

Livelihood Adaptation Strategies of Adolescent Girls on Climate Change in Southwest Nigeria

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Abstract: - The study examined the effects of climate change on the adolescent girls' livelihood and the adaptation strategies employed by them in Southwest Nigeria. A multistage sampling procedure was used to select respondents. Data were gathered through structured interview schedule from 240 adolescent girls. Data collected were analysed using frequency counts, percentages and inferential statistical tools. The result shows that the respondents had a mean age of 15.6. Majority (82.1%) of the adolescent girl had secondary education and the mean household size was 8. The major effects of climate change identified by the adolescent girl was scarcity of water 83.3%, others were prolonged rain break 79.6% and disease outbreak 72.5%. Some of their livelihood adaptation strategies were fetching of water (86.7%) and firewood (71.2%) from long distances, helping vulnerable groups suffering from climate induce ailments (70.4%) and reduction in food intake (52.9%). The study shows that education ($\chi^2=17.565$; $p\leq 0.007$) and age ($r=0.195$; $p\leq 0.002$) had a significant relationship with the adolescent girls livelihood adaptation strategies. The study confirms that adolescent girls play some important roles in helping their family to adapt to the effects of climate change. It also reveals that there is a positive significant relationship between adaptation strategies employed by adolescent girls to the effects of climate change and the risk encountered by them ($r=0.183$; $p\leq 0.004$). Therefore the adolescent girls must be regarded as one of the stakeholders on climate change issues and they should be empowered.

Index terms: Adolescent Girls, Climate Change and Adaptation Strategy.

I. INTRODUCTION

Climate change is defined as a change in state of climate that can be identified (e.g. by using statistical tests) by changes in the mean and or variability of its properties that persists for an extended period, typically decades or longer (The intergovernmental panel on climate change) [10]. According to [2] climate change also refers to changes in the variability or average state of the atmosphere over time ranging from a decade to millions of years. The issue of climate change which is of global concern has generated research responses from academics of various disciplines [22,13 and 18]. [10] noted that the range of published works on climate change indicated that the net damaged cost of climate change is likely to significantly increase overtime. Many African countries that practise rain-fed agricultural are particularly vulnerable to climate change [7]. In fact climate change is one of the fundamental challenges facing the international communities today, while the developing

countries are seriously bearing the effect. The variations in climate parameters affect different sectors of the economy, like Agriculture, health, water resources, energy etc. [16]. According to [17] climate is also causing poverty, hunger, gender disparity, illiteracy and ill health of mother and child. Rough estimates also suggest that overtime i.e. in the next 50 years climate change may likely pose serious constraints to meeting global food need than other agricultural system [10]. Other effects of climate change according to [21] include; no access to portable water, displacement and migration of families, stress and risks for adolescent girls.

Climate change already constitutes a hindrance to achieving some international goals e.g., The Millennium Development Goals (MGDS). If proper care is not taken climate change will likely disrupt the world's agenda and goal. It will also increase poverty level, death toll and generate global insecurity. Some researchers have warned that no progress will be achieved on climate change until all stakeholders on climate are identified and their needs and rights addressed. Stakeholders on climate change refer to those that are affected by climate change and those who played major roles in adaptation to its effects. Men, women children had been identified as stakeholders on climate change, but a particular sector had been left out and under researched which are the adolescent girls [21]. The adolescent girls according to World Health Organisation [24] are female children between ages 13 and 19 years, there is a dearth of information on the effects of climate change on adolescent girls and their livelihood adaptation strategies. Therefore this study aims describing the socio- economic characteristics of adolescent girl; ascertain the manifestations of climate change in the study area; identify the effects of climate change on adolescent girls; identify the adaptation strategies employed by the adolescent girls in the study area and risk they encounter.

II. METHODOLOGY

The study was carried out in Southwest Nigeria. Southwest Nigeria has six states: -Ekiti, Lagos, Ogun, Ondo, Osun and Oyo. According to Federal Ministry of Industry Trade and Investment [8], temperature across the country is relatively high with a very narrow variation in seasonal and diurnal ranges (22-36°C). There are two basic seasons; wet season which lasts from April to October; and the dry season which lasts from November till March. South West Nigeria falls on latitude 6° to the North and latitude 4° to the south.

A multi stage sampling procedure was employed in this study. In the first stage, three (3) states in the region were randomly selected. The second stage involved random selection of two Local Governments Areas (LGAs) from each of the state. The third stage also involved a random selection of two communities from each LGA. At the final stage twenty (20) adolescent girls were purposively selected from each community. Thus, a total of 240 respondents were selected for the study. Descriptive statistics such as frequency counts, percentages, means, and standard deviation graph, tables and charts were used to describe and represent the socio-economic characteristics of the respondents. The adaptation strategies were measured on 3-point rating scale and were scored as never involved=1, occasionally involved=2 and always involved=3. The hypotheses were analysed with SPSS 16.0 version, using Chi-squares (χ^2) for categorical variables and Pearson Product Moment Correlation (PPMC) (r) for variable measured at interval and ratio scale. Summated rating scale was used to generate scores for adaptation strategies.

III. RESULTS AND DISCUSSION

The features presented and discussed under the socio economic characteristics of the respondents are: age, marital status, level of education, household size, and religion.

1) *Age*: Figure 1 reveals that respondents were within age range of 10 and 20 years. It also shows that 15.4% was at the early adolescent age, 52.4% were in the middle adolescent age and 32.0% were in their late adolescent age. The mean age of the respondents was 15.6 and the standard deviation was 2.16. The majority of the adolescent girls interviewed were at middle adolescence stage. These adolescent girls are matured enough in African settings to be involved in some household chores which thus expose them to the effects of climate change.

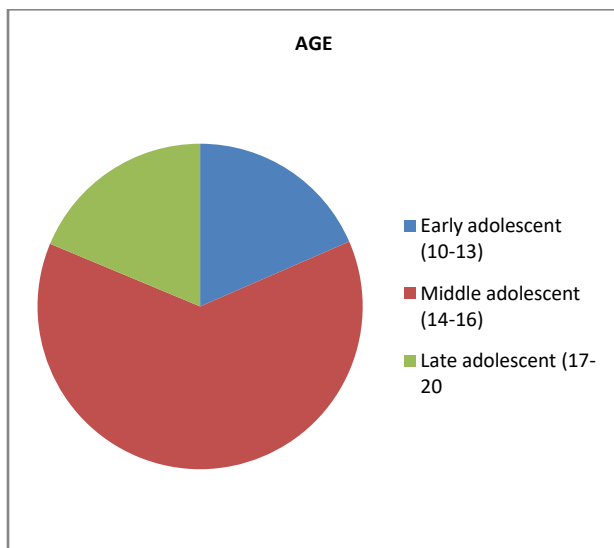


Figure I: AGE DISTRIBUTION OF RESPONDENTS

SOURCE: Field survey, 2018

2) *Marital status of the respondents*: Figure 2 shows the marital status of the respondents. Majority (93.8%) were single while 6.2% were married. The 6.2% of the adolescent girls that were married might be those respondents that dropped out of school due to poverty induced by the effect of climate change and some that were married out in order to use their bride price to augment their household income when there was crop failure due to the effects of climate change. They are known as the ‘famine bride’ [21]

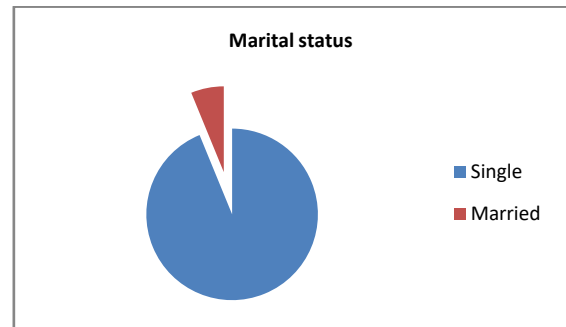


Figure II: MARITAL DISTRIBUTION OF RESPONDENTS

SOURCE: Field survey, 2018

3) *Level of education of respondents*: Table 1 show that most of the respondents (82.1%) were in secondary school or completed secondary education. Only few of them (0.8%) were without formal education This is line with Federal Ministry of Trade, Industry and Investments [8] reported that over 47% of Nigeria population are 15 years and below and they are in secondary school The implication of this finding is that majority of the adolescent girls are literate. This goes a long way in getting them informed on the concept of climate change and probably on better adaptation measures. This is in line with [1] who asserted that increased level of education leads to increase adaptive capacity to the effects of climate change.

Table I DISTRIBUTION OF RESPONDENTS BASED on LEVEL of EDUCATION

Level of education	Frequency
No formal education	(6.8)
Primary education	(3.3)
Secondary education	(82.1)
Tertiary education	(13.3)

Source: Field survey, 2018

4) *Respondent’s distribution by their parents’ household size*: Data in Table II shows that the household size in the study area ranges from three to twenty three. The standard deviation of the household size was 3.60, and the mean household size was 8 This is in line with [15], assertion that large family size is an important asset in working together to reduce vulnerability to the effect of climate change.

TABLE II DISTRIBUTION of RESPONDENTS BASED on FAMILY SIZE

Family size	Frequency	Percentage
1-10	204	75.1
11-20	32	13.3
20 and above	4	1.7

Source: Field survey , 2018

5) *Religion and membership of social organisation:* Table III also shows that majority (86.2 %) of the respondents were Christians, (13.8 %) were Muslims. Thus the study area is dominated by Christians. About one- fifth (18.3) of them did not belong to any organisation, while majority (75.0%) belonged to religious organisation. Since majority of the respondents belonged to an organisation, this implies that the adolescent can be informed on issue of climate change and various adaptation strategies through various organisations that they belong to.

TABLE III RESPONDENTS' DISTRIBUTION by RELIGION and MEMBERSHIP of SOCIAL ORGANISATION

Variable	Frequency	Percentage
Religion		
Christian		86.2
Muslim		13.8
Types of organisation		
Religious		75.0
Social		6.7
No organisation		18.3

Source: Field survey, 2018

6) *Parental background:* As shown in Table IV Majority (78.8%) of the respondents submitted to being raised by both parent while few of them were raised by single parents. Most of their parents had one form of education (92.9%) and almost half (48.8%) of their parents were farmers.

TABLE IV RESPONDENTS' DISTRIBUTION BASED on PARENTS' BACKGROUND

Variable	Frequency
Type of parenting	
a Single parent	51 (21.3)
Co – parent	189 (78.8)
Level of education	
Had no formal education	17 (7.1)
Had formal education	223 (92.9)
Parent primary occupation	
Farming	135 (48.8)
Trading	44 (18.3)
Civil service	27 (11.2)
Craftsmanship	34 (14..2)

Source: Field survey, 2018 (Percentage in parenthesis)

7) *Awareness of manifestations of climate change by the adolescent:* Table V shows that the major manifestations of climate change identified by the adolescent girls were high temperature (97.9%) followed by irregular rainfall (97.1%) as they ranked 1st and 2nd position respectively. Other manifestations identified were storm (88.3%), too much rainfall (87.5%), and whirlwind (54.2%). While about one-third of them (38.3%) of them submitted to the occurrence of Hailstones, and thunder storm, implying that these occurrences were not common in the study area. However cyclone, earthquake and hurricane came 7th in ranking as none of them was aware of these phenomena. We can infer that that these three phenomena do not take place or are rare occurrence in Southwest Nigeria. This confirms the predictions made by [10, 11] that Africa will experience the effects of climate change such as, drought, flood, rise in temperature, and incidence of fire outbreak which will trigger natural disasters. We can also deduce that adolescent girls were aware of the manifestations of climate change in their environment.

TABLE V AWARENESS of MANIFESTATIONS of CLIMATE CHANGE

Manifestation of climate change	Aware	Not aware	Ranking
High temperature	235 (97.9)	5(2.1)	1st
Irregular rainfall	233(97.1)	7(2.9)	2nd
Storm	212(88.3)	28(11.7)	3rd
Flood	170(70.8)	70(29.2)	4th
Whirlwind	130(54.2)	110(45.8)	5th
Hailstone and thunderstorm	92 (38.3)	148 (61.7)	6th
Cyclone	0(0)	240(100)	7th
Hurricane	0(0)	240(0)	7th
Earthquake	0(0)	240(0)	7th

Source: Field survey, 2018 Figures in parentheses represent percentage

8) *Effects of Climate Change on adolescent girls' livelihood:* The results shown in Table VI reveal the effects of climate change on adolescent girls' livelihood. As revealed by their responses the major effect of climate change experienced by them were scarcity of water (83.3%) prolonged rain break (79.6%), disease outbreak (72.5%) crop failure (65%) and food shortage (52.9%). This is line with some findings and predictions of some scientist [11] that African will experience drought and scarcity of water as a result of climate change. Since the adolescent girls are involved in household chores; for example scarcity of water means that they have to go out in search of water even if it means trekking to long distance.

TABLE VI EFFECTS OF CLIMATE CHANGE ON ADOLESCENT GIRLS' LIVELIHOOD

L Livelihood I index	Effects	Aware (Experienced it)	Not aware
Access to water and fire wood	Prolonged rain break	191(79.6)	49(20.4)
	Flood	77(32.1)	163(67.9)
	Scarcity of water	(200) (83.3)	40(16.7)
	Storm	97 (40.4)	143(59.6)
	increase incidence of fire outbreak	90(37.5)	150 (62.5)
Food availability a status	Food shortage/hunger	127 (52.9)	113(47.1)
H Health status	Disease outbreak	174 (72.5)	66 (27.5)
T Agriculture	Crop failure	156(65.0)	84 (35.0)

Source: Field survey, 2018

9) *Adolescent girls' livelihood adaptation strategies*: Table VII shows adolescent girls' livelihood adaptation strategies to the effects of climate change. The major adaptation strategies employed by the adolescent girls to the effects of climate change were fetching of water (\bar{x} =3.63) and firewood (\bar{x} =3.30) from long distances, practising mixed cropping (\bar{x} =3.16) and helping other vulnerable groups like elderly people (\bar{x} =2.99) as they were ranked 1st, 2nd, 3rd and 4th respectively. [23] and [5] reports that adolescent girls always walk longer distances to collect water and fire wood in severe

climate changes. This also agrees with, [12] who stated that girls and women spend more time caring for household members during climate change induced disasters. Some of the girls reported to have experienced reduction in food intake due to food shortage as a result of effect climate change (\bar{x} =2.21). This is confirmed by [14] who asserted that boys are preferred to girls when rationing food in households during drought or heavy precipitation which resulted in damaged crops. Practices undertaken by adolescent girls to adapt to the effects of climate change on their economic status (household income), were hawking (\bar{x} =2.19) Absenting from school in order to take up menial jobs (\bar{x} =2.04). This had resulted in reduction in attendance of girls in schools. Adolescent were significantly involved in these adaptation strategies as they have a mean which is above the benchmark. They were not significantly involved in migration (\bar{x} =1.99) and becoming famine bride (\bar{x} =1.47) as they had means below the benchmark and were ranked 11th and 12th respectively. This is in line with [4] that reported that changes in climate patterns such as rainfall variation which cause decrease in household income, has always resulted to girls being called on to contribute to the household income. Though some were not yet married but their bride price had been collected by their parents from the men that they were betrothed to The percentage of the respondents that reported to have become famine bride is lower than the national average of 43 percentage as reported by some researchers [19]

TABLE VII ADOLESCENT GIRLS' LIVELIHOOD ADAPTATION STRATEGIES

Livelihood index	Effects of climate change	Adaptation strategy	mean	Ranking	Decision
Access to water and firewood	Scarcity of water, drought and flood	Fetching of water from long distance	3.63	1st	Significantly involved
		Fetching of firewood from long distance	3.30	2nd	Significantly involved
Food availability status	Food shortage/hunger	Reduction in food intake	2.22	8th	Significantly involved
Health status	Disease outbreak	Helping other vulnerable groups like young ones, elderly people	2.99	4th	Significantly involved
Agricultural output	Crop failure	Shifting cultivation	2.67	7th	Significantly involved
		Mixed cropping	3.16	3rd	Significantly involved
		Irrigation	2.88	6th	Significantly involved
		Mulching	2.94	5th	Significantly involved
Economic status(household income)	Crop failure, reduction in crop yield and low income	Dropping out of school to take up menial job	2.04	10th	Significantly involved
		Hawking on the street	2.19	9th	Significantly involved
		Becoming famine bride	1.47	12th	Not significant
		Migration	1.99	11th	Not significant

Source: Field survey, 2018 Benchmark =2

Key: Figure in parentheses represent percentage

10) *Level of Adaptation strategies employed to the effects of climate change:* Table VIII reveals that only 29.2% of the adolescent girls had low adaptation level. While more than half (56.2%) had moderate adaptation level and 14.6% had high adaptation level. This shows that the adolescents’ girls are useful agents of adaptation to the effects of climate change. They all employed one adaptation strategy or the other to the effects of climate but at different capacity

TABLE VIII LEVEL OF ADAPTATION STRATEGIES EMPLOYED to the EFFECTS of CLIMATE CHANGE

Adaptation level	frequency	Percentage (%)
Low adaptation level(12-20)	70	29.2
Moderate adaptation level(21-28)	135	56.2
High adaptation level(29-36)	35	14.6
Total	240	100

Source: Field survey, 2018

11) *Risks encountered by the adolescent girls in the course of adapting to the effects of Climate Change:*

Table IX reveals the risks encountered by the adolescent girls in the course of adapting to the effects of climate change such as, injuries, sexual abuses, infectious diseases, and violent attacks from people. Many of the respondents submitted to have suffered injuries (\bar{x} =0.50) attacks from wild animals (snake, scorpion.) (\bar{x} =0.42) and from people (\bar{x} =0.32) in the course of adapting to the effect of climate change and they were ranked 1st, 2nd and 4th respectively. Others indicated that they have been abused (\bar{x} =0.37). This assault might be due to the fact that some of them had to walk long distance far away from home, and protection of their parents to fetch water and firewood. This is in line with [23] that asserted that trekking long distances to fetch firewood and water exposes adolescent girls to sexual harassment. [25] also reported that globally, 25.3% of girls experience sexual violence.

TABLE IX RISKS ENCOUNTERED BY THE ADOLESCENT GIRLS in the COURSE OF ADAPTING to the EFFECTS of CLIMATE CHANGE

Risk	Mean	Ranking
Suffer injury	0.50	1st
Attack from wild animals	0.41	2nd
Abuse of any kind	0.36	3rd
Suffer violent attack from people	0.31	4th
Infection of disease	0.27	5th
Sexual abuse	0.24	6th
kidnapping	0.13	7th

Source: Field survey, 2018

12) *Result of Hypotheses testing:* There is no significant relationship between socio- economic characteristics of adolescent girls and the livelihood adaptation strategies employed by them.

This section showcases the investigation of the relationships between the socio-economic characteristics of the adolescent girls and the adaptation strategies employed to the effects of climate change.

The result of the Chi-square presented in Table X reveals that out of the eight variables subjected to Chi square analysis at $P=0.05$. Only educational status of the adolescents was found to significantly influence their adaptation strategies. Meaning that the higher the educational status of the adolescent the better their livelihood adaptation strategies and the higher their adaptive capacity. This is in line with [26] and [3] and [6] that education influences adaptation strategies to climate change. This means that educational status ($\chi^2=17.565$; $P\leq 0.007$) of the respondents have a significant relationship with the adaptation strategies employed by them. This implies that since the adolescent girls can read and write they will be able to source for information on climate change adaptation strategies, and therefore increase their adaptive capacity.

While Table XI shows the results of the Pearson Product Moment Correlation(r) at $P\leq 0.05$, that there is a significant relationship between age ($r=0.195$; $P\leq 0.002$) and adaptation strategies employed by adolescent girls. This means that the age of the adolescent influences their adaptive strategy. This means the higher their age the better their adaptive capacity. This is in line with [20] who asserted that adaptation strategy was by age. This is also confirmed by [9], and [6] who asserted that education, age and gender influences adaptation strategies

TABLE X CHI- SQUARE ANALYSIS OF SOCIOECONOMIC BACKGROUND and ADAPTATION STRATEGIES

Variable tested	χ^2	Df	Asym p.sig	C.f.	Decision
Marital status	2.858	2	0.24	0.108	NS
Educational level	17.565	6	0.007	0.261	S
Membership of organisation	4.307	2	0.116	0.133	NS
Type of organisation	1.792	4	0.408	0.86	NS
Type of parenting	2.661	6	0.850	0.105	NS
Parental occupation	12.371	5	0.261	0.221	NS
Parental education	7.255	4	0.509	0.171	NS

Source: Field survey, 2018.

S=Significant NS= Not significant

C.F. =Contingency coefficient

TABLE XI PEARSON PRODUCT MOMENT CORRELATION of AGE, HOUSEHOLD SIZE and ADAPTATION STRATEGIES

Variable tested	r	p-value	Decision
Age	0.195	0.002	S
Household size	0.90	0.110	NS

Source: Field survey, 2018.

S=Significant NS= Not significant

r=Correlation coefficient

13) *Pearson Product Moment Correlation of risk and Adaptation Strategies*; The result in Table XII reveals that there is a positive significant relationship between adaptation strategies employed by adolescent girls to the effects of climate change and the risk encountered by them ($r=0.183; p \leq 0.004$), This implies that the more the adaptation strategies employed by the adolescent girls the more the risks they encountered which might be due to their age.

TABLE XII PEARSON PRODUCT MOMENT CORRELATION of RISK and ADAPTATION STRATEGIES

Variable tested	r	p-value	Decision
Risk encountered	0.183	0,004	S

Source: Field survey, 2018.

IV. CONCLUSION

The study revealed that the four major manifestations of climate change identified by the adolescent girls for the study were high temperature (97.9%), irregular rainfall (97.1%) and storm (88.3%). It also established that the adolescent girls livelihood were been affected by climate and the major effects were; scarcity of water (83.3%), drought (79.6%), diseases outbreak (72.5%), crop failure (65%) and food shortage (52.9%). The study also reveals that the adolescent girls played huge role in adapting to the effects of climate change on their livelihood some of which are fetching of water and firewood from long distances helping other vulnerable groups. From the study we can deduce that the higher the age and the educational status of the adolescent girls the greater their adaptive capacities to the effects of climate change.

V. RECOMMENDATIONS

The study recommends that;-

- The policy makers on climate change should recognise adolescent as an important stakeholders on climate change.
- When designing and planning programmes on climate change adolescent girls should be involved.
- The government at all levels should empower adolescent girls to be able to adapt effectively to climate change
- Communities, local and state government should provide portable water for rural people..

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