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All papers submitted to COBRA were subjected to a double-blind (peer review) refereeing process. Referees were drawn from an expert panel, representing respected academics from the construction and building research community. The conference organisers wish to extend their appreciation to the following members of the panel for their work, which is invaluable to the success of COBRA.

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Mainstreaming women's needs with disaster risk reduction in the built environment - preliminary findings

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Abstract

This paper is based on a doctoral research that aims to investigate how women's needs can be mainstreamed into disaster risk reduction in the built environment. The paper reviews literature to emphasise the importance of gender mainstreaming in disaster risk reduction and presents the findings of the study's literature review and its pilot interviews. Methodology of the overall research is briefly explained in addition to the methods used to prepare this paper. Literature suggests that women face different conditions in disasters due to their different social roles and responsibilities and as a result, women have different needs in disaster risk reduction. In fulfilling the needs of women in disaster risk reduction, the built environment performs a significant role. In this context, it is identified that gender mainstreaming can integrate a gender perspective into disaster risk reduction in the built environment and identify the varying needs and vulnerabilities of women. The paper presents its findings to indicate that women's involvement in decision making in the construction industry, consultation of community women, conducting needs assessment and construction briefing are possible ways of mainstreaming women's needs into disaster risk reduction in the built environment.

Keywords: built environment, disaster risk reduction, gender mainstreaming, women

1. Introduction

A disaster is commonly defined as a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources (UN/ISDR, 2009). Further, a disaster can be indicated as a situation or an event which overwhelms local capacity necessitating a request to national or international level for external assistance (EM-DAT, 2009). Thus, the affected community's insufficient capacity to recover from damages is a prominent feature of a disaster. However, there are some individuals and groups in the society whose capacity to cope disasters is lower than the others.

Any disaster emerges as a combination of a triggering agent (hazard) and vulnerabilities (McEntire, 2001; Sahni and Ariyabandu, 2003). A triggering agent or hazard is defined as a potentially damaging physical event, phenomenon or human activity that may cause loss of life or injury, property damage, social and economic disruption or environmental degradation (UN/ISDR, 2004). On the other hand, vulnerability is known as a set of conditions that affect the ability of countries, communities and individuals to prevent, mitigate, prepare for and respond to triggering agents (Ariyabandu and Wickramasinghe, 1997). In other terms, they are the factors which determine the degree to that someone's life and livelihoods is put at risk by a discrete and identifiable event in nature or in society (Blaikie et al., 1994). According to Blaikie et al. (1994), class, caste, ethnicity, gender, disability, age, or seniority of a person's affects his/her capacity to respond for disasters. In a similar vein, Cutter et al. (2003) elaborate factors affecting social vulnerability as socio-economic status, gender, race and ethnicity, age, status of commercial and industrial development of a community, employment and occupation, living area (rural/urban), type of residential property, infrastructure and lifelines, family structure, education, population growth, social dependence and special needs influence social vulnerability. Therefore, it can be argued that a person's or a group's higher vulnerability is caused by particular personal characteristics or characteristics associated with their household or community that restrict their ability to prepare and respond for disasters (Cannon, 2008).

In this context, the poor, the elderly, children, women and disabled people are identified as more vulnerable to disasters. In particular, women have been frequently illustrated as more vulnerable to disasters (Neumayer and Plumper, 2007; Enarson and Meyreles, 2004; UN-HABITAT, 2004; UN/ISDR, 2002). According to Childs (2006), gender is one of the main factors which determines the capacity and vulnerability to disasters. Thus, managing higher disaster vulnerabilities of women is an important issue to be addressed (UN/ISDR, 2002). However, reducing disaster vulnerabilities is enormously linked with the characteristics of the built environment. According to Bartuska (2007), the built environment provides the context for all human endeavours since, it is everything humanly created, modified, or constructed, humanly made, arranged, or maintained. In other words, disasters occur as a result of hazards intersecting with the built environment, particularly poorly located and poorly constructed development (UNDP cited Duque, 2005). Thus, it is suggested it is the characteristics of the built environment that can be managed to manage disasters (Duque, 2005). Hence, a doctoral research is being conducted to investigate how women can be mainstreamed into disaster risk reduction in the built environment to reduce women's disaster vulnerabilities.

In this regard, this paper gives an account of how can women's needs and concerns be mainstreamed into disaster risk reduction in the built environment in order to reduce their disaster vulnerabilities.

Accordingly, the following section of this paper briefly explains the methodology of the overall research and the methods used for the paper followed by a section which reviews literature in relation to the theme of the paper. Subsequently, the findings of the paper are presented. Thereafter, the findings are discussed prior to the conclusions of the paper.

2. Methodology

This section of the paper initially gives an overview of the methodology which has been adopted for the overall research under three sub headings of philosophical worldviews, strategies of enquiry and data collection and analysis methods followed by the specific methods used for this paper in the next subsection.

2.1 An overview of the methodology of the research

2.1.1 Philosophical worldviews

The research problem of this study was considered from a pragmatist view, which argues that the most important determinant of the research philosophy adopted for a study is the research problem not the methods used (Saunders et al., 2007; Creswell, 2009). Having viewed the research problem from a pragmatist viewpoint, it was identified that this research prefers interpretivism in terms of epistemological thinking since the problem is focused on capturing needs and concerns of a group of people to integrate them into disaster risk reduction in the built environment. Further, the epistemological stance of interpretivism leads this research towards the ontology of social construction. Accordingly, the research views reality as being socially constructed. In addition, this research has been identified as a value laden research under axiological philosophical assumptions since the influence of researcher's values, the personal beliefs or the feelings of the researcher creates a part of the philosophical beliefs of the research.

2.1.2 Strategies of enquiry

Case studies has been selected as the most suitable research strategy for this particular study as the study focuses on a contemporary phenomenon with considerable existing background knowledge which allows the development of an initial conceptual model and a set of research question that could guide the research. The design of a case study research designs can be divided in to two main types such as, single case designs and multiple case designs (Yin, 2009). Typically, single case designs are chosen if the cases are unusually revelatory, extreme exemplars or opportunities for unusual research access (Eisenhardt and Graebner, 2007). Accordingly, multiple case design has been identified as the appropriate design for this particular research since its cases could not be characterised as any of the aforementioned types.

Further, a case study design could have either a single unit of analysis (holistic) or multiple units of analysis (embedded) (Yin, 2009). The unit of analysis is the focus or the heart of the study (Miles and Huberman, 1994). Accordingly, the focus of this study has been identified as the integration of disaster risk reduction into the decisions taken in the built environment within the case studies of construction projects.

2.1.3 Data Collection and Analysis Methods

According to Yin (2009), there are six main methods of data collection in case studies. They are; documentation, archival records, interviews, direct observation and physical artefacts. In this research, interviews have been selected as the key source of evidence since they are highly efficient in gathering rich empirical data in qualitative research (Eisenhardt and Graebner, 2007). The interviews of this study attempt to obtain data to understand why women should be mainstreamed into disaster risk reduction in the built environment and how that can be achieved. As Eisenhardt and Graebner (2007) suggest it is intended to approach numerous and highly informed interviewees who are able to view the phenomenon from diverse perspectives in order to reduce the bias in interview data. In this study, respondents are chosen from the higher level decision making level in organisations within the built environment which contribute to projects involved in disaster risk reduction. All the interviews are recorded using a digital voice recorder.

The initial steps of analysing of interview data involves transcribing the recorded interviews, reading the transcripts thoroughly to understand general views that they present, developing different data categories according to the different themes which emerge from the transcribed data and allocating relevant sections of original data to the identified categories. Then, the relationships within and amongst categories are identified in order to draw conclusions. The software NVivo has been recognised as an effective electronic tool to support the aforementioned procedure in this research.

2.2 Methods used for the paper

Two methods were used in gathering data which formed the basis of this paper, literature review and pilot interviews whilst the overall research stands on the methodological grounds outlined in the earlier section. Firstly, the paper reviews literature to emphasise the importance of investigating into how women can be mainstreamed into disaster risk reduction in the built environment. In this context, literature on women's different needs in disaster risk reduction and ways of mainstreaming them into disaster risk reduction decision making in the built environment are reviewed. In the section of findings, the literature findings on ways of mainstreaming women are further highlighted.

Secondly, the findings of the pilot interviews of this research are indicated in the paper. It is important to conduct pilot interviews before the main interviews to avoid likely problems in the interview guideline. According to Saunders et al. (2007), pilot questionnaires help to avoid the problems respondents may face in answering the questions and the inconveniences that might be occurred in recording the data whilst it enable to assess the validity and reliability of the questions. In this research, six pilot interviews were carried out with six professionals in the construction industry and the field of disaster management. These interviews were extremely useful in refining the guideline for the main round of data collection and to bring new insights for the research. The findings of these interviews in relation to the main aim of the research, i.e. investigating how women can be mainstreamed into disaster risk reduction in the built environment are indicated in this paper after the literature review.

3. Literature review

3.1 Disaster implications on women

According to UN/ISDR (2002), gender relations pre-condition people's ability to anticipate, prepare for, survive, cope with and recover from disasters. The attention of researchers towards gender in the context of disasters was drawn by the disproportionate disaster damages brought to women and girls (Neumayer and Plumper, 2007; Enarson and Meyreles, 2004). According to Neumayer and Plumper (2007), women's higher disaster vulnerabilities can be caused by their biological and physiological conditions, and the differences in socio-economic status of men and women. Table 1 illustrates various types of conditions that make women more vulnerable to disasters and the specific implications of disasters on them with some examples from different countries around the world.

Table 1: Disaster implications on women (Source: United Nations, 2009)

Condition/situation	Specific implications for women	Examples
Direct impacts of sudden onset hazards (floods, cyclones, tsunamis, mud slides etc.)	<p>Women are at greater risk of injury and death due to societal restrictions and gender roles.</p> <p>Swimming is not a skill girls and women are encouraged to learn in some cultures.</p> <p>In some regions women's clothing limits their mobility.</p> <p>In some societies and cultures, women cannot respond to warnings or leave the house without a male companion.</p>	<p>More women die than men from disasters. Statistics from past disasters including the Indian Ocean Tsunami and the 1991 Bangladesh Cyclone have showed women overrepresented in mortality rates.</p> <p>Due to recent floods in Nepal caused by the Saptakoshi River, women report that they cannot feed their children because the river took away their cows.</p>

Condition/ situation	Specific implications for women	Examples
	Loss of crops and livestock managed by women (with direct detriment to family food security).	
Impacts of slow onset hazards (drought, desertification, forestation, land degradation etc.)	<p>Increased workload to collect, store, protect, and distribute water for the household – often a responsibility that falls entirely to women.</p> <p>Increased domestic workload to secure food.</p> <p>Increased numbers of women headed households due to men’s migration.</p> <p>Women’s access to collect food, fodder, wood, and medicinal plants diminishes.</p>	<p>In East Africa, it has been recorded that women walk for over ten kilometers in search of water, and when droughts worsen some even return home empty-handed.</p> <p>In Senegal much arable land is lost due to erosion. As a result, most of the young people and males migrate to the cities to find jobs leaving women in charge of the households.</p> <p>More women than men rely on forest based products to sustain households. Up to 80% of the population of some developing countries rely on traditional medicine as their primary source of health care. Women often have a more specialised knowledge of wild plants used for medicine than men.</p>
Lesser access to early warnings and lower ability to respond	<p>Warnings in many cases do not reach women.</p> <p>Women lack adequate awareness how to act upon warnings.</p> <p>Women lack life saving skills such as swimming and climbing.</p> <p>Women tend to take the responsibility of carrying children and elderly to safety.</p>	During the 2006 tsunami, more women died than men – for example in Indonesia and Sri Lanka, male survivors outnumber female survivors by 3 or 4 to 1.
Lower land and other asset ownership	<p>Less control over production and markets.</p> <p>Less ability to adapt to ecological changes, resulting in crop failure.</p> <p>Loss of income.</p>	<p>Fewer than 10% of women farmers in India, Nepal and Thailand own land.</p> <p>In Malawi, the value of assets owned by male-headed households is more than double that of female-headed households. Male-headed households are more likely to own agricultural assets.</p>
Lower income	Greater vulnerability in the face of shocks such as food shortages, crop failure,	Women earn only 70-80% of the earnings of men in both developed and developing countries.

Condition/ situation	Specific implications for women	Examples
	disasters.	Women have less access to secure and better paid jobs in the formal sector. They are mostly occupied in the informal sector, making less money, with less employment security.
Lower levels of education	Hampers women's access to information, and limits their ability to prepare and respond to disasters.	876 million people in the world are illiterate, of whom two-thirds are women.
Lower levels of participation at decision making bodies	Women's capacities are not applied, their needs and concern are not voiced and they are overlooked in policies and programmes.	Women are poorly represented in decision making bodies. Socio-cultural norms and attitudes bar women's participation in decision-making.
Poor access to resources	Women suffer inequitable access to markets, credit, information and relief services resulting in less ability to recover from disaster losses.	Analysis of credit schemes in 5 African countries found that women received less than 10% of the credit given to men. Women face more difficulties in accessing credit, as they do not possess assets for collateral.

The conditions and implications in Table 1 highlight that the socio economic conditions of women are more prominent in determining their vulnerabilities than the biological or physiological factors. In this regard, women's role as mothers and primary care takers of elderly, disabled and children play a significant role. Apropos, women are more vulnerable to disasters than men mainly because they play different roles in society (UN-HABITAT, 2004). According to UN-HABITAT (2004), the way men and women behave in their different roles differentiate their vulnerabilities to disasters. These roles result in different identities, social responsibilities, attitudes and expectations leading to gender inequality cutting across all socio-economic development (United Nations, 2009). Women are generally more vulnerable to all four different types of disaster vulnerabilities, economic, social, physical and environmental since the aforementioned differences are unfavourable to women in terms of disaster vulnerabilities and coping capacities (United Nations, 2009). Incidentally, the following list summarises the main socio-economic reasons behind women's higher disaster vulnerability (Enarson, 2000).

- Women have less access to resources.
- Women are victims of the gendered division of labour.
- Women are primarily responsible for domestic duties such as childcare and care for the elderly or disabled and they do not have the freedom of migrating to look for work following a disaster.

- Housing is often destroyed in the disaster; many families are forced to relocate to shelters.
- When women's economic resources are taken away, their bargaining position in the household is adversely affected.

Further, it is clear that the extent of socio-economic vulnerability of women is varied up on the socio-economic conditions of their community or the country. In particular, women who live in developing countries and poor communities are more vulnerable to disasters (Neumayer and Plumper, 2007; UN-HABITAT, 2004). In addition, it is evident based on the aforementioned factors that the cultural aspects of different communities contribute to shape the level of women's disaster vulnerability. Conversely, unlikely the socio-economic conditions, the biological or physiological conditions which contribute to women's higher disaster vulnerabilities are more independent on these external factors.

Incidentally, the biological or physiological factors which contribute to increase women's higher disaster vulnerabilities cannot be underestimated among the causes for women's higher disaster vulnerability. They restrict women in getting involved in mitigation and preparedness activities whilst setting the background for women to have a particular socio economic status in the society indirectly. Thus, although women's vulnerabilities are frequently claimed as socially constructed, the biological construction of women also increases their vulnerability to disasters. In this regard, Enarson and Fordham (2001) identify biological factors as one of the five categories of processes which increase women's disaster vulnerabilities. The five categories of processes are as follows.

- Biological
 - Pregnancy and lactation increase vulnerability because of constrained mobility and the greater need for food and water
 - Longer life-spans can lead to increased poverty in the elderly female population, contributing to the feminization of poverty
- Economic
 - Reproductive work of bearing and caring for children and providing other essential family support, on which much male work in the public sphere depends, does not figure in economic (monetary) evaluations
 - Women's time inputs are not recognized and can be ignored when postdisaster relief and rehabilitation resources are being distributed
 - Women's external work opportunities lie disproportionately in part-time, temporary and low-status occupations which place them at greater risk of poverty
 - Lack of access to credit reduces women's ability to recover from disaster

- Structural adjustment programmes exacerbate the negative impacts of increasing flexibilisation of work and decreasing social programmes, contributing to the feminization of poverty, and making poor women targets for population control and violence
- Priority in work opportunities may be given to men
- Social
 - Widespread gender inequality in access to educational opportunities
 - Illiteracy (as estimated by UNESCO for 2000, 14.7% for men and 26.4% for women)
- Political
 - Lack of universal suffrage
 - Limited access to, and occupation of, decision-making power structures
- Environmental
 - The domestic environment, especially in remote rural areas, can be particularly vulnerable in disasters but attention is generally focused on how public/commercial realms are impacted
 - The domestic environment is also a work environment for women earning income at home, who are doubly impacted by housing loss
 - Many women support families through homestead gardens and local agricultural production but these activities are not featured in assessments of economic production values nor are likely to be prioritized in disaster recovery programmes

Accordingly, it is evident that women face different conditions to men in disasters mainly, due to their different social roles and responsibilities. These different roles and responsibilities which women have in the society result in different needs for women (Commonwealth Secretariat, 1999). In particular, their needs are commonly related to their roles as mothers, homemakers and providers of basic needs (Commonwealth Secretariat, 1999). According to the aforementioned factors and processes, these different needs result in varied vulnerabilities or capacities to prepare for disasters. Thus, it is important that the different roles, capacities, vulnerabilities and needs are recognised and considered for effective disaster management (UN-HABITAT, 2004).

According to Pearl and Dankelman (2010), water, sanitation and health challenges put an extra burden on women, adding to the double burden of productive and reproductive labour when there is a disaster and a collapse of livelihood. Further, socio-cultural norms and care giving responsibilities prevent women from migrating to look for shelter and work when a disaster hits (Pearl and Dankelman, 2010). In a similar vein, unavailability of sufficient facilities of water, sanitation and healthcare limit women's access to necessary services and resources and make them more vulnerable to disasters. As UN-HABITAT (2004) suggests,

the ability of women to access economic security has a major effect on their ability to reduce the risk of potential disasters on their livelihoods and well being. In this context, it may be important for some women to have livelihood facilities at home since they have restrictions in going out for work with their care giving responsibilities. In addition, they have greater concerns over issues such as security of their environment and evacuation routes in an event of a disaster.

Thus, the built environment needs to be supportive in facilitating women's different needs in relation to security, evacuation, livelihood facilities at home, sanitation, etc. in the context of a disaster in order to prevent them being more vulnerable. In particular, the integration of disaster risk reduction into the built environment requires to mainstream specific needs of women in the planning and designing decisions. In this context, UN/ISDR (2002) highlights gender mainstreaming as a way of bringing a gender perspective into disaster reduction as it could translate into identifying the ways in which women and men are positioned in society and their varying vulnerabilities. Therefore, the following section reviews literature to give an account of gender mainstreaming to elaborate how it can bring a gender perspective to disaster risk reduction.

3.2 Gender mainstreaming in Disaster Risk Reduction

In the context of disaster reduction, there are numerous elements and strategic components that need to be looked upon from a gender perspective for the promotion and implementation of a comprehensive and sustained disaster reduction policy (UN/ISDR, 2002). Further, integrating a gender perspective to disaster reduction strategies, policies and practices has been identified as a key issue by the international community through different global agendas. The Hyogo framework for action, which was adopted by 168 countries at the World Disaster Reduction Conference in Kobe, Japan in 2005 includes this under the general considerations for its priorities of action. The framework says that a gender perspective should be integrated into all disaster risk management policies, plans and decision making processes, including those related to risk assessment, early warning, information management, and education and training (UN/ISDR, 2005). Thus, UN/ISDR (2002) emphasises that mainstreaming gender into disaster-reduction policies and measures can identify the ways in which women and men are positioned in society and their different needs through integrating a gender perspective to the policies and measures.

Gender mainstreaming has been defined in different ways by different authors and institutions. However, as Council of Europe (1998) exhibits there is little consensus about a definition of gender mainstreaming or on how to mainstream the gender equality perspective in practice and what this implies. However, Council of Europe (1998) suggests that a comprehensive definition of gender mainstreaming shall include

most of the aspects mentioned in various definitions such as the main goal that has to be achieved i.e. gender equality; the functional and structural implications of gender mainstreaming i.e. the reorganisation, improvement, development and evaluation of policy processes; various techniques and tools required for gender mainstreaming in a particular circumstance i.e. full participation of women in all aspects of life as well as the analysis of all proposals concerning general or sectoral policies and programmes from a gender equality perspective. Accordingly, the definitions of gender mainstreaming could vary from one to another depending on the characteristics of the organisation or the environment in which gender mainstreaming has to be achieved.

In the context of disaster risk reduction, gender mainstreaming is defined by the UN/ISDR as fostering awareness about gender equity and equality etc., to help reduce the impact of disasters and to incorporate gender analysis in disaster management, risk reduction and sustainable development, to decrease vulnerability (Inter-agency Secretariat for the ISDR, 2002). Further, UN/ISDR (2002) views gender mainstreaming as a means of promoting the role of women in the field of development, integrating women's values into development work. Accordingly, in the context of this research, gender mainstreaming is defined as integrating the experience, knowledge, interests, needs and concerns of women into disaster risk reduction decisions during planning and designing of a built facility to reduce the impact of disasters and decrease vulnerabilities.

A strategy for mainstreaming gender must be laid to achieve equality, which is however not balancing the statistics of males and females since gender equality is the key goal of gender mainstreaming, (European Commission, 2004a). As UN/OSAGI (2001a) elaborates, mainstreaming involves more than increasing women's participation and it is not about adding a "women's component" or even a "gender equality component" into an existing activity. "Mainstreaming entails bringing the perceptions, experience, knowledge and interests of women as well as men to bear on policy-making, planning and decision-making." (UN/OSAGI, 2001b).

As the definition could vary depending on the environment, the way to mainstream gender may also differ according to the characteristics of a particular situation. However, European Commission (2004b) suggests that the basic feature of mainstreaming as the systematic consideration of the differences between the conditions, situations and needs of women and men in all policies and actions in the relevant environment. Carolyn Hannan, Director of the UN Division for the Advancement of Women (cited ILO), outlines the basic principles of mainstreaming as follows:

- Establishment of adequate accountability mechanisms for monitoring progress

- Initial identification of issues and problems across all area(s) of activity to diagnose the gender differences and disparities
- Not assuming that issues or problems are neutral from a gender-equality perspective
- Gender analysis (According to (IFAD, 2000), Gender analysis helps to identify where and what kind of inequities may exist between men and women with regard to legal rights, opportunities for personal development, access to productive resources, political participation, etc.)
- Clear political will and allocation of adequate resources for mainstreaming, including additional financial and human resources if necessary for translation of the concept into practice
- Widening women's equitable participation at all levels of decision-making

However, the different ways of integrating women's needs into disaster risk reduction in the built environment have not been clearly identified in the literature. Accordingly, the subsequent section focuses on how the women's needs can be mainstreamed into disaster risk reduction decisions in the built environment. It compiles the findings of this research through its literature review and pilot interviews to compile different ways of identifying women's needs in order to mainstream them into disaster reduction decisions in the built environment.

4. Findings- mainstreaming women's needs in disaster risk reduction

Having women in decision making has always been identified as an effective way to mainstream gender in to decision making in literature. Thus, the following sub section focuses the findings on explaining how women in decision making favours gender mainstreaming.

4.1 Women in decision making

As the aforementioned points of gender mainstreaming emphasise, on principle, widening women's equitable participation at all levels of decision-making is necessary for integrating a gender perspective. In this regard, Inter-agency secretariat for the ISDR (2002) emphasises that gender equality in disaster reduction requires empowering women to take an increasing role in leadership, management and decision making positions to ensure a participatory approach. Notably, Commonwealth Secretariat (1999) states, a successful process of gender mainstreaming in organisations involves decision makers at senior levels representing gender equality interests at each stage. Incidentally, women are in a better position in identifying the specific needs of women that to be integrated into the disaster risk reduction decisions in order to decrease women's higher vulnerabilities. Further, having shown a central involvement to the development of their communities throughout history, women have enormous capabilities that can be

capitalised to improve disaster management (UN-HABITAT, 2004). On the other hand, women's subordination in male led decision making processes has been shown as a reason for women's higher vulnerabilities for disasters (Groots International, 2008).

Therefore, it is important to have women in the construction industry involved in disaster risk reduction decision making process in the built environment to identify any specific need and concerns of women in a particular community. Notably, the technical and professional participation of women in the disaster risk reduction stages is important to emphasise the specific needs of most vulnerable social groups (Toscani, 1998). Then, the equality of gender specific needs and concerns related to disaster risk reduction could be more effectively taken into consideration in decision making leading to reduce women's disaster vulnerabilities. However, women's involvement in disaster risk reduction decision making in the built environment is insufficient as the representation of women in the mainstream management is significantly low. According to Construction Skills (2004) women account for approximately 9 percent of the total employment in the construction industry, the hard core of the built environment and only 5 percent of them are engaged in mainstream management. Therefore, it is important to further investigate how the status of women in decision making can be improved in the relevant context.

In addition, consultation, needs assessment and construction briefing have been identified as possible ways of gender mainstreaming through the pilot interviews that have been carried out. They are discussed further with support of literature in the following sub sections.

4.2 Consultation

A comprehensive understanding of the patterns of human settlement and development within a community is extremely important to reduce disaster vulnerabilities of the particular community (Morrow, 1999). In this regard, the women in a community is a reliable source to obtain the information regarding these patterns and the way they affect their lives since they perform a central role in the development of their households and their local community. According to Toscani (1998), it is important women participating in decisions related to the choice of construction sites, channelling of a river, reforestation, etc. for effective identification of potential risks and risk reduction strategies of a community. Similarly, UN-HABITAT (2004) highlights that a lack of gender perspectives in reconstruction can reduce the effectiveness of infrastructure and services in a community, as the needs and priorities of women are often overlooked when women are not consulted.

4.3 Needs assessment

Needs assessments are extremely useful in identifying different user needs in planning a service or a facility. According to WHO (2000), it is a tool used in planning a service or system. Required capacity of a service/system and the diverse needs to which it should respond can be evaluated using this tool (WHO, 2000). Thus, needs assessments are helpful in identifying different vulnerabilities of a community when planning a built facility. In this context, risk mapping and vulnerability analysis/assessments also become relevant tools that can serve the purpose of reducing risk of disasters through identifying varying needs of different social groups of a community. According to Morrow (1999), local risk mapping can locate where high-risk groups are concentrated and the vulnerability maps are invaluable tools for emergency managers and disaster responders to prepare informed estimates of anticipated community needs at all levels of crisis response. Although, the term needs assessment is frequently used in relation to post disaster stage, this can be used in the risk reduction stage to identify the different needs of the users of a particular built facility during its planning stage. In this context, a needs assessment can be conducted through a survey among the women who are going to use a built facility or through some interviews with them.

4.4 Construction briefing

Briefing is the process by which client requirements are investigated, developed and communicated to the construction industry (Constructing Excellence, 2004). According to Barrett and Stanley (1999), construction briefing is critical in understanding the needs of the client. It seeks to minimise the likelihood of a client receiving an unsatisfactory building by ensuring that project requirements are fully explored and communicated as clearly as possible (Constructing Excellence, 2004). Traditionally, a brief is prepared by writing down the needs of the client after a conversation with him/her at an early stage of the construction process (Barrett and Stanley, 1999). However, a brief can be used to mainstream specific needs of women into disaster risk reduction decision making in the built environment since it is a method that attempts to capture user needs before a built facility is designed. In this context, the specific needs of women which are identified through consultation and needs assessment can be integrated into a construction brief in order to transmit them into the relevant decisions.

Having presented the preliminary findings of the study, the paper draws its conclusions in the following section.

Conclusions

Women are more vulnerable to disasters. Hence, they have different needs in disaster risk reduction. Achieving gender mainstreaming in the built environment is important to identify the varying needs and

vulnerabilities of women in the society. Gender mainstreaming is integrating the experience, knowledge, interests, needs and concerns of women into disaster risk reduction to reduce the impact of disasters and decrease vulnerabilities of women. Women's involvement in decision making in the construction industry, consultation of community women, conducting needs assessment and construction briefing are possible ways of mainstreaming women's needs into disaster risk reduction in the built environment.

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