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Perceptions of Building Occupants on Effectiveness of Practiced Damp Remediation Measures in Ghana

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Abstract
This study sought to assess the perceptions of building occupants on the level of effectiveness of some practiced damp remediation measures in Ghana through a questionnaire survey of 5,100 inhabitants living in buildings in eleven major towns in Ghana. The study employed the average weighted model where the average effective scores of all the damp remediation measures studied were considered by the inhabitants as highly ineffective. However, the rankings of these measures by their Effective Index Values based on the level of effectiveness attached to each measure by the respondents showed that using damp proof courses and membranes and construction of aprons at the base of walls showed some level of effectiveness in their application to address the problem of dampness in residential buildings in Ghana. These findings call for the urgent need for all stakeholders in Ghana and other tropical countries to educate building occupants on the need to satisfactorily address the problem of dampness in buildings.
Keywords: dampness, Effectiveness, inhabitants, measures

1. Introduction

In tropical regions like Ghana characterized by high rainfall and humidity together with high temperatures throughout the year, dampness is a very common problem in buildings. Dampness in buildings located in Ghana are usually characterized by the presence of hygroscopic salts, decayed skirtings, mould growth, stains which most of the times appear in the form of horizontal bands, etc. (Agyekum *et al.,* 2013). In other countries worldwide, dampness in buildings are characterized by visible wetting of walls, ceilings and floors, blistering of paints, bulging of plaster, mould growth on surfaces and fabrics, rotten timber and sulphate attacks on brickworks (Trotman *et al.,* 2004). Aside placing the performance of building structures under high risks (Oliver, 1997), the presence of dampness in buildings also have serious health implications on inhabitants living in the buildings (Palomaki & Reijula, 2008). In Ghana, the problem of dampness is very common in many residential buildings and that calls for the urgent need to address such a problem. Because of the lack of technical understanding of this problem, both owners and occupants of buildings in their quest to address the issue have adopted some remedial measures. Such measures include the use of damp proof courses and membranes, construction of aprons at the bases of walls, tiling of wall bases, patching of wall bases, repainting among others (Agyekum *et al.,* 2013). How effective these adopted remediation measures are still remains a question that needs to be resolved and this will continue until professionals with technical abilities to address such problems come together to find solutions. This study aimed at assessing the perceptions of building occupants on the effectiveness they attached to the damp remediation measures which they practiced from the layperson's point of view.

1.1 Some reported cases of dampness in buildings

Dampness in walls of buildings may lead to physical, biological or chemical deterioration of building materials. It is an important factor since it determines the quality of air in relation to human health and comfort and also the structural integrity of timber products in buildings (Haverinen-Shaughnessy, 2007; King *et al.,* 2000).Over the years dampness has received several definitions from different experts, but all point to one thing, that is, water present in buildings which is not supposed to be there. According to The Canadian Wood Council, CWC (2000), dampness can be defined as water penetration through the walls and certain elements of the building, especially where the building is close to a water source. Dampness is one of the subject areas littered with misconceptions and confusions over terminology and thinking (Halim *et al.,* 2012; Burkinshaw & Parrett, 2004). According to Seeley (1994), dampness is the wetting of structural elements through moisture rise by capillary action. It can be described as excessive moisture contained within building materials and components which has the tendency to cause adverse movements or deterioration and which can result in unacceptable internal environmental conditions (Briffet, 1994). Dampness in a building also involves an excess of moisture that causes cosmetic problems, spoils decoration, deteriorate fabrics and causes structural problems or conditions that is of adverse effects to the health of occupants (Oxley, 2003). It is one of the most serious structural effects and can occur in the walls of both old and modern types of construction (Hetreed, 2008; Burkinshaw & Parrett, 2004). Dampness in walls spoils paints and interior decorations, encourages mould and rots growth, hampers aesthetics, poses threats to the health of occupants through providing breeding conditions for mosquitoes, bacteria and fungal growths. It undermines structural integrity of wall elements, reduces thermal insulation property of building materials as well as affects the comfort of the occupants (Trotman *et al.,* 2004; Mbachu, 1999). In Ghana, dampness in the walls of buildings has existed for some time and efforts are being made by building occupants to address such problems (Agyekum *et al.,* 2013).

1.2 Effectiveness of some damp remediation measures practiced worldwide

Dampness/moisture damage of buildings does not have a homogenous appearance, hence, each building needs to be examined individually. Although there are uniform phenomena seen in the microbial contamination of the indoor environment and health effects of the occupants, the original causes of moisture problems and the possibilities of eliminating them vary (Haverinen-Shaughnessy, 2007; Bornehag *et al.,* 2001). Intervention studies on some affected buildings have shown some positive effects after remediation or cessation of exposure on occupants' health (Meklin *et al.,* 2005; Shoemaker & House, 2005). According to Haverinen-Shaughnessy (2007), careful remediation process includes solving the cause(s) of the damage, removing contaminated materials, good quality reconstruction and follow-up measures.

For over 2000 years now, dampness in buildings has received serious attention and lots of remediation measures have been proposed to address the problem. Remediation measures started in the days of the Israelites where the earliest written instructions were given for evaluating microbial contamination in housing environments (Leviticus 14, verses 35-38). These four aspects of dampness remediation measures were given: inspection (*Lev* 14:36); remediation (*Lev* 14:40–42); evaluation criteria for failure (*Lev* 14:43–45); and evaluation criteria for successful remediation (*Lev* 14:48). Among the measures proposed for the treatment of the dampness problem in scripture was removal of stones on walls in affected areas and thoroughly scraping off mould from the contaminated ones. Also proposal was made for the replacement of affected stones followed by replastering of affected areas (Lev 14:40-41). It is seen from the scripture that replastering was one of the highly used damp remediation measures in the days of old. Scripture, however, does not give accounts of the effectiveness of these measures. Only two instructions were given on the success or failure of the method, thus, if it was found that the dampness was still present and kept on spreading, the house was to be torn down (Lev 14: verse 45). If after the inspection it was found that the dampness had not reappeared upon replastering, then the house was pronounced clean and occupants could use the building (Lev 14: verse 48).

1.2.1 The Comer method

Tamas & Tuns (2008) tried to provide a solution to eliminate capillary moisture from brick walls using the Comer Method. The method was applied in two ways, thus, the method of milling holes and the silt method. In the method of milling holes, series of holes were drilled in line along the affected wall. The diameters of the holes depended on the type of material treated and the type of insulating material inserted. Silicon mortar was inserted in the holes and when the required strength was reached, new series of holes were drilled in those wall zones that had not been tackled. The process was continued until there was total isolation of moisture between the lower and upper sides of the walls. This method was very expensive because of the large number of holes that were drilled. The second method which is the silt method could be used for interior or exterior walls made of bricks, concrete or some types of ceramic blocks. In the first stage, a certain height of the mortar in the affected wall was removed. A cut was made in the wall at specific lengths and a special foil which works as a barrier against moisture was placed in horizontal slots created in the wall. The depth of the cut section varied depending on the applied method and the type of wall to be treated. The findings from their study showed that this method provided a radical solution to the upward moisture problems in brick walls. Their study also revealed that in terms of efficiency and durability, the method was a definitive one. The method did not require maintenance or continuous monitoring and it was feasible in a short time without special arrangements. The disadvantage of this method was that its application was limited to only masonry walls of bricks, capstone, etc.

1.2.2 The Dry Zone Technology

This technology was used by Tamas & Tuns (2010) to remove moisture from the capillary walls of buildings, a problem which appeared due to the lack of a horizontal insulation layer in those buildings or poor ventilation of interior spaces within such buildings. It was a special damp proofing cream that was introduced along mortar courses at regular intervals by injecting it into pre-drilled holes. The dry zone diffused before curing to form a continuous water repellent barrier and that prevented the damp from rising up the wall. This method was fast, clean and simple and due to its water-based cream and its non-toxicity, it was safe and completely error-proof to apply. It could be injected 2-3 times faster than ordinary liquid injections fluids. It was found from their study that the Dry Zone could eliminate moisture from capillary walls and it required no special equipment.

1.2.3 Chemical injection methods/Chemical damp proof courses

These damp proof courses have been in use since the 1950s (Rirsch & Zhang, 2010). There are several variations in their compositions and effectiveness. However, the most effective chemical damp proof systems can offer comparable protection to physical damp proof courses at a lower cost of installation. They are liquids that are injected into holes drilled at regular intervals in a horizontal plane along masonry. Silicones, stearates, latex, wax and silicates in solvent or aqueous carriers are among the ingredients used as chemical damp proof courses. The degree of effectiveness and life expectancy will depend on the exact product formulation (Rirsch & Zhang, 2010).

1.2.4 Wall base ventilation system

Torres & de Freitas (2007) felt that many of the techniques used to minimize rising dampness were not effective, particularly, in dealing with walls of considerable thickness and heterogeneous materials. Experiments were performed at the Building Physics Laboratory (LCF) of the Faculty of Engineering of Porto University to validate a new technology for treating rising dampness in walls of historical buildings, using a wall base ventilation system. This method involved ventilated peripheral channels in addition to diminishing water contact with porous walls. This increased the evaporation of absorbed water which took place below the ground level. Installing a hygro-regulated mechanical ventilation device could increase the system's effectiveness (2007). At the end of the experiment, the results showed that implementing this treatment technology (wall base ventilation system) reduced the level of rising dampness but did not eliminate the problem.

1.2.5 Drainage of surface water, sloping of terrain and use of braking layers underneath floors

In a study in Denmark Brandt *et al.* (2012) explored several measures taken to improve basements, i.e. getting them drier and explored new measures to stop rising dampness in the basements of structures. These methods as described by Brandt et al. (2012) included diversion/drainage of surface water away from buildings, sloping of terrain at least 1:40 away from the building and use of capillary braking layer underneath floors to avoid rising dampness in the floors, etc. In their study, all the tested methods proved usable, however, not all of them were considered suitable for commercial use either because of their safety implications or because they were very expensive in use (Brandt *et al.,* 2012).

1.2.6 Solutions to home moisture problems

Brook (2008) outlined some solutions to home moisture problems and they included: adequate drainage around the house; repair and redesign of rain water downpipes; checking and replacing all leaking pipes; ceasing all moisture generation activities in buildings like cooking without lids, drying of wet clothing indoors, etc. Most of these methods proved to be effective in addressing some dampness problems like condensation and water penetration, however, where the problem originated from other sources such as rising dampness, other methods were needed to assist in the remediation action (Brook, 2008).

1.2.7 Traditional methods

According to Guimeraes *et al.* (2013), in Portugal, walls with problems caused by rising damp could be treated with any of the traditional methods namely: execution of a damp proof course; creation of a potential against the capillary potential, installing atmospheric drainage or ventilation pipes, applying coating with controlled porosity and porometry and hiding the anomalies. Measures used for treating all kinds of dampness problems have their own advantages and disadvantages. Creating a damp proof course system by reducing the absorbent area is an interesting idea but not often used for aesthetic and structural reasons (Guimeraes *et al.,* 2013). Hutton (2012), also asserts that the control of moisture movement using either damp-proof or hydrophobic materials to create a relatively less permeable 'moisture barrier' is not necessarily a cost effective option in controlling dampness problems and may even be counter-productive (Hutton, 2012). This is because a damp proof barrier is always vulnerable to local failure and will tend to concentrate moisture and dampness problems at those points. This is a general characteristic of all impermeable materials, including those used in tanking systems, which are generally found to fail at some point or after some time (Hutton, 2012). Water tight barriers can cause vibrations that can bring about stability problems (Guimeraes *et al.,* 2013). The introduction of hydrofuge products has little effects when dealing with thick and heterogeneous walls (Guimeraes *et al.,* 2013). Applying coatings with controlled porosity cannot be done in the absence of renderings, which makes the application of these methods difficult where walls have not been rendered (Guimeraes *et al.,* 2013). In Ghana, Agyekum *et al.* (2013) identified the use of damp proof courses and membranes, construction of aprons at the bases of walls, patching of wall bases, tiling of wall bases and re-plastering to be among the damp remediation measures practiced by building occupants. The effectiveness of these methods still remains a question to be answered.

Table 1 Comparing the effectiveness of various damp remediation measures

Author	Damp Remediation Method (Main)	Appearance	Effectiveness	Limitation
Guimeraes *et al.* (2013)	Execution of a damp proof course • Reducing absorbent section • Water tight barriers • Hydrofuge products	Bad	Bad, Mean	Not used for aesthetics and structural reasons
		Mean	Good	Causes vibrations that can lead to stability problems
		Good	Very good	Has little effect on thick and heterogeneous walls
	Creation of a potential against the capillary potential	Good	Bad	Considered ineffective
	Installing atmospheric drainage or ventilation pipes	Mean	Bad	Considered ineffective
	Applying coating with controlled porosity and porometry	Good	Mean, Good	Cannot be used on non-plastered walls
	Hiding anomalies	Good	Mean	Reduces space and hides the original wall from view
Tamas & Tuns (2008)	The Comer Method	Good	Good	Its application is limited to only masonry walls of bricks, capstone, etc.
Tamas & Tuns (2010)	The Dry Zone Technology	Good	Good	
Rirsch & Zhang (2010)	Chemical injection methods/chemical damp proof courses		the most effective chemical damp proof systems can offer comparable protection to physical damp proof courses at a lower cost of installation	The degree of effectiveness and life expectancy will depend on the exact product formulation
Torres &de Feitas (2007)	Wall base ventilation system		The method only reduced the level of rising dampness	Method did not eliminate the problem of rising dampness
Brandt *et al.* (2012)	Explored several measures to stop rising dampness in the basements of structures.		All the tested methods proved usable	Not all of them were considered suitable for commercial use either because of their safety implications or because they were very expensive in use

2. Materials and methods

A questionnaire survey was conducted between the months of November 2012 and March 2013 to assess the perceptions of building occupants on the effectiveness of some damp remediation measures practiced in Ghana. A total of 5,100 inhabitants of residential buildings in eleven major towns in Ghana were selected for the study. The residential buildings surveyed were made up of self-built houses by owner-occupiers suffering from the problem of dampness. This is because in Ghana, self-built houses constitute the dominant mode of housing supply (Ahadzie and Badu, 2011) and the findings from this study will be of great benefit to occupants of these houses. It therefore becomes necessary to concentrate on these types of buildings than the others. Only inhabitants living in buildings constructed with sandcrete blocks were considered for the study because available statistics indicate that sandcrete blocks constitute about 89% of walling materials in Ghana (Ghana Statistical Service, GSS, 2000), hence, the results will be adequate in terms of its generalization.

Per the records of the Ghana Statistical Service (GSS, 2000) there are 278, 273 buildings in the eleven major towns in Ghana. A sample size of 5,100 buildings showing signs of dampness was selected from the total population of 278, 273 buildings using the formula proposed by (Yamane, 1967) as follows:

$$n = {}^{N}\!/_{1 + N(e)^2} \quad (1)$$

Where N = the total population size; e= the standard error of sampling distribution assumed to be 0.014 and n is the sample size. The convenience purposive sampling approach was then used to select the 5,100 residential buildings with damp problems within each location.

The construction technology commonly used in Ghana is the simple artisanship system (Koranteng & Abaitey, 2009). Many of the residential buildings in Ghana are constructed by artisans who have little knowledge in construction technology. It becomes very difficult for these artisans to implement basic principles of construction and this has created lots of problems in many residential buildings. The perceptions of the inhabitants were sought on the effectiveness of the ten damp remediation measures which are highly practiced in Ghana (Agyekum *et al.,* 2013). These measures were those that had been practiced by building occupants in Ghana in trying to address the problem of dampness in buildings (Agyekum *et al.,* 2013). Perceptions of the respondents as used in the context of this study refer to the ability of the building occupants to understand and make good judgement about the effectiveness of the damp remediation measures practiced.

A structured questionnaire was prepared to seek the perceptions of building occupants on the issue under consideration in the study. The questionnaire was divided into two sections. The first section sought information about the respondents' profile and the second section assessed the perceptions of the inhabitants on the effectiveness of the damp remediation measures on the Likert scale of 1 to 5 (where 1= highly ineffective and 5=highly effective). Respondents who were largely heads of households practiced these remedial measures with little or no technical inputs, hence, their perception on the effectiveness of the practiced measures is just an expression of a lay person's opinion on the matter. In order to make the analysis of the results simpler, the measures were coded as Damp Remediation Measure 1 (DRM 1), DRM 2 up to DRM 10 As shown in Table 2.

The Weighted Average Model (WAM) (Ayarkwa *et al.,* 2011) was used to assess the perceptions of the respondents on the effectiveness of the damp remediation measures The WAM, based on the Average Effective Score (AES), was calculated as:

$$AES_i = \frac{\sum_{i=1}^{5} X_j N_{ij}}{N}. \quad (2)$$

AES_i is the average effective score of the damp remediation measure *i*, X_j the damp remediation score assigned (on a Likert scale of 1 to 5), N_{ij} = the number of respondents who assigned the score X_j for the measure *i* and N is the total number of respondents.

The WAM was further used to assess the perception of the respondents on the effectiveness of the damp remediation measures. To rank the level of effectiveness of the DRMs, the combined values of the weighted average and standard deviations were used and the coefficient of variation measured as the Effective Index Value was calculated using the model:

$$EIV_i = \frac{AES_i + AES_i}{\delta i}. \quad (3)$$

Where EIV_i is the effective index value of the damp remediation measure *i,* AES_i is the average effective score of the damp remediation measure *i* and δi is the standard deviation of the average effective score for the measure *i.*

3. Results and discussions

3.1 Respondents' profile

From the questionnaire survey, 61% and 39% of the respondents who live in residential buildings in the four climatic zones were owners and tenants respectively. The findings also showed that the proportion of buildings with ages below 5 years were 9%, and those with ages above 5 years were 91%. Studies have shown that older buildings are more susceptible to dampness (Ahmed &Rahman, 2010; Riley & Cotgrave, 2005; Trotman *et al.,* 2004). It is expected that after four years of construction, all or most of the construction water should have evaporated and any other symptom identified should be seen as a form of dampness. Also in Ghana, many building owners start their construction by putting in place the substructure which could at times last for several years before they finally visit the site again to complete their projects. The ages of the building as perceived by the respondents refers to how old the buildings have been since they were last occupied. Because of the way most residential buildings are constructed in Ghana, there is that tendency that most of the buildings could be older than the average age of 5 years. However, irrespective of this situation since 91% of the buildings surveyed in all the climatic zones were older than 5 years, they could provide enough information required for the study.

Detached or separate houses (66%), block flat or apartment (16%), semi-detached houses (13%) and compound houses (5%) were the four major buildings surveyed. According to (GSS, 2000), compound houses constitute 45% and the largest proportion of building types in all regions in Ghana except the Volta Region, where separate houses are predominant. In Ghana, these compound houses refer to a cluster of buildings in an enclosure that have a shared or associated purpose such as the houses of extended families, etc (GSS, 2000). Separate or detached houses are the next major type of buildings in Ghana, constituting 25% of all building types (GSS, 2000). The results of the study however showed that most of the buildings that were surveyed were the detached type. The deviation in this result was due to the fact that only major towns where people will have better living standards were surveyed. This study was purpose oriented and was conducted irrespective of the findings from the (GSS, 2000).

3.2 Level of effectiveness of damp remediation measures

Table 2 shows data on the effectiveness of the damp remediation measures based on the opinion of each building occupant. The perceptions of building occupants were sought on the level of effectiveness they attached to each of the practiced damp remediation measures. Given the non- technical background of the respondents, their responses are only opinions on effectiveness and not based on any technical assessment. In Ghana, when it comes to the issue of constructing residential facilities, people do not strictly adhere to the building regulations. Most building owners in several instances tend to modify their sets of drawings during construction without the knowledge of the technical expert. These measures as identified are those which building occupants and owners themselves put in place without any technical consultations. It is therefore very important to know their perceptions on most of these methods which they are practicing. Also, these measures are all purely constructional and not chemical injections or any other, hence, the effectiveness of each measure will be visible for any person to see, be it a lay person or a technical person. Because most of these measures being discussed are practices adopted by the occupants themselves, they should be in the best position to assess whether the measures were effective or not.

A summary of the Average Effective Scores (AES), Effective Index Values (EIVs) and ranking of the EIVs (REIVs) of the ten damp remediation measures are shown in Table 2.

Table 2 Summary of Average Effective Scores, Effective Index Values and Rank of Effective Index Values

CODE	Damp Remediation Measure	Average Effective Score (AES)	Standard Deviation (δi)	Effective Index Value (EIV)	Rank of Effective Index Value (REIV)
DRM 1	Construction of aprons at wall bases	1.83	0.43	8.51	2nd
DRM 2	Sloping of ground around the base of walls to allow easy run-offs of water	1.80	0.76	4.74	7th
DRM 3	Redesign and projections of roof structures to reduce the effects of driving rain and direct sunlight	1.33	0.76	3.50	9th
DRM 4	Repainting	1.89	0.75	5.04	5th
DRM 5	Tiling of wall bases	1.10	0.30	7.33	3rd
DRM 6	Checking and replacing all leaking pipes	2.02	0.88	4.59	8th
DRM 7	Repair and redesign of new rain water down pipes and gutter systems	1.67	1.02	3.27	10th
DRM 8	Patching of wall bases	2.09	0.79	5.29	4th
DRM 9	Using damp proof courses (DPCs) and damp proof membranes (DPMs)	1.89	0.44	8.59	1st
DRM 10	Reduction of moisture generation activities in buildings like cooking without lids, etc	1.97	0.79	4.99	6th

For a damp remediation measure to be effective it should have an AES value of 3.0 or more, otherwise, it is considered ineffective (Ayarkwa *et al.,* 2011). From the results all the measures have AES values of less than 3, and therefore considered by building occupants as ineffective measures for controlling dampness in residential buildings. The measures were ranked based on their Effective Index Values (EIVs).The Effective Index Values (EIVs) made use of the Average Effective Scores (AES) and the standard deviations of the measures, hence, the measure with the highest effective index value was ranked first followed by the others. It is very important to note that many of these practiced measures are purely related to construction and once those measures are not carried out by the technical experts there could always be problems. It was surprising to know that about 95% of the buildings visited had three or more of these measures put in place. These measures all exhibited different constructional methods and approaches. None of the measures which were practiced by the respondents had been in existence for less than 5 years, an indication that those measures had been practiced for quite a reasonable number of years but the problem still prevailed.

Although from the opinion of the respondents, none of the ten measures was considered effective (thus, all have AES values to be less than the effective value of 3), the ranking of the effective index values show that 'using damp proof courses and membranes' and 'construction of aprons at wall bases', have shown some level of effectiveness in addressing the problem of dampness in buildings in the eleven major towns.

Figure 1 shows the Average Effective Scores and Effective Index Values of the ten damp remediation measures.

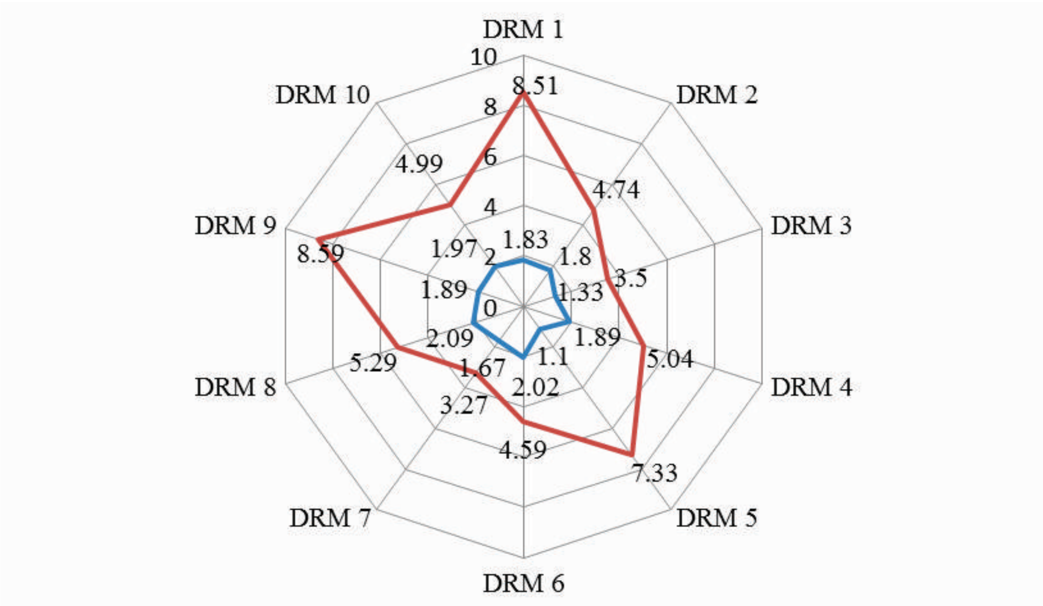

Figure 1 Damp remediation measures with Average Effective scores (Blue) and Effective Index Values (Red).

Although the AES is a weighted average measure and could be used to rank all the damp remediation measures, it does not consider the degree of variation between individual responses. Since a smaller variation between individual responses gives better quality to the weighted average value, when two factors carry the same or very close weighted values the factor carrying the smaller variation is given a higher ranking. Thus, the effective assessment of ranking attributes should consider both the weighted average and the coefficient of variation measured by the effective index values. This point is buttressed by the fact that, from Figure 1, for instance, patching of wall bases (DRM 8) had an AES of 2.09 (the highest among all the ten), however, a combination of the AES and the standard deviation produced an EIV of 5.29. On the other hand, using damp proof courses (DPCs) and damp proof membranes (DPMs) (DRM 9) had an AES value of 1.89 and an EIV of 8.59. It is therefore seen from the results (Table 2 and Figure 1), that, having a higher AES value does not necessarily mean being the most effective (with a higher EIV). From the analysis, the effectiveness is achieved by having a combined value of the AES and the standard deviation.

Measures such as 'adequate drainage around the house', 'repair and redesign of rain water downpipes', 'checking and replacing all leaking pipes', etc. which have shown to be effective in addressing various types of dampness like condensation and water penetration in most European countries (Brandt *et al.,* 2012; Brook, 2008; Young, 2007; Haverinen-Shaughnessy, 2007) have been less effective in Ghana. The reason behind this may be attributed to their ineffectiveness in treating certain types of dampness like condensation and water penetration which are common but not very severe in Ghana.

Tiling of wall bases and repainting of the affected areas are measures which were not only used on the external surfaces of walls to prevent rainwater splash back, but were also used internally by occupants to address problems such as rising dampness. This could be due to the lack of technical knowledge in construction exhibited on the parts of the occupants. The explanation given to the level of effectiveness building occupants attached to these two measures was the fact that most people have used them and they realized from the usage that these measures could sustain the problem for some time. However, they acknowledged the fact that within a short period the problem of dampness resurfaces.

Fig 2 a) Aprons constructed together with replastering b) Base of wall tiled

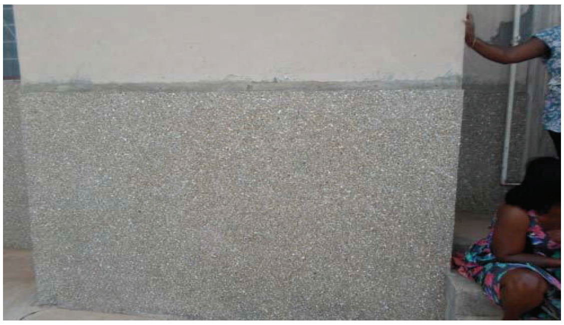

Fig 3 a) Tiled apron at the base of wall b) Terrazzo at the base of wall

Conclusion

The study sought to assess the perceptions of 5,100 building occupants on the effectiveness of some practiced damp remediation measures in Ghana. The opinion of the respondents have shown that although all the ten damp remediation measures studied have been ineffective (based on their AES values) in addressing the problem of dampness in Ghana, 'use of DPCs and DPMs' and construction of aprons at wall bases' were among the measures which have shown some level of effectiveness (based on EIV values) in their applications. The results also showed that with the exception of the DPCs and DPMs already known worldwide as a remediation measure of dampness, 'construction of aprons at wall bases' among others is also a damp remediation measure which is frequently practiced by building occupants in Ghana, and which per the views of the occupants has shown some level of effectiveness in its application. These findings were purely based on the views of respondents who had no technical knowledge of measures they practiced to address a typical problem of dampness. It is very important that these respondents are educated on the problem of dampness by technical experts. Those who are yet to build should be educated on how to go about their projects and if possible leave those projects to people with the technical brains to handle them. These findings should create the necessary platform for all stakeholders in Ghana and other tropical countries to come together and address the problem of dampness in residential buildings. As a recommendation for further study, the perceptions of professionals in the construction sector should be sought on the effectiveness of damp remediation measures which they recommend to their clients.

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