Awareness of the Factories, Offices and Shops Act 1970 (Act 328) at KNUST, Ghana

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Abstract
This paper establishes the awareness levels of the Factories, Offices and Shops Act 328 (FOSA), which relates to occupational safety and health (OSH) in Ghana. Data collection involved administering questionnaires to sampled individuals and key informants from the campus of KNUST. Questionnaires were designed to capture data on FOSA awareness levels, compliance and respondents’ perception of its effectiveness. There is generally low awareness level of FOSA and other existing laws on health and safety. Less respondents, between 40% and 25% from the general and key informant surveys respectively were aware of OSH laws. There is relatively high awareness level associated with the Labour Act 651 representing 60%, followed by FOSA (27%) and finally Workmen’s Compensation Law 187 (13%). On compliance, while over 90% have access to sanitary facilities, findings on fire-detecting and fire-fighting equipment availability, and reporting of incidents to authorities are worrying. Also most emergencies exits have no inscriptions to guide premises users incase of any emergencies. It is recommended that nationwide study should be conducted to establish the extent of low OSH awareness levels. Discussions on exploring the opportunities to incorporate OSH into Ghana’s educational and job trainings should be stimulated.

Keywords: Act 328, awareness, FOSA, Ghana, health and safety

1. Introduction

All over the world, there are steady efforts to promote and sustain safety and health at workplace and even in homes. Health and safety concerns have become paramount to individuals, government agencies and businesses alike. This is more pronounced in developed countries where occupational safety and health have become rooted in the laws, culture and lifestyle of citizens, unlike developing countries. Verma (1996) attributes Canada’s successful Occupational Safety and Health (OSH) regime to initiatives like awareness creation, nationwide access to information, accessible OSH education and training at various levels including universities and colleges, and increase numbers of OSH professionals. Also the United Kingdom has a successful OSH culture and management systems in Islington through strategies like inspections and organising awareness raising and training events, and publicising prosecutions to increase the general public’s awareness of health and safety regulations [I].

Mock et al. (1999) hint that safety and health cannot be ignored since injuries alone account for 14% of all disability adjusted-life year (DALY) losses for the entire world’s population. It is estimated from the International Labour Organization (ILO) that globally over two million people die annually as a result of occupational accidents and work-related diseases (ILO, 2005 and Machida, 2010). Indeed there is significant economic cost to nations as high rates of work-related accidents and diseases contribute to about 4% of the world’s gross domestic product loss (Machida, 2010). According to Adei & Kunfaa (2007) workplace related accidents, injuries and diseases cost Ghana about 7% of gross domestic product (GDP). Clearly health and safety has become a major global concern and should trickle down to all countries. From the ILO, the global challenge now is extending the benefits of real advances in health and safety from industrialized nations to the whole working world (ILO, 2005).

Unfortunately, Ghana like other developing countries as of now has no comprehensive national policy on Occupational Safety and Health (OSH). Meanwhile the country is geared towards industrialization as one of the fast growing economies in the world (Solari et al., 2012), especially following the oil boom. The reality is that a lot of efforts are usually required in promoting health and safety through legislation, enforcement, promotion and
training (Labour Department of Hong Kong, LD-HK, 2010). Ghana is no exception in this regard. The caution is that there could be steady economic development with low awareness level of Occupational Safety and Health (OSH). For instance, Hu et al (1998) claim that despite Taiwan’s rapid economic development, the general awareness, knowledge and perception of the importance of OSH were relatively lacking and limited. Though Ghana has no comprehensive OSH policy, according to Bruce (2009) there exist fragmented safety and health laws used by various ministries, departments and agencies for enforcement and complementary roles. Moreover, Adei and Kunfaa (2007) assert that there are three main laws on OSH in Ghana, namely: the Factories, Offices and Shops Act 328 (FOSA), Workmen’s Compensation Law 187 (1987), and Labour Act 651 (2003). There are also claims that FOSA, which is considered the main OSH statute, has several limitations (Bruce, 2009 and Asiedu, 2010). Thus, there exist institutional framework for OSH. However, this does not deny that the OSH regime in the country has several challenges that need attention.

Apart from the limitations associated with FOSA (Act 328), it is also not clear the awareness level among the populace after over four decades of its existence. Laryea and Mensah (2010) claim that there is poor state of health and safety on construction sites attributing to reasons like lack of strong institutional framework, poor enforcement of health and safety policies and procedures, and low premium on health and safety by the Ghanaian society. The authors also attribute this to lack of awareness of health and safety obligations under existing Acts. Meanwhile, one of the key conditions for addressing health and safety is the development of awareness (Fairbrother, 1996). Osagbemi et al. (2010) suggest that health and safety awareness or consciousness influence compliance of safety measures and not necessarily socio-demographic factors. Also the understanding from India is that awareness of safety and health should be integral part of all training programmes for industries, commerce, services, and educational environments targeting all including workers, supervisors, traders, management personnel, other unions, under-graduate, post-graduate, medical students, etc (GoI, 2011). It can be inferred that improvement in health and safety is realized through sensitization, awareness creation and formal training.

This paper therefore establishes the extent of awareness and compliance with the Factories, Offices and Shops Act 328 (1970), the main OSH legal framework in Ghana, using one of the university communities, Kwame Nkrumah University of Science and Technology (KNUST) in Kumasi. Specifically, the following are established from the study: level of awareness, compliance with some basic requirements and the perception about the effectiveness of the Act.

2. Institutional framework for occupational safety and health in Ghana

Ghana like other countries also has a bit of history concerning Occupational Safety and Health (OSH) tracing back to the colonial era. According to Asiedu (2010), the development of OSH began in the 1930’s without any designated body for labour administration, and OSH was limited to the processing and payment of compensations to workers who were accidentally injured. Around 1938, the British established a Labour Department and legally empowered it to deal with general labour administration. By September 25 1951, a fully qualified and experienced factory inspector to oversee the safety, health and welfare of workers assumed duty. The Factories Inspectorate Unit operated as a unit of the Labour Department, until May 1 1985 when it was separated from the latter and became an autonomous Department (Factories Inspectorate Department) (Asiedu, 2010). The Department of Factories Inspectorate (DoFI) under the Ministry of Employment and Labour Relations (formerly Ministry of Employment and Social Welfare, MoESW) promotes health and safety of persons within the purview of the Factories, Offices and Shops Act, 1970 (Act 328) (MoESW, 2011). It is the recognised body in Ghana by the International Labour Organization, ILO on OSH (Bruce, 2009). Among the core functions of DoFI from MoESW (2011), the key ones are: inspections of workplaces to ensure maintenance of reasonable standards of safety and health, prosecutions of offences under the Factories, Offices and Shops (Act 328), and investigation of reportable occupational accidents and dangerous occurrences.

Moreover, there are other easily identifiable key stakeholders from other government ministries, departments and agencies that play complementary role in the promotion, but not enforcement of OSH measures (Bruce, 2009). These key ministries include Mines, Environment, Health, Road & Transport, and Science & Technology, while the key departments & agencies are National Labour Commission and its Departments; Environmental
Protection Agency; Metropolitan, Municipal and District Sanitary Inspectorate; Chamber of Mines; Ghana Standards Board (now an authority), and Ghana Foods and Drugs Board (now an authority) (Bruce, 2009 & Asiedu, 2010).

Currently, there is no comprehensive national policy on OSH in Ghana. Paradoxically, a policy document titled “Development of Legislation and Policy on OSH for all Sectors of the Ghanaian Economy” was drafted in June 2000 as a bill (Asiedu, 2010) but has not been pushed further for adoption and passage by parliament into law. Notwithstanding, there are several laws and regulations (though with diverse limitations) used by the several government ministries and agencies in the country in discharge of their responsibilities. The lead agency DoFI operates under the Factories, Offices and Shops Act, 1970 (Act 328), FOSA as the main statute. According to (WIEGO, 2010), the Act 328 (FOSA) and the Mining Regulations 1970 (LI 665 & 666) are the two main statutes that have charted the course of OSH over the years. Other statutes that have bearing on OHS include the Workmen’s Compensation Law 1987 (PNDCL 1987), Environmental Protection Agency Act 490 (1994), Ghana Health Service and Teaching Hospitals Act 526 (1999), Labour Act 651 (2003) sections 118 – 120, Children’s Act 560 (1998), Small Scale Gold Mining Law 1989, PNDCL Law 218, Ghana Road Traffic Offences Regulations 1974 (LI 952) and Radiation Protection Regulations 1993 (LI 1553) (Adei and Kunfaa 2007; [II]; Hodges and Baah, 2006; Asiedu, 2010; & WIEGO, 2010).

According to the DIAGLGUE (ILO, 2006), Ghana has been a long-standing member of the International Labour Organization (ILO) since May 1957 soon after independence. It means the country should have by now a strong institutional framework to champion the course of OSH for industrialization. On the contrary, the framework is not clear, limited in scope for the entire economy (given the emergent oil and allied sectors), fragmented with unnecessary overlaps (Bruce, 2009) and other challenges. Adei and Kunfaa (2007) and WIEGO (2010) claim some of the OSH challenges include lack of commitment by managements and government, restrictive inspections, lack of education and enforcement by under resourced DoFI, and poor knowledge or awareness levels of laws and regulations. For instance, claims exist that the proportion of workers who receive OSH service in the informal sector alone (which dominates Ghana’s workforce by 70% - 90%) is not more than 1 – 2% (WIEGO, 2010 & Alfers n.d.). This is a worrying picture and it cannot support productive workforce in a fast growing economy towards industrialization. A smart approach to improving the situation will be to learn from other successful countries. The starting point is to have a comprehensive policy on OSH capable of ensuring OSH service delivery to all sectors of the economy. This seems to have worked well for others; Ghana can do it and now is the time!

2.1 The Factories, Offices and Shops Act, ACT 328, 1970

FOSA has limitations, already enumerated although it has been amended about three times under: (1) the Provisional National Defense Council (PNDC) Law 66 (1983), (2) PNDC Law 275 (1991) and (3) Ghana National Fire Service Act, 1997 (Act 537) (Ghana, Factories Offices & Shop Act 328, 1970), all to widen the scope. However, there are parts and sections of the document that explicitly seek to promote OSH, which can be listed here. These are Parts 4 through to Part 7, and then Part 9 covering the following: notification of accidents, health & welfare, safety, dangerous conditions & practices, and offenses & legal proceedings. Some basic and critical requirements of FOSA that can be seen as supported by WorkSafe (2008) are workplace amenities needed to promote health, safety, welfare and personal hygiene. These include toilets, shelter, seating, dining rooms, change rooms, drinking water, personal storage, washing facilities, workspace, temperature, air quality, lighting and flooring, fire fighting, emergency exits etc.

3. Approach to the study

The study is based on literature review and structured questionnaire surveys. The surveys involved a general survey (on individuals), and a key informants survey (informants from offices and shops including banks, a post office, students’ halls of residence, a laboratory, a pharmaceutical shop, & other trading shops/stores). In all 54 responses were received from the 85 questionnaires administered and the responses are: 42 from the general survey (GS) and 12 from the key informants survey (KIS). The questionnaires were administered using the convenient or grab sampling technique (a non-probability sampling). According to Robson (2002) the sensible
use of convenient sampling has more to do with getting a feeling for the issues, and sampling is used in many contexts other than a sample survey. This sampling approach was adopted because of the challenge of getting respondents to willingly participate in the surveys. Also the study is not necessarily a sample survey but as a case study to get a finding that could be indicative (Robson, 2002). Data from the study is analysed in terms of basic descriptive statistics and cross-tabulations using Microsoft Excel which was also used to create the database.

4. Results and discussion

4.1 Metadata

The study used adult respondents (31% females and 69% males) with more than half (57%) between the ages of 23 and 30 years, and 43% above 30 years old. A majority (89%) of respondents have tertiary education background and the rest (11%) with technical/commercial and senior high school education. Thus all respondents could read and write with high tendency to provide relevant contribution to the study. Students (final year undergraduate and postgraduate students) represent 52% of all respondents and the remainder is workers. Also among the key informants, 17% were owners of shops and or offices and the rest were officers managing the place.

4.2 Level of awareness of FOSA and other laws

On the average, 60% of respondents claim no knowledge of any existing laws or regulations on workplace safety and health. With this figure, 32% are coming from the workers and the majority (68%) are students. Though a significant number of workers are ignorant about laws on OSH, the magnitude of lack of awareness among students who will soon be joining the job market is also overwhelming. Among the 40% who claim knowledge of laws on OSH, the commonly known law is the Labour Act (see Table 1). Workmen’s Compensation Law 187 (PNDC 187) is the least known law (13%), and FOSA the main OSH statute (MoESW, 2011 and Asiedu, 2010) is also struggling with just 27% awareness level. While workers are more familiar with the Labour Act, the students do not know the existence of any Workmen’s Compensation Law (Table 1). Overall, three laws on OSH are known by respondents from this study. This also confirms the assertion by Adei & Kunfaa (2007) that in the absence of OSH policy, these three are the main OSH laws in Ghana.

<table>
<thead>
<tr>
<th>Laws/Regulations</th>
<th>Students</th>
<th>Workers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOSA, Act 328 (1970)</td>
<td>67%</td>
<td>17%</td>
<td>27%</td>
</tr>
<tr>
<td>Labour Act 651 (2003)</td>
<td>33%</td>
<td>67%</td>
<td>60%</td>
</tr>
<tr>
<td>Workman’s Compensation Law 187 (1987)</td>
<td>0%</td>
<td>17%</td>
<td>13%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Moreover, 82% of respondents who claim awareness of existing laws reveal that the last time they heard about the laws was between 6 months and a year ago. The rest heard about the laws at least three years ago. Respondents recall that they last heard of the laws through the media (31%), an agency or institution (31%) and other (38%). Thus, OSH laws and especially FOSA can be promoted through the use of such channels but other potential platforms must be explored. In fact, the results from the key informants survey (KIS) are quite similar to the general survey (GS). Only 25% of informants claim awareness of laws on OSH and among these, FOSA is the least known (33%) while Labour Act is the commonest (67%). The low awareness levels of OSH laws especially FOSA supports Laryea and Mensah (2010) stance that there is lack of awareness of health and safety obligations under existing acts, and this contributes to several challenges including low premium on health and safety by the Ghanaian society.

4.3 Compliance with some basic requirements

There is a high level of compliance with provisions of facilities that promote personal hygiene and sanitation.
High access to sanitary facilities (toilets and hand washing facilities) is reported (see Figure 1): 100% & 90% from students and workers respectively on toilets, and 82% (students) & 90% (workers) on hand washing facilities, all from the general survey. The hand washing facilities are sink-with-taps (77%), shower bath (20%) and bowl with water (3%). From the KIS, 92% indicate that staff and customers have access to sanitary facilities, and again an indication of good compliance level though not 100% access as required by the law (Ghana, Factories Offices & Shop Act 328, 1970).

The results on fire safety, thus availability of fire detecting and fire fighting equipment are worrying. Most respondents 85% (workers) and 91% (students) from the GS indicate non-existence of fire detecting systems at their premises (see Figure 2). On fire fighting, the situation is an improvement over the fire detecting installations but still quite significant respondents 23% (students) and 45% (workers) claim no equipment exist.

Moreover, there is a comparable findings from KIS: 67% say their premises have nothing like fire detecting systems or equipment installed and 25% reveal that there are no fire fighting equipment available. Further to that, the 67% whose premises have no fire detecting facilities gave no acceptable reasons for non-compliance. Majority (63%) claim they never thought of it, only 13% say they cannot afford and finally 25% have no reason...
for not installing them. These findings are worrying because the law requires all premises, thus offices, shops and factories to be installed with fire detecting and fighting equipment. But that is not much of the case from this study, which implies that enforcement is lacking, poor commitment because of low premium on health and safety, and myriad of factors identified by Laryea & Mensah (2010). It can be recalled that Ghana has witnessed several bitter fire incidents with offices, shops and factories over the years. The government at a point in time ordered an industry to close down after fire explosions that reportedly resulted from violation of safety compliance (Ocloo, 2011). The order was to compel management to institute immediate safety measures; and the question now is “can we afford to relax enforcement till disaster occurs?” No way, in as much as enforcement is mandatory at factories, they must be equally so at offices and shops!

Compliance with provision for emergency exit or escape equally needs attention. Clearly, emphases on the inscription “emergency exit” do not exist in most cases even where exit provisions are made within the premises. On the average, only 14% of respondents from the GS claim there exist clearly marked and or dedicated emergency exit (either as doors or windows) (Table 2). The rest (84%) are just doors (either as the main or extra doors) without any inscriptions to indicate their use during emergencies. Moreover, the KIS shows that the premises of informants did not have any dedicated emergency exits and they were relying on the main and or extra doors, strongly supporting the findings from the general survey (GS), Table 2. Thus, predominantly doors used for entry and exits are the same ones used as emergency exits.

### Table 2: Means of escape or exit for emergency situations - general survey

<table>
<thead>
<tr>
<th>Means of escape/exit</th>
<th>Student</th>
<th>Workers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency door</td>
<td>13%</td>
<td>10%</td>
<td>12%</td>
</tr>
<tr>
<td>Emergency window</td>
<td>5%</td>
<td>0%</td>
<td>2%</td>
</tr>
<tr>
<td>Extra doors</td>
<td>41%</td>
<td>20%</td>
<td>31%</td>
</tr>
<tr>
<td>Main door</td>
<td>41%</td>
<td>70%</td>
<td>55%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

On reporting the occurrence of incidents, most respondents 75% (from KIS), those from GS - 82% (students) and 95% (workers) indicate that nothing has ever happened within their premises. However, minority (25% to 5%) indicates witnessing incidents like explosions, fires and collapse of a structure or part of a building at their premises. They claim the incidents resulted in mostly injuries (83%) and damage to property (17%). Interestingly, 86% of such incidents were not reported to any authorities, a situation that confirms the claim by (Annan, 2010) that most safety and health related incidents are not reported in Ghana. The rest (14%) were reported to authorities such as hospitals, police and others, mainly figure heads in society without involving the Department of Factories Inspectorate (DoFI).

### 4.4 Perception about the effectiveness of Act 328 (FOSA)

The perception about the Act 328 (FOSA) is clearly not positive across all the surveys (GS and KIS). Quite a majority (Tables 3 & 4) believe in the following: (1) that the document itself is not common (79% - GS & 67% - KIS); (2) there is not enough awareness about the act (74% - GS & 75% - KIS); (3) the general public do not talk about the act (62% - GS & 50% - KIS); (4) education about the act is not enough (64% - GS & 83% - KIS) and (5) the agency or department responsible is not well known (81% - GS & 83% - KIS). In addition to this, 75% of the key informants reveal that the agency or department responsible for implementation of the act does not visit their premises (Table 4). Unfortunately, this is least expected since inspections of workplaces that include offices and shops are among the key core functions of the agency (DoFI).
Table 3: Individual’s perception of FOSA, Act 328 (1970) – general survey

<table>
<thead>
<tr>
<th>Group</th>
<th>Responses</th>
<th>DC</th>
<th>EA</th>
<th>PT</th>
<th>EE</th>
<th>AW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>Agree</td>
<td>5%</td>
<td>9%</td>
<td>9%</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Strongly agree</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Not sure</td>
<td>9%</td>
<td>9%</td>
<td>27%</td>
<td>27%</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td>Disagree</td>
<td>36%</td>
<td>45%</td>
<td>36%</td>
<td>41%</td>
<td>37%</td>
</tr>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>45%</td>
<td>32%</td>
<td>23%</td>
<td>27%</td>
<td>45%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Workers</td>
<td>Agree</td>
<td>0%</td>
<td>10%</td>
<td>20%</td>
<td>15%</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Strongly agree</td>
<td>0%</td>
<td>5%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Not sure</td>
<td>25%</td>
<td>15%</td>
<td>15%</td>
<td>25%</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td>Disagree</td>
<td>40%</td>
<td>60%</td>
<td>30%</td>
<td>30%</td>
<td>45%</td>
</tr>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>35%</td>
<td>10%</td>
<td>35%</td>
<td>30%</td>
<td>35%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Perception codes
DC = document is common
EA = Existence of enough awareness
PT = the general public talk about it
EE = Existence of enough education
AW = Its agency is well known

Table 4: Key informants’ perception about FOSA, Act 320 (1970) – key informants survey

<table>
<thead>
<tr>
<th>Responses</th>
<th>% Distribution of responses about FOSA, Act 328 (1970)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DC</td>
</tr>
<tr>
<td>Agree</td>
<td>8%</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>0%</td>
</tr>
<tr>
<td>Not sure</td>
<td>25%</td>
</tr>
<tr>
<td>Disagree</td>
<td>42%</td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>25%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

Perception codes
DC = document is common
EA = Existence of enough awareness
PT = the general public talk about it
EE = Existence of enough education
AW = Its agency is well known
AV = Its agency visits premises

5. Conclusions
There is generally low awareness level on laws and or regulations relating to health and safety among respondents. However, most of the people who are aware of any existing laws are more conscious of the Labour Act 651 (2003), followed by the FOSA (Act 328) and the Workmen’s Compensation Law 1987 (PNDCL 187). In fact, the terribly low level of awareness with FOSA (Act 328) is alarming and it is an indictment of the country’s OSH regime. FOSA compliance in terms of access to sanitary facilities is encouraging, with over 90% access to such facilities. Also there exist some means of exits for emergency situations, but most of these exits (main and
extra doors) are not specifically dedicated as required and/or there are no inscriptions to indicate them. Compliance with fire safety is poor. Almost all respondents from the general surveys and more than half of key informants do not have fire detecting systems in their premises, a worrying situation that needs urgent attention. On top of this, quite a significant number also report that there are no fire fighting equipment available within their offices, shops and working premises. It is tolerable that very few incidents such as fire, explosions, and collapse of structure or part of building has occurred at the premises of respondents. Moreover, no deaths are recorded but most of these incident resulted in injuries and very few ended in damage to property. On the other hand, the terrible situation is that most were not reported to authorities for any necessary action and this must be discouraged. The general perception about the effectiveness of FOSA is not positive and majority of respondents believe that the document itself is not readily available, there is not enough awareness & education about the act, and the agency responsible for the act is not well know and it does not also visit their premises.

Ghana needs to explore the opportunities to incorporate health and safety in our educational and job trainings. It is time the responsible agency develops responsive education, awareness creation, and enforcement strategies to fill the gaps as a preparation towards the anticipated new OSH legal framework. There is also the need to clarify and strengthen the OSH institutional framework through implementing a comprehensive OSH legal framework that meets the challenges of all workplaces and premises.

References


Note


Biographical Details

Bismark Dwumfour-Asare is a lecturer at the Department of Environmental Health & Sanitation of University of Education, Winneba in Ghana. He has a background in water, sanitation, environment, health and safety through his education and working experience over five years now. He has been a researcher on a global action-research project called WASHCost in Ghana, and currently he is one of the experts leading its replication in
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