates that in a resource limited ecosystem such as Ghana, the available limited resources are applied to the health threats to the population that would yield the most result, protect most lives, prevent the spread of disease and cure/manage cases already exposed (National Health Insurance Act, 2012 (Act 851). Emerging diseases, though, receive attention, such is often reactionary and then followed by an accelerated pace to catch up with the outbreak as it was in the case of the Ebola Virus Diseases in West Africa and in the case of SARS in Hong Kong as reported by the CDC and WHO bulletins. When the initial cases of cutaneous leishmaniasis were first reported, most in the health care delivery system in Ghana did not consider it a serious health threat that needed the allocation of resources. Perhaps the situation would have been different if the outbreak had occurred in the major urban centers such as the capital Accra or even Kumasi.

At any rate, when the DHMT reported a handful of cases of a disease from Ho, in the Volta Region 1999, a disease that was yet to be identified and named, studied and for the appropriate interventions and treatment protocols to be designed, there was no urgency to apply the basic epidemiologic tools to it.

Dr. Margaret Kweku, a young medical officer and researcher; who at that time was armed with MPH and was an MPhil Student at the School of Public Health University of Ghana, Legon was then working as a public health physician and a District Director of Health Services at Hohoe. Prior to coming to Hohoe, Margaret was the acting District Director of Health Services for Kadjebi District also in the Volta Region from 1999 to 2000. Margaret was transferred to Ho the regional capital in 2001 as a Municipal Director of Health Services and the Medical Superintendent of the Ho Polyclinic. Needless to say that she did not arrive in Hohoe District Hospital as a greenhorn.

Despite her previous experiences in other parts of the Volta Region, Margaret was then looking for an opportunity to make a contribution to the lives of her people. Dr. Kweku hails from Lolobi Kumasi in the Hohoe Municipality, whose professional progression has demonstrably been staged in the Volta Region as previously told. Dr. Margaret Kweku after obtaining her Ph. D from the London School of Tropical Medicine, unlike many others, she returned home to serve her people.

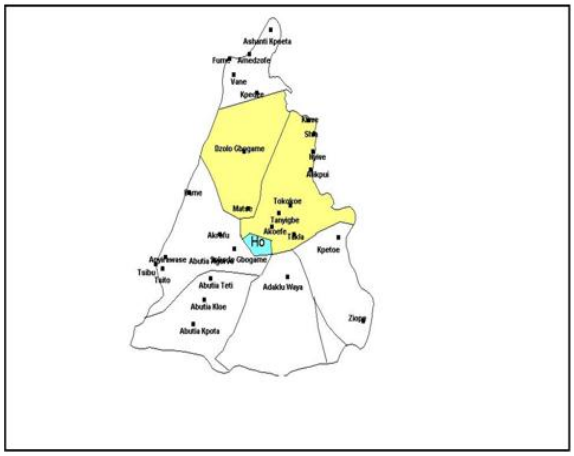

Figure 1. The Map of the Volta Region

In fact, the field research leading to her Ph. D took place at the Hohoe Onchocercaisis Research Center as a researcher. The Center was under the management of a seasoned, WHO sponsored doctor, Dr Kwabla Awadzi. The entire Centre was a collaboration between the WHO and the Ghana Health Service. During this period not only did Margaret worked as a researcher at the Onchocercaisis Research Center in Hohoe, but she was also a part-time lecturer at the School of Public Health, University of Ghana, Legon until she was appointed the Mayor or Municipal Chief Executive for the Hohoe municipality. A position she occupied from September 2011 to September 2015 with class and dedication, where political will met public health practice. Hers' was a combination of skills which came in handy when there was civil unrest in her municipality and three (3) people died during the communal clash in Alavanyo, in 2014.

She applied her skills as a medicine woman, a mother, a public health professional, a researcher towards the resolution and calming of tempers in the conflict. Even as a Municipal Chief Executive, she was on adjunct status with the School of Public Health, University of Health and Allied Sciences. During this period, she was a Co-Principal Investigator in a Phase-II vaccine trial for the Ebola Virus Disease in Ghana, for which she and her co-researchers including world acclaimed scientist like Prof. Fred N. Binka, but particularly, she was vilified, life threatened and insulted in the media. Do you want to know why she was singled out and attacked? You guessed it, yep, because she is a woman! The attacks were so vitriolic that her own political party regional chairman and his supporters started circulating mails suggesting her removal as the Mayor of Hohoe.

The attacks and name calling finally ended at a Parliamentary inquiry. The researchers had to face off with the lawmakers during Q and A moment, where for a brief moment which seemed like eternity science bowed to political power in the Parliament of Ghana. Their charge was that she and her co-researchers were bringing the Ebola Virus Disease into the Volta Region to kill her own kin. Incidentally and not that it matters, but Prof. Fred N. Binka, one of the lead Investigators hails from the Volta Region as well. The other Co-principal Investigator is Prof. Kwadwo Korem of the Nugochi Memorial Medical Research Institute, University of Ghana, Legon, Accra.

In the case of Cutaneous leishmaniasis discovery in the Volta Region, by December 2002, there was no dedicated researcher on the cases in as far as the Ghana Health Service was concerned. Other health research centers and the teaching hospitals in Ghana were more focused on the usual known diseases such as HIV/AIDs, malaria, TB, cholera, Buruli ulcers and the prevention of PTMCT, infant mortality, road traffic accidents and CSM. Cutaneous Leishmaniasis was not part of the disease profile that was afflicting the population at the time, so it was presumed.

As has already been reported, though there were reports to the DHMT since 1999 about a strange disease in the municipality, there was no urgency to apply the basic epidemiologic tools to it. When Margaret arrived at Ho as the District Director of Health Services in 2001 there were still reports of cases from the health centres and communities to the district disease control Officers who prescribed drugs for treatment. Dr Margaret was not informed until she heard rumors in town that someone had died of Buruli ulcer and on the same day a Medical Assistant, (MA) who had treated the patients with the treatment prescribed by the Disease Control Officer, (DCO) without any success visited the office to give feedback to the DCO who had gone on study leave. In the absence of the DCO the MA was compelled to discuss the problem with Dr Kweku. The Medical Assistant reported that since he was posted to the health centre in the year 2000, he had been treating ulcers which were not healing and patients thought he was not competent and was only collecting their money. While on the way going to the health centre to investigate, the new DCO officer discloses to Margaret that there were also reports from the other communities. Margaret was not happy and tried to find out why she was not informed. The explanation given was that male doctors (DDHS) have worked in the district and could not do anything about the problem, therefore there was no need informing a female doctor, irrespective of her credentials, training or title as District Director of Health Services, (DDHS).

Let's talk money for the moment in disease outbreak and investigations. Since Cutaneous Leishmaniasis was not the usual type of funded disease, there was no budgetary allocation to even begin the investigation into it and to understand it. This is not to say that the public health arm of the Ghana Health Service did not have funds for disease outbreak and investigations. It did. What the GHS did not have was familiarity with the disease, and whether there was an outbreak at all. Leishmaniasis can be characterized as a disease of poverty.

Though many of the publicly funded health programs are focused on the poor and towards an overall poverty alleviation for a large segment of the population, the elephant in the room was the lack of familiarity with leishmaniasis. Needless to say that there was resistance from the top brass of the Ghana Health Service to devote any amount of resources to leishmaniasis. In such matters, persistence and teamwork often work for a win-win outcome for all.

After securing the support of the Regional Health Director, Dr. Mcdamien Dedzo, who in turn garnered the support of Dr. George Amofah, the Director of Public Health and the Director General of the Ghana Health Service, Prof. Badu Akorsah, Margaret was given the green light to collect samples for testing and analysis. With much alacrity and as the main researcher on the case, she ordered wound biopsies to be taken from health centers in the Ho municipalities of 15 patients (aged 12-71 years) who reported to the health centers at various times in 2002 with chronic ulcers. By February 2003, barely two months into the New Year, 15 samples which had been ordered were received. The Director General of the Ghana Health Service, Prof. Badu Akorsah helped to open the doors for her to send the samples to the pathology unit of the Korle-Bu Teaching Hospital, Accra for testing and evaluation.

By this time, a great deal of angst on the part of Margaret and her assigned research assistant and photographer, Mr. Gregory Amenuvegbe was high. Her professional career was on the line. If the result from the biopsies turned out to be a mere smoke screen, a mere case of skin rash, then she would have cried wolf when there was none! With nail biting concentration and patience, they waited, and so did all the other stakeholders to this investigation. At the close of 2002, the reported cases of leishmaniasis were quite few as noted in Table 1. The data reported in Table 1 are only for Kpedze, Ho/Shia and Tsito sub-districts in the Ho municipality. The initial incidence raised a great deal of concern. But by the close of 2003, the general worry moved from concern to well-founded headache. If such data is emanating from just three sub-districts, how wide-spread is the prevalence?

But because no attention had been applied to the diseases, the incidence and prevalence data was all hidden from the view of the medical and health authorities. As made self-evident in Table 1, leishmaniasis was a significant case that needed attention just like all the other diseases of poverty, particularly due to its ability to disfigure and leave indelible scars on the face, neck, forearms, legs, and other parts of the bodies of sufferers at various stages of presentation as shown in the figure 2.

The answer was not far removed from the initial research site. Investigations into other parts of the Volta Region also revealed quite an alarming statistics as seen in Table 2. Other towns within the Volta Region also had similar tales to tell. Finally, the rumors of a mysterious disease were no longer rumors. All of a sudden, they were faced with another health cost burden; another disease of poverty for the limited resources were to be extended.

The reported cases needed validation or confirmation as required by epidemiology. Finally, the wait was over and the 15 biopsies that were sent to the Korle-Bu Teaching Hospital came back thus: Microscopic report showed leishman-Donovan bodies in 10 out of 15 specimens. The other 5 specimens showed heavy infiltrate of histiocytes, plasma cells, lymphocytes, neutrophils and giant cells in the ulcers, which is suggestive of cutaneous leishmaniasis (figure 3).

As a follow-up of the laboratory outcome, funds were provided for further investigations that yielded the date in the tables and figures below. The moment funds were allocated to the investigation of the disease, almost everyone connected to the issue wanted to see immediate result without having to wait for the roll out of the basic research activities. But such expectation was to be expected. Activities carried out by Margaret as the District Director of Health Services and her assistant, Gregory Amenuvegbe were calibrated to maximum result.

These were namely: (A)

i. Making a list of communities mentioned by the District Disease Control Officer (DDCO);
ii. Collecting the names of cases and communities from the health centre register;
iii. Visiting some of the communities mentioned by the DDCO and those from which samples were collected from the health centres;
iv. Talking to community members to find out if there are new cases or other concerns related to the disease.
v. Observing lesions on affected persons;
vi. Asking questions on how it started, progress and duration of the disease.
vii. Asking if they knew of other people with the disease; and
viii. Asking how long the disease has been with them.

Additional activities were carried out, namely: (B)

From the health centre register-November 2002:
Five communities were selected. Four persons who reported to the health facility for wound dressing were selected from each community. They were transported to the regional hospital. 20 Wound biopsy samples were collected under local anaesthesia. The biopsies were then transported to Korle-bu Teaching Hospital Pathology Laboratory for testing. A Follow-up was made to three schools. Line listing was carried out at health facilities and outreach clinics in July and August 2003. Active case search was conducted in three districts during November 2003 National Immunization Day in the Volta Region.

LESSONS LEARNED

We learnt that there are many sources of information such as; Rumors, verbal reports, written reports from Ghana Port Health, data from health facility were available to the DHMT. Any of these reports could be used by the DHMT. Epidemiologic tools such as verification of information by visiting the health facilities and communities to confirm the information was available. This requires committed staff.

This investigation employed tools such as follow ups, line listing of cases, case search to determine the spread of the disease to inform public health action, used laboratory support such as wound biopsy and wound smears to confirm presence of the disease. The sources of information to the DHMT were: Rumors in town that someone had died of Buruli ulcer. Timely dissemination of results and distribution of reports ensures timely follow-up to ensure that the disease is under control.

Table 1. Distribution of cases in the Ho municipality in 2002 and 2003

Sub-District	2002	2003	Total
Adaklu	0	18	18
Kpetoe	0	17	17
Abutia	0	15	15
Kpedze	770	2725	3,536
Ho/Shia	1536	2854	4,390
Tsito	42	556	598
Total	2,348	6,185	8,533

Figure 2. Stages of development and forms of cutaneous leishmaniasis

Table 2. Investigation (5): Case Search Results

Municipality/District	Number of cases before 2003	Number of cases in 2003	Total number of cases (old and new)
Hohoe municipality	2	174	176
Kpando district	76	91	167
Ho municipality	2348	6185	8,533
Total	**2,426**	**6,450**	**8,876**

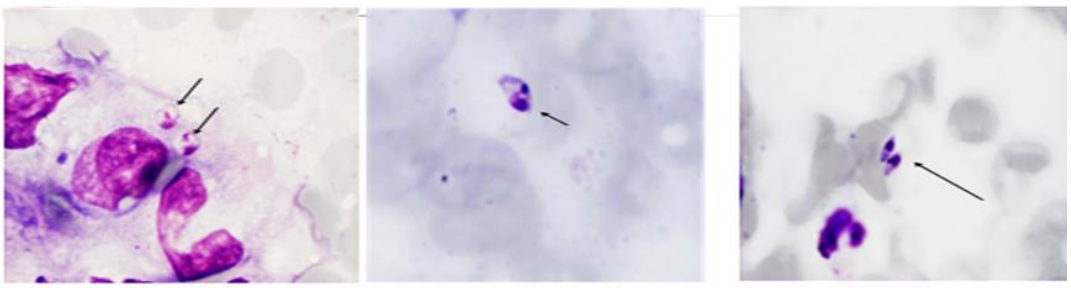

Figure 3. Smears from lesions of patients with cutaneous leishmaniasis showing amastigotes (arrows)

RECOMMENDATIONS

- Identification of the vector and parasite species and the reservoirs of the parasites to facilitate their control
- Immunological studies to monitor the immunity levels of those who have had the infection
- Epidemiological studies to determine periodic fluctuation of the transmission of infection studies

SOURCES OF INFORMATION

- Listen to rumours
- Use reported information (Verbal and written)
- Use health facility reports and data
- Verify the information at the health facility and community before reporting to a higher level**.**

CONCLUSION

While other actors in the Ghana Health Service and medical scene did contribute to the identification or discovery of leishmaniasis in the Ho municipality, without the research efforts of Margaret Kweku, the disease would have received a different label, a different nomenclature that could have led to misdiagnosis and treatment. Though there was initial resistance as to the necessity of laboratory investigation to establish the aetiology of the disease, persistence yielded great dividends to the medical and research community in Ghana.

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