

# Knowledge Building on Climate Change among Women in Flood-Prone Communities in Cotabato City

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## ABSTRACT

According to the United Nations (UN), disaster situations such as flooding in South and East Asia are increasingly linked to climate change, and the greater vulnerability of women is most striking. Women typically outnumber men by 14 to 1 among those dying from natural disaster. Due to the scarcity of studies which document knowledge building on climate change among women particularly in flood-prone communities in Cotabato City prompted the researcher to conduct this study. Using an exploratory research design, 289 respondents were interviewed using questionnaires. Mean, frequency, and percentage were also utilized. Findings revealed that six out of seven women had heard about climate change and all have experienced its serious effects. Women had moderate knowledge on climate change. There was a significant difference in women's knowledge when grouped according to age, educational attainment, and length of stay in the community. Women have some correct understanding of the issue yet they have misconceptions about the scientific causes and effects of climate change. Hence, the DepEd and CHED must ensure the integration of

climate change and its full implementation in the basic education and the new tertiary general education curricula. This mechanism will ensure the building of knowledge and capacity of the youth on climate change.

**Keywords**— Climate change, flood-prone community, knowledge building, exploratory research design, Cotabato, Philippines

## INTRODUCTION

Climate change demands global attention for it brings various exigencies (Rodrigues, da Silva, de Oliveira, Gabriel Filho, & Putti, 2018) most especially in developing countries (PAGASA, 2011). The poorest will experience the worst consequences of climate change while at the same time having a reduced coping capacity (Preet, Nilsson, Schumann, & Evengård, 2010). Global warming induced by human activities such as charcoal harvesting in South Somalia (Ogallo, Mwangi, Omondi, Ouma, & Wayumba, 2018) are directly accelerating atmospheric concentrations of CO<sub>2</sub>, methane and nitrous oxide, and some chemically manufactured greenhouse gases (Lifshits, Spektor, Kershengolts, & Spektor, 2018) has been causing increasing environmental, economic, and socio-political crises (Bose & Navera, 2017). Variability of precipitation, frequency, and intensity of typhoons, sea level rise, and the risk of more droughts, floods, and heat waves (Bhuyan, Islam, & Bhuiyan 2018) invokes land cover dynamics within the river basins which include mangrove, forest, beach, tidal areas, lagoon, river, settlements, barren salt areas (Paz-Alberto, de Dios, Alberto, & De Guzman, 2018) and on ecosystems, food and water security, health, infrastructure, and human security is already occurring around the world (Australian Academy of Science, 2015).

The Philippines is highly vulnerable to climate change impacts (Paz-Alberto, de Dios, Alberto, & De Guzman 2018), with an average of 20 typhoons hitting the country every year (Maceda, 2015). Climate change amplifies the different socio-economic burdens already shouldered by Filipino families are increasingly putting the urban and rural poor at risk (Santos, 2012). The country's vulnerability to severe weather worsens the existing disparity in living standards between the rich and the poor and gender-related inequalities (PAGASA, 2011). Women in developing countries are particularly vulnerable (UNDP, 2011) and even worse than those living in the low lying communities. In Bangladesh, girls are considered as the burden of the society and being dominated by a patriarchal kinship system which mainly reflects their subordination and unequal status in the society

(Aker, 2018). Women suffer a disproportionate amount of impacts due to the systemic inequality between men and women in society (Dube, Intauno, Moyo, & Phiri 2017). Climate-related shortages force women to perform additional unpaid works (Owusu-Agyeman, Fourie-Malherbe, & Frick, 2018 & Gonda, 2016).

Harvested works of literature reveal that women are less able to cope and adapt to the effects of climate change. To date, gender equality is given minimal attention, and the degree of difference in the impact of climate on women and men has been overlooked. The literature on the mechanisms for building knowledge of women most especially in vulnerable communities is minimal. To address this gap, this research on knowledge building on the causes and effects of climate change is imperative to provide timely and more proactive responses for women living in most vulnerable communities such as Cotabato City. Investigating the knowledge building activities of women on climate change could lead and guide the local leaders in addressing the gaps and issues that hinder compliance to international and national mandates specifically RA 9729 or the Climate Change Act of 2009 and the effective implementation of local Climate Change Adaptation Plan for the different barangays in Cotabato City, Philippines.

## **FRAMEWORK**

Some theories have been utilized to study the status of women and their plight with the effects of global warming. Kaijser and Kronsell (2013) employed an intersectional analysis of climate change which illuminates how different individuals and groups relate differently to climate change. Intersection sketches out a pathway that stays clear of traps of essentialism, enabling solidarity and agency across and beyond social categories. It illustrates how power structures and categorizations may be reinforced, but also challenged and renegotiated, in the realities of climate change.

The study of Dube et al. (2017) investigated how livelihood-related household labor requirements are shifting as a result of climate change which used an adapted version of the Harvard Analytical Framework. On the other hand, Gonda (2016) utilized discursive and cultural constructions of hegemonic masculinities and femininities in reasoning that women are likely not only to suffer more from the consequences of climate change, but they will also be more eager to implement actions that alleviate their increasingly heavy duties.

This study which focused on knowledge building on climate change was anchored on Adult Learning Theory or Andragogy of Malcolm Knowles. Knowles made five assumptions about the characteristics of adult learners (andragogy) that are different from the assumptions about child learners (pedagogy). As people mature, their self-concept moves from one of being a dependent personality toward one of being a self-directed human being; they accumulate a growing reservoir of experience that becomes an increasing resource for learning, and their readiness to learn becomes oriented increasingly to the developmental tasks of his/her social roles. Their orientation to learning changes from one of postponed application of knowledge to immediacy of application, and their orientation toward learning shifts from one of the subject-centeredness to one of the problem centeredness and the motivation to learn is intrinsic (Knowles, Holton, & Swanson, 2012).

Moore (2010) elaborated that adult learning is a unique process that requires supporting processes to make it successful. Two of the processes that co-exist with adult learning are critical thinking and decision-making. The ultimate goal of adult learning is to make the educational experience as valuable to the learner as possible and to create a desire to expand the learning. On the other hand “mentoring” uses transformational theory through the critical reflection in a non-judgmental manner and addresses the principle of andragogy that experience is the most abundant source of adult learning (Klinge, 2015).

Anchored on the theory of Andragogy, this study explored that the experiences of women living in flood-prone barangays for the past years exposed them to acquire knowledge and understanding about the causes and effects of climate change. To fully understand the mechanisms employed in building knowledge of women, personal and social factors were explored. The relationships of the independent variables such as women’s age; some children; educational attainment; employment status; source of income; and monthly income and the dependent variables regarding women’s knowledge were examined to identify contributing factors.

## **OBJECTIVES OF THE STUDY**

The study determined the knowledge building on climate change among women in flood-prone communities in Cotabato City. Specifically, it aimed to describe the (1) profile characteristics of women in terms of a) age; b) number of children; c) educational attainment; d) employment status; e) source of income;

f) monthly income; g) length of stay in the barangay; (2) women experience about the effects of climate change for the past three years and how serious are the effects; (3) women's knowledge about the causes and effects of climate change; (4) mechanisms employed in building women's knowledge; and (5) significant difference on women's knowledge on climate change when grouped according to their profile characteristics.

## METHODOLOGY

### Research Design

This research which employed an exploratory design aimed to capture the experiences of women in building their knowledge of climate change. The techniques used were a survey and key informant interview.

### Research Site

The study was conducted in the three flood-prone barangays in Cotabato City under the province of Maguindanao in the Autonomous Region in Muslim Mindanao (ARMM). The sample barangays namely: Poblacion1, Poblacion 2, and Rosary Heights 3 were located along Rio Grande de Mindanao, Matampay, Kakar, and Pulangi rivers.

### Participants

The main participants of the study were married women and residents in the barangay for at least three (3) years. The Barangay Chairman or Punong Barangay and the barangay health worker serving the community were the secondary respondents. Purposive sampling was applied in identifying the sample barangays. Stratified systematic sampling was employed in selecting the households where a total of 283 households were proportionately distributed; Poblacion 1 was represented by 66 households, Poblacion 2 with 88 households while 129 households from Rosary Heights 3. For each sample barangay, two key informants were selected purposively. Hence, a total of 289 respondents were involved in the study.

The researcher hired and trained enumerators who assisted her in surveying the three barangays. The enumerators were already familiar with the communities because of their previous engagement with the project of the University Research and Publication Center. They were oriented to the content of the questionnaire and the attached cover letter which introduced the main goal of the study, and

the participation of the respondent was voluntary. They secured the consent of the participant before proceeding to the interview.

During the actual survey, the enumerators were grouped into two (2). With the Barangay Hall as the point of origin, one group took the houses in the right direction while the other group surveyed those houses on the left side. Both groups moved towards the direction of the houses along the river bank following the 5-house interval.

### **Instrumentation**

The first instrument was the interview questionnaire which was based on UN and PAGASA (2011) pieces of literature regarding the causes, effects, and mechanism in building knowledge on climate change. Section I asked for the profile; Section II on the experiences and seriousness of climate change; Section III on knowledge on causes and effects; and Section IV on mechanisms in building knowledge. The survey questionnaire subjected to content validity of the two (2) experts in climate change yielded the rating of 4.625 in the scale of 5.

The second instrument was the interview guide questions which focused on the key informants' knowledge of women's experiences, knowledge of climate change, and the mechanisms employed by the barangay in building their knowledge.

### **Procedure**

After the approval and endorsement of the research proposal for implementation, the researcher communicated to the office of the local government to carry out the objectives of the study. First, the approval and endorsement of the City Mayor were sought, and the approved letter together with the survey questionnaire was brought to the Barangay Chairmen of Poblacion 1, Poblacion 2, and Rosary Heights 3 as the locale of the study. Second, the Barangay Chairman approved and endorsed the request for data gathering in the barangay, and finally, the researcher together with the trained enumerators conducted the house-to-house visit to gather the data using the survey questionnaire which commenced on October 28, 2016, until November 5, 2016.

The Statistical Package for Social Sciences (SPSS) 20 was employed in processing the data. The quantitative data in the profile and knowledge of climate change was summarized using mean, frequency, and percentage. ANOVA was used in finding the data for a differential problem. For the qualitative data such as the participants' mechanisms employed, themes were constructed as a guide.

## RESULTS AND DISCUSSION

The mean age of the women is 36 years old, indicating that they are in their early adulthood. On average, they have four children and have been staying in their barangay for about 19 years. This implies that majority of the women are familiar with the community, people, and events such as the effects of climate change. While all women have been into formal education, most are high school graduates and have not finished a degree. More than half of the women are unemployed while others are self-employed and few are employed in service, government, and private organizations. However, the working women are just earning meager monthly income which is below the minimum wage.

Unemployment engages women in multiple tasks and responsibilities. As full-time housekeepers, women perform both maternal and domestic roles and are dependent on men for the livelihood of the family (UNDP, 2011). These are due to factors such as women's economic disadvantage, social and cultural norms and the discrimination they face in the access to and control over productive resources and their limited decision power (Jost et al., 2015 & UN). The unequal relationship between men and women gave rise to higher rates of poverty and more severe experience of poverty by women than men (Kaijser & Kronsell, 2013 and Dube, Intauno, Moyo, & Phiri, 2017).

Out of 283 participants, only 249 (88 percent) have heard about climate change. About 9 out of 10 women are aware of the climate change phenomenon, but all of them have experienced the effects of climate change over the past three years. Increased water level, flooding, heavy rainfall, and high temperature are the worst effects. Heavy rains often result in high water level in the low lying communities. This is expected for the majority of the barangays in Cotabato City are flood-prone since it lies within the Mindanao River basin and 70% of the city's total land area lies below sea level.

Drought, flash flood, typhoon, and storm surge have no severe effect on women. Despite viewing other events as not having serious effects, generally, climate change is quite a severe situation for the women living in the flood-prone barangays. According to UN, disaster situations such as flooding in South and East Asia are increasingly linked to climate change, and the greater vulnerability of women is most striking. Women typically outnumber men by 14 to 1 among those dying from natural disaster. For example, women and girls were recorded as comprising up to 80 percent of those who lost their lives in the 2007 Asian Tsunami (UN). Women in the South were more affected by climate change

(Arora-Jonsson, 2011) and gendered social norms and roles inhibit women's adaptive capacity (Jost et al., 2015).

Most women have correctly identified the causes of climate change such as smoke from a vehicle (96%); burning of plastic and other garbage (95%); and pollution from factories (90%). Also, the women are right in saying that volcanic eruptions warm the environment (77%) and it is a consequence of modern life (76%). However, they have incorrectly identified that climate change is caused by nature (84%); overuse of aerosol or hairspray decreases greenhouse gases (83%); accumulation of gases in the atmosphere cool the earth (81%); cutting and burning of trees (77%); and God's punishment to human abuses on the environment (76%).

While most women have beliefs that are contrary to the scientific causes of climate change, they view the environment as a sacred and God-given gift. They (people) are God's stewards of the natural resources. Women have a healthy body of knowledge that can be used in climate mitigation, disaster reduction, and adaptation strategies (Gonda, 2016). Their knowledge is honed by their interaction with nature and emerges from participation in nature rather than separation from it (UNDP, 2011).

The misconception on climate change is critical if not corrected. If women continue to believe in what they know, their knowledge will be handed down to their children. This is a serious matter that is needing attention from local leaders. Proper education for mothers and women must be pursued at the barangay level. Since mothers are the first teachers of their children, they need support so they can educate their children and others correctly. This concern could be addressed by way of foreground gender mainstreaming (Dube, Intauno, Moyo, & Phiri, 2017). The government should incorporate gender perspectives in the national policies, actions plans, and other measures in climate change (UNDP, 2011). In this light, consultation and participation of women in climate change initiatives must be ensured. Those responsible for teaching adults must take on the responsibility of creating a learning environment that facilitates critical thinking and ensures learners see the vital connection between adult learning, critical thinking, and decision-making (Moore, 2010).

On the effects of climate change, the result reveals that women know that all populations will be affected (96%); occurrence of drought (94%); contamination of freshwater supply (93%); destroys homes (86%); brings malaria (83%); contributes to deaths from cardiovascular disease (80%); affects the supply of fresh water (78%); and extreme heat can trigger asthma (72%).

Women have already known from experience that everyone is affected by climate change. Since they live in flood-prone barangay, they know the risks of climate change to their life and property. Women's responsibilities in households and communities, as stewards of household resources, security and safety of their children and family position them well to adapt to changing the climate.

Notably, women misconceive that climate change lessens the risk of water-borne diseases (82%). They need to understand more on the effects of high temperature, flooding, and the like on health. They need to know that dengue, malaria, and skin diseases are not only caused by flooding but even caused by warm temperatures (PAGASA, 2011).

Moreover, women misconstrue that rising temperatures and variable precipitation are likely to increase the production of staple foods (74%). This misconception implies that they lack full knowledge of the effects of climate change on food production and supply. As city dwellers, they are not exposed to farming and agriculture and so, they are not aware that the changing climate endangers food supply. This misconception of most women needs to be corrected for them to understand the dangerous effects of climate change fully so that they can respond and act responsibly considering that the impoverished and flood-prone communities are at higher risks (PAGASA, 2011). In the US, contrary to expectations from scientific literacy research, women convey greater assessed scientific knowledge of and concern about climate change than men do (McCright, 2010).

Most women identify training and seminar/workshops as mechanisms in establishing their knowledge. Their membership in Pantawid Pamilyang Pilipino Program (4Ps) or cash transfer has exposed them to the discussion on climate change. During their Family Development Sessions (FDS), they learned about dengue and malaria prevention, clean environment, and gardening.

Women have learned climate change from TV and radio programs. These media are the most common source of information available to them, and they find them useful in disseminating information. However, there are possible problems with these mechanisms considering the one-way flow of information to the audience. Incomplete and unclear information about climate change may happen with the limitation of these media. On the other hand, the least they heard it from the newspaper and internet. These imply that women have limited or lack of access to these media. The use of technology is never gender-neutral. Like the Philippines, the access of girls and women to information and communication technology is restricted by social and cultural bias, inadequate

technological infrastructure in rural areas, the fear of or lack of interest in technology, women's lack of disposable income to purchase technology services and low level of education limits women's ability to understand and adapt to the impacts of climate change (UN).

Furthermore, the women learned climate change from their local leaders. The barangay leaders conducted house-to-house visits to inform the residents about their campaign for garbage-free barangay. This shows that local leaders mentor their constituents. Mentoring is traditionally a process in which an experienced guides another person in the development of her or his ideas, learning, and personal/professional competence (Klinge, 2015).

The workers of the Department of Social Welfare and Development (DSWD) and barangay officials are the most effective groups in building knowledge of women, indicating that women trusted these groups. Women's participation in community clean-up drive is an indication that they have succeeded in teaching them and enhanced consciousness of their obligation as residents in the community. To strengthen this mechanism, climate change policy must be interdisciplinary which ensures building bridges between extreme events and societal impacts (Bogardi & Fekete, 2018).

Significant differences on women's knowledge on climate change are found when they are grouped based on their age (the F-value is 1.755 with a p-value of .045) and the highest educational attainment where the F-value is 2.023 and a p-value of .016. On the other hand, there are no significant differences in women's knowledge of climate change when grouped according to the number of children (F-value= 249 with a p-value of .240), length of stay in the barangay (F-value= 1.018 with a p-value of .436), employment status (F-value=1.447 with a p-value of .131), source of livelihood, (F-value= 1.048 with a p-value of .346), and monthly income (F-value= 1.095 with a p-value of .362).

Since the p-values are less than .05 between the women's knowledge on climate change and their age and highest educational attainment, the hypothesis which states that there is no significant difference in the knowledge on climate change is rejected. Therefore, older and more educated women have better knowledge than their counterparts. The other variables such as some children, length of stay in the barangay, employment status, source of livelihood and monthly income do not matter in knowledge building.

It can be gleaned from this study that knowledge building among women on climate change supports the principles of Adult Learning theory or Andragogy of Malcolm Knowles. Adults are motivated to learn based on experience and

personal interests. They need to know why they should learn to know something before undertaking to learn it. While adults are responsive to external motivators, the strongest motivation is internal pressures to learn (Knowles, Holton, & Swanson, 2012 & Moore, 2010) and learn better in situations where they are comfortable both physically and psychologically (Klinge, 2015).

In this study, the women who have learned several lessons from repeated experiences of rising water level, high temperature, and flooding in the barangay have gained some knowledge on the causes and effects of climate change and acquired skills as forms of response mechanisms. These are indications that the experiences of women have motivated them to know more to become resilient to the effects of climate change. Although education constrains them, they have grasped information from seminar/training, TV and radio programs and house visits the dangers posed by climate change. The women in this study hold critical knowledge on climate change adaptation and their local beliefs and traditions produce a wealth of traditional knowledge that is priceless.

The understanding of women on the seriousness of climate change has motivated them to participate and cooperate in the barangay clean-up drive indicating that they recognize the importance of the activity for the broader community rather than self-interest. The internal pressure for collective action as evidenced by their compliance to barangay ordinances on proper waste disposal and protection of the rivers, streams and the like goes with personal will and conviction for social accountability and responsibility. Similar findings are found in the study of Whyte (2014) among indigenous women that the responsibilities they assume in their communities expose them to harm stemming from climate change impacts and other environmental changes. At the same time, their commitment to these responsibilities motivates them to take on leadership positions in efforts at climate change adaptation and mitigation.

## CONCLUSIONS

Knowledge building on climate change among women employs mechanisms that are responsive to their needs as women and mothers. Local culture involving group dynamics and interaction, inputs, mentoring, and sharing of stories and best practices have been useful in acquiring information on climate change. Knowledge gained from these mechanisms and the direct exposure and repeated experiences of flooding and high-water level have provided the women a critical space in addressing the worsening effects of global warming.

Women have acquired some correct understanding of climate change, but misconceptions on the topic prevail. They have incorrect beliefs on the scientific causes and effects of climate change and the processes involved in the accumulation of greenhouse gases in the atmosphere. This is critical since all information including wrong ones when transmitted to the young are construed as correct and proper which could aggravate further the vulnerabilities and risks of climate change when left unrectified.

Despite prevailing limitations, knowledge of climate change has led women to become resilient with the effects of global warming. The government agencies and barangay leaders who played key roles in building their knowledge have guided them to become resilient and conscious of their obligation in the protection of the environment.

Better knowledge of climate change is found among older and more educated women. Better education, more maturity, and analytical processes are needed in understanding the scientific causes and effects of changing the climate. The younger generation of uneducated women needs literacy in these aspects not only to cope successfully with the dangers of climate change but for them to protect their generation and future generations to come.

## **TRANSLATIONAL RESEARCH**

The findings of this study could be translated through a journal article for international publication, newsletter, television and radio, social media, and other forms of information dissemination for the international and national institutions on climate change. The result of the study may provide feedback to global advocates on the status and challenges in the attainment of goals relative to strategic priorities to address the impacts of global warming, vis-à-vis knowledge and capacity development of women. It is hoped that the findings will be translated into a collective action among government leaders and stakeholders around the world which addresses gender inequality and, thus elevates the position of women in the society in order to equip them with knowledge and capacity to fight the global impact of climate change for themselves, children, family, and to their own community.

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