

Effect of Flood on Socio-Economic Wellbeing of Owode Yewa Residents

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ABSTRACT

Owode-Yewa town as a suburban area in Ogun State, Nigeria experiences persistence flood occurrence most especially during the raining season annually. However, flood has been recognized as a threat to the existence of human beings and ecosystems. It is in this light that this study aimed at evaluating the impact of flood incidence on socio-economic wellbeing of residents in the town. Using a scientific method of sampling size determination, a probabilistic sample of 191 was obtained. The study employed systematic random sampling approach to select and administer well-structured questionnaires among the household heads in the town. Prior to Ordinary Least Square (OLS) analysis, Orthogonal Varimax Principal-Component Factor Analysis (PFA) was conducted. From the findings, it was revealed that flooding, erosion and mass deposition exert negative significant influences on socio-economic wellbeing of the residents in the study area. However, evidence provides that incidence of soil pollution has significant and positive effect on residents' socio-economic wellbeing in the town. The study therefore affirms that the impact of flood on socio-economic wellbeing of residents in Owode-Yewa town is mixed. Accordingly, the study recommends that concerted efforts by both private and public sectors should be made towards flood mitigation in the area. Flood warning, flood forecasting and flood information should be available to residents. And provision of infrastructure like adequate internal roads, curvet and drainage system in the town.

Keywords: Flood, Socio-Economic, Wellbeing, Owode Yewa Residents & Nigeria

1. INTRODUCTION

Flood in Owode-Yewa, Ogun State is attributed to heavy rain, shape land, soil of the types and development patterns. Flood is a recurrent phenomenon in the area. The land use activities influence the urbanization contributes to flooding activities in built up areas development are not major causes but increase the impact as a result of involvement in modern ways of construction and development. The causes also attributed to expansion of physical development towards flood prone area. Increase in subsequent flooding reshape the geography of the area and wellbeing of the inhabitant, it can have long time effect on the residents. The important factors of wellbeing originate from morality and psychology, this comprises social, political, economic, cultural, and moral interactions to build a conducive environment that initiate sustainable human development (Alatartseva & Baryshev, 2015).

The effect Floods manifest on both residents and communities, it affected the social, economic, and physical wellbeing of the people. The aftermath effect of floods have both negative and positive depending on the location of the town, demography factor, community layout and land configuration. Floods can have negative impact on wellbeing of a community with loss of properties disruption in commercial activities, displacement which causes social disintegration, damages on infrastructure and damage of farm produce leading to shortage of food.

2. LITERATURE REVIEW

Recently, there has been frequently in flooding globally, the causes has been attributed to the rapid urbanisation without considering spatial planning as an important element in ordering of land uses. Elewo (2015) examined the socio-economic impacts of flooding on residents of Port Harcourt therefore, concluded that the attitude of developers in construction on drain area, non-challant attitude towards master plan review and performance of relevant government agent in planning of environment contributes to the flooding situations in urban areas. Kwari, Ayuba, & Denis (2016) :Vlachos (1995) & Dewan,(2015) examined the impact of floods on socio-economic activities, concluded that responses should relate to organisation mobilization, methodological break through, considering the relationship between social complexity and spatial Interactions” Sevetlana, Radowan& Jan (2015) emphasized that economic impact are in two fold, positive and negation, the positives realised in regular supply of domestic water, fertility of land increase but the negative impact are difficult to measure in terms of loss of property, destruction of infrastructure and reduction in tax due to unexpected closure of industries. Ligtoet, Hilderink, Bouwman, Van Puijenbroek, Lucas, & Witmer (2014) described challenges faced in flood research as individual behaviour which must be inculcated into different model analysing impact of floods. Adenekan (2010) identified flooding as one of determinant hindering African’s growing of cities inhabitant from poverty alleviation therefore, impact of flooding worsen physical development and have effect on urban poor.

Human activities and environment are symbolic in nature, unaffordable environment have effect on the wellbeing of the resident. Nigeria experience highest flooding rate in 2012, 28 out of 36 states were involved, it rendered people homeless thousands of people dead and destruction of property flooding is attributed to the worst ecological problem globally with advert effect on health, environment and socio-economic activities of the resident (Ajibola, Izunwanne & Ogungbemi, 2012). Recently people are moving to urban areas for better quality of life, they need areas with high economic activities, where daily activities can provide for human needs, the advantages of living closely place of work, concentration of people and economic activities at particular area reduce durability of infrastructure due to high population and causes environmental pollution floods in an area have significant impact of service provided by community or government to better life of inhabitant, whenever there is flooding, it destroyed available infrastructure, this have an effect on the wellbeing of the people. Adelekan (2010) highlighted the major causes of floods in built-up areas. These include uncontrolled expansion of impermeable surfaces resulting in increased run-off, run-off responses (20) under high intensity rainfall, building on floodplains, lack of storm water drainage, failure to maintain existing drainage systems, and weak institutional capacity of the urban administration.

3. RESEARCH METHODOLOGY

In accordance with extant literature on socio-economic impacts of flood on people, a linear model of Ordinary Least Square method was developed. The choice of the model is informed by the procedures pattern of data management exercise. Orthogonal Varimax Principal-Component Factor Analysis (PFA) was conducted to reduce complex data structure of the study dependent variable. This technique has been widely recognized in research analysis and econometrics as data reduction technique (Jack, 1971; Kim and Mueller, 1978; Tucker and MacCallum, 1997; Pallant, 2005; Hair, Black, Babin, Anderson & Tatham, 2006; Tabachnick & Fidell, 2007; Hair et al, 2010). The researcher estimates scores for predicted variable through regression coefficients from factor analysis thereof. Similarly, mean scores of five dimensions of flood incidence were estimated to be included in a linear regression model.

The European Union (2003) has recognized flooding, erosion, mass deposition, and pollution (water and soil) as dimensions of flood incidence.

Mathematically, the model may be written as;
 Socio-Economic Wellbeing = f (Flood Incidence)

$$\text{SEW} = f(\text{FLI}) \dots \dots \dots \text{equation 1}$$

Where;

SEW = Socio-Economic Wellbeing; and FLI = Flood Incidence
 FLI is measured by; FLO = Flooding; ERO= Erosion; MDE = Mass Deposition; WAP = Water Pollution;
 SOP = Soil Pollution

In other words, equation (1) becomes;

$$\text{SEW} = f(\text{FLO} + \text{ERO} + \text{MDE} + \text{WAP} + \text{SOP}) \dots \dots \dots \text{equation 2}$$

Equation (2) transforms into;

$$\text{SEW} = \bar{\alpha} + \beta_i (X_i) + \epsilon \dots \dots \dots \text{equation 3}$$

Where; X_i = vector of explanatory variables; β_i = vector of coefficients of X_i ; $\bar{\alpha}$ = intercept; ϵ = disturbance term

$$\text{SEW} = \bar{\alpha} + \beta_1 \text{FLO} + \beta_2 \text{ERO} + \beta_3 \text{MDE} + \beta_4 \text{WAP} + \beta_5 \text{SOP} + \epsilon \dots \dots \dots \text{equation 4}$$

A priori expectation is expressed as $\beta_1 - \beta_5 < 0$. This implies that the study expects negative relationship between dependent variable and the predictors. Lastly, all analyses were conducted at 5% level of significance.

Owode Yewa is a town situated in Yewa South Local Government of Ogun State, Nigeria. According to descriptive findings of the study, the town is dominated by artisans and traders as economic actors. One of the reasons for this concentration is closeness of the town to international border neighbouring town. However, no information is specifically available on the total population of the residents in this town. Even information on population census by National Population Commission (NPC, 2010) is only available at local government level. In spite of this, the researcher ensured that the current research duly followed scientific processes in arriving at a representative sample. Given the fact that the experience on flood occurrence in the study area could only be provided by those who have stayed long in the town, the researcher considered household heads as the subjects of the study. Meanwhile, as earlier explained, information on total figure of household heads in this is also scarcely or not available.

In other words, the researcher endeavoured to spend much time and energy in visiting each community of the towns for joint consultation with Community Development Associations (CDAs) on the research topic and bringing into fore significances of the current research. At each of the consultation exercise, the total number of household heads was obtained from the chairmen of the associations. This was made possible through the members register maintained by each CDA. Moreover, out of the registered CDAs by Yewa South Local in Owode Yewa Township, the researcher visited eighteen CDAs and a total number of 380 household heads were obtained through the process. The selection is informed by the accessibility of the town. Therefore, the figure obtained formed the total population of the study as the household heads were the unit of analysis for the study.

As the population figure stands at 380 household heads, the study thereby obtained a sample size of 191. This was achieved through the application of sample size determination formula recommended by Krejcie and Morgan (1970) for a known population.

The procedure was observed via the formula below;

$$S = \frac{X^2 NP(1-P)}{Z^2 (N-1)+X^2 P(1-P)} \dots\dots\dots \text{Krejcie and Morgan (1970)}$$

Where s = sample size; X^2 = table value of chi-square at 1 degree of freedom for desired confidence level (0.95); N = population size (380); and P = population proportion (0.5). Furthermore, in order to create representative probability-based selection, the study employed systematic sampling procedure to select every 5th household approached in each of the Communities visited. The unit of the analysis is the household head. The researcher, with proper monitoring, recovered a complete 178 questionnaires yielding a retrieval rate of 93%. From the 178 questionnaires collected, 12 questionnaires were considered unusable because they had missing response items which made them unusable according to the researcher’s rule. The remaining 166 (87%) questionnaires were completed and used in the analysis. This response rate is considered highly sufficient considering that it is close to three times the acceptable standard for survey response rate of 30% as suggested by Sekaran (2003).

4. PRESENTATION, INTERPRETATION AND DISCUSSION OF FINDINGS

The uniqueness values from Orthogonal Varimax Principal-Component Factor Analysis (PFA) indicated that three out of six measurement variables (income; occupation; education; access to water supply, electricity and medical facilities) of socio-economic wellbeing were retained. These variables are occupation, education and access to electricity with uniqueness values of 0.37; 0.32; and 0.37 respectively. Uniqueness value indicates the variance that is unique to the variable and not shared with other variables. Hair *et al* (2010) has recommended the percentage of uniqueness to be 40% or lower, thus, the greater the uniqueness value the lower the relevance of the variable in the factor model. This result is shown in the Appendix (Table 2). More so, composite score was obtained for these variables as a single predicted variable. In other words, the following Table 1 reveals the result of cross-sectional linear OLS.

Table 1: Summary of Regression Results
Dependent Variable: SEW

| Model | Predictor | Coefficient | Std. Error | P> t | P-value | R ² |
|-----------|---------------|-------------|------------|-------|---------|----------------|
| SEW MODEL | <i>F-Stat</i> | | | | 0.0000 | 0.31 |
| | FLO | -.4242206 | .0322559 | 0.000 | | |
| | ERO | -.0977995 | .0499548 | 0.001 | | |
| | MDE | -.3567123 | .0323465 | 0.000 | | |
| | WAP | -.2267543 | .0248248 | 0.282 | | |
| | SOP | .6975237 | .0250043 | 0.000 | | |
| | _cons | 7.862145 | .3194272 | 0.000 | | |
| | AIC | -501.5066 | | | | |
| | BIC | -475.0258 | | | | |
| | Breusch-Pagan | 326.87 | | | 0.0553 | |

Source: Author’s Computation from STATA 12 Outputs, 2018

The information in Table 1 reveals the outcome of the OLS multiple regression analysis conducted after taking into consideration the results of earlier Orthogonal Varimax version of Principal-Component Factor Analysis (PFA). The Table depicts the overall significance of flood incidence model to explain socio-economic wellbeing of residents in Owode-Yewa, Ogun State and thus shows joint significance of all the flood predictors. This is informed by probability value of F - statistics (.0000) against adopted 5% level of significance. Although, the measure provides overall goodness of fit it is important to subject the result of regression thereof to some additional scrutiny because a wrongly specified model may lead to erroneous inferences (Cameron & Trivedi, 2009). In other words, some diagnostics checks were performed. The information in the Table indicates that Akaike Information Criterion (AIC) was preferred to Schwarz Bayesian Information Criterion (BIC) given its smaller value. Again, the non-significance of Breusch-Pagan / Cook-Weisberg test for heteroskedasticity in the Table indicates acceptance of null hypothesis of constant variance for all the predictors and predicted variables.

From the Table 1, an increase in the level of flooding, erosion, and mass deposition significantly reduce socio-economic wellbeing of the inhabitants in the study area. Thus, an increase in the flooding significantly reduces socio-economic wellbeing of residents by 42%; an increase in erosion level significantly lowers socio-economic wellbeing of residents by 10%; and an increase in mass deposition significantly reduces inhabitants' socio-economic wellbeing by 35%. This result is consistent with Adenekan (2010). On the other side of the coin, an increase in water pollution was found to be statistically insignificant in influencing socio-economic wellbeing of residents. The outcome may be due to non-reliance of people on Nigeria governments at all levels in provision of good pipe borne water. Residents in Nigeria mostly those that live in remote areas source for water through private boreholes.

However, an increase in the level of soil pollution was found to be statistically significant in improving socio-economic wellbeing of the study inhabitants. This is surprising given a priori expectation of the study. In the meantime, this finding may be due to the importance of water to soil fertility which indirectly has effect on peoples' income like farmers through productive harvest. This finding is consistent with Sevetlana *et al*, (2015) Again, according to the current study, soil pollution was found to be the greatest contributor to advancement in socio-economic wellbeing of residents in Owode-Yewa, Ogun State of Nigeria. In addition, the Table reveals that 31% variation in socio-economic wellbeing in the study area is statistically explained by flood incidence.

5, CONCLUSION

Over time flood disasters have caused much damage to both human beings and ecosystems. This is particularly more evidenced in developing countries like Nigeria most especially when it is related to people wellbeing. It was discovered by this study that flood incidence exerts significance influence towards low level of socio-economic wellbeing of residents in Owode-Yewa, Ogun State. But when flood is viewed as soil pollution it significantly improves wellbeing of people like farmers in the area of soil fertility which has potential positive effect on farm production. In other words, the study affirms that the effect of flood on socio-economic wellbeing of residents in Owode-Yewa town is mixed. However, despite this study made tenacious attempt to empirically investigate how flood incidence affects socio-economic wellbeing of the residents, the key impacts of flood in the study area was unconsidered. Thus, this gives room for future research among scholars in the field and other related disciplines.

6. RECOMMENDATIONS

In line with the study findings, these following recommendations are made;

- (i) Concerted efforts by both private and public sectors should be made towards flood mitigation in the area of flood warning, flood forecasting and flood information.
- (ii) Governments should develop, upgrade and implement rescue and safety measures in flood-prone suburban and rural areas across the country.
- (iii) Both wealthy Nigerians and governments should magnanimously provide effective insurance schemes for victims of flood disasters. This will assist in restoring social economic loss and living conditions of the affected victims.
- (iv) There is need by governments to develop and implement efficient and effective physical planning and land use management practices in suburban and rural areas across Nigeria.
- (v) Provision of adequate infrastructure like access road to each dwelling, curvet and drainage system for free flow of storm water.
- (vi) There is need by government to timely organize public awareness and education programmes for people on possible risks of floods.

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APPENDIX

Table 2: Othogonal Varimax Principal-Component Factor Analysis
(INM = Income; OCT = Occupation; EDU = Education; WAS = Access to Water Supply;
ELET = Electricity; MED = Access to Medical Facilities)

| Variable | Factor1 | Factor2 | Factor3 | Uniqueness |
|----------|---------|---------|---------|------------|
| INM | -0.6068 | -0.1910 | 0.2940 | 0.5088 |
| OCT | 0.2292 | 0.4766 | 0.5884 | 0.3741 |
| EDU | -0.4262 | 0.5188 | -0.4819 | 0.3170 |
| WAS | -0.2894 | 0.6046 | 0.3718 | 0.4124 |
| ELET | 0.5246 | 0.4264 | -0.4121 | 0.3731 |
| MED | 0.6039 | -0.0873 | 0.2683 | 0.5557 |

Source: STATA 12 Outputs, 2018

Table 3: Regression Results

| Source | SS | df | MS | Number of obs = | 166 |
|------------------------|------------|-----|------------|-----------------|----------|
| F(5, 158) = 536.76 | | | | | |
| Model | 68.3870008 | 5 | 13.6774002 | Prob > F | = 0.0000 |
| Residual | 15.3907679 | 604 | .025481404 | R-squared | = 0.3163 |
| Adj R-squared = 0.3048 | | | | | |
| Total | 83.7777687 | 609 | .137566123 | Root MSE | = .15963 |

| SEW | Coef. | Std. Err. | t | P> t | [95% Conf. Interval] | |
|-------|-----------|-----------|--------|-------|----------------------|-----------|
| FLO | -.4242206 | .0322559 | 13.15 | 0.000 | .3608732 | .487568 |
| ERO | -.0977995 | .0499548 | 1.96 | 0.001 | -.0003066 | .1959057 |
| MDE | -.3567123 | .0323465 | -11.03 | 0.000 | -.4202376 | -.293187 |
| WAP | -.0267543 | .0248248 | -1.08 | 0.282 | -.0755077 | .021999 |
| SOP | .6975237 | .0250043 | -27.90 | 0.000 | -.7466296 | -.6484178 |
| _cons | 7.862145 | .3194272 | 24.61 | 0.000 | 7.234822 | 8.489468 |

Source: STATA 12 Outputs, 2018

Table 4: Information Selection Criteria

| Model | Obs | ll(null) | ll(model) | df | AIC | BIC |
|-------|-----|-----------|-----------|----|-----------|-----------|
| . | 166 | -260.0387 | 256.7533 | 6 | -501.5066 | -475.0258 |

Table 5: Homoscedasticity Test

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
 Ho: Constant variance
 Variables: FLO ERO MDE WAP SOP
 chi2(4) = 326.87
 Prob > chi2 = 0.0553