



Assessing the Effectiveness of Post-disaster Housing Reconstruction from the Flood Victims' Perspective: A Pilot Study

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Abstract: In any flooding, houses are the component that is most extensively damaged, and repeatedly represents the greatest portion of the loss in the overall impact of a disaster on the national economy. In October 2012, a flood devastated 14 States in Nigeria that included Kogi where safe actions on victims' rehabilitation, recovery and risk vulnerability reduction were swiftly taken through post-disaster housing reconstruction developments. However, the implementation of some of the resolutions was inadequately done due to non-availability of basic guidelines for the reconstruction processes. This research aims to develop a post-disaster housing reconstruction framework for flood victims in Nigeria. Fifty questionnaires were administered to the 2012 flood victims out of which 43 constituting 86% was valid for analysis using SPSS. This report reveals the results of the pilot study conducted before carrying out the main survey to collect information from target respondents. The pilot study shall help to minimise errors in the questionnaire, warrants the smooth running of the survey, ease the response rate, and offer a useful and valuable inquiry. The results include the descriptive statistics, reliability test, content and construct validity, the normality test, and factorability. The values of skewness and kurtosis were all within the recommended limit of $-/+2$, which indicates the normal distribution of all the constructs of the study. The summary of the reliability test for each construct of the post-disaster housing reconstruction questionnaire, are Effectiveness of reconstruction strategies, 0.966; Resource mobilisation strategies, 0.772; Resilience strategies, 0.866, Reconstruction approaches, 0.816, Issues experienced, 0.944, and the Community satisfaction with reconstruction strategies have a value 0.902 for Cronbach alpha coefficient. The results are a positive indicator to use the instrument for the main survey.

Keywords: Floods impact, Flood victims, Housing, Post-disaster housing reconstruction, Pilot study, Nigeria

1. Introduction

A disaster is a phenomenon that has the potential of causing damage to life and property and destroy the economic, social and cultural life of people. The occurrences of natural disasters are higher than before worldwide causing damage, loss, and disturbance to lives, built and social assets, and economy. According to Opdyke (2017), more than four thousand natural disasters impacted communities around the world from 2006 to 2016. Considering average wise, this equates to more than one disaster occurrence per day. The impacts of these natural disasters on the people and environment tend to be heavy and unimaginably surprising (Adaji, 2019). According to Guha-Sapir, Below & Hoyois (2017), these events from 2006 to 2016 claimed or killed nearly one million people, rendered over 21 million people homeless, and caused nearly US\$6.3 trillion in damage worldwide. The existence of natural disasters is outside the control of humankind (Athukorala, 2012). Developing countries tend to endure the pain of the impact of disasters, with the poor in these countries often being the most severely affected (Barenstein, 2016; Chang, 2012). Housing is usually viewed to be the most valuable asset for people in developing countries.

In any flooding, houses are mostly the component that is most extensively damaged or lost, and repeatedly represents the greatest portion of the loss in the overall impact of a disaster on the national economy (Lyons, 2009). For example, Roosli, Wahid, Bakar & Baharum (2015) reported that during 2014 flooding in Malaysia, housing was the sector that experienced extreme damage. In an attempt to describe the precise scenario of the 2014 floods in Malaysia, Mohamed, Ebenehi, Adaji, Seow, Chan, Goh, & Rahim (2017) expressed that it is not out of place for one to say that the speed of the flood water in the affected regions flowed so fast with vitality equivalent to that of Tsunami. It is displacing anything that obstructs its channel of flow, including buildings (residential and non-residential houses) and other infrastructures. Similarly, Richard, Adejo, James, & Luqman (2017) and Jinadu (2015) reported that Nigeria is not excluded from the flood devastation on housing.

In October 2012, a flood devastated 14 States in Nigeria that included Kogi. The flood of 2012 is considered as the worst since Nigeria became independent in 1960. The life-threatening physical and socio-economic shocks of 2012 floods became a crucial matter of interest among stakeholders in disaster management where safe actions on victims' rehabilitation, recovery and risk vulnerability reduction were swiftly taken to mitigate flooding impacts in the future. However, the implementation of some of the resolutions was inadequately or poorly done due to corruption manifesting through the diversion of resources for personal interests (Jinadu, 2015) and non-engagement of the affected community (Richard et al., 2017). The consequences of poor implementation are leaving the affected population vulnerable to the menace of flooding now and in the future. This establishes a pressing need for a more appropriate and immediate construction sector response (Amaratunga, Malalgoda & Pathirage, 2010).

After a disaster hits and leaves people destitute or homeless, whether to build in the same area or to resettle is a fundamental decision to be considered in the disaster recovery phase. Only a well-planned and managed process of resettlement can deliver positive long-term development effects (Adaji, 2019; Badri, Asgary, Eftekhari, & Levy, 2006). Researchers have contributed their opinions regarding the impacts of flooding and have made recommendations for sustainable reconstruction (Etuonovbe, 2011; Adetunji & Oyeleye, 2013; Kwari, Paul & Shekarau, 2015; Otomofa, Okafor & Obienusi, 2015). Despite the enormous resources being currently assigned for post-disaster recovery and reconstruction, vulnerable communities have not been able to attain back any resilience in both under-developed and developing countries.

Post-disaster housing reconstruction projects have been executed several times for different types of disaster-affected communities in both the local and global perspective (Vithanagama, Mohideen, Jayatilaka, & Lakshman, 2015). Among those, flood resettlement is important due to its complexity in nature. Post-disaster housing reconstruction (PDHR) that are well constructed gives confidence and security to the troubled communities, which in turn allows the people to address better their core requirements for providing a livelihood for themselves and their extended families (Niazi & Anand, 2010). However, studies reveal that objectives of housing reconstruction after a disaster are often not met and opportunities for community development are deficient due to the non-effective reconstruction process. According to Hayles (2010) and Barakat (2003), the choice of location, site selection and settlement planning; the choice of construction method and materials; and the choice of design are the considerations that must be addressed when planning post-disaster housing reconstruction.

This research aims to develop an effective post-disaster housing reconstruction framework for flood victims in Nigeria. The following research objectives were formulated to achieve the stated aim:

- 1 To investigate the current community involvement in post-disaster housing reconstruction for flood victims in Nigeria.
- 2 To identify community perception on the effectiveness of the post-disaster housing reconstruction strategies for flood victims in Nigeria.
- 3 To assess the impacts of the reconstruction strategies used on the effectiveness of post-disaster housing reconstruction strategies for flood victims in Nigeria.
- 4 To evaluate the mediation effects of issues experienced and community satisfaction with reconstruction strategies on the effectiveness of post-disaster housing reconstruction strategies for flood victims in Nigeria.

5 To propose and validate a post-disaster housing reconstruction framework for flood victims in Nigeria.

2. Pilot Study

Pilot testing of a survey instrument is an essential aspect in research design since it helps to get the wordings of the instrument (questionnaire) appropriately and to increase the reliability, validity, and practicability of the survey (Cohen, Manion, & Morrison, 2013). It comprises primarily the administration of the questionnaire to many respondents who are a representative of the target research sample and the subsequent use of statistical analysis and feedback to reduce the number of items in the questionnaire into a manageable number. Cohen et al. (2013) accentuated that the pilot data obtained from the pilot test is analysed to determine the reliability, colinearity, multiple regression and factor analysis.

Before conducting the field survey among respondents by collecting information to achieve the itemised objectives, we carried out a pilot study. The rationale for the pilot study was to certify the reliability and validity of the developed research instrument to minimise errors in the questionnaire, makes survey runs smoothly, facilitate response rate, and provide a useful and valuable inquiry (Fink, 2015). In the submission of Mathers, Fox, & Hunn (2007), pilot-testing of questionnaire warrants the inclusion of all significant issues; the correctness of its order; identification of ambiguous or misleading statements, and avoid omission of any vital matter from the questionnaire. The quality and structure of a survey are improved through a pilot study (Creswell, 2013). According to Saunders, Lewis & Thornhill (2016) and Collins & Hussey (2003), testing a questionnaire through a pilot study regardless of how best is its perceived design is imperative. Piloting essentially involves the administration of the questionnaire to some respondents who are a representative of the target research sample and the subsequent use of statistical analysis and feedback to reduce the number of items in the questionnaire into a manageable number.

The collected data from the pilot study were analysed using the descriptive of the variables. The reliability was assessed using Cronbach’s Alpha coefficient based on the recommendation of (Pallant, 2011). We evaluated the normality of the data using Skewness and Kurtosis in pertinent with the submission of George & Mallery (2010) that the values of Skewness and Kurtosis should be within the range of $-/+2$ for the response to be considered normally distributed. Correspondingly, the missing values and outliers were observed and treated respectively. The structure of the data was also assessed using factor analysis. The possibility of multicollinearity was examined using the Variance Inflation Factor (VIF) and Tolerance level, which is required to be less than 10 and 1, respectively (Pallant, 2011). This paper is based on questionnaires for post-disaster housing reconstruction projects administered to the respondents (2012 flood victims) within Kogi, Nigeria. Section 3 presents the results of the analysis.

3. Pilot Instrument Administrations

Table 1 shows the number of questionnaires administered to the respondents. Johanson & Brooks (2010) recommend a minimum of 30 respondents to conduct a pilot study. We distributed a total of 50 questionnaires to 2012 Flood victims in the study area, of which 90 percent were returned. However, of the returned questionnaire, two were discarded due to issues of outliers and missing entries leaving 86 percent valid response for the analysis, which indicates good response rate.

Table 1 – Pilot Instrument Administration.

Questionnaires	Response	
	Frequency	Percen
Administered	50	-
Returned	45	90
Valid and Usable	43	86

4. Data Descriptive, Normality, Reliability and Factorability

4.1 2012 Flood Victims in Nigeria

This section provides the result of the pilot study descriptive, normality, reliability and factorability according to the constructs in the post-disaster housing reconstruction questionnaire. These constructs are Resource Mobilisation Strategies (RMS), Resilience Strategies (RS), Reconstruction Approach (RP), Issues Experienced (EX), Community Satisfaction with Reconstruction Strategies (CSS), and the Effectiveness of reconstruction strategies (ERS).

4.2 Normality of the pilot results

Data normality is an essential aspect of both univariate and multivariate analysis. Downplaying this essential stage in quantitative data analysis process imperils the validity and reliability of the research outcome. Even though

the current analysis is exclusively concerned with identifying the factorability and reliability of pilot data, it is imperative to examine the normality of the data. Hence, Ho (2013) and Child (2006) said that both univariate and multivariate normality has to be established within a data set before factor analysis is to be executed or performed. A normality test was carried out using the frequency, skewness, and kurtosis to analysed normality of pilot data. The results showed that the data achieved acceptable normal distribution with kurtosis and skewness between 1.974 and -0.001; which are within ranges of ± 2 as recommended in George & Mallery (2010).

4.3 Factorability

Having examined the normality in the dataset in this section, the result of the exploratory factor analysis (EFA) is presented. According to Yong & Pearce (2013), factor analysis is applied in many disciplines such as behavioural and social sciences, medicine, economics, and geography based on the technological advancements of computers. The rationale of conducting factor analysis is to discover the underlying dimensions or constructs in the dataset. EFA was performed in this study to examine the unidimensionality of the factors in this study’s constructs before further analyses to answer the research objectives. EFA was used to determine the number of common features that will be responsible for correlations and identify potential groupings into constructs to use as measurement models (Yong & Pearce, 2013). Holding to the fact that EFA is essential in housing performance studies, its pragmatism and subjectivity (Tabachnick & Fidell, 2014) make it necessary to use multiple criteria concurrently in extraction methods before deciding which variable to work with (accept) or drop (Williams, Onsman & Brown, 2010). Based on this justification, EFA was conducted for each construct that made up the conceptual framework for this research to determine the workable factors and their correlations within the construct and their results are presented accordingly.

4.3.1 Effectiveness of Reconstruction Strategies

Table 2- EFA for the effectiveness of reconstruction strategies

Constructs	Items	Factor Loadings	Kaiser Meyer-Olkin	Bartlett's Test of Sphericity	Total Variance
Effectiveness Reconstruction Strategies	ERS1	.742	.921	7830.627	79.570
	ERS2	.658			
	ERS3	.795			
	ERS4	.755			
	ERS5	.763			
	ERS6				
	ERS7				
	ERS8	.717			
	ERS9	.705			
	ERS10	.728			
	ERS11	.594			
	ERS12	.800			
	ERS13	.842			
	ERS14	.845			
	ERS15	.806			
	ERS16	.821			
	ERS17	.776			

ERS18	.68
ERS19	.55
ERS20	.69
ERS21	.79
ERS22	.84
ERS23	.82
ERS24	.79
ERS25	.65
ERS26	.88
ERS27	.90
ERS28	.78
4	

The effectiveness of reconstruction strategies construct result of the factor analysis in Table 2 showed that the value for the Kaiser-Meyer-Olkin (KMO) measures of Sampling Adequacy is .931. It is more than 0.5 and significant at 0.001 as required. The value for the Bartlett test of sphericity is 7830.627. It means the Bartlett test of sphericity is large and significant ($p < .05$), which means that the variables are related. The total variance explained by the construct is 79.578, which is considered satisfactory (Pallant, 2011; Williams et al., 2010). The factor loadings for each item are all more than 0.5 as recommended by Hair, Black, Babin, & Anderson (2010), except for ERS6 and ERS7 which were removed because of low factor loadings.

4.3.2 Resource Mobilisation Strategies

Table 3- EFA for resource mobilisation strategies

Constructs	Items	Factor Loadings	Kaiser Meyer-	Bartletts Tes	Total Varianc
Resource Mobilisation Strategies (RMS)	RMS1	.850	.6	1489.446	79.7
	RMS2	.747			
	RMS3	.739			
	RMS4	.853			
	RMS5	.585			
	RMS6	.859			
	RMS7	.897			
	RMS8	.843			
	RMS9	.883			
	RMS1	.884			
	RMS11	.552			

The resource mobilisation strategies construct result of the factor analysis in Table 3 showed that the value for the Kaiser-Meyer-Olkin (KMO) measures of Sampling Adequacy is .697. It is more than 0.5 and significant at 0.001 as required. The value for the Bartlett test of sphericity is 1489.446. It means the Bartlett test of sphericity is large and significant ($p < .05$), which confirms that the variables are related. The total variance explained by the construct is 79.739, which indicated a good result (Pallant, 2011; Williams et al., 2010). The factor loadings for each item are all more than 0.5, as recommended by Hair et al. (2010).

4.3.3 Resilience Strategies

Table 4- EFA for resilience strategies

Constructs	Items	Factor Loadings	Kaiser-Meyer-Olkin	Bartlett's Test of Sphericity	Total Variance
Resilience Strategies (RS)	RS1	.736	.794	2798.330	72.1
	RS2	.785			
	RS3	.722			
	RS4	.741			
	RS5	.571			
	RS6	.811			
	RS7	.734			
	RS8				
	RS9	.572			
	RS10	.527			
	RS11	.676			
	RS12	.789			
	RS13	.756			
	RS14	.768			
	RS15	.854			
	RS16	.900			
	RS17	.901			
	RS18	.887			
	RS19	.840			

The resilience strategies construct result of the factor analysis in Table 4 showed that the value for the Kaiser-Meyer-Olkin (KMO) measures of Sampling Adequacy is .794. This is more than 0.5 and significant at 0.001 as required. The value for the Bartlett test of sphericity is 2798.330. This means the Bartlett test of sphericity is large and significant ($p < .05$), which implies that the variables are related. The total variance explained by the construct is 72.142, which indicated a good result (Pallant, 2011; Williams et al., 2010). The factor loadings for each item are all more than 0.5 as recommended by Hair et al. (2010), except for RS8, which was removed because of low factor loadings.

4.3.4 Reconstruction Approaches

Table 5- EFA for reconstruction approaches

Constructs	Items	Factor Loadings	Kaiser-Meyer-Olkin	Bartlett's Test of Sphericity	Total Variance
Reconstruction Approach (RP)	R	.763	.762	1101.198	63.2
	R	.822			
	R	.761			
	R	.712			
	R				
	R	.761			
	R	.754			
	R	.669			
	R	.530			
	RP10	.807			
	RP11	.778			
	RP12	.734			

The reconstruction approach construct result of the factor analysis in Table 5 showed that the value for the Kaiser-Meyer-Olkin (KMO) measures of Sampling Adequacy is .762. This is more than 0.5 and significant at 0.001 as required. The value for the Bartlett test of sphericity is 1101.198. This means the Bartlett test of sphericity is large and significant ($p < .05$), which denotes that the variables are related. The total variance explained by the construct is 63.292, which indicated a good result (Pallant, 2011; Williams et al., 2010). The factor loadings for each item are all

more than 0.5 as recommended by Hair et al. (2010), except for RP5, which was removed because of low factor loadings.

4.3.5 Issues Experienced

Table 6- EFA for issues experienced

Constructs	Items	Factor	Kaiser Meyer-	Bartlett's	Total	Variance
		loading	Olkin	Test	Variance	%
Issues Experienced (EX)	EX1	.806	.9	3077.619	73.4	83
	EX2	.845	.24			
	EX3	.798				
	EX4	.647				
	EX5					
	EX6	.738				
	EX7	.696				
	EX8					
	EX9	.868				
	EX10	.839				
	EX11					
	EX12					
	EX13					
	EX14	.617				
	EX15	.822				
	EX16	.859				

The issues experienced construct result of the factor analysis in Table 6 showed that the value for the Kaiser-Meyer-Olkin (KMO) measures of Sampling Adequacy is .924. This is more than 0.5 and significant at 0.001 as required. The value for the Bartlett test of sphericity is 3077.619. This means the Bartlett test of sphericity is large and significant ($p < .05$), which suggests that the variables are related. The total variance explained by the construct is 73.483, which signified a good result (Pallant, 2011; Williams et al., 2010). The factor loadings for each item are all more than 0.5 as recommended by Hair et al. (2010), except for EX5, EX8, EX11, EX12, and EX13 which were removed because of low factor loadings.

4.3.6 Community Satisfaction with Reconstruction Strategies

Table 7- EFA for community satisfaction with reconstruction strategies

Constructs	Items	Factor	Kaiser Meyer-	Bartlett's	Total	Variance
		loading	Olkin	Test	Variance	%
Community Satisfaction with Strategies (CSS)	CSS1	.6	.8	2331.150	59.8	72
	CSS2	.76	.40			
	CSS3	.6				
	CSS4	.6				
	CSS5	.7				
	CSS6	.7				
	CSS7	.6				
	CSS8	.6				
	CSS9	.8				
	CSS10	.5				
	CSS11	.7				
	CSS12	.7				
	CSS13					
	CSS14	.6				
	CSS15	.6				
	CSS16	.7				
	CSS17	.803				

The community satisfaction with reconstruction strategies construct result of the factor analysis in Table 7 showed that the value for the Kaiser-Meyer-Olkin (KMO) measures of Sampling Adequacy is .840. This is more than 0.5 and significant at 0.001 as required. The value for the Bartlett test of sphericity is 2331.150. This means the Bartlett test of sphericity is large and significant ($p < .05$), which connotes that the variables are related. The total variance explained by the construct is 59.872, which represented a good result (Pallant, 2011; Williams et al., 2010). The factor loadings for each item are all more than 0.5 as recommended by Hair et al. (2010), except for CSS13, which was removed because of low factor loadings.

4.4 Reliability of pilot results

Having established the number of factors to be retained, it is recommended that the reliability of the items and their corresponding constructs be examined to ascertain the validity of the questionnaire scales. The reliability of the questionnaire scales for this study was tested using Cronbach’s Alpha method. The acceptable threshold for scale reliability is .70 and above while .60 is considered acceptable if the study is at its exploratory phase (Tabachnick & Fidel, 2014; Pallant, 2011; George & Mallery, 2010; Hair et al., 2010). However, a reliability test was carried out to measure the reliability of constructs, as presented in Table 8.

Table 8- Reliability test for constructs

Construc ts	Items	Cronbach's Alpha	Cronbach's Alpha Based on
Effectiveness of Reconstruction Strategies	2	.9	.9
Resource Mobilisation Strategies	8	.66	.66
Resilience Strategies	1	.7	.7
Reconstruction Approaches	1	.8	.8
Issues Experienced	1	.8	.8
Community Satisfaction with Reconstruction Strategies	1	.9	.9
	7	.02	.03

Results from Table 8 indicated that a reliable Cronbach’s alpha of more than .70 was achieved in all of the constructs. Therefore, the questionnaire scale is proven to be highly reliable and could be helpful or useful in measuring what it is purposed for (Tabachnick & Fidell, 2014; Pallant, 2011; George & Mallery, 2010; Hair et al., 2010).

5. Conclusion

This paper discusses pilot testing of a questionnaire administered among the 2012 flood victims on the post-disaster housing reconstruction projects from Kogi State in Nigeria. A total of 50 questionnaires were administered, and 43 were found useful from 45 returned. Six constructs were assessed for normality, reliability, factorability. All the results gave a favourable indication to proceed with the main survey with little adjustments.

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