

Climate Change Perception and Adaptation Practices of Gondar City Administration Office Workers, Ethiopia

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Abstract

Purpose- Cities and their residents are affected by climate change, the poor are more vulnerable to consequences of climate extremes and variability increases. Climate change mitigation and adaptation are challenges that face cities. City administration offices can contribute positively in mitigating climate change impact if workers have right perception. This study focus on determining the perception of Gondar City administration workers on climate change impact, organizational adaptation capacity and adaptation works. Factors associated with adaptation practices of climate change impact were also determined.

Design/methodology/approach- A cross sectional study design was implemented among Gondar city administration workers.

Findings- Majority of workers in City of Gondar administration offices were aware of climate change and its impact. Adaptation capacity of the city administration was relatively low; which results unavailability of adaptation plans and minimal works done on climate change adaptation. The study also revealed that adaptation capacity of Gondar city administration offices was associated with the practicality of adaptation activities within the city.

Originality/value- This paper will be of value to city management and policy developers looking in to mainstream climate change adaptation in Ethiopia at City level.

Key words: Awareness, Perception, Climate change adaptation, Adaptation capacity

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1. Introduction

Cities contribute much to Green house gas emissions (Castan Broto and Bulkeley, 2013) , several researchers point out that major cities are one of the main sources of climate change (Lankao, 2009). The lives and livelihoods of hundreds of millions of people will be affected by what is done (or not done) in urban centers with regard to climate change over the next five to ten years (Robert I. McDonald, 2011).

The need for city and municipal governments and civil society groups to act to reduce greenhouse gas emissions is well established with many city governments in the developed world. On the other hand urban centers (and nations) that face the highest risks from the negative effects of climate change are those with small contributions to the greenhouse gases in the atmosphere; most also have serious constraints on their capacity to adapt to these effects (David Satterthwaite, 2009). Cities in developing countries are vulnerable for extreme urban heat waves, floods and storms (Craig D Idso, 2001, Emanuel, 2005). Communicable diseases caused by many waterborne and vector borne infectious diseases are strongly influenced by climate conditions, and several are common within these cities. Air pollution in cities are also exacerbated due to levels of many pollutants, such as ozone, that are affected by atmospheric conditions and tend to be higher on warmer days (Corvalan, 2007).

Urbanizations with a growth of population have been identified as one of the most powerful and visible anthropogenic forces on earth (Dawson, 2009). It is a process and outcome of social changes, in-flow and concentration of people and activities in cities (Ogundiji, 2009). With increasing urbanization, understanding the impacts of climate change on the urban environment becomes more important. The manner at which slums grow and the handling of several household activities in developing countries does not only depict weak governance but also a people that lack proper understanding of implications of their activities on the environment (Olayinka C. Oloke, 2013).

To prevent adverse effects of climate change in cities, public knowledge about the nature of the impact, its mitigation and adaptation should be considered as some of the strategies in the governing process. There is a clear need to develop and evaluate effective public health interventions for extreme weather events, such as heat health-warning systems to reduce the impact of heat waves (Corvalan, 2007).

Many studies have been focusing on climate change policies and action at the national level, but few have

studied policies and action at the city level, especially cities in emerging economies (Karabag, 2011). There is a paucity of studies done on the capacity of Ethiopian city municipalities that examine their perception and adaptation practices. This study contributes to address the gap by assessing the perception of Gondar city administration workers and their adaptation practices for the city they are governing.

2. Methodology

2.1. Design

A cross-sectional study design was implemented to find out Gondar town Administration workers on climate change impact and their adaptation practices at organizational level with their associated factors.

2.2. Study Area

Gondar is a city and separate woreda in Ethiopia located in the Semien Gondar Zone of the Amhara Region. It has a latitude and longitude of 12°36'N 37°28'E with an elevation of 2133 meters above sea level. Gondar previously served as the capital of both the Ethiopian Empire and the subsequent Begemder Province. Tourists usually come to this city due to the attractions of several Royal Castles built 400 years ago.

Gondar city administration contains different offices including Gondar city municipality, Gondar city health, Keble administration, Gondar city water works office.

2.3. Study Population

The study population was all Gondar city administration workers. Workers who were excluded in the study were: those workers who were at annual leave, sick, temporary and part time workers.

2.4. Operational Definitions

In this paper terms are defined operationally for the sake of measuring the variables mentioned.

Awareness of climate change impact: respondents having knowledge regarding the causes earth's warming, global and local impact of climate change impact.

Adaptation capacity: organizational capacity for adapting climate change by having adequate finance, collaboration of with other sectors and adequate plan and preparation for limiting future climate change impacts.

Adaptation practice: practical activities done by organization on climate change adaptation in terms of involving community based city plans, building adaptive capacity among the most vulnerable and developing stand-alone climate change plans.

2.5. Sample Size and Sampling Technique

Sample size was determined using single population proportion formula and by considering the prevalence 50% since there is no finding on perception of climate change and adaptation practices in Ethiopian cities administration offices to achieve maximum sample size of 384 considering, 95% level of confidence and 5% margin of error. This sample size was reduced to 298 using finite population Correction for proportion. Systematic random sampling technique was used to interview 298 Gondar town administration workers in Gondar Town.

2.6. Data Collection

The questionnaire was adopted from different scientific literatures in order to measure climate change impact perception and adaption practices. The questionnaire was carefully translated from English into the local language Amharic for interviewing, and translated back to English and pretested in adjacent Woreda administration office in order to ensure the validity and reliability of the questionnaires. Trained data collectors were involved for data collection.

2.7. Data Analysis

Data were entered, cleaned, edited and analyzed using SPSS statistical package for social scientist version 16. Descriptive statistics was used to describe the level of awareness, adaptation capacity and adaptation practice. Binary and logistic regression was also used to find out the association between adaptation practices and other variables of the study.

3. Result

All the study subjects attended the interview; the mean age of respondents was 33+1 years. Male respondents account 62.1% of the total study subjects. Majority of the respondents have attended first degree and Diploma education program with a percentage of 31.9% and 34.9% respectively. The rest attended only primary, secondary and masters degree with a proportion of 10.4%, 19.5% and 3.4% respectively.

3.1. Awareness of climate change and impacts

From the overall study subjects of Gondar city administration offices workers 245(82.2%) of them respond that they heard about climate of the earth is changing. From those who know the "earth is warming", 185(62.2%) of the respondents understands green house gases emitted from industries are the major causes The number workers who aware deforestation is one of the causes of warming of the Earth in addition to the green house gases was found to be 126(57.7%).

The number of administration workers who understood "increasing heat waves" and "annual rain fall variability"

as indicator of local climate change are 256(85.9%) and 142(47.7%) respectively. The number of study subjects who understood cities can be impacted by climate change; indicated in table 1 below, issues including “increasing temperature can aggravate air pollution”, “droughts can intensify disruption of water supply”, “extreme weather events and acute temperature can impact energy reliability” and “climate change can impact urban public health” were 59(19.8%), 188(63.1%), 131(44%) and 200(67.1%) respectively see table 1.

Table 1: Awareness of Gondar City Administration workers on Climate Change in Gondar town, 2012.

Variable	Yes f*(%)	No f(%)
Have you ever heard about “the climate of the Earth is changing”?	245 (82.2)	53 (17.8)
Human activities such as green house gases emitted from industry are the major cause for warming of the Earth.	185 (62.1)	113 (37.9)
Deforestation is one of the causes of warming of the Earth.	126 (57.7)	172 (42.3)
Increasing heat waves is an indication of climate change at local level?	256(85.9)	42(14.1)
Annual rain fall variability is an indication of climate change at local level?	142 (47.7)	156 (52.3)
Increasing temperature in cities can aggravate air pollution in cities?	59(19.8)	239(80.2)
Climate change is expected to intensify droughts, resulting in disruptions to water supply in cities.	188 (63.1)	110(36.9)
Extreme weather events and acute temperatures can impact energy reliability for city users	131(44)	167(56)
Climate change can impact urban public health?	200 (67.1)	98 (32.9)

f*=frequency

3.1. Climate change Adaptation Capacity of Gondar City administration offices

Three questions were asked to assess the adaptation capacity of Gondar City administration offices. Workers that account 177(57.4%) of them responded that their organization has a tendency in financing adaptation in city of Gondar. Details are enlisted in table 2 below, From the total study subjects 165(55.4%) of them responded that their organization is linked with other sectors for a possible collaboration for solving impacts results from climate change. Almost half of the study subjects 150(50%) replied that “their organization is prepared for existing and future climate impacts for limiting their magnitude and severity” see table 3.

Table 2: Climate change Adaptation Capacity of Gondar City administration offices in Gondar town,2012.

Variable	Yes f*(%)	No f(%)
Your organization has a capability in financing adaptation in city of Gondar.	177(57.4)	121(40.6)
Your organization is linked with other sectors for possible collaboration for solving impacts due to climate change.	165(55.4)	133(44.6)
Your organization is prepared for existing and future climate impacts for limiting their magnitude and severity.	150(50.3)	148(49.7)

f*=frequency

3.2. Climate change adaptation practices in City of Gondar administration offices

At holistic level, Gondar City administration office adaptation practices were assessed using three questions, from the overall study subjects 99(33.2%) of them replied that their organization performance in incorporating community-based adaptation plans was adequate. Almost half of the study subjects 161(54%) rated their organization have adequate performance in building Adaptive Capacity among the most Vulnerable. Respondents that account 48(16.1%) rated their organization plan in developing stand-alone climate plans or incorporating climate considerations into existing plans, policies, and projects see table 3.

Table 3: Table that showed Climate change adaptation practices of City of Gondar administration offices in Gondar town, 2012.

Variable	Adequate f*(%)	Poor f(%)
Rate your organization performance in incorporating community-based adaptation into city plans.	99(33.2)	199(66.8)
Rate your organization performance in building Adaptive Capacity among the most Vulnerable.	161(54)	137(46)
Rate your organization plan in developing stand-alone climate plans or incorporating climate considerations into existing plans, policies, and projects.	48(16.1)	250(83.9)

f*=frequency

3.3. Associated factors for climate change adaptation practices in City of Gondar administration offices

Binary logistic regression was applied to see the association between socio-demographic, awareness, attitude,

and adaptation capacity with the variable. Only adaptation practice was associated the outcome variable, the others was not related. The application of multiple logistic regressions also showed that adaptation practice was associated with adaptation practices AOR: 6.585, 95% CI:(3.777, 11.482). Other explanatory variables were not associated with adaptation practices in multiple logistic regression analysis as well see table 4.

Table 4: Explanatory variables tested for association with adaptation practices using Multiple Logistic Regression.

Variables	Sig.	Adjusted Odds Ratio (95% CI)
[Age=19-25]	0.854	.829 (0.113, 6.084)
[Age=26-35]	0.721	1.429 (0.201, 10.153)
[Age=36-45]	0.898	1.139 (0.155, 8.370)
[Age=46-55]	0.825	1.246 (0.177, 8.767)
[Educational level=Primary]	0.321	0.412 (0.072, 2.368)
[Educational level=Secondary]	0.404	.503 (0.100, 2.531)
[Educational level=College Diploma]	0.618	0.673 (0.142, 3.192)
[Educational Level=University First Degree]	0.857	0.866 (0.182, 4.118)
[Educational level=University Masters]	.	.
[Gender=Male]	0.708	1.113 (0.636, 1.948)
[Gender=Female]	.	.
[Awareness=Adequate]	0.746	1.103 (0.611, 1.989)
[Awareness=Poor]	.	.
[Adaptation Capacity=Adequate]	0.000	6.585 (3.777, 11.482)
[Adaptation Capacity =Poor]	.	.

4. Discussion

Majority the respondents are male (62.1%) this confirms males comprise higher by involvement as a labor force in Ethiopia at organizational level (MOLSA, 2013). More than half of the respondents have joined University for attending first degree and Diploma education program with a percentage of 31.9% and 34.9% respectively this is in line with labor force in governmental organizations in Ethiopia constitutes more than 50% are graduated from a university (UN, 2007).

Awareness of respondents on climate change impact that indicates majority (82.2%) of them have heard that climate of the earth is changing. This result is a little bit lower than a study done on the awareness of climate change among urban community in Pune City of Maharashtra state of India with a result 91.68% (Harshal T. Pandve, 2011). The result of this study is also a little bit lower than a study done on farmer's awareness level on climate change in rural areas of Oyo state, Southwest, Nigeria indicated that 87.5% of respondents have heard about climate change (Raut, 2011). This might be due to is the low media coverage regarding climate change in Ethiopia national Media including radio, TV, journals and Magazines.

From the respondents 62.1% and 57.7 % of them respectively answered that, human activities such as green house gases emitted from industries and deforestation are the major cause for warming of the Earth. This result is lower as compared to the two different studies done in India, having 98% and 81.4% of respondents described green house gases emitted from industries are contributing to climate change ; deforestation was also commented as one of the reason for global climate change in both studies with a percentage of respondents 74.9% and 77.1% (Harshal T. Pandve, 2011, Raut, 2011). One of the reason that partake a lower awareness on causes of climate change in this study might be the curricula's of Ethiopian education didn't mainstream climate issues at various discipline that can indirectly enhance awareness of the educated society at organizational level (Dalelo, 2011).

Increasing heat waves and annual rainfall variability were commented by study subjects constituting 85.9% and 47.7% respectively as an indicator of climate change at urban level. A study done in Lagos state Nigeria on

awareness of the impact of household activities on climate change indicated that increasing heat waves and annual rainfall variability were an indicator of local climate change having respondents constitute 66.18% and 59.09% respectively (Olayinka C. Oloke, 2013). The difference may result from the fact that heat waves were more visible than annual rainfall variability and respondents may easily answered that they repeatedly felt in their living area (Dejene, 2010).

A few study subjects (19.8%) have answered that increasing temperature in cities can aggravate air pollution in cities. This result seems lower response rate; as workers in city administration offices are expected to understand increasing temperature will increase the frequency of days with unhealthy levels of ground-level ozone, a harmful air pollutant, and a component in smog ; for actions related to the delivery of a wide range of services that ensure the well-being of citizens (EPA, 2008, WorldBank, 2011).

More than half of respondents with a proportion of 63.1% and 67.1% indicated that climate change can impact “water supply in cities” and “urban public health” respectively. 44% of study subjects indicated that extreme weather events and acute temperatures can impact energy reliability for city users. These results are almost similar to the percentage of study done in India Pune city having a proportion of 72.2%, 61.39% and 43.79% (Harshal T. Pandve, 2011). City administration workers are expected to understand climate change can affect water supply in cities, urban public health and energy reliability of a city. As climate specialists pointed out that a solution to climate change problem will require climate change awareness and its proper understandings (Adewale, 2012).

In this study, capability in financing adaptation, collaboration for solving impacts due to climate change and collaboration for solving impacts due to climate change was not a high agenda at City administration level. Capacity building regarding climate change impacts on city of Gondar mainly water resource management, strengthening sustainable energy system, transport and public health, should take much attention at city level (Ramin, 2009).

Practical climate change adaptation works of Gondar city administration offices were very low as can be seen in table 3. The possible explanation for this result might be Ethiopia’s climate change policies focuses on agriculture and rural areas at Ministry level (Claudia Ringler, 2011, Leulseged Yirgu, 2013). There remains a lot to work in framing a policy and plan on climate change adaptation works focusing the challenges of impacts of climate at city level as well.

Multivariable logistic regression indicated that workers gender, age, educational level and awareness of climate change were not associated with adaptation practices of city of Gondar Administration offices. On the other hand adaptation capacity of climate change was associated with climate change adaptation practices in multivariable logistic regression. This result is consistent with the general truth that adaptation capacity can influence adaptation works to be done in managing of risks posed by climate change. This result was also in line with a research done with various authors that capacity for governing climate change locally relates to resources; the financial and human assets which local authorities can deploy in relation to addressing climate change (Harriet Bulkeley, 2009).

5. Conclusion

Majority of workers in City of Gondar administration offices were aware of climate change and its impacts. Adaptation capacity of the city administration was relatively low; which results unavailability of adaptation plans and minimal works done on climate change adaptation. The study also revealed adaptation capacity of Gondar city administration offices were associated with works done on climate change adaptation. Further works should be done in how to adjust and develop management strategies in coping climate change impacts at the city level and different sectors of the city management.

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