International Journal of Innovation Scientific Research and Review
Vol. 07, Issue, 04, pp.8061-8068, April 2025
Available online at http://www.journalijisr.com
SJIF Impact Factor 6.599

Research Article

ISSN: 2582-6131

WOMEN'S VULNERABILITY TO CLIMATIC CONSTRAINTS IN THE ISSABA DISTRICT OF BENIN

Asai AkinniGervais ATCHADE

Laboratoire Pierre Pagney: Climat, Eau, Ecosystèmes et Développement (LACEEDE), Universitéd'Abomey-Calavi, Bénin.

Received 01st February 2025; Accepted 02nd March 2025; Published online 14th April 2025

ABSTRACT

The level of vulnerability of populations to climatic conditions varies according to the degree of exposure and, above all, the capacity to adapt. This ability to adapt depends on the technical/technological, financial and socio-cultural factors of the environment. The aim of this study is to contribute to a better understanding of the degree of vulnerability of women in the Issaba district to climatic constraints in Benin. The methodological approach adopted is based on documentary research and fieldwork. Interviews were conducted with sixty-four (64) women involved in climate-dependent activities. The vulnerability study consisted of identifying climatic constraints and developing sensitivity and vulnerability matrices based on the information gathered during the fieldwork. During the dry season, they are more confronted with water supply problems. There is a trend towards higher temperatures, which sometimes puts a brake on women's activities, as this increases the drying up of rivers and water tables. Pockets of drought are the most common risks (60%), followed by the early end of the seasons (40%), severe drought (45%), late and violent rains (30%) and flooding (20%), according to the women we met. Because of the recurring climatic constraints, access to water is a difficulty faced by women in the Issaba district. Waiting in queues with children on their backs around water points exposes them to the cold and mosquito bites. This is a threat to children's health in particular. To a lesser extent, the activities of women also continue to exacerbate the environmental risks already felt in the area. This means that the local population needs to be made aware of endogenous strategies (the harmful effects of cutting wood) and the need to reforest the area. Major efforts will also have to be made by local development players to increase the number of water points and bring them closer to the local population.

Keywords: Issaba Borough, women's vulnerability, climatic constraints, adaptation strategies, income-generating activity.

INTRODUCTION

The more the years go by, the more climate constraints pose a threat to the environment and make women more vulnerable. According to the Human Development Report, the world is facing an urgent and acute crisis: climate change. The impacts of climate change affect different people in different ways, depending on their livelihood strategies, socio-economic status, decision-making power and access to resources, services and information. The work of the IPCC in 2007 showed that climate change is leading to an increase in global temperatures. This thermal warming is manifested in heat waves, the high occurrence of extreme weather events (heavy rainfall, droughts, violent winds) and high rainfall instability. They also claim that <<an increase of 1.5 to 3°C in temperature would contribute to a 15 to 18% reduction in rainfall in intertropical African zones >> .

In West Africa in general, and in Benin in particular, the agro-climatic parameters present particular constraints for agriculture, especially in the south-west and the far north, which are regions that sometimes experience severe droughts (PANA-Benin, 2008, p 24). In Benin, according to E . Ogouwalé (2006, p.186), the climatic context would be marked by a 15-30% reduction in rainfall between 1990 and 2025, if the increase in temperature were to be between 0.6° and 10° C, particularly in latitudes between 5° and 10° North. Poor communities, especially women, with their heavy responsibilities at family and community level and their many activities dependent on rainfall, will be the most vulnerable because of their limited capacity to adapt and their heavy dependence on climate-sensitive resources such as water resources and agricultural production systems. In the Issaba district, women are active in various sectors that are closely linked to climate constraints.

***Corresponding Author: Gervais ATCHADE,**
Laboratoire Pierre Pagney: Climat, Eau, Ecosystèmes et Développement (LACEEDE), Universitéd'Abomey-Calavi, Bénin.

It was with the aim of contributing to a better understanding of the degree of vulnerability of women in the Issaba district to climatic constraints that the subject was chosen..

MATERIALS AND METHODS

Study environment

The Issaba district is one of the five districts of the Commune of Pobè in the Plateau department. It lies between parallels 7° 2'29'' and 7°12'18'' north latitude and meridians 2°35'28'' and 2°42'32'' east longitude (D. Fadélé and R .Ogouyomi , 2016 p 25) .

Administratively, this district comprises sixteen (16) villages, namely: Issaba, Illekpa, Kadjola, Atchaga and Igbo-Ewé Aba, Ouignan-Ilé, Itchagba, Iwoyé, Itchoché, Itchakpo, Itchèdè located in the Issaba depression and Ketty, Illouloffin, Onigbolo and Gbanago located at the latitude of Onigbolo on ferruginous and ferrallitic soils. The Issaba district is bordered to the north by the Odomèta district, to the north-east by the Towé district, to the south by the Ahoyéyé district, to the south-east by the Iganan district, to the north-west by the Massè district and to the south-west by the Adja-ouèrè district. Figure 1 shows the geographical location of the Issaba district.

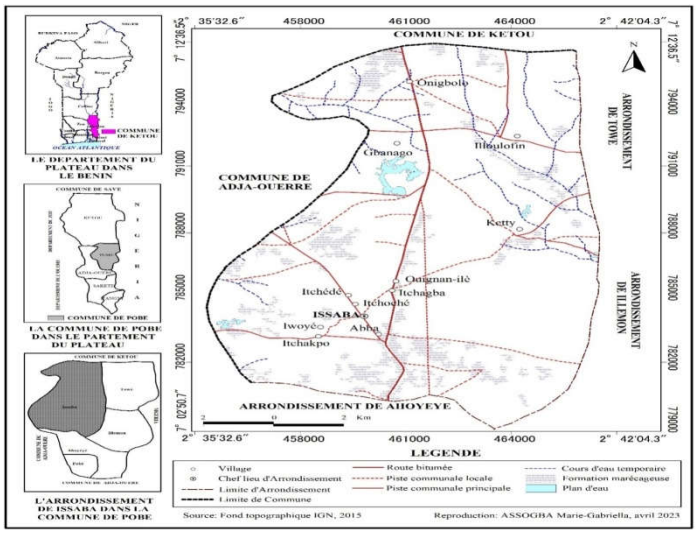

Figure 1: Geographical location of Issaba district.

Data used

The data and information used in this study are climatological and socio-demographic statistics, namely:

- rainfall and temperatures at the Pobè agro-climatic station, obtained from Météo-Bénin over the normal climatological period from 1981 to 2020, to assess climatic conditions in the study area;
- demographic data on the population and the number of households in the Issaba district, obtained from the INStad village notebooks and projected to 2025;
- data on the most vulnerable women's activities, obtained by observation during fieldwork and in the documentation;
- data on endogenous strategies developed by women to cope with climatic constraints;

All these data were collected through documentary research, investigations and direct observations in the field..

Data collection methods

This section covers documentary research and fieldwork.

- Documentary research

Documentary research was carried out in two stages.

- The first stage involved research in local documentation center. The second stage was carried out on the Internet.

- Fieldwork

The need to supplement and verify bibliographical data based on observations and interviews with women and local councillors led us to carry out a real-life investigation based on a given sample..

- Sampling

The sample consisted of women from rural villages in the Issaba district. The choice of respondents was based on the following criteria::

- Be a facilitator in a project or NGO working in the agricultural field and more particularly with rural women;
- Be an agricultural agent or technician working in the field of agricultural production in general;
- Be a female head of household. This criterion was chosen because this responsibility exposes them more to climatic constraints;
- Be a male head of household. This criterion was chosen because in some households the opinions of men are also taken into account.
- The respondent must have lived in the Issaba district for at least ten (30) years. This criterion was chosen because in order to speak about the realities of an area, it is necessary to have lived there for a certain number of years.

In addition, the different categories of women or men: elderly women or men (over 50), female heads of household, married women and young women (under 50), were considered in the vulnerability analysis because of their specific nature.

The sample size was determined using the Schwartz (2002) method. It is calculated with a confidence level of 95% and an error of plus or minus 5%.

$N = t^2. Pq / e^2$; where N = sample size per village; t= deviation fixed at 1.96 corresponding to a confidence level of 95%; P= n /N P=number of farm households (n) in relation to the total number of farm households in the (07) villages of the Issaba district (N) ;

q = 1-p and e = margin of error equal to 5%. In this way, a sampling rate of 10% was applied to determine the number of people to be surveyed per village. The numerical application for the village ABBA gives the following result:

P = 553/3239 = 0.17; q =1 - P = 0.83 ;

e^2 (5%) ²=0 ,0025 ;

N = 111 x 10/100 ;

N = 11,1

Given the time available, 64 households were interviewed. Table I summarises the sampling by selected village.

Table I: Characteristics of the sample used

Villages covered	Number of farm households in 2013 (women and men)	Number of farm households surveyed	Proportion (%)
ABBA	553	12	18,75 %
GBANAGO	387	07	10,94 %
ISSABA	342	05	7,81 %
ITCHAGBA	377	06	9,38 %
ITCHAKPO	316	03	4,69 %
KETTY	492	16	25 %
ONIGBOLO	772	15	23,43 %
Total	**3239**	**64**	**100%**

Source: *INSAE 2013 and calculation result*

In addition to the sixty-four (64) women and men (targets) who were the subject of our survey, the interview guide was sent to four (04) local authorities.

Data processing method

Once the survey forms had been processed manually, they were coded and then processed on the computer using Excel and Word. Pre-existing and newly-acquired information (statistical data) was processed using Excel 2016 to produce graphs. In addition, the data and information collected from the field, directly received on the

KoboCollect software server as the agents complete the tools in the field, is processed using the same software.

- **Processing rainfall and temperature data**

A number of mathematical formulae were used to process the rainfall and temperature data. These formulas were used to produce figures.

Arithmetic mean

The arithmetic mean has been used to study the rainfall regime. It is the fundamental parameter of central tendency. It has also been used to characterise average climatic conditions and to develop a number of dispersion indices.

It is expressed as follows::

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} xi$$

The dispersion parameters are calculated from this average..

Standard deviation

Calculating the standard deviation is a way of assessing the dispersion of values around the mean<<normal>>. It is determined by calculating the square root of the variance: σ(x)=√V.

Reduced centred anomalies

The standard deviation is used to study rainfall anomalies. An anomaly refers to a situation where there is a deficit or surplus in relation to the average, which is considered to be a normal rainfall or temperature situation. It is an observation measured in statistical form which, in relation to a given<<normal>> average, may be positive or negative. The anomalies at each station are calculated using the formula::

$$Xi' = \frac{xi\_x}{\sigma x}$$

Xi: for year i, xi= the value of the variable, x= the mean of the series and σx= the standard deviation of the series.

In this way, certain thresholds are set for the Rainfall Index (PI). For each threshold, the percentage of the number of times the PI is above or below certain values is calculated over several years. These values are: 0; + 0.25; + 0.5; + 0.75; + 1; + 2. For the purposes of this study, the values considered are: + 0.25; + 0.5; + 1; 2. When the Rainfall Index (PI > -1) meshes are very dry, from (-0.25 < PI < -0.5) meshes are dry and PI < -0.25) meshes are moderately dry. They are very rainy when (IP > 1) and rainy when (0.25 < IP < + 0.5). For the purposes of this study, dry periods are referred to as deficit periods and wet periods as surplus periods. The reduced centred anomaly is used to identify years with extreme rainfall.

Table II shows how the anomalies were determined.

Table II: Determination of anomalies in rainfall series.

IP > 1	Very rainy	Surplus
IP <+ 0,5	Rainy	
IP <0,25	Normal	Normal
-0,25 < IP < -0,5	Dry	Deficient
IP > - 1	Very dry	

Source: *Ali et al., 2005*

• Analysis of the vulnerability of Issaba women to climatic constraints

The analysis of women's vulnerability was based on the existing relationship between the vulnerability of activities and the difficulties women have in accessing the resources they need to meet their basic needs. It therefore focuses on the following activities

- Climate-dependent household activities (supply of water and energy for cooking and other purposes);
- Income-generating activities (agricultural production, agri-food processing, trade in agricultural products), which are themselves directly or indirectly dependent on the climate.

Vulnerability is a function of the nature, extent and rate of climate variation to which the system in question is exposed, the sensitivity of that system and its capacity to adapt. In practice, the climate risk sensitivity matrix is used to analyse the vulnerability of livelihoods. This is a simpler methodological approach for establishing sensitivity to climate risks. It is implemented in several stages:

Stage 1: this consists of drawing up a list of exposure units in the sector under consideration, which will be taken into account in the vulnerability analysis exercise. These sectors or exposure units form the lines of the sensitivity matrix;

Step 2: The second step consists of drawing up an inventory of the most significant climate risks for the sectors or exposure units in the region under consideration.

Step 3: The third step is to assess the degree of sensitivity of each sector or exposure unit to each of the selected climate risks. For this purpose, five levels of sensitivity are considered, as illustrated in Table III.

Table III: Climate risk assessment scale

Scale of vulnerability	Extent of risk
1	Low
2	Fairly low
3	Medium
4	Quite strong
5	Strong

Data source:*Yigo, 2011*

According to the same source, application of the matrix produces three indicators:

- the exposure index ;
- the rank in terms of exposure of exposure units to climate risks;
- the climate risk impact index.

According to Badolo (2008) quoted by Yigo (2011, 26 p) , the value of the exposure index for an exposure unit is given by the sum of the columns for each row of the matrix. The value of the impact index for a given risk is the sum of the rows for each risk. The indices determined are also used to establish a hierarchy of risks in the study area in relation to the exposure units considered. Table IV presents the conceptual framework of the sensitivity matrix.

Table IV: Sensitivity matrix

Exposure units	Climate risks/constraints	Exposure index
Exhibition unit 1		
Exposure unit 2		
Exposure unit 3		
Exposure unit 4		
Impact index		

Source*: Yigo, 2011*

The methodological approach adopted during this study made it possible to select the tools and collect the necessary data available to identify the main climatic constraints and characterise the vulnerability of women in the Issaba district. The data and information collected from the field, directly received on the KoboCollect software server as the agents fill in the tools in the field, are processed with the same software.

RESULTS AND DISCUSSION

This section reviews the climatic context of the study area, the climatic constraints faced by the women and their effects, and the strategies developed.

Climatic context of the study area

The following figure shows the rainfall pattern in the Commune of Pobé, which includes the Issaba district.

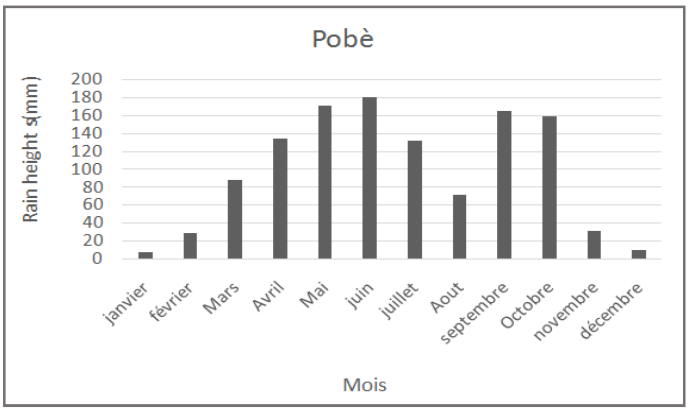

Figure 2: Rainfall pattern in the Commune of Pobé (1981-2020)

Examination of this figure shows four (4) main phases. An initial phase during which the average rainfall recorded does not exceed 40 mm. This phase covers the months from November to February; it is the long dry season. The second phase begins in March and ends in July. This is the period of the long rainy season when the maximum rainfall for the year is recorded (40% of rainfall on average according to Bokono-Ganta, 1987). The third phase is the period of low rainfall, known as the short dry season. The fourth phase is the period of the short rainy season. Thermometrically, the minimum temperature varies between 21.18 and 22.18°C and the maximum temperature between 29.25 and 35.37°C. Although temperature fluctuations vary, it should be noted that they are more pronounced at minimum temperatures than at maximum temperatures. These thermal events lead to plant stress, which affects seasonal crops, the basis of food security (M. C. Lanokou, 2016, p 92). The following figure shows the rainfall indices obtained during the study period in the study area..

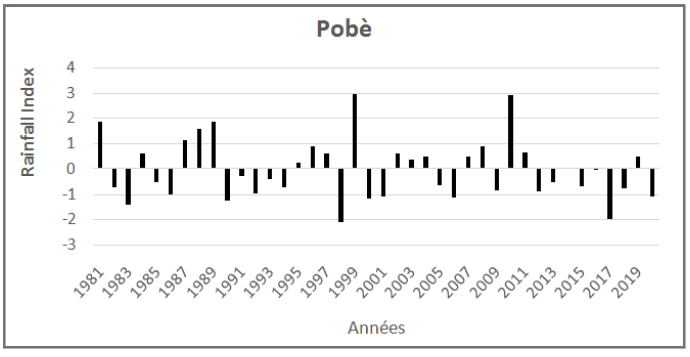

Figure 3: Standardized rainfall indices from 1981 to 2020

Source: *Météo-Bénin, 2023*

Figure 3 shows the evolution of rainfall indices over the period from 1981 to 2020. It shows that the district of Issaba has experienced since 1981 a variability in its rainfall levels characterized by an alternation of eighteen (18) excess years which are: 1981, 1984, 1987, 1988, 1989, 1995, 1996, 1997, 1999, 2002, 2003, 2004, 2007, 2008, 2010, 2011, 2014, and 2019. This represents 47.5%. The twenty-one (21) deficit years: 1982, 1983, 1986, 1990, 1991, 1992, 1993, 1994, 1998, 2000, 2001, 2005, 2006, 2009, 2012, 2013, 2015, 2016, 2017, 2018, 2020. This represents 52.2%. It should be noted that during deficit years, women are more confronted with difficulties in obtaining water to carry out their activities.

Climatic Constraints Facing Women in the Issaba District

The results of the fieldwork show that women in the Issaba district face a number of constraints in their activities, but climatic ones such as floods, acute droughts, pockets of drought, early season endings, late and heavy rains, and their consequences have attracted attention.

Major Climatic Risks

Major climate risks are perceived differently by the people interviewed in the study environment, as shown in the figure.

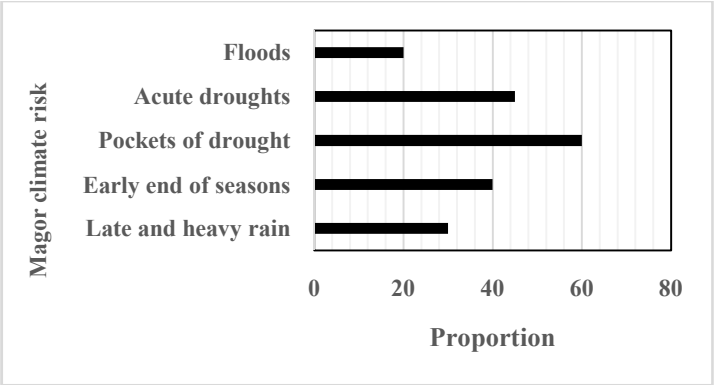

Figure 4: Most frequent major climate risks according to interviewees

Data source: *Field surveys, August 2023*

The analysis of the results obtained at the women's level shows that at 60%, pockets of drought constitute the most significant risks, then we have the early end of seasons (40%), acute droughts (45%), then late and violent rains (30%) and finally floods (20%). For these women, the various risks cited are periodic and very recurrent in the sector. These risks, when they materialize, have severe consequences on natural resources, livelihoods and communities. These consequences are felt in various ways across different social strata. At the women's level, climate-dependent household activities, income-generating activities and health are mainly involved.

Effects of climatic constraints on the different activities carried out by women in the Issaba district

- **Household Water Supply**

In the Issaba district, household water supply is provided by women, according to field surveys. The decline in rainfall and the increase in deficit years have negative consequences on surface water resources previously used by women for domestic work. In this context, they face immense difficulties in supplying their households with water, as they lack boreholes, equipped wells, and even less connection to a water distribution network. Water collection has become an

exhausting chore, according to the women surveyed, as during the dry season they are forced to travel long distances in search of water for their work, a consequence of the drying up of wells. Photo 2 illustrates the presence of women around a water point in Issaba.

Photo 1: Women collecting water for various household chores in Issaba

Photographed by ASSOGBA, April 2023

According to information provided by ninety-four (94%) women, the pocket situations of droughts or pronounced drought cause the level of the water table to drop at the level of groundwater (wells and boreholes) and an early drying up of certain watercourses. Thus the time spent searching for water is lengthened and it is necessary to shorten the sleeping time, being understood, because it is necessary to wake up very early in the hope of occupying the first positions at the water supply point to be served quickly or to give up other activities. Thus, these women and children are exposed to the cold, mosquito bites. This represents a threat to the health of children especially. The income-generating activities carried out by these women are affected, because they no longer devote enough time to them.

- **Household fuelwood supply**

Energy is the most significant area in terms of estimating the impacts of climate constraints on women. Firewood and charcoal are the most commonly used for cooking by nearly ninety-five (95%) of the women surveyed. Despite the efforts of private companies selling butane (domestic gas) through promotions in the urban area of the district, women clearly remain attached to natural biomass, with all the supply difficulties and risks related to their health and that of their children. Figure 1 illustrates a case of firewood display and charcoal sales in Issaba.

Plate 1: Display of firewood and sale of charcoal in Issaba

Photograph: ASSOGBA, April 2023

Firewood is becoming increasingly difficult to find, and sometimes when it is found, it is in very limited quantities. This creates additional pressure on the use of charcoal to compensate for the lack of fuelwood. The main causes of the disappearance of wood resources in Issaba are primarily environmental and anthropogenic. Since rainfall deficits, periodic droughts, and the low regeneration capacity of vegetation already cause enormous losses, deforestation for the production of wood and charcoal causes even more damage to environmental resources. The consequences are critical for women, who, faced with limited access to fuel, no longer find business opportunities.

Income-generating activities

Women often face climate constraints in some of their income-generating activities.

- **Agricultural Production**

In the agricultural sector, women cultivate corn, cassava, market garden produce, and produce palm oil. Women initially work in their spouses' fields before devoting themselves to producing small areas allocated by their spouse or a family member. Drought, floods, and the late onset and early end of the rains are climatic disturbances that make women more vulnerable given their limited resilience. They are sometimes forced to harvest early to safeguard part of their production, according to twenty (20%) of the women surveyed. They are also exposed to several risks, including insect bites and sometimes reptile bites. Therefore, the fact that women lack much protection in the fields makes them more vulnerable to various attacks and several diseases, including malaria, fever, and sometimes body aches and other conditions, according to the women surveyed. One of the effects of climate constraints on women producers is the increase in the amount of work. Women work on the most degradable plots, given their limited means of adaptation.

- **Agri-food processing activities**

Women's main activities in agri-food processing are cassava processing and charcoal production. The main resources they need for these activities are large quantities of water and firewood.

Figure 2 shows women processing cassava into flour, commonly known as gari, and wood into charcoal.

Plate 2: Processing cassava into gari and wood into charcoal in Issaba

Photographed by ADEYE and ASSOGBA, April 2023

Information gathered from women processing cassava into gari and other crops shows that the cost of firewood is high, and they are forced to travel long distances to find it, which has an impact on their production capacity and weekly turnover. Added to this situation is the scarcity of water, which they also need in the various stages of cassava processing. To meet family needs, many women also engage in small businesses producing agricultural products that depend on their availability, such as the production of chili, tomatoes, and corn, which are highly dependent on rainfall. Sometimes, lacking

the means to preserve certain agricultural products, the vendors are forced to sell at low prices in order to sell their products to avoid losses, according to the women surveyed. According to them, climatic constraints severely disrupt their income-generating activities.

- **Marketing of agricultural products**

Many women producers and processors of agri-food products are involved in the trade of certain agricultural products such as tomatoes, chilies, vegetables, flatbreads, gari, etc. According to these women at the points of sale, poor sales and disease are daily threats to them. This results in a loss of income, as some goods rot, and they find themselves unable to save money. Such a situation makes women more vulnerable. Climate disruptions leave women severely overburdened, to the point where they are unable to actively participate in community life or participate in decision-making in large numbers.

Women's Vulnerability to Climate Constraints in the Issaba District

The vulnerability of women in the Issaba district to climate constraints was analyzed based on their age and occupational characteristics. Surveys conducted among women in the Issaba district made it possible to classify the activities carried out by these women according to their vulnerability to climate constraints (Table V).

Table V: Level of vulnerability of activities to climatic constraints

Activities	Degree of vulnerability to climate constraints
1-Climate-dependent household activities	Strong
2-Agricultural production	Quite Strong
3-Sale of agricultural products	Quite Strong
4-Agro-food processing	Quite Strong

Source: *Field survey, April 2023*

The analysis of Table V shows that climate-dependent household activities, especially water supply, are the most sensitive to climate constraints. However, agricultural production, the sale of agricultural products, and agri-food processing have the same degree of vulnerability (quite high). Indeed, according to the women surveyed, these products are derived from agricultural production, making any disruption to the latter dependent on the climate. Water supply can be explained by the fact that rural populations are dependent on water resources, which are very sensitive to the effects of climate disturbances, and the relief of the commune of Pobè, which does not favor the retention of a large quantity of water in the soil. There is a strong relationship between water availability and agricultural production, on the one hand, and between water availability and agri-food processing, on the other, automatically felt by the women who sell and process agricultural products.

Table VI presents the degree of vulnerability of women to climatic constraints according to social status (sensitivity matrix analysis) in the district of Issaba.

Table VI: Degree of vulnerability of women to climatic constraints

		Climatic constraints					
Categories of vulnerable women	**Acute drought**	**Flood**	**Late and heavy rains**	**Dry pockets**	**Early end of seasons**	**Exposure index**	**Exposure index ranks**
Elderly women (over 50)	5	3	3	5	5	90%	1
Female heads of household (Under 50)	5	3	3	4	5	85%	2
Married women (Under 50)	5	3	3	4	4	80%	3
Young women (Unmarried)	5	2	2	3	3	65%	4
Impact indices	100%	60%	60%	80%	85%		
Impact index rankings	1	4	4	3	2		

Source: *Field surveys, April 2023*

The analysis of Table VI shows that all categories of women have high exposure indices; reflecting the sensitivity of all these categories of women to climatic constraints without exception. Women aged over 50 (90%) and women heads of household (85%) are the most exposed, but specifically this exposure multiplies when elderly women are also heads of household. All women are therefore vulnerable to climatic constraints, which constitutes a handicap for local development in the district of Issaba. According to the women interviewed, elderly women are no longer able to travel long distances to get water and no longer have the strength to perform certain household tasks. This forces them to be dependent on other relatives. Also, women heads of household are among the categories most vulnerable to climatic constraints because all the family responsibilities are taken care of by these women. This multiplies their tasks, also due to the climate and land degradation, the products necessary for feeding the family are often rare and even if these products exist, they are often sold at high prices. In addition, periods of intense heat and cold worsen the already precarious living conditions of women. According to the women interviewed, the sensitive nature of the women's body makes them exposed to some diseases

Women's Health in the Issaba District

The significant variation in climate parameters (precipitation, humidity, temperature, sunshine, etc.) affects human health in general and that of women in particular. Figure 4 presents the diseases to which climate constraints expose women in the Issaba district.

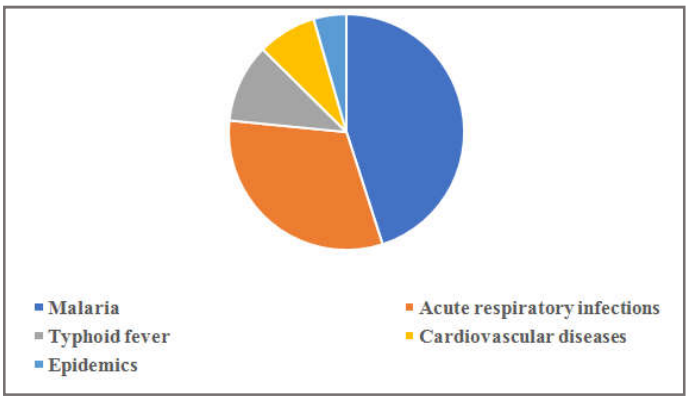

Figure 4: Frequent diseases among women in the Issaba district

***Source**:Fieldwork results, April 2023*

In times of extreme cold during the rainy season or extreme heat during drought, women and their families face enormous health problems. Microbiological hazards resulting from the upheavals of heavy rainfall, increased humidity and heat include waterborne diseases carried by stagnant water (epidemic 4%), vector-borne diseases (malaria 45%, typhoid fever 11%) due to the proliferation of mosquitoes and the existence of numerous breeding sites in humid areas. A history of hypertension, infections, dehydration, and endocrine diseases are among the pathologies to which women are subject. These threats to women's health force them to spend the majority of their annual income on family healthcare and often when they do not have the means they lose their lives. The damage caused by climatic constraints to women does not leave them without reactions. Thus, women develop adaptation strategies to cope with climatic stress.

Women's Adaptation Strategies to Climate Constraints

To cope with the negative effects of climate constraints, women in the Issaba district are developing adaptation strategies.

To ensure the availability of water for drinking, washing clothes, cooking, etc., women usually store water in basins. The goal is to collect rainwater for domestic use through pipes (gutters) installed along the tin roofs. According to the women, this storage system allows for a constant supply of water during rainy periods, avoiding the time-consuming queues at boreholes and wells every morning and evening. The containers are primarily used to fill the jars and, according to the women, are very practical at water supply sites and are accessible to all on the market. They all confirm that these endogenous water storage strategies considerably reduce their efforts. Unfortunately, not all women are able to use these strategies due to their limited means or the lack of tin roofs; in some areas, roofs are predominantly made of straw. Furthermore, the adaptation strategies used by the actors are not often studied in advance by them. They have a spontaneous and reactionary nature. Thus, each climate facet knows its adaptation measure used, but this study retains some supposedly important ones.

- Agricultural producers carry out several sowings during the months of March and April due to the late onset of rains at the beginning of the growing season, or changes in the agricultural calendar;
- Women farmers have gradually abandoned local maize varieties, which are long-cycle varieties, to adopt newer, short-cycle varieties;
- Women farmers are developing other income-generating activities, which include the sale of adulterated gasoline and the trade of manufactured products.

DISCUSSION

The analysis of the results obtained for women shows that, at 60%, pockets of drought constitute the greatest risks, followed by early season endings, acute droughts, then late and heavy rains, and finally floods. Women aged over 50 (90%) and female heads of household (85%) are the most exposed, but this exposure is particularly high when older women are also heads of household. All women are therefore vulnerable to climate stress, which constitutes a handicap for local development in the Issaba district. The results of this study are similar to those of Sodji (2023, p. 27), who states that young women are exposed to a degree of vulnerability of 44%, which ranks them fourth in terms of vulnerability. They are particularly affected by flooding, with an exposure index of 3, as well as by heat and cold, with respective exposure indices of 4. However, they are less exposed to other climatic constraints such as drought and strong winds.In the Commune of Savalou in Benin for the PMSD, (2021, p. 50), farmers are the most vulnerable actors (100%), followed by processors (67%) and finally livestock breeders (17%), as for fish farmers, the percentage remains negligible compared to the number of actors in the sector. The impacts of these risks are reflected in the decline in the income of the actors and its corollaries in the study environment. In the district of Issaba, due to recurring climatic constraints, access to water is a difficulty encountered by women in the district of Issaba. The queues of women with children on their backs around water points expose them to the cold and mosquito bites. This represents a threat to the health of children in particular. Significant efforts will also be required by local development actors to increase the number of water points and bring them closer to the population.

CONCLUSION

This study contributes to a better understanding of the degree of vulnerability of women to climate stresses in the Issaba district. Women's vulnerability to climate stress varies depending on their age and the activities they undertake. The effects of climate disruptions impact women's various activities, such as fetching water for their households, agricultural production, processing and marketing agricultural products, and the search for fuel (wood). They are also exposed to diseases such as malaria, epidemics, and typhoid fever, which worsen their living conditions. Older women and female heads of household are the most vulnerable to major climate stresses: extreme heat, extreme cold, flooding, and drought. Faced with these challenges, women in the district are developing a number of strategies.

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