

Investigating Women's Realization on Understanding the Impact of Climate Variability in Socioeconomic Performance in Zanzibar, Tanzania: A Case of Jambiani Village

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Abstract

The study employed the triangulation approach to investigate the impact of climate variability on selected socioeconomic indicators, particularly food production, health and education, and how much climate variability and its impact on those indicators was realized and understood among the women living in Jambiani community in Zanzibar. The study used the explanatory, sequential mixed method to collect, datasets related to Jambiani communities (*i.e.* from the women in Kibigija village), other climate data acquired from Tanzania Meteorological Authority (TMA), Ministries of Agriculture and Health and Southern District in Zanzibar. The results obtained from the analysis of both anecdotal (interview, questionnaire among others) data shows that climate variability was imminent in Jambiani communities between 2010 and 2015 and had a negative impact on food production, health and education. Further results revealed that women working in informal sectors are more vulnerable to climate impacts than women working in formal sectors due to less knowledge and techniques to mitigate/cope with climate variability impacts. Conclusively the study has shown that climate variability affects more women with less awareness of what is happening and how to cope with it, thus the study calls for new research work and increasing the awareness on the impacts of climate on human basic needs.

Keywords

Climate Variability, Women, Coping Mechanism, Zanzibar

1. Introduction

There exists overwhelming scientific evidence that climate variability is unequivocal and has negative impacts on ecosystems [1]. It is projected that due to climate variability wet areas may get wetted and dry regions are likely to be drier [2]. Both excessive rainy and dry seasons have adverse impacts on people and environment. Also, it is believed that warmer temperatures increase infectious diseases such as cholera, diarrhea and other illness such as heat cramps or stroke. Indeed, droughts bring malnutrition particularly to the elderly and children because of the lack of nutritious food [3]. Furthermore, reference [4] has noted that climate variability-related diseases coupled with HIV/AIDS increase stress and vulnerabilities to people, especially those in rural communities.

Also, reference [1] has noted that if the temperature continues to increase at or beyond 2°C, the ocean may rise and wipe out the earth in the next 35 - 50 years, also reference [5], had shown that both excessive and deficient rainfalls have adverse impacts on ecosystem, while anomalous strong rainfalls may raise the water table and in turn affects the growth of plantations [6]. Besides, [2] indicated that the hydro-meteorological-related disasters in the East African (EA) region have increased from less than three events during the 1980s to more than seven during the 1990s and up to 10 events per year between 2000 and 2006, whereas the associated cost as per [7] were \$1 billion in 2011, \$0.3 billion between 2001 and 2010. As for Tanzania in specific [8] noted that the storm in March, 2015 left 900 families homeless, killed 49 people and injured 91 at Mwakata Village in Kahama District.

Gender and Climate Change Adaptation

According to the available literature, climate change and its variable impacts have caused and will continue to cause severe effects globally but will negatively impact the poor countries in terms of environment, health, safety and livelihoods [9] [10]. This is particularly true in Africa. Recently, Africa has experienced increased rainfall shortages, which affects rain-fed agriculture, and in turn enhances food insecurity and malnutrition. Indeed, the existing climate change contributes to raise in sea-levels and increase the expansion of arid and semi-arid lands. In most IPCC reports, women and children often seem to be the most vulnerable victims of climate change due to their traditional roles and responsibilities [11].

On the other hand, number of reports and studies have been documented on climate change impacts mitigations and analysis, but the extent to which climate changes and variability affects the people living in the rural communities (Zanzibar in particular) are either limited or not yet documented. Some studies including [12] have noted that men have more opportunities of reducing their climate change vulnerability than women. Also, [13] noted that women suffer most due to climate variability compared to male. The impacts of climate variability on women's socioeconomic life are real, but little is known/documentated on

the women awareness on the impacts of climatic indicators (e.g. rainfall and temperature) on major socioeconomic indicators, such as food, health and education. Thus, this study focuses on gaining insight to the understanding of the effects that climate variability and its associated impacts on key socioeconomic indicators, of education, health and food production. Specifically, the study aimed to determine the extent to which women in rural areas are aware of the impacts of climate variations on their basic socioeconomic indicators of health, education, and food production. Specifically, the needs to 1) Examine the impact of climate variability on education, health and food production; 2) Evaluate women's ability to recognize climate variability and its impact on the basic socioeconomic indicators and lastly; 3) To identify the women adaptive mechanisms to cope with the impact of climate variability on their livelihoods.

2. Methodology

2.1. Description Study Area

Zanzibar is semiautonomous state consisting of two main Islands of Unguja and Pemba. Geographically, Unguja lies 6°10'0" South, 39°11'0" East. The Island is about 25 - 50 km off the coast of the mainland with a total population of 896,721, mostly concentrated in the urban region of Zanzibar [14]. The study was conducted at Jambiani (in Unguja) which is located at southern coast of Unguja with an elevation of 1 m above sea level and about 53 km from Zanzibar town (stone town) **Figure 1**. Jambiani has about 7000 inhabitants situated on the southeast coast between Paje and Makunduchi [14]. The main socioeconomic activities in Jambiani is highly gender oriented [15]. For instance, socioeconomic activities including making roofing materials, collecting palm-leaves, seaweed farming, coconut husking, octopus hunting, collecting shells and sea cucumbers which are all typical female activities, whereas men are mostly occupied in fishing or retail businesses.

Climatically, Jambiani like other districts in Unguja has a tropical climate; with a bimodal regime of rainfall (*i.e.* long and short rains) which are highly influenced by the movement of the Inter-Tropical Convergence Zone (ITCZ) [16] [17] [18] [19] which moves north and south during the year. The mean annual maximum and minimum temperature is 32°C and 21°C [20] with variable seasonal mean maximum and minimum temperatures [18]. Due to the existing impacts of climate change and variability, Zanzibar has experienced wide variation of severe weather events including heavy rains, tropical cyclones [18], and strong wind among others. For instance, in 1st of May 2015, Unguja experienced the worst 24-hour downpour of 196.3 mm [21] where entire city of Zanzibar was flooded people lost their lives, and properties and many others were injured.

The Zanzibar southeastern coastal communities including Jambiani are often affected by water salinization, and are highly dependent the rainfall (*i.e.* both the long rain and the short rain seasons) for fresh water resources. The characteristic of soil in southeast is built on coral rag soil and has a much sandier base and is less fertile than the western side of the island [22].

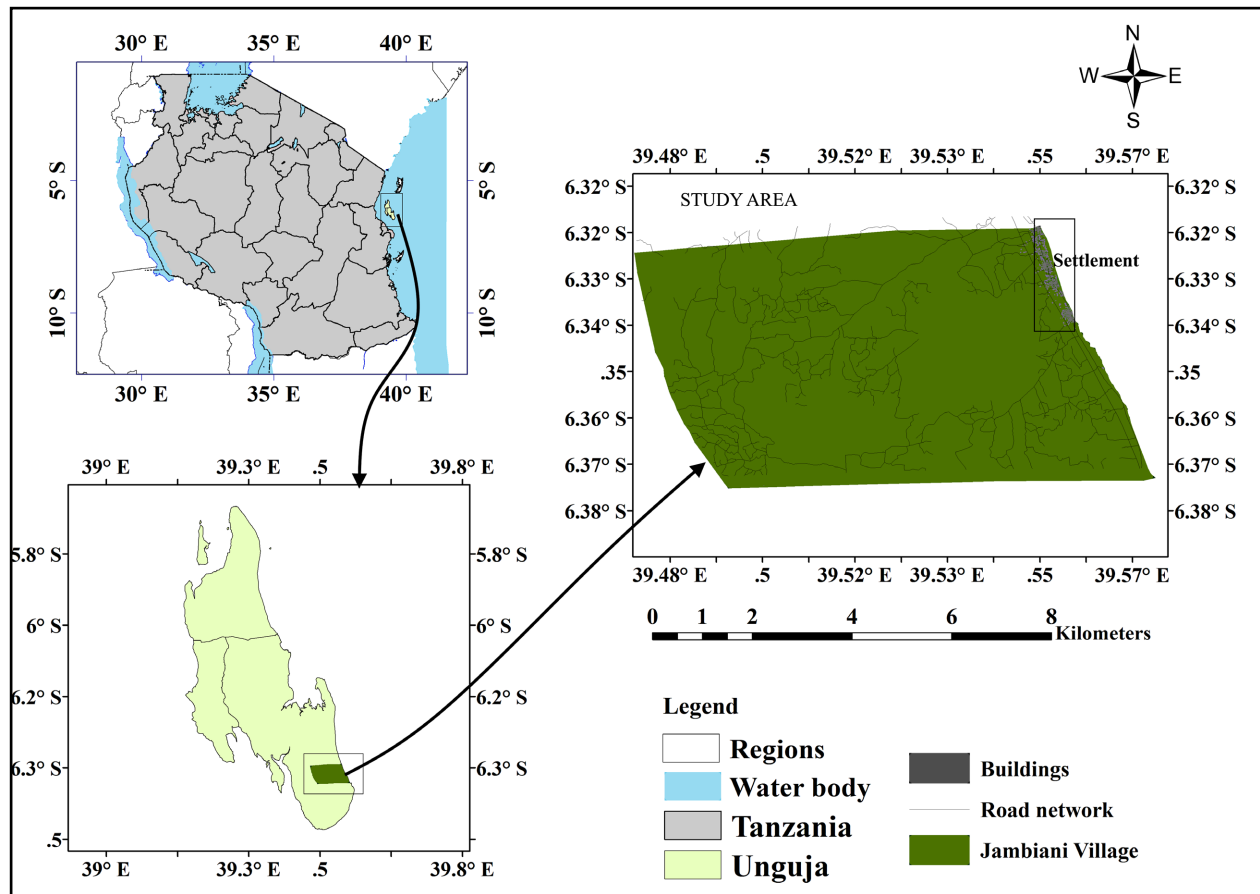


Figure 1. Map showing the studied area (Jambiani) in Unguja. Source: Google maps modified by the author.

2.2. Research Design

The study employed the mixed triangulation approach (MTA) to investigate the impact of climate variability on the selected socioeconomic indicators, particularly food production, health and education. Since 1959, the MTA method has been used in social and behavioral inquiries. Its benefits are seen in combining qualitative and quantitative databases to provide a deeper knowledge on the population that is under investigation have been well documented [23].

Also, the MTA resonates well with the micro theories that are used in this study to predict and explain the reality of the impact of climate variability on education, health and food production as prescribed in the statistical records vis-à-vis in the experience of women living in Jambiani District.

Using the mixed method, the study has utilized the Convergent Parallel Technique (CPT) to collect and analyze separately both quantitative and qualitative data. The same CPT was used to compare the results of each dataset and test any convergence or divergence in the findings of those data sets [23].

Through finding the solutions of the addressed questions **Table 1** describes the strategies used to 1) Describe the relationship between climate variability and the impact on education, health and food production; 2) To explain women's phenomena in Jambiani and their common symbols, which they use to describe

Table 1. Application of the MTA.

No	Research Question	What to be observed	Data Collection Strategy
1	What is the noticeable impact on socioeconomic indicators, namely education, health and food production?	Sample and analyze the impact of climate variability on socioeconomic indicators, namely education, health and food production.	Quantitative: use of statistical records to sample and describe the relationship between climate variability and impact on education, health and food production.
2	How and to what extent women are able to recognize climate variability and its impact on education, health and food security?	Describe women's ability to recognize climate variability and its impact on education, health and food security.	Qualitative: use of in-depth interviews to detail and recount women's phenomena and symbols of interaction in relation to climate variability and its impact on education, health and food security within their socioeconomic context.
3	What adaptive mechanisms do women use to cope with the impact of climate variability?	Identify and explain adaptive mechanisms women use to cope with the impact of climate variability.	Qualitative: utilization of in-depth interviews to understand women's experience and actions or steps in place to minimize the impact of climate to improve their livelihoods.

climate variability and its associated impacts in their livelihoods, especially in education, health and food production.

2.3. Population and Sampling Procedure

The analysis in this study was divided into two categories namely 1) Statistical records on climate variability, enrolment and attendance of primary school children, use of medical facilities by outpatients and crop production, where the data were acquired from the Ministries of Agriculture and Health, and the Southern District in Zanzibar, these records cover the period from 2010-2015. This period was among the intense focus on issues of climate change and variability in Tanzania, where number of policies and regulatory frameworks were regulated to accommodate climate change initiatives [14] [24]. 2) Qualitative information (data) or responses acquired from the women in Kibigija of the Jambiani communities.

Also, it was mainly between 2010 and 2015 that strategies to mitigate climate change and scientific studies to understand the causes and impacts of climate change in Tanzania emerged, and it is assumed that the Local Government Authorities (LGAs) began to place more emphasis on keeping records to track the impacts of climate change on key sectors during this period.

Also reference [14] has noted that during these years, climate change was put on the national agenda and a new definition of it (*Mabadiliko ya Tabia Nchi*) became available in Kiswahili for the first time. Given these inputs, it is to be expected that residents of rural communities, regardless of gender, were beginning to develop an understanding of climate change and variability and its associated causes, impacts and adaptation.

The qualitative data were collected from 70 women living in Kibigija one of the communities of Jambiani District. This community was selected because it is a peri-rural area where women work in both formal and informal sectors.

On the question on how big the sample size for this study should be, [25] suggests: “there is no need to keep the sample size very high in terms of accessibility. It is possible to get more reliable results with better planning and smaller sample size.” Thus, the study size was kept relatively small to ensure that a researcher could spend quality time with individuals to gather stories and information to obtain deeper insights on how women describe their situations in relation to climate variability and its effects on family or community livelihoods.

The study used purposive sampling [23] to select 70 women. For women to participate, they had to meet two criteria: first they were required to demonstrate that they were aware of or remembered any incident related to climate variability within the 2010-2015 period. Second, they had to agree that they were willing participants and that they would provide the factual information required for the study.

The women were categorized into two groups. The first group of thirty-five worked in the informal sector (farming, domestic related activities and retailing business) and the second group of thirty-five came from the formal sector, *i.e.* from the public or private sectors.

3. Data Collection

Numerical records and in-depth interviews were used to collect data on climate variability and its impact on food production, health and education in Jambiani District. The same variables or themes were used throughout the data collection. This approach was ensured that the comparison of results was done on qualitative and quantitative databases that had the same logic and pattern [23]. The data in the numerical records were sampled according to food production, health and education indicators vis-à-vis rainfall distribution between 2010 and 2015.

Similarly, in a two-hour in-depth interview, the women were asked to describe the weather trends and give accounts of any impacts they noticed in food production, health, and education, and what they did to cope with or minimize the adversarial conditions. In the interviews open-ended questions were used to collect detailed views from the participants who met in groups of two which allowed them to support one another during the interview and help each other to recall events related to climate variability and its impacts. The researcher was careful to observe similarities and differences in responses during the discussions and to follow-up with questions that allowed for deeper understanding and clarification. The role of the researcher during the discussion was to encourage the participants to express their thoughts and talk about their experiences and the impacts they had observed related to climate variability and its impact. The researcher took notes unobtrusively and did not interfere with the discussion. At the end of each session, the researcher summarized the discussions and asked the participants to verify the accuracy and completeness of what had been said.

Data Analysis

The study used Microsoft-Excel to analyze, visualize and describe qualitative da-

ta. Data analysis employed a side-by-side technique [26] with each set of data collected and analyzed differently. Also, the interview data from women working in the informal and formal sectors were analyzed separately and compared to determine whether women working in different sectors demonstrated the same understanding of climate variability and its impact on food production, health and education.

Statistical results on climate variability and associated socioeconomic indicators (food production, health and education) were reported first and discussed along with the interview results to confirm or disconfirm whether the respondents believed that the impacts on those socioeconomic indicators were the same. By comparing the two databases, the study was able to describe the convergence and divergence of the impacts on the selected socioeconomic indicators from two sets of data.

4. Results and Discussion

4.1. Impact of Climate Variability on Education, Health and Food Production

The study analysed the five years (2010-2015) datasets of weather and climate acquired from TMA and records on food production, health and education in Jambiani obtained from the Southern District of Zanzibar. The results presented in **Figure 1** revealed that, as for climate parameters, the annual rainfall record in Jambiani was projected to be around 1609.7 mm with 276.7 mm during the long rain of March, to May (MAM), at and 163.9 mm during the short rain of October, November and December (OND). More results show that in 2010 and 2015 Jambiani received excessive rainfall that was well above the average whereas in 2012 and 2013 the rainfall was below the average. The rainfalls in 2011 and 2014 were close to the projected average (1609.7 mm).

Indeed, as for the comparison of MAM and OND rainfall results in **Figure 2** shows that in 2010, 2012, 2013, 2014 and 2015 Jambiani had excessive rainfall during MAM but the varied rainfall during OND, and this variation was from year to year; for instance, 2010, 2012 and 2013 OND rains were below average but the OND amounts in 2011 and 2015 were almost double compared to the expected rainfall amount (163.9 mm).

4.2. Climate Variability and Food Production

The results of the influence of climate variability to the food production for the 2010 to 2015 presented in **Table 2** indicates that in 2011 and 2013, when Jambiani had rains close to the annual normal average (1609.7 mm), more food was produced than in 2015.

More results in **Table 2** shows that 2013, had a relatively stable rainfall such that with the exception of rice, almost every crop had better production in 2013 when the annual rainfalls were closer to the average (1609.7 mm).

As for the comparison of the food production for the two wet years of 2013

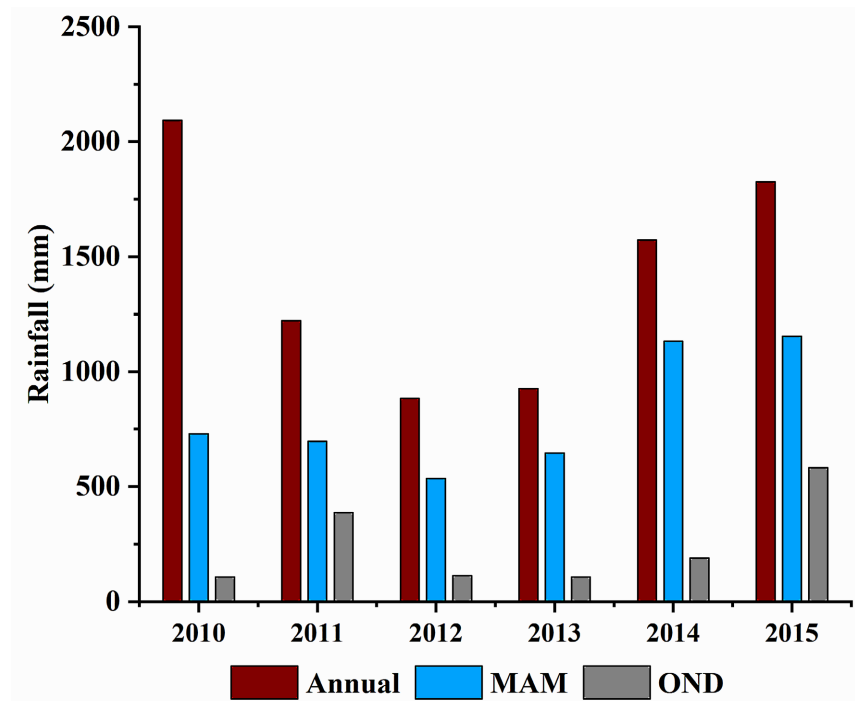


Figure 2. The inter annual and seasonal rainfall variability in Jambiani Unguja.

Table 2. Food production (in-tones) from 2010-2015.

Types of Crops	2010	2011	2012	2013	2014	2015
Cassava	-	396.52	-	238.28	192.25	89.53
Rice	-	0	-	0	123	120
Bananas	-	118.525	-	74.45	70.61	42.32
Yams	-	158.85	-	72.55	65.51	37.595
Arrow roots	-	36.12	-	22	12.37	11.05
Pineapple	-	1	-	4.75	4.5	21.8
Cowpea	-	20	-	9.9	6.13	7.58
Pawpaw	-	57.93	-	28.1	13.5	9.132
Sweet Potatoes	-	28.75	-	11.38	15.78	4.89
Millet	-	0	-	0	0	0.5
Peanuts	-	15.25	-	1.5	4.25	1.7
Maize	-	89.06	-	80.38	35.75	33.17
Pigeon peas	-	69.43	-	68.5	40	28.35
Sorghum	-	0	-	0	0	0
Pumpkin	-	19.82	-	17.75	13.854	5.27
Peas	-	117.75	-	43.87	22.9	23.91
Tomatoes	-	-	-	-	0	27.15
Vegetables	-	313	-	133.04	60.66	0

Source: Ministry of Agriculture, Zanzibar (2010-2015).

and 2015 results in **Figure 3** revealed that cassava was mostly produced followed by rice, while vegetable was highly produced in 2013 than in 2015.

4.3. Climate Variability and Health

The results of the climate variability on health for the five categories of the diseases are presented in **Table 3**. The first category shows that diseases decreased in Jambiani in years with excessive rainfalls. For instance, results in **Figure 2** has shown that 2010 and 2015, rainfalls were excessive compared to 2012, 2013 and 2014, where **Table 3** shows that 2010 and 2015 there were fewer cases of upper respiratory tract diseases reported (2959 and 2265 cases) than the years which had few rainfalls 2011, 2012, 2013 and 2014 (3751, 4208, 4071 and 3005 cases). Similar pattern holds for other diseases including skin diseases, trauma, dental diseases, anemia, among others.

Further results in **Table 3** shows that the reported cases of diseases were increased during the excessive rainfalls than the years with less rainfall. For instance, chicken pox, in 2015 had 810 cases followed by 2014 with 725 cases, with few cases of 653 and 485 in 2015 and 2014 had excessive rains compared to 2013 and 2012. Also, it is interesting to note that although 2010 had excessive rainfalls, but it had fewer cases of chicken pox (301 cases). Moreover, **Table 3** shows that the increase of disease cases did not follow the patterns of rains. For example, diseases such as diarrhea, eye, pneumonia, ear, nose and throat (ENT), head and neck, as well as other diagnosis had more cases irrespective of the rainfall strength. Also diseases like, ENT, head and neck had more cases in 2010 (808 cases) than 2015 (233 cases), although these two years had excessive rainfalls in record. Likewise, in 2012 there were more cases of ENT, head and neck (808

Table 3. Diseases Outbreak in Jambiani 2010-2015.

Data Element	2010	2011	2012	2013	2014	2015
Upper Respiratory Tract Infections	2959	3751	4208	4071	3005	2265
ENT head and neck	872	650	808	671	419	233
Pneumonia	808	1077	853	682	405	269
Diarrhea	426	1139	554	653	725	810
Chicken Pox	301	-	485	653	725	810
Skin diseases	274	348	438	509	354	252
Trauma/Injuries	215	546	416	590	208	33
Eye diseases	154	221	282	172	167	222
Dental diseases	149	194	220	245	208	145
Anemia	144	212	148	169	-	-
Hypertension	-	147	-	-	-	-
Other Diagnosis	1639	3311	2122	2373	1458	632

Source: Ministry of Health, Zanzibar (2010-2015).

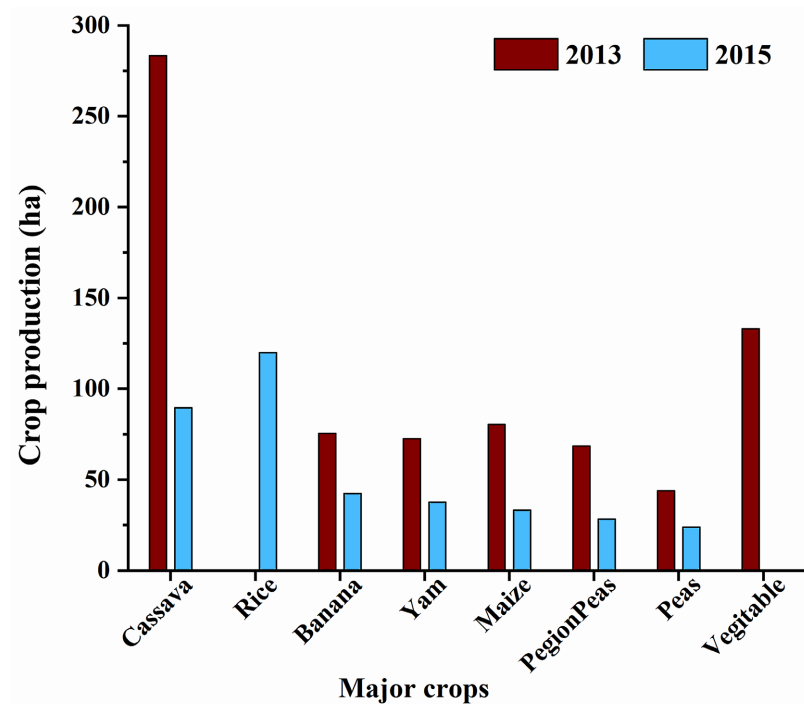


Figure 3. Comparison of production of major crops in 2013 and 2015 in Jambiani.

cases) but less case in 2011 and 2013 (650 and 671 cases). In light of the above empirical analysis, it seems that some health issues increased in Jambiani during excessive rains. However, the effect of climate variability on health differs greatly from one disease to the other. Some diseases are more common during less rainy times and some are widespread when the rains are excessive.

4.4. Climate Variability and Education

As for the impacts of the climate variability (especial rainfall) and school attendance, **Figure 4** indicates, the rate of absenteeism in Jambiani Primary School aligns with the rainfall records. In 2010 and 2015 when Jambiani received excessive rains, the number of absentees in Jambiani Primary School increased. Likewise, in 2012 when the rainfalls were below average, the local primary school had a higher than average number of absentees. But in 2011 and 2014 when Jambiani had almost normal rainfalls, the rate of absenteeism dropped.

4.5. Women's Understanding of Climate Variability and Its Associate Impacts

Climate Variability Understanding of Women

The results of the women position in understanding the impacts of climate variability reveals that 75% of all participants indicated that they were aware of climate change and variability, though 25% did not have any idea of what it is all about. Formally employed women working in government and the private sector had more understanding, compared to women working in informal sectors such as farming and small business retail. Also results have shown that 50% of the

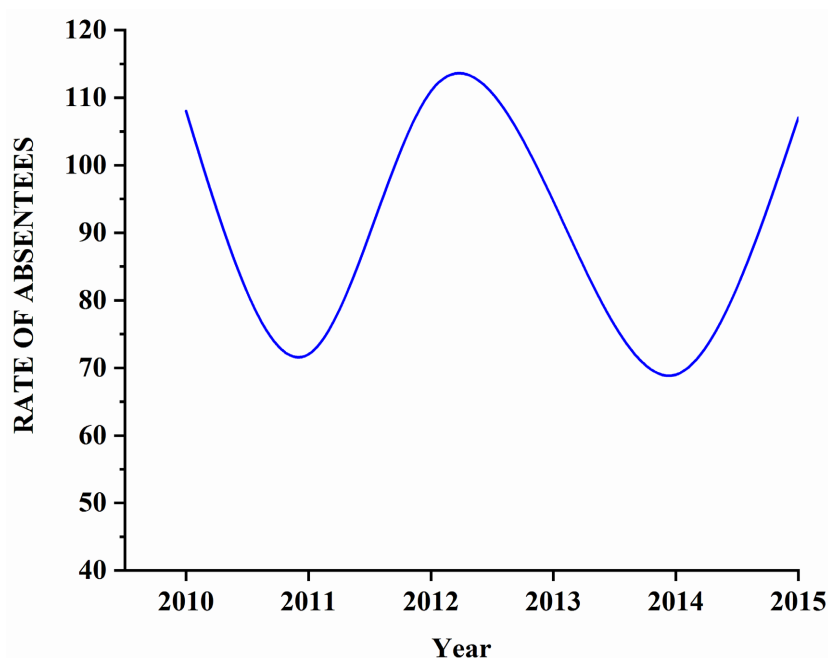


Figure 4. The rate of absentees of Jambi Primary School from 2010-2015.

women employed in the formal sector were aware of climate change and variability compared to approximately 20% of women involved in the informal sectors (such as farmers and small scales business owners). Also results have shown that most of the interviewed (45%) indicated that 2015 was the year most affected by climate variability, followed by 2014 (25%) and 2011 and 2013, scoring 15%, respectively. Also results revealed that most women noted that 2011 and 2013 had long dry seasons, while 2014 and 2015 had excessive rains. Even if they had no access to TMA data. As for the impact of climate variability on health women responded that there were disease outbreaks in 2011 as well as between 2013 and 2015, others noted that “almost everybody was sick in 2015”, and the most noted afflictions were skin diseases and diarrhea. As per frequency of visiting, hospitals results revealed that 90% of women working in the informal sector reported visiting the hospital “several times” compared to 30% of women employed in the formal sector. Further results show that children between 2 - 5 years of age were the most affected. Among the interviewed person one noted that “I remember that in especially in 2015, I had less time to work on the farm or participate in social activities. My kids and relatives were almost sick most of the time. So I spent more time in the hospital than engaging in productive activities”. Besides, the results of the impact of climate variability on education results indicate that children from families where mothers were working in informal sectors did not perform as well in school as compared to children whose mothers were employed in government or private sectors, and the main reason behind their poor performance was the irregular attendance in classes because they were sick.

Moreover, the responses whether there was a significant reduction during the

investigated period, show that 65% of all respondents indicated that during those times they did not have enough food, although 35% of all respondents said that their food supply was sufficient. However, 70% of those interviewed said that prices increased during periods that food production was lower. On the other hand, results have revealed that climate variability affected farming activities, for instance, 65% of the families grew crops, the majority (85%) claimed that the harvests were not enough, and that crops such as maize, peas, millet and seaweed especially did not perform well. Other crops, such as rice, pumpkin, bananas, sweet potatoes and sorghum dried up or did not grow well because of either excessive rains or prolonged dry seasons. Also, harvests were held back due to an increase of insects and immigration of wild pigs, which destroyed crops during the dry season. It should be noted that production of crops such as cassava, bananas, yams, arrowroot, pineapple, pawpaw and maize pumpkins among others were also in decline in the Southern Sector Agriculture District between 2010 and 2015.

5. Discussion

Based on the presented results the study found that rainfalls, including short (OND) and long (MAM) rains, were inconsistent over the seasonal and annual rainfall was more variable for the investigated five years period *i.e.* 2010-2015, and this variability, lead to negative implications on food production, health and education. The study finding aligns with several official government reports, such as [27] and the Revolutionary Government of Zanzibar (RGoZ) report on climate change impacts on socioeconomic outlook (2012); in recent years, Zanzibar, in particular, has been increasingly vulnerable to climate variability especially, along the east coast of the island. The evidence shows that crop production was poor in 2015 when Jambiani received excessive rainfalls but food production increased when rainfalls were relatively close to those projected. [28] points out that climate variability in Zanzibar has contributed to uncertainty in food security, which in turn has contributed to the deterioration of the delivery of social services and to individual livelihoods. Also the presented results show that in Jambiani there were more disease outbreaks during years that exceeded or fell short of normal rainfalls than in years that had rainfalls close to the forecast average. Several scholars [29] [30] agree that the most associated diseases mentioned in these studies included diarrhea, vector-borne diseases, malaria, respiratory illnesses and other transmitted diseases. However, the data gathered for this study did not allow a clear examination of why some diseases are more common in excessively dry seasons while others are more prevalent when rains are above average.

The study results of the declining in primary school attendance during high rainfall events are in agreement with findings of the [31] [32] which showed that school absenteeism and dropout are higher in flood-prone areas than in areas that are not *i.e.* children are likely to withdraw from school due to climate varia-

bility having irreversible impacts on the day-to-day earnings of their family.

As for the women's understanding of climate variability and its associated impacts, the presented results have shown that women have different levels of understanding on both climate change and climate variability depending on their education and employment *i.e.* the employed ones in the formal sector have more knowledge about climate variability than self-employed women such as housewives or those involved in agriculture or small retail businesses. Also the presented results had revealed that families of women working in the informal sectors, housewives and those working in the farms, had more health issues than the families of women working in the formal sectors. Similarly, children of the women who are working in the formal sectors performed better in school than did the children whose mothers work in the informal sectors. These findings have been agreed by the [33] report that women living in the poorest, less-advantaged communities are more affected by the impacts of climate change than are those in better social classes living in more affluent areas.

As for the strategies taken by the women to cope with the impacts of climate variability the presented results have revealed that women took a number of actions to cope with the impact of climate change. Including switching to small retail businesses and taking banks loans to raise their business and capital, and this is well agreed [10]; [13] who noted that women who are more vulnerable to climate variability impacts have less knowledge and fewer resources to mitigate or handle the impacts that come with it.

6. Conclusions

From the presented results and the foregone discussions, the study concludes the following.

1) Both OND and MAM rains were inconsistent over the specified time period (2010 to 2015), indicating significant climate variability that had negative impacts on food production, health and education.

2) Women have different levels of understanding of both climate change and climate variability, depending on their marital status and socio economic activities. Further results showed that employed women (*i.e.* in formal sectors) have more knowledge on climate change compared to self-employed women.

3) Most women working in the formal sectors had better coping mechanisms to mitigate climate change impacts than those who only had access to work on farms, in small retail businesses or were housewives. Climate variability is likely to be with the communities in Zanzibar for the long term, imposing a variety of different negative impacts on the delivery of social services related to food production, health, and education.

4) Women in the rural community of Jambiani use symbols (e.g. "prolonged draught" and "excessive rainfall") to describe climate variability, and have tangible examples to describe the impacts on food production, health and education.

5) Women in the rural community of Jambiani have developed actions within

the community to address the impacts of climate variability on food, health, and education. However, the adaptive interventions do not help significantly mitigate the climate variability impacts.

6) There are different levels of knowledge and capacities to mitigate and adapt to the effects caused by climate variability between women working in the informal sector (in farms, homes, and retail businesses) and those working in the public sector. The families in the informal sectors suffer most from climate variability because they have less knowledge and fewer resources to mitigate the impacts of and adapt to the effects caused by climate variability.

7) Knowledge and experience of community people on climate variability impacts and how to mitigate them have established a remarkable foundation for adaptation and mitigation interventions.

Recommendations

Thus from the study findings and conclusion, the study recommends the following.

1) Since the study has found that there is direct linkage between the climate variability impacts and the deterioration of social services such as education, health and food, thus effective mitigation and adaptation schemes towards the impacts of climate change and variability should be well addressed.

2) People in a given social setting have their own ways of interpreting climate variability and its associated impacts. It is therefore important for all climate change advocates to explore those symbols first and use them as a point of entry to engage communities in mitigation and adaptation initiatives to address climate change challenges.

3) Education about climate variability and related climate change mitigation and adaptation initiatives should recognize that women have different needs when it comes to understanding of these issues. It is therefore recommended to all climate change advocates that greater focus should be placed on women living in the less advantaged communities.

4) Decision and policy-makers should be more sensitive and responsive to the needs of women and address disparities such as that making it impossible for women in the informal work environment to access needed credit in times of disruptions and extreme weather due to climate change.

5) It remains unclear why some diseases are more common during wet seasons and some more widespread during dry seasons, thus more research is required to learn more about these questions.

6) Since women have been observed to be more vulnerable to the impacts of climate than males, more studies of climate change impacts are important to evaluate the extent to which different social statuses of women are being impacted.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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