

**MODIFIED GENERALISED FOSTER-GREER-THORBECKE INDEX IN
UNIDIMENSIONAL POVERTY IN NIGERIA**

BY

Rita Nneka UGBECHIE

B.Sc. Industrial Maths (DELSU), M. Sc. Statistics (Ibadan)

(MATRIC. NO.: 109516)

A Thesis in the Department of STATISTICS

Submitted to the Faculty of Science

in partial fulfillment of the requirement for the Degree of

DOCTOR OF PHILOSOPHY

of the

UNIVERSITY OF IBADAN, IBADAN.

Department of Statistics

University of Ibadan, Ibadan.

JANUARY, 2021.

ABSTRACT

Unidimensional poverty analysis is the use of income or expenditure as an indicator for poverty. This approach relies heavily on the use of the Poverty Line (PL) as an arbitrary classification threshold to classify households into poor and non-poor groups. However, the major criticism of this approach is its sensitivity to extreme observations. Also, the existing Foster-Greer-Thorbecke (FGT) index is limited by its exclusion of variations among the poor. Therefore, this study was aimed at developing a Modified Generalised Foster-Greer-Thorbecke (MGFGT) poverty index and hybrid PL.

The existing Foster-Greer-Thorbecke (FGT) poverty index was modified by choosing the Indicator Function (IF), $I(y \leq z)$, where z is PL and y is the Per Capita Household Expenditure (PCHE) to represent starving, extremely poor, moderately poor and non-poor households instead of the poor and non-poor households of the original IF. The Poverty Gap Ratio (PGR), $\left(\frac{z-y}{z}\right)$ was redefined as $\left|\frac{y-z}{z}\right|$. The PL was also redefined as $z_H = z_r^\beta z_a^{1-\beta}$ where z_H is the hybrid PL, z_r is the relative PL, z_a is the absolute PL and β ($0 < \beta < 1$) is the elasticity of the hybrid PL with respect to PCHE. Four relative PLs: mean PCHE (Z_{r1}), $(2/3)$ *mean PCHE (Z_{r2}), median PCHE (Z_{r3}), and $(2/3)$ *median PCHE (Z_{r4}) were used for each β to determine z_H and the Modified Head Count Index (MHCI), Modified Poverty Gap Index (MPGI), and Modified Square Poverty Gap Index (MSPGI), respectively using the consumption expenditure data obtained from the 2012/2013 General Household Survey (GHS) of the National Bureau of Statistics. These indices were accessed using the minimum variance criterion. A supplementary simulated dataset with 5000 replications was used to investigate the statistical distributions of the MHCI, MPGI and MSPGI with their basic moments. The statistical distributions were further assessed for their suitability based on the Kolmogrov-Smirnov goodness of fit (GOF) test at $\alpha_{0.05}$.

The MGFGT was $P_\alpha^* = \frac{1}{N} \sum_1^N \left| \frac{y-z_H}{z_H} \right|^\alpha I^*(y \leq z_H)$, where α is the sensitivity of the index to poverty and $I^*(y \leq z_H)$ is the modified IF with $\frac{3}{6}, \frac{2}{6}, \frac{1}{6}$ and 0 representing starving, extremely poor, moderately poor and non-poor households, respectively. The MGFGT became MHCI, MPGI and MSPGI for $\alpha = 0, 1$ and 2, respectively. The estimates of Z_{r1}, Z_{r2}, Z_{r3} and Z_{r4} at $\beta = 0.6$ with their corresponding hybrid PLs were N110,984.97, N73,989.90, N85,906.95, N57,271.35; and N12,135,653.00, N9,514,991.00, N10,406,910.00, N8,159,565.70, respectively. The estimates of MHCI, MPGI and MSPGI for the four hybrid PLs at $\beta = 0.6$ were 0.5000, 0.4954, 0.4909; 0.4999, 0.4822, 0.4656; 0.4999, 0.4947, 0.4946; and 0.5000, 0.4932, 0.4866, respectively. The approximate estimate of 50% from the estimates of the indices suggested that approximately 50% of the household experienced starvation. These estimates further indicated the robustness of the indices. The GOF test validated the Weibull distribution for fitting the MHCI and Frechet distribution for fitting both the MPGI and MSPGI.

The modified generalised Foster-Greer-Thorbecke poverty index allowed the inclusion of variations among the poor. There was further reduction in the negative effects of arbitrariness and sensitivity in unidimensional poverty analysis.

Keywords: Modified head count index, Modified poverty gap index, Modified square poverty gap index, Hybrid poverty line

Word count: 491

ACKNOWLEDGEMENTS

My greatest appreciation goes to the Almighty God who has being my strength and has made it possible for me to be able to carry out this research work. I thank God for His divine protection, provision, health, and uncommon favour, wisdom, knowledge, and understanding.

I wish to express my unreserved gratitude to my supervisor, Ass. Prof. O. I Osowole for his constructive support, valuable suggestions and immense contributions to this work.

My sincere appreciation also goes to the entire staff and students of the Department of Statistics especially Dr. A. U. Chukwu , Prof. O. I. Shittu, Dr. O.B. Akanbi and Dr. S.O. Oyamakin, who have in one way or the other contributed to the success of this work.

I appreciate the Management and Staff of College of Education, Agbor, Delta State. My sincere appreciation also goes to the Tertiary Education Trust Fund (Tetfund) for the sponsorship of this Ph.D programme.

My most heartfelt thanks go to my dearest husband, Mr. Patrick E. Nwaka for his constant words of advice, prayers, love, support and understanding. I thank my parents, Mr. C.O. Ugbechie and my mum, Ezinnne Theresa Ndididi Ugbechie of blessed memory, my brothers and sisters and their families, Mr. and Mrs Ogiemen and family for their support.

I appreciate the prayers of my mother in-law, Mrs. Philomina Nwaka and family. To my colleagues, especially Mr. S.O. Aghamie, Rev S.O. Ibude, Dr Chris Emenonye and the entire staff of Mathematics Department, College of Education, Agbor, I say thank you. To my uncle- Msgr, J.K.A. Aniagwu, Dr. Igabari ,the Dikes, the Amolos, the Emodis, the Omeonus and the Ilegbedions, I thank you all. I thank Harrison, Chiyere , Chukwuma Obah of blessed memory, and others for their assistance. To my Christian brothers and sisters and all other friends, thank you very much for your prayers and support.

CERTIFICATION

I certify that this project work was carried out by UGBECHIE, RITA NNEKA (MATRIC. NO. 109516) in the Department of Statistics, University of Ibadan, Ibadan.

Supervisor
O.I. OSOWOLE
B.Sc. M.Sc, Ph.D (Ibadan).
Reader, Department of Statistics,
University of Ibadan, Ibadan. Nigeria.

TABLE OF CONTENTS

Title page	i
Abstract	ii
Acknowledgements	iii
Certification	iv
Table of contents	v
List of Tables	viii
Abbreviations	xvii
List of Appendices	xviii
CHAPTER ONE: INTRODUCTION	1
1.1 Definitions of Poverty	1
1.2 Definitions of Poverty in terms of Absolute and Relative.	3
1.3 Overview of Poverty in Nigeria	4
1.4 Manifestations/Dimensions of Poverty	5
1.5 Review of Policy Interventions Towards Poverty Alleviation	6
1.6 Motivation for the Study	10
1.7 Objective of the Study	10
CHAPTER TWO: LITERATURE REVIEW	12
CHAPTER THREE: METHODOLOGY	27
3.1 Measurement of Poverty	27
3.2 Basic Axioms of Poverty Measures	27
3.3 Mathematical representation of selected poverty axioms	28
3.3.1 Focus Axiom	28
3.3.2 Weak Monotonicity Axiom	29
3.3.3 Impartiality Axiom	29
3.3.4 Continuity Axiom	29
3.4 Poverty Line	30
3.4.1 Relative Poverty Line	31
3.4.2 Absolute Poverty Line	31
3.4.3 Merit/Demerit of Relative and Absolute Poverty Lines	31
3.4.4 Hybrid poverty Line	32

3.5	Poverty Indices	33
3.6	Modified Poverty Levels	33
3.7	Modified Foster-Greer-Thorbecke (FGT) Index	33
3.7.1	Modified Foster-Greer-Thorbecke Head Count Index	34
3.7.2	Modified Foster-Greer-Thorbecke Poverty Gap Index	35
3.7.3	Modified Foster-Greer-Thorbecke Poverty Square Gap Index	35
3.8	Probability Distributions of Modified Foster-Greer-Thorbecke Poverty Indices and Distribution fittings	35
3.8.1	Frechet Distribution	36
3.8.2	Moments of Frechet distribution	36
3.8.3	Weibull Distribution	36
3.8.4	Moments of Weibull Distribution	37
3.8.5	Goodness of Fit Test: Kolmogorov-Smirnov (K-S) Test	37
CHAPTER FOUR: RESULTS OF ANALYSIS AND DISCUSSION		39
4.1:	Relative Poverty Lines and Hybrid Poverty Lines based on the six (6) Geo-political Zones	42
4.2:	Relative Poverty Lines and Hybrid Poverty Lines based on sectorial Division.	54
4.3	Analysis of the Three Levels of Poverty	57
4.4:	Poverty levels and their poverty lines	58
4.5:	Number of Households and Proportion of those who fall under these Poverty Levels for the Relative Poverty Lines and Hybrid Poverty Lines	76
4.6	Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Square Poverty Gap Index (P_2^*).	148
4.7	Estimates of parameters of selected distributions and Descriptive Statistics for the modified FGT poverty indices	220
CHAPTER FIVE: SUMMARY AND CONCLUSION		231
5.1	Summary and Conclusion	231
5.2	Contributions to Knowledge	236
5.3	Areas of Further Research	236
REFERENCES		238
APPENDIX		247

LIST OF TABLES

Table 4.1: Relative Poverty Lines and Hybrid Poverty Lines for the whole country.	40
Table 4.2: Relative Poverty Lines and Hybrid Poverty Lines for North Central	42
Table 4.3: Relative Poverty Lines and Hybrid Poverty Lines for North East.	44
Table 4.4: Relative Poverty Lines and Hybrid Poverty Lines for North West.	46
Table 4.5: Relative Poverty Lines and Hybrid Poverty Lines for South East.	48
Table 4.6: Relative Poverty Lines and Hybrid Poverty Lines for South South	50
Table 4.7: Relative Poverty Lines and Hybrid Poverty Lines for South West	52
Table 4.8: Relative Poverty Lines and Hybrid Poverty Lines for Rural Sector	54
Table 4.9: Relative Poverty Lines and Hybrid Poverty Lines for Urban Sector.	56
Table 4.10: Poverty levels and their poverty lines for the whole country	58
Table 4.11: Poverty Levels and Their Poverty Lines for North Central	60
Table 4.12: Poverty levels and their poverty lines for North East	62
Table 4.13: Poverty Levels and Their Poverty Lines for North West	64
Table 4.14: Poverty Levels and Their Poverty Lines for South East	66
Table 4.15: Poverty Levels and Their Poverty Lines for South South	68
Table 4.16: Poverty Levels and Their Poverty Lines for South West	70
Table 4.17: Poverty Levels and Their Poverty Lines for Rural Sector	72
Table 4.18: Poverty Levels and Their Poverty Lines for Urban Sector	74
Table 4.19: Poverty Levels and Their Proportions/Number of poor Households for Relative (Mean Per capita Exp) and Hybrid Poverty Lines for the Whole country	76
Table 4.20: Poverty Levels and Their Proportions/Number of poor Households for Relative (2/3 Mean Per Capital Exp) and Hybrid Poverty Lines for the Whole country	78
Table 4.21: Poverty Levels and Their Proportions/Number of poor Households for Relative (Median Per Capita Exp) and Hybrid Poverty Lines for the Whole country	80

Table 4.22: Poverty Levels and Their Proportions/Number of poor Households for Relative (2/3 Median Per Capita Exp) and Hybrid Poverty Lines for the Whole country	82
Table 4.23: Poverty Levels and Proportions/Number of Poor Households for Relative (Mean Per Capita Exp.) and Hybrid Poverty Lines for North Central	84
Table 4.24: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Mean Per Capital Exp) and Hybrid Poverty Lines for North Central	86
Table 4.25: Poverty Levels and Proportions/Number of Poor Households for Relative (Median Per Capita Exp) and Hybrid Poverty Lines for North Central	88
Table 4.26: Poverty Levels and Proportions/Number of Poor Households for Relative(2/3 Median per capita) and Hybrid Poverty Lines for North Central	90
Table 4.27: Poverty Levels and Proportions/Number of Poor Households for Relative (Mean Per capita Exp) and Hybrid Poverty Lines for North East	92
Table 4.28: Poverty Levels and Proportions/Number of Poor Households For Relative (2/3 Mean Per Capital Exp) and Hybrid Poverty Lines for North East	94
Table 4.29: Poverty Levels and Proportions/Number of Poor Households for Relative (Median Per Capita Exp) and Hybrid Poverty Lines for North East	96
Table 4.30: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Median Per Capita Exp) and Hybrid Poverty Lines for North East	98
Table 4.31: Poverty Levels and Proportions/Number of poor Households for Relative (Mean Per capita Exp) and Hybrid Poverty Lines for North West	100
Table 4.32: Poverty Levels and Proportions/Number of poor Households for Relative (2/3 Mean Per Capital Exp) and Hybrid Poverty Lines for North West	102

Table 4.33: Poverty Levels and Proportions/Number of poor Households for Relative (Median Per Capita Exp) and Hybrid Poverty Lines for North West	104
Table 4.34: Poverty Levels and Proportions/Number of poor Households for Relative (2/3 Median Per Capita Exp) and Hybrid Poverty Lines for North West	106
Table 4.35: Poverty Levels and Proportions/Number of Poor Households for Relative (Mean Per capita Exp) and Hybrid Poverty Lines for South East	108
Table 4.36: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Mean Per Capital Exp) and Hybrid Poverty Lines for South East	110
Table 4.37: Poverty Levels and Proportions/Number of Poor Households for Relative (Median Per capita Exp) and Hybrid Poverty Lines for South East	112
Table 4.38: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines for South East	114
Table 4.39: Poverty Levels and Proportions/Number of Poor Households for Relative (Mean Per capita Exp) and Hybrid Poverty Lines for South South	116
Table 4.40: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Mean Per capita Exp) and Hybrid Poverty Lines for South South	118
Table 4.41: Poverty Levels and Proportions/Number of Poor Households for Relative (Median Per capita Exp) and Hybrid Poverty Lines for South South	120
Table 4.42: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines for South South	122
Table 4.43: Poverty Levels and Proportions/Number of Poor Households for Relative (Mean Per capita Exp) and Hybrid Poverty Lines for South West	124

Table 4.44: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Mean Per capita Exp) and Hybrid Poverty Lines for South West	126
Table 4.45: Poverty Levels and Proportions/Number of Poor Households for Relative (Median Per capita Exp) and Hybrid Poverty Lines for South West	128
Table 4.46: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines for South West	130
Table 4.47: Poverty Levels and Proportions/Number of Poor Households for Relative (Mean Per capita Exp) and Hybrid Poverty Lines for Rural Sector	132
Table 4.48: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Mean Per capita Exp) and Hybrid Poverty Lines for Rural Sector	134
Table 4.49: Poverty Levels and Proportions/Number of Poor Households for Relative (Median Per capita Exp) and Hybrid Poverty Lines for Rural Sector	136
Table 4.50: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines for Rural Sector	138
Table 4.51: Poverty Levels and Proportions/Number of Poor Households for Relative (Mean Per capita Exp) and Hybrid Poverty Lines for Urban Sector	140
Table 4.52: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Mean Per capita Exp) and Hybrid Poverty Lines for Urban Sector	142
Table 4.53: Poverty Levels and Proportions/Number of Poor Households for Relative (Median Per capita Exp) and Hybrid Poverty Lines for Urban Sector	144
Table 4.54: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines for Urban Sector	146

Table 4.55: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Mean Per capita Exp) and Hybrid Poverty Lines(Z_H) for the whole Country	148
Table 4.56: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for the whole Country	150
Table 4.57: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for the whole Country	152
Table 4.58: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for the whole Country	154
Table 4.59: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for North Central	156
Table 4.60: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for North Central	158
Table 4.61: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Median Per capita Exp) and Hybrid Poverty Lines (Z_H)for North Central	160
Table 4.62: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines(Z_H) for North Central	162
Table 4.63: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Mean Per capita Exp) and Hybrid Poverty Lines for North East	164

Table 4.64: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Mean Per capita Exp) and Hybrid Poverty Lines for North East	166
Table 4.65: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for North East	168
Table 4.66: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines(Z_H) for North East	170
Table 4.67: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H)for North West	172
Table 4.68: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for North West	174
Table 4.69: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for North West	176
Table 4.70: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for North West	178
Table 4.71: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for South East	180
Table 4.72: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for South East	182

Table 4.73: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for South East	184
Table 4.74: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for South East	186
Table 4.75: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for South South	188
Table 4.76: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for South South	190
Table 4.77: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for South South	192
Table 4.78: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for South South	194
Table 4.79: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for South West	196
Table 4.80: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Mean Per Capital Exp) and Hybrid Poverty Lines (Z_H) for South West	198

Table 4.81: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Median Per Capita Exp) and Hybrid Poverty Lines (Z_H) for South West	200
Table 4.82: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Median Per Capita Exp) and Hybrid Poverty Lines (Z_H) for South West	202
Table 4.83: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for Rural Sector	204
Table 4.84: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Mean Per Capital Exp) and Hybrid Poverty Lines(Z_H) for Rural Sector	206
Table 4.85: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Median Per Capita Exp) and Hybrid Poverty Lines(Z_H) for Rural Sector	208
Table 4.86: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Median Per Capita Exp) and Hybrid Poverty Lines(Z_H) for Rural Sector	210
Table 4.87: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for Urban Sector	212
Table 4.88: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Mean Per Capital Exp) and Hybrid Poverty Lines (Z_H) for Urban Sector	214
Table 4.89: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Median Per Capita Exp) and Hybrid Poverty Lines(Z_H) for Urban Sector	216

Table 4.90: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Median Per Capita Exp) and Hybrid Poverty Lines (Z_H) for Urban Sector	218
Table 4.91 Parameter Estimates for selected Distributions	221
Table 4.92: Descriptive Statistics for modified Head Count Index for the whole Country ($Z_{r1}, \beta=0.6$)	223
Table 4.93: Descriptive Statistics for modified Poverty Gap index for the whole Country ($Z_{r1}, \beta=0.6$)	225
Table 4.94: Descriptive Statistics for modified Square Poverty Gap Index for the whole Country ($Z_{r1}, \beta=0.6$)	227
Table 4.95: Results of K-S Goodness of Fit Test for distributions of Modified FGT indices for the whole Country	229

ABBREVIATIONS/SYMBOLS

y	Per capita Expenditure of the households
N	Household Size (Population)
n	Number of poor households
n₁	Number of Starving households
n₂	Number of Extremely poor households
n₃	Number of Moderately poor households
Z	Poverty line
Z_r	Relative Poverty Line
Z_a	Absolute Poverty Line
Z_H	Hybrid Poverty Line
Z_{r1}	Mean per capita household expenditure
Z_{r2}	2/3 Mean per capita household expenditure
Z_{r3}	Median per capita expenditure
Z_{r4}	2/3 Median per capita expenditure
β	Elasticity of Poverty
P₀*(MHCI)	Modified Head count Index
P₁*(MPGI)	Modified Poverty Gap Index
P₂*(MSPGI)	Modified Square Poverty Gap Index

LIST OF APPENDICES

APPENDICES	DESCRIPTION	
Appendix 1	Probability Distribution Function of Modified Head Count Index for the whole Country ($Z_{r1}, \beta = 0.6$)	247
Appendix 2	Cumulative Distribution Function of Modified Heat Count Index for the whole Country ($Z_{r1}, \beta = 0.6$)	248
Appendix 3	Probability Distribution Function of Modified Poverty Gap Index for the whole Country ($Z_{r1}, \beta = 0.6$)	249
Appendix 4	Cumulative Distribution Function of Modified Poverty Gap Index for the whole Country ($Z_{r1}, \beta = 0.6$)	250
Appendix 5	Probability Distribution Function of Modified Square Poverty Gap Index for the whole Country ($Z_{r1}, \beta = 0.6$)	251
Appendix 6	Cumulative Distribution Function of Modified Square Poverty Gap Index for the whole Country ($Z_{r1}, \beta = 0.6$)	252

CHAPTER ONE

INTRODUCTION

Poverty is everywhere though the extent may not be the same. Poverty alleviation and eradication are always a subject of focus of any government. To achieve this, the poor must be identified firstly and appropriate techniques should be developed to aggregate information on the poor to obtain a precise index of poverty. Poverty has been said to be multi-dimensional manifesting in different forms with a myriad of causes and should therefore be looked at from different angles to ensure that proper intervention policies are made. Despite the clamour for multi-dimensional approaches, money metric approaches are still being used because they are simpler to apply and usually offer a quantitative approach. This study does not differ from the use of the money-metric approach. It uses expenditure as a proxy for poverty.

1.1 Definitions of Poverty

In common language usage, poverty is about deprivation of necessities – the primary dictionary definition of poverty is “want of the necessities of life” (Oxford, 1998, p. 1135). However, it has long been noted that the definition of the “necessities of life” must be relative to the norms of a particular society at a specific point in time. In defining poverty as the want of necessities, Adam Smith’s views on this were drafted at a time – more than 200 years ago – when all nations had very much lower incomes at S present but their relevance endures. He was quite clear that the definition of “necessity” depends on prevailing social norms:

“Under necessities, therefore, I comprehend that only those things which nature but those things which the established rules of decency have rendered necessary to the lowest rank of people”. (Volume 2, Bk. V, Ch. 11, pt 11, Art iv – 1961, p. 400).

Individual families and groups in the population can be said to be in poverty when they lack the resources to obtain the types of diet, participate in the activities,

and have the living conditions and amenities that are customary, or at least widely encouraged or approved in the societies to which they belong (Townsend, 1979).

Poverty is deprivation due to a lack of resources, both material and non-material e.g. income, housing, health, education, knowledge, and culture (Eu Cookie – see online). Poverty has also been described with the following terms – Income or consumption poverty, Human (under) development, social exclusion, ill-being (lack of) capability and functioning, vulnerability, livelihood unsustainability, lack of basic needs, relative deprivation (Maxwell, 1999).

According to the World Bank (World Bank, 2000) poverty is pronounced deprivation in well-being where well-being can be measured by an individual's possession of income, health, nutrition, education, assets, housing, and certain rights in a society such as freedom of speech. Also poverty is a lack of opportunities, powerlessness, and vulnerability. Poverty is truly a multi-dimensional phenomenon in such a setting and requires multi-dimensional policy and program interventions to improve the well-being of individuals and hence, make them free from poverty.

Naidoo (2007) cited in Osowole (2011) says that “poverty, in its daily use, implies a comparison between the condition of a household or person on the one hand, and the perception of the person who speaks or writes about what is necessary to sustain life on the other hand”. Poverty is hunger. Poverty is a lack of shelter. Poverty is being sick and not being able to see a doctor. Poverty is not having access to school and not knowing how to read. Poverty is not having a job, is fear for the future, living one day at a time. Poverty is losing a child to illness brought about by unclean water. Poverty is powerlessness, lack of representation, and freedom (World Bank, 2001).

Poverty is a state or condition in which a person or community lacks the financial resources and essentials to enjoy a minimum standard of life and well-being that's considered acceptable in society (Investopedia, 2014). Wikipedia (2014) defines Poverty as a general scarcity or depth, or the state of one who lacks a certain amount of material possessions or money. United Nations defined poverty as fundamentally, the inability of getting choices and opportunities, a violation of human dignity. It means a lack of basic capacity to participate effectively in society. Not having enough to feed and clothe a family, not having a school or clinic to go to, not having the land on which to grow one's food or a job to earn one's living, not having access to credit. It means insecurity, powerlessness, and exclusion of individuals,

households, and communities. It means susceptibility, to violence and it often implies living in a marginal or fragile environment without access to clean water or sanitation.

Poverty is pronounced deprivation in well-being and comprises many dimensions (World Bank, 2014). It includes low incomes and inability to acquire the basic goods and services necessary for survival with dignity. Poverty also encompasses a low level of health and education, poor access to clean water and sanitation, inadequate, physical security, lack of voice and insufficient capacity and opportunity to better one's life" (Wikipedia, 2014).

Poverty is the state of one who lacks a usual or socially acceptable amount of money or material possessions. Poverty is said to exist when people lack the means to satisfy their basic needs (The Editors of Encyclopedia Britannica, 1963). Poverty is a state or condition in which a person or community lacks the financial resources and essentials for a minimum standard of living. Poverty means that the income level from employment is so low that basic human needs cannot be met (James, 2019).

1.2 Definitions of Poverty in terms of Absolute or Relative

Poverty was also considered in terms of being relative and absolute. Relative Poverty considers your location and what it means to be poor in a particular society. It measures if an income falls below the minimum amount needed to maintain the average standard of living in the society one lives in. Absolute Poverty defined by World Bank says rather than measuring poverty against the rest of the population, poverty is measured against a fixed standard of living. By the World Bank's Global Poverty Line of \$1.90 a day, about 700 million people live below this poverty line (Compassion International, 2021).

Tejvan (2017) also defined poverty in terms of absolute and relative; Absolute Poverty according to him is a condition where household income is below a necessary level to maintain basic living standard (food, shelter, housing). The condition makes it possible to compare between different countries and also over time. Relative Poverty is a condition where household income is a certain percentage below median income. Absolute poverty is a state in which a person or family is highly deprived of the basic needs making their livelihood difficult. Relative poverty is a condition when

a person or family is unable to reach the minimum average living standard in society (Surblin, 2019).

1.3 Overview of Poverty in Nigeria

Nigeria is Africa's most populous country with an estimated population of 174,507,538 and a growth rate of 2.54% in 2010. Nigeria accounts for one-sixth of the African population (Wikipedia, 2014). According to United Nations Children's Fund (UNICEF, 2007), the country ranks the 9th most populous country in the world. Population growth has been explosive and has one of the largest rates of development and fertility in the globe. Nigeria will be one of the nations accountable for most of the complete population rise in the world by 2050, according to United Nations (UN) projections.

There are four big ethnic groups in Nigeria: Fulani, Hausa, Igbo, and Yoruba, and as many as 350 languages are spoken across the nation. The nation has a federal administration system with a Federal Capital Territory (FCT), 36 States, and 774 Local Government Areas. While oil revenue is Nigeria's biggest source of revenue, the nation has become overly dependent on its oil industry, while other economic sectors such as agriculture, palm oil manufacturing, and coconut processing are declining. Nigeria has a strong wealth and poverty dichotomy. While the nation is wealthy in natural resources, its economy is still unable to satisfy people's fundamental requirements. Such disparity between Gross Domestic Product (GDP) development and growing poverty is indicative of a skewed distribution of the riches of Nigeria.

Nigeria ranks 158 out of 177 nations in the United Nations Human Development Index of 2007. This represents a substantial decline in its human development rank of 151 in 2004. Approximately 64 percent of Nigerian families consider themselves poor, while 32 percent say their financial condition has deteriorated over a period of one year. While national statistics report a decrease in the trend of poverty, it is painfully sluggish and progress towards achieving the Millennium Development Goals (MDG) of eradicating extreme poverty and hunger is slow. Poverty continues to be one of the country's most critical problems, and population growth levels have resulted in a continuous rise in the number of disadvantaged people. Life expectancy continues to decrease, estimated to have fallen

from 47 years in 1990 to 44 years in 2005. Years of military dictatorship, corruption, political instability, and bad governance have meant inadequate investment in infrastructure and fundamental facilities in the country. Corruption is one of Nigeria's main problems, increasing the country's expenses and making the country unattractive to investors. The government has made deliberate efforts to fight corruption, first by passing the anti-corruption bill and then by setting up the Independent Corrupt Practices Commission (ICPC) and the Economic and Financial Crimes Commission (EFCC).

According to Vanguard Newspaper (2014) the World Bank President, Jim Yong Kim at the IMF/World bank spring held April 10, 2014, stated that Nigeria is one of the top five countries that has the largest number of poor. He ranked India number one with 33% of the world poor, China 2nd with 13% and Nigeria third with 7% of the world poor/Bangladesh (6%) and the Democratic Republic of Congo (5%) which together are home to nearly 760 million of the world's poor.

The Country Director of the World Bank in Nigeria, Marie-Francoise Man'e – Nelly, had recently restated what already published figures have indicated that 100 million Nigerians live in destitution, another term for extreme poverty. Secondly, the information used by the World Bank was confirmation of the figures released by the National Bureau of Statistics (NBS) which earlier in the year alerted that despite favourable economic growth and performance, the poverty rate jumped from 54.7 percent in 2004 to 60.9 percent in 2010. It had also added that while 100 million Nigerians lived in absolute poverty, 12.6 million were moderately poor in 2011.

Ikande (2018) said according to the UN report, Nigeria ranked 152nd in terms of living standards in a total of 188 countries in 2016, 42% in employment rate, and that 80 million citizens were forced to live on \$1.25 a day. Kazeem (2018) in Quartz Africa said that 'Nigeria has become the poverty capital of the world. He said a new report by the World poverty clock shows Nigeria has overtaken India as the country with the most extremely poor people in the world. India has a population seven times larger than Nigeria's. He opined that '86.9 million Nigerians now living in extreme poverty represents nearly 50% of its estimated 180 million population.'

1.4 Manifestations/Dimensions of Poverty

Poverty has various manifestations including insufficient income and productive capital to ensure healthy livelihoods; hunger and malnutrition; ill health;

inadequate or insufficient access to education and other social services; increased disease morbidity and mortality; homelessness and insufficient housing; precarious environments; and inequality and exclusion from the community. The lack of involvement in decision-making and civil, social, and cultural life is also defined.

The lack of control over resources, including land, skills, expertise, capital, and social relations, is inseparably linked to poverty. Without these services, politicians are easily overlooked by citizens and have restricted access to agencies, markets, and public service jobs. Therefore, poverty eradication cannot be accomplished by anti-poverty programs alone, but it will require political engagement and reforms in economic systems to ensure access to resources, jobs, and public services for everyone, to enact policies geared towards a more equal distribution of wealth and income, to provide social security for those who are unable to support poverty eradication (Chimanikire, 2012).

In terms of agriculture, poverty in Nigeria is a rural phenomenon. In terms of agriculture, poverty in Nigeria is a rural phenomenon where agricultural activities are found predominant. More than four-fifths (86.5 percent) of the households participated in agriculture in the rural areas compared with only 1.40 percent in the urban areas. Gender-wise, more males participated in agriculture, twenty-eight percent and 15.3 percent of males and females respectively participated in agriculture. The poor participated more in agriculture than non-agriculture. Twenty-five percent of the core poor households were in agriculture which 20.0 percent were in non-agricultural activities. The non-poor household participated less in agriculture (about 37.0 percent) with 46.1 percent in non-agriculture.

Gender-wise, it has been noted that male-headed households were more likely to be in poverty. The trend showed that for male headed households relative incidence of poverty varied increasingly from 29.2 percent to 58.2 percent from 1996 to 2004. The results for the female headed households also varied increasingly from 26.9 percent to 43.5 percent from 1998 to 2004 (Osowole, 2011).

1.5 Review of Policy Interventions Towards Poverty Alleviation

The inability of African states to bring about the necessary transition and economic diversification to allow them to step away from inherited colonial systems is an important manifestation of the African crisis. These had both basic international and domestic aspects. In the international sphere, the colonial economic system put

African countries (and the third world in general) in the position of specialist producers for the developed countries of primary products such as cocoa, cotton, coffee, tin, and copper. African countries have become entirely dependent on their foreign exchange and thus on the prosperity of their economies in large part. The financial, technical, knowledge power, organizational strength, and cohesion to manipulate the market to their advantage are still lacking in the vagaries of price fluctuations. The implications of monoculture and undue reliance on exports of commodities are on the part of African domestic economies. As a result, they are mainly aimed at meeting the needs of the developed consumer economies for raw materials, contributing to the neglect of food crop production in favor of cash crops. They are often distinguished by a concentration in urban areas of social amenities, resulting in rural-urban migration. This form of economic system is incapable of meeting the basic needs of African people for food, shelter, jobs, or equity and national cohesion. Food security, jobs and income generation, conservation of natural resources, and environmental protection are the key objectives of a long-term plan to improve the living conditions of millions of African people.

The implementation of improved technology, the so-called "green revolution", could give a potential solution to Africa's problems in an attempt to tackle hunger and malnutrition. What has been popular in Asia, though, can not be implemented automatically in Africa. Compared to Asia, Africa has poor land, limited immigration prospects, and poorer agricultural credit infrastructure, supply and demand imports. The prospects for improved agricultural productivity in Africa are good, considering all these constraints. The trend towards declining yields, soil depletion, food scarcity and malnutrition can be reversed by technical achievements and improvements. Agriculture has accounted for less than 10 percent of planned development spending in many African countries. In April 1994, the new General Agreement on Tariffs and Exchange (GATT) was signed by more than 120 world leaders and was celebrated as the greatest achievement in global trade.

GATT is projected to raise global sales by US\$510 billion annually by the end of the implementation period, according to the World Trade Organization (WTO), the body implementing the new agreement. But while the developed world may be patting itself on the back at the beginning of the new trade order, Africa has yet to realize what the GATT/WTO will benefit from. In the global sense, beyond the provision of mainly raw materials, Africa plays an almost negligible role in world

trade. It is therefore misleading to lump it with the rest of the developing world because its contribution to trade is not as important as its scale. The share of world trade in Africa has declined from 5 percent in 1980 to just 2.6 percent in 1992.

Living standards have risen significantly over the past decades, according to the World Bank (2010) - Summary, Recognizing, Measuring, and Addressing Poverty. The proportion of the population of the developing world living in severe economic poverty, identified as living on less than \$1.25 a day (adjusted to account for the most recent disparities in buying power across countries at 2005 prices), has decreased from 52% in 1981 to 26% in 2005. Trade and capital flows that make up the global economy will help millions, but poverty and misery remain. Governments and international development organizations have started to re-examine the way they work in response to such concerns.

In September 2000, 189 countries signed the Millennium Declaration, which resulted in the implementation of the Millennium Development Goals (MDGs). The MDGs are a set of 8 objectives for which 18 numerical targets have been defined and more than 40 quantifiable indicators have been identified. Such goals are:

- (i) Eradicate extreme poverty and hunger.
- (ii) Achieve universal primary education.
- (iii) Promote gender equality and empower women.
- (iv) Reduce child mortality.
- (v) Improve maternal health.
- (vi) Combat HIV/AIDS, malaria and other diseases.
- (vii) Ensure environmental sustainability.
- (viii) Develop a global partnership for development.

Although each aim is meaningful in its own right, they should be seen as mutually reinforcing. It will take capacity building for efficient, democratic and responsible governance, security of human rights and respect for the rule of law to achieve them. Following the United Nations Millennium Declaration adopted at the Millennium Summit held in New York from 6 to 8 September 2000, Nigeria is committed to achieving the Millennium Development Goals (MDGs) by 2015.

In order to meet the demand of UN, Nigeria has embarked on several Poverty reduction programmes. They include:

- i. The Better Life/Family Support Programme
- ii. The National Directorate of Employment

- iii. Self Help Group Foundation (International Communities and Non-Governmental Organisations (NGOs))
- iv. Directorate of Food, Road and Rural Infrastructure, etc.

According to UNICEF (2007), as part of Nigeria's strategy to address poverty and generate national wealth and employment, the Federal Government developed the National Economic Empowerment and Growth Strategy (NEEDS) in 2004. NEEDS has four components: reorientation of values, poverty reduction, creation of resources, and job creation. It also laid down the required government changes to achieve this and the international community's necessary assistance. In all 36 states and the Federal Capital Territory and local governments, NEEDS are cascaded with comparable action plans called SEEDS (State Economic Empowerment and Growth Strategy). LEEDS (Economic Empowerment and Development Strategy for Local Government) respectively. NEEDS I, the development strategy's first stage was introduced between 2003 and 2007. A second stage, NEEDS II, is being implemented by the government.

In 2005, Nigeria successfully negotiated debt relief from the Paris Creditors Club, worth US\$ 18 billion. It was the largest debt relief in Africa and the world's second-largest debt relief. The agreement was released by the Nigerian government on pro-poor programs to help the nation achieve the MDGs for around US\$ 1 billion per year. In addition to pro-poor spending, the budget for projects relating to the MDGs, including the rehabilitation and facilities of dilapidated primary health centers, the building of rural roads, and the recruitment of rural teachers in the most vulnerable areas, provides for an equal amount per year.

To reduce poverty, President Goodluck Jonathan's government has also set up the "YOU WIN" initiative to cultivate young entrepreneurs and help them build jobs. There is also the reinvestment and empowerment subsidy program (SURE-P) in which the federal government is also seeking to create jobs by partly removing the fuel subsidy proceeds. According to Ikande (2018), in 2015, All Progressives Congress (APC) officials pledged substantial changes to residents. Five hundred billion Naira was allocated from the 2016-2018 budget. Public action was initiated by Buhari's regime to ensure the social well-being of Nigerians viz (1) Improving the education system-500,000 educators were employed to teach the Nigerian strategy to do this. For positions prepared, they are to be educated and hired. (2) Youth Development Initiative, 300,000-500,000 people are to be trained for a successful

career, 100,000 students have been endorsed for free education. (3) For primary school learners, a one-meal program has been set up. The state said 300 billion Naira in 2016 and 339 billion Naira in 2017 were allocated to the budget. In 2018, 338.9 billion Naira will also be allocated. (4) Pension of 5000 Naira for 1 million Nigerians. Poverty alleviation initiatives are currently in effect in Nigeria (1) The Government Enterprise Empowerment Program seeks to assist entrepreneurs, businesswomen, and craftsmen in the micro-credit system. (2) N-Power (Federal Government initiative) in the fate of unemployed graduates, N-Power plays a major role.

For Nigeria to make significant progress in reducing poverty and ensuring that the majority of its people enjoy an improved quality of life, it is important to increase domestic spending on social services, increase the capacity to provide public services, and make better use of funds. Also, infrastructure programs initiated at the federal government level need to be continued and replicated through States and Local government Areas.

1.6 Motivation for the Study

This study received motivation from Foster (1998) who suggested the use of hybrid poverty lines in poverty analysis. Madden (2000) also corroborated the use of these lines. Studies on poverty analysis in Nigeria where both relative and hybrid poverty lines were incorporated have received little attention. Therefore, this present study is an attempt to highlight the prospects of dual poverty lines in Uni-dimensional poverty analyses. It also attempted the mathematical representation of some selected axioms of poverty and reclassified poor households into three levels instead of the conventional two levels (core poor and moderately poor).

1.7 Objectives of the Study

The aim of this research work was to assess the potentials of the modified FGT Poverty indices with specific reference to hybrid poverty lines. The specific objectives were:

- i. To attempt a mathematical re-representation of selected basic axioms of poverty measures via the basic set theory.
- ii. To reclassify the total number of poor households as starvation, extremely poor and moderately poor.

- iii. To modify the FGT index and to determine the estimate of the modified FGT poverty indices for hybrid and relative poverty lines.
- iv. To determine the prospects of available national survey data in the enhancement of descriptive and analytical considerations of the present study.

CHAPTER TWO

LITERATURE REVIEW

The concept of poverty is no longer a new subject matter. Many researchers have worked extensively on this and there is still much room for further research. Booth (1892) and Rowntree (1901) were the first researchers to work on poverty over a century ago. In the 1920's the Gross National Product per capita reflected in Microeconomic indicators focused on poverty based on the level of income. In recent times, Expenditure is used because it is money metric also in nature. Rowntree based his study on an estimate of notation and other requirements which led to the development of poverty standard for individual families and was published in 1901.

Zadeh (1965) introduced the theory of fuzzy sets as a class of objects with a continuum of grades of membership ranging from zero to one (membership function). The notion of inclusion, union, intersections, complement, relation, and convexity were extended to such sets and various properties of these notions in the context of fuzzy sets were also established.

Sen (1976) proposed an axiomatic approach to poverty measures. He highlighted two distinct problems that must be faced in measuring poverty, viz. identifying the poor among the total population and constructing an index of poverty using the available information on the poor. He argued that poverty indices should satisfy certain ethically defensible criteria or axioms and that the desirability of a poverty measure should be evaluated in terms of these axioms.

Schokkaert and Van (1990) applied the capability approach using micro data of 1979 on the unemployed in Belgium. They showed that material factor are almost irrelevant in the determination of the well-being of the unemployed, thereby providing support for a broad concept of well-being.

Ogwumike (1987) used micro data of 1980 household survey conducted in Borno, Imo, and Oyo States and complemented by then Federal office of Statistics(now called National Bureau of Statistics-NBS) data, derived some poverty lines for Nigeria. He examined the utility of poverty measures taking into account the basic needs of life-based on Nigeria scene. Using data from a sample survey of households

he conducted in Borno, Imo, and Oyo States between October 1984 and January 1985, he derived minimum levels for such basic needs item as food (759.5 kilocal/week and 2533.3 gm/week protein), shelter (₦4.55 a month per person), education (2.09/month per person) in Nigeria; he derived a poverty line of ₦47.44 per person per month for Nigerian based on food and non-food needs. The food component constitutes about 80 percent of total expenditure and calculated the extent of poverty (those with income less than the poverty line ₦47.44) to be 57.14 percentage of the sampled households. He then concluded that a greater proportion of the population may continue to be deprived of their needs unless radical poverty eradication programmes are instituted in Nigeria.

Slotje (1991) in his study, used a multidimensional approach in measuring the quality of life across countries. He operationalized Sen's concept that other factors besides Gross Domestic Product and mortality rates should be incorporated into any quality of life analysis. This revealed that when the information from several economic well-being indicators is aggregated into one summary index, the world rankings of the quality of life index vary. He used twenty indicators to compute a well-being index for 126 countries.

Ellaman (1994) study revealed that there were severe negative effects on mortality and morbidity over the period 1987 to 1993. Crude death rate rose from 10.5 to 14.6. This led to a drop by seven years in the life expectancy in the males. Morbidity increased significantly due to diphtheria, Syphilis, and tuberculosis, the health of pregnant women and the newly born also continued to deteriorate. He observed a sharp decline in living standards after the collapse of the USSR.

Cheli and Lemmi (1995) took a relative approach to poverty according to some dimensions where one is poor in respect of some other individual. This was a modification of the fuzzy approach suggested by Cenoli and Zani (1990). He named this method the total fuzzy and relative approach. According to them, every kind of poverty indicator (qualitative, ordinal or continuous variables objective) can be used for defined an overall membership function to the fuzzy subset of the poor. Thus the use of poverty line is completely avoided.

Shorrocks (1995) notated that the Sen Shorrocks Thon (SST) index and the Sen index are closely related but the SST index has more desirable properties. The Sen index is not replication invariant, so its value will change if two or more identical population are merged. It is not a continuous function of individual income

most important of all, it fails to satisfy the transfer axiom (the strong upward transfer and continuity axiom) but the SST index does.

Jalan and Ravallion (1996) studied transient poverty in a six year panel dataset from a sample of 5,000 households in post reform rural China. He observed that the transient poverty is low among the chronically poorest and tends to be high among those near the poverty line. Using censored quantile regression techniques, the authors found that systemic factors determined transient poverty, although they were generally congruent with the determinants of chronic poverty. There was little to suggest that the two types of poverty were created by fundamentally different processes. It appeared that the same things that would help reduce chronic poverty - higher and more secured farm yield and higher levels of physical and human capital - would also help reduce transient poverty.

Vero and Werquin (1997) cited in Osowole (2011) suggested a further fuzzy approach to poverty measurement. The conventional poor/non-poor dichotomy was replaced by defining poverty as a matter of degree, determined by the place of the individual in the income distribution. The fuzzy poverty measure proposed is in fact also expressible in terms of the generalised Gini measure. Their method adjusted for certain indicators that may be highly correlated in the multi-dimensional measure of poverty.

Khandker (1998) in his study based on extensive survey data from Bangladesh, demonstrates that microcredit programmes are an effective policy instrument for reducing poverty among poor people with the skills in becoming self-employed. It showed that such programmes are more cost-effective than some other types of anti-poverty programmes. Microcredit programmes were found to be particularly important for Bangladesh women, many of whom are restricted by social custom from seeking wage employment. Baulch and McCulloch (1998) used Panel Survey data of 800 households in 52 villages to study Poverty status and its transitions in rural Pakistan.

Foster (1998) suggests a hybrid poverty line that is a weighted geometric mean of relative and absolute poverty lines. According to him, the relative poverty line is too sensitive to changes in the income standard while the absolute poverty line is too subjective (independent of any change). Foster (1998) cited in Madden (2000), analyzed Irish poverty using the 1987 and 1994 Irish Household Budget Surveys for

two intermediate values of the parameters, 0.5 and 0.7, and found that the results were similar for the two.

National Bureau of Statistics (NBS) (1999) used 1980, 1985, 1992, and 1996 consumer expenditure surveys to profile poverty and the trend in Nigeria. The poverty lines were estimated using the two-third ($\frac{2}{3}$) and one-third ($\frac{1}{3}$) means per capital households' expenditure. All persons with per capita expenditure less than these values were considered core poor and moderately poor respectively.

Atkinson and Bourguignon (2000) combined absolute and relative poverty lines. When mean income is low enough that $Z_r > Z_a$, they suggest that the absolute poverty line would be appropriate and hence the income elasticity of the poverty line is zero in that region. However, when incomes are high enough for $Z_a > Z_r$ the relative income elasticity of the poverty line should apply, yielding a unitary income elasticity of the poverty line.

Osberg and Xu (1999, 2000) carried out some empirical studies on the percentage of change of the SST index over time and found that the percentage change of $1 + \text{Gini coefficient}$ is often very small while the percentage changes of poverty rate and poverty gap are often large. Due to this empirical observation, Osberg and Xu (2008) proposed the use of the poverty box in a unity box to better communicate with the public about main changes in the poverty intensity. The poverty rate is illustrated by the poverty box width (on the horizontal axis) while the poverty gap is shown by the poverty box height (on the vertical axis). The overall poverty intensity is roughly indicated by the size (or area) of the poverty box.

Pradhan and Ravallion (2000) in their study on money metric poverty analysis showed how subjective poverty lines can be derived using simple qualitative assessments of perceived consumption adequacy based on a household survey. Respondents were asked whether their consumption of food, housing, and clothing was adequate for their family's needs. This was implemented using survey data for Jamaica and Nepal.

Klasen (2000), used data from the project for statistics on living standards and development, constructed an aggregated deprivation index comprising 14 areas of functioning (education, income, wealth, housing, water, sanitation, energy, employment, transport, financial services, nutrition, health care, safety and perceived well-being). He measured and compared expenditure poverty and poverty in South Africa.

Cushing and Zheng (2000) and Jolliffe (2003) cited in Nwoke (2014) used a distribution sensitive Foster, Greer and Thorbecke poverty index to determine the urban and rural difference in poverty incidence, depth, and severity. They concluded that rural poverty is higher than urban poverty. Poverty can be measured using the headcount ratio which is based on the ratio or percentage of the number of individuals or households whose income falls below the poverty line to the total number of individuals or households.

Xu and Osberg (2002) showed that based on the Sen Index and two of its constituting components (poverty rate and average poverty gap), one can always compute the SST index from the Sen Index. The SST can measure poverty incidence, depth, and inequality jointly while permitting the index to be decomposed into commonly used poverty measures. The difference between the sen and SST indices is the Gini index of poverty ratios.

Ceriolli and Zani (2003) set an arbitrary lower limit below which people are classified poor (with weight 1) and an arbitrary upper limit below which people are counted as definitely non poor (with weight 0). Those in between the upper and lower limits are then given a weight between 0 and 1 based on their rank and share in the equivalised income distribution.

Robeyns (2003) using the British Household Panel Data assessed gender inequality in Western Societies making a quantitative empirical application. The assesment of gender inequality revealed a much greater ambiguity than is generally assumed by those who claim that women are univocally disadvantaged compared to men ,or by those who claim that there are no relevant inequalities left while women are indeed disadvantaged in more dimensions then men, there are strong indications that men have worse social relations than women and for many capabilities the results are inconclusive.

Weber *et al.* (2005) reviewed the nature of poverty in the United States and observed that poverty rates are highest in most urban and rural areas and that because only one-fifth of the nation's 35 million people live in non-metropolitan areas, rural poverty has received less attention than urban poverty from both policy makers and researchers. The authors examined factors effecting poverty in rural areas and explored whether there is something about rural places and demographic Characteristics and local economic context that makes poverty more likely in those places.

Bagheri and Kavand (2006) using SST index, the poverty intensity in Iran during the years 2003 and 2004 was calculated for urban and rural areas using the data obtained from the household income and expenditure survey conducted by the Statistical Centre of Iran and considering the absolute SST poverty line of 2300 calories with the percentage of changes compared over the two years. Also, the portion of factors constituting SST index over the said years was specified. The confidence interval of the index was calculated with the application of the Bootstrap method. The findings revealed that the poverty intensity in 2004 compared with that in 2003 increased up to 1.7% in urban areas and reduced to 1.8% in rural areas and the changes are significant at of 90% confidence level. Also, the poverty intensity over these two years has been higher in urban areas than in rural areas.

Shavhua Chen and Martin Ravallion (2007) reported estimates of measures of absolute poverty for the developing world for the period 1981-2004. They observed a strong trend decline in the percentage of people who are completely poor, though with inconsistent progress across regions. The study showed pronounced urbanization of deprivation in developing countries, and about three-quarters of the poor lived in rural areas.

Suman (2009) proposed a two-parameter class of human development index that reflects the sensitivity of inequality among dimensions. The indices have helped to address firstly, the inequality that pertains to the spread of distribution across persons and secondly the inequality of interactions among dimensions. The indices were applied to the year 2000 Mexican Census data to contrast the new approach with the existing approaches.

Apata *et. al.* (2010) examined the determinants of rural poverty in Nigeria. The study used a probit model on a sample of 500 smallholder farmers to classify factors influencing the probability that households will escape chronic poverty. Results show that exposure to micro-credit education, involvement in livestock assets in agricultural workshops / seminars, access to female headed household extension services and distance to the market increases the likelihood of persistence in chronic poverty.

Anyanwu (2010) study presented a profile of Generated poverty in Alyena from 1980 – 1996. The findings indicate that 72 percent of the rural population share was below the poverty line, 40 percent for 1992, using the 1996 National Market Survey dataset. All poverty indices (headcount, depth, and severity) suggest that poverty in

the female-headed household was more severe in 80, but the male-headed household became poor in 1985.

Charles *et al.* (2010) examined the poverty level of bee farmers involved in the activities of non-governmental organisations (NGO) in Kaduna State using the Bee-keeping Extension Society of Nigeria as a case study. The poverty level was compared with bee farmers that did not take part in the NGO's activities to decipher the impact of NGO's on their clients. The Foster-Greer-Thorbecke indices were used for analysis and a common poverty line of N21,485.21 (US\$139.51) was established. The result revealed that though participating bee farmers had a larger number of poor, the degree of poverty among the non-participating bee farmers was more compared to the participating bee farmers. The difference in poverty level among the two groups was marginal which led to the conclusion that the activities of the NGO had a marginal impact on its clients.

Osowole and Ugbechie (2011) applied principal component analysis (PCA) to the 2003/2004 National Living Standard (NLSS) data to identify relevant determinants associated with rural household poverty in Oyo State, Nigeria. Household size, mother's educational level, age of the household head, father's work and mother's work were the key factors found to be major determinants of rural poverty incidence in the state. The choice of expenditure as a proxy for measuring poverty was further corroborated. The outcome showed that factor analysis is very useful in targeting and of alleviating poverty.

Ravallion and Chen (2011) argued that the income elasticity of one is implausible and posit a weak relative axiom that requires poverty to fall if all incomes rise by the same proportion. They provided the alternative hybrid poverty line formula $Z = \max. \{Z_a, f+Z_r\}$ where $f > 0$ is interpreted as the fixed cost of social inclusion. They set the three parameters of their proposed formula with the aid of data. Their lines satisfied the weak relativity axiom for the standard scale invariant poverty measures.

Hakovirta (2011) used the Luxembourg income study data sets from 2004 and 2005 to analyse the contribution that child maintenance makes to the reduction of child poverty. The countries compared were Canada, Denmark, Finland, Germany, Norway, Sweden, the United Kingdom (UK), and the United States (US), which represented countries with different child support schemes. Results showed that the contribution that child support makes to reducing child poverty, in general, is modest. However, in reducing

child poverty, it has a comparatively significant effect reducing child poverty for those who receive it. Child support decreased the UK's income deprivation gap to the greatest degree, and raises the most vulnerable children out of poverty in Denmark and Sweden.

Ijaiya *et. al.* (2011) studied the Impact of Economic Growth and Poverty Reduction in Nigeria using multiple regression analysis. The result showed that the initial level of economic growth is not prone to reducing poverty, while the positive change in economic growth is prone to reducing poverty. They suggested sound macroeconomic policies, huge investment in the development of agriculture and good governance as a way to boost and maintain Nigeria's economic growth rate.

Osowole (2011) used the Nigerian living Standard Survey (2004) to estimate the Foster-Greer-Thorbecke (FGT) poverty indices-Head count (HCI),Poverty Gap Index(PDI) and Square poverty gap(SPDI),He derived their estimates, moments and determined the probability densities of the FGT poverty indices from a general system of distribution that classifies distribution based on pre-determined selection criteria. He observed that the head count index followed a normal distribution while both poverty gap and square poverty gap indices followed a four-parameter Beta distribution.

Olorunsanya *et. al.* (2011) carried out a Comparative analysis of the poverty status of urban and rural households in Kwara State, Nigeria, focusing on people's demographic and socioeconomic characteristics. Data from 250 respondents from both sectors were used. The research revealed the prevalence of poverty among rural households, female-headed households, those without formal education, and farming households.

Anyanwu (2011) study focused on poverty in Nigeria's Igbo land (Abia, Anambra, Ebonyi, Enugu, and Imo states) using data set from the 1996 National Consumer Survey. The outcome showed that by 1996, the proportion of the population living under the Igbo state's poverty line stood at 55.1 percent, up from 40.9 percent in 1992. The incidence of poverty was 21.6 percent in 1996, a rise of 16.2 percent again in 1992. The frequency increased to 11.4 percent in 1996 from 8.7 percent in 1992. The rate of poverty in urban and rural areas rose from 38.3 percent to 49.2 percent and 43.3 percent to 58.8 percent, respectively, between 1992 and 1996.

In Igbo land, the size of households and agriculture have been established as major factors contributing to increased poverty.

National Bureau of Statistics (2011) allocated/used two levels of Poverty viz “core poor” and “Moderately poor”, that is having three household classification, viz; Core poor, moderately poor and non- poor. “Core poor” was set at weighted mean per capita household expenditure for food and non-food and was calculated as 11,867.00 Naira for 2004. Persons whose expenditure fall between 11,867 and 23,733 Naira (Poverty lines) were considered “moderately poor”.

Ahmed (2012) in his study measured off-reserve Aboriginal and non-Aboriginal income poverty at inequality for the period 1996-2007 and compared the results for off-reserve Aboriginal and non-Aboriginal population groups. For measurement purposes, statistics Canada’s low-income cut-offs were considered as poverty lines. Poverty indices such as headcount ratio, income gap ratio, poverty gap index, Foster-Greer-Thorbecke Index, Sen Index, and Sen-Shorrocks-Thon (SST) index were used. The Gini coefficient is used as the measure of inequality. Both pre-tax and post-tax income were considered. He observed that though a substantial decline in off-reserve Aboriginal poverty is recorded by most of the poverty indices by the early 2000s, off-reserve Aboriginal poverty remained higher than non-Aboriginal poverty. After the decline, these off-reserve Aboriginal poverty indices remained stable and showed some decline from mid-2000s onwards. Income inequality among the non-Aboriginal population remained stable throughout the period whereas off-reserve Aboriginal income inequality showed a slightly increasing trend in the 2000s.

Asogwa (2012) ascertained the economic situation of Nigeria, and the place of the rural women in it. Desk analysis format was used to collect data from different official sources in Nigeria and analyzed in percentage frequencies. The result showed that loans granted by Nigerian commercial banks were in the ratio of 75.86 percent: 24:14 percent to men's advantage. The real rural women received about 25 percent of the micro-finance loans to women.

Olatomide (2012) discussed the concept of poverty, its causes, and the different measurement methods used in poverty assessment. Causes of poverty in Nigeria were also brought into perspective. Measurement of poverty is complex and varied, he said. Discussion of poverty measure has, therefore, commenced with the simple living standard measure, poverty line determination and array of measures

involved in absolute and relative poverty measures. Measure of poverty that enables us show its decomposability by population, capture issue of social capital and how the poor themselves measure poverty were highlighted. He concluded that the principal cause of poverty in Nigeria is inadequate economic growth.

Rattan (2012) examined the temporal and gross state behaviour of growth, poverty, and inequality and also examined the relationship between them to see whether the temporal behaviour of the incidence of poverty is compatible with the policy evolution followed in India since independence. He found out that the economy has indeed achieved a high growth trajectory such that it has been conspicuous during the post reform period with a remarkable structural transformation accompanied by the tremendous increase in the service sector driven by growth. Secondly, he found that there was no uniform relation between temporal behaviour of the growth rate and the Gini inequality across the states. Four poverty lines criteria were used to estimate the incidence of poverty. Minimum calorie allowance, food share of total expenditure, N395.41 per capita per month at 1995 prices and N1500 per capita per annum at 1996/1997 prices. The analysis of rural socio-economic profiles showed striking locational variation among bottom medium, and top income classes. The variation was discovered to relate intimately with agro-ecology (a major occupation) and urban inference as key correlates household income. Food dominates household spending, which for bottom, medium and top income classes comprise about 69 percent, 65 percent and 54 percent.

Osowole *et. al.* (2012) carried out a logistic regression modeling of the poverty status of households in Nigeria to identify possible determinants of poverty using the 2003/2004 National living standard survey (NLSS) data. The result showed that household size and educational group for the highest level attained by the household head were the most significant determinants of poverty. The study strongly recommends that moderate house size and acquiring of formal education be encouraged to reduce poverty prevalence.

Ayoade and Adeola (2012) examined the effect of poverty on rural household in Orire Local Government Area of Oyo State, Nigeria. Simple Random Sampling Technique was used to pick 120 respondents. The data collected were analyzed using concise and inferential statistics. The respondents ' average age was 43, while the respondents ' majority (80.8%) were married with an average annual income of

N181,291.67. The findings showed that the main effect of household poverty is low living standards (98.3 percent).

Olowa *et. al.* (2013) studied the effect of remittances (money by migrants to relatives back home) on poverty among rural households in Nigeria. The study utilized a large nationally representative household survey to analyze the impact of domestic (from Nigeria) and foreign (from Africa and other countries) remittances on rural poverty in Nigeria. The result showed that all forms of remittances in rural Nigeria are raising the level of depth and severity of poverty.

Osohole and Bamiduro (2013) in an attempt to provide an insight into some intrinsic characteristics of the Foster-Greer-Thorbecke index (Head Count index, Poverty Gap Index and Square Poverty Gap Index) derived estimators for the indices from first principles. The study found the estimators to be reasonably unbiased and consistent.

Esanov (2013) studied the dynamics and distribution of poverty and investigated the impact of growth and inequality on the poverty level in Kazakhstan over the periods of four years 2001-2004. The study further decomposed changes in poverty into growth and redistribution component. The analysis is based on data from four rounds of the Kazakhstan household budget survey (HBS), collected annually by the National Statistical Agency of Kazakhstan. The empirical analysis demonstrated that the incidence of poverty measured by the headcount index has declined from 20% in 2001 to 9.5% in 2004. The examination of the distribution of poverty at the sub-national level shows that the extent of poverty is prevalent in agricultural regions. Contrary to conventional wisdom, economic growth in the transition economy fails to contribute to this trend. Finally, the decomposition of changes in poverty reveals that the fall in poverty is entirely driven by the improvement in the inequality whereas growth appears to be poverty enhanced.

Nwoke (2014) examined the efficiency of median per capita expenditure for measuring poverty in Nigeria using the General Household Survey data. The researcher used the relative poverty lines of median per capita expenditure and two-third of mean per capita expenditure to compute the poverty lines. Results showed that median per capita expenditure was a better method.

Otu *et. al.* (2014) study critically analysed the poverty incidence with specific reference to poverty incidence, poverty profile, poverty trend, measurement of poverty and the major causes of poverty in Nigeria. Data were obtained from the

Federal Office of Statistics (FOS) and the Central Bank of Nigeria and the result showed that despite the abundant natural and human resources in Nigeria, the amazing paradox – a country rich with plenty but occupied by people who are perpetually poor and underdeveloped.

Edson *et al.* (2014) explored the changes in the social inequalities among Mexico indigenous and non-indigenous population for the period time 2000 to 2010 using routinely collected poverty, welfare and health indicator data. They described changes in socio economic indicators (housing condition), Poverty (Foster Greer-thorbecke) and Sen-Shorrocks-Thon (SST) Indexes, and health indicators (childhood stunting and infant mortality) using diverse sources of nationally representative data. The analyses showed consistent evidence of disparities in the Mexican indigenous population regarding both basic and crucial developmental indicators.

Osowole *et al.* (2014) investigated the effect of the relationship between income poverty and inequality in Nigeria. The Head count was used to estimate the incidence of poverty while the Gini coefficient was used to estimate income inequality based on household data from a living standard survey of households in Nigeria. The study revealed a positive correlation between poverty and income inequality that is, poverty was highest where inequality of income was highest and vice versa.

Ugbechie (2015) validated the desirable axioms necessary for selecting poverty measures. These Focus Axioms (FA), Weak Monotonicity Axiom (WMA), Impartiality Axiom (IA), Weak Transfer Axiom (WTA), Strong Upward Transfer Axiom (SUTA), Continuity Axiom (CA) and Replication Invariance Axiom (RIA). Sen-shorrocks-Thon (SST) Index was shown to satisfy these axioms while Headcount index failed to satisfy four of these desirable axioms. These are Weak Monotonicity Axiom (WMA), Weak Transfer Axiom (WTA), Strong Upward Transfer Axiom (SUTA) and Continuity Axiom (CA).

Ogbeide and Agu (2015) investigated the existence of a casual relationship between poverty and inequality in Nigeria economy and which direction it followed. Adopting Granger casualty technique, the study found that there is a direct line of casualty between poverty and inequality as well as indirect channels through low expectancy and unemployment which increased poverty in Nigeria.

Osowole (2015) carried out an analysis of variance on the determinants of poverty in Nigeria using two survey datasets .He used correlation and regression

analyses for the urban areas, rural areas, and the entire country. The result showed that a significant determinant of poverty is the percentage of adult females with ages from 15-49 exposed to media usage not less than once a week. He suggested promoting women's literacy as a potential strategy of action to reduce the impacts of poverty in Nigeria.

Victoria (2017) explored seven theories of poverty; viz, the Culture of Poverty, individual Deficiency theory, Progressive Social Theory, Geographical Disparities, Cyclical interdependence theory, poverty individualization, and the theory of Social exclusion/cumulative disadvantage and examined how they relate to the nature of poverty in Nigeria. It suggests an understanding of the underlying Causal Factors of Poverty in designing pro-for-programs and a tackle hydra-headed approach is a threat both effectively and gradually.

Eigbiremolen (2018) used an improved poverty line to investigate the incidence and trends of poverty and examines poverty dynamics in Nigeria. Using panel data from the General Household Survey estimates found a slightly lower rate of deprivation during the periods under review compared with previous figures. Male households headed, and small families were less likely to live in poverty.

Eigbiremolen and Ogbuabor (2018) used the food poverty line for food poverty analysis for Nigeria which accounted for urban-rural income and price differential. Estimate from the General Household Survey (GHS) longitudinal data reveals that about half of the population was food-poor in 2013. The proportion of the population that slipped into food poverty within the periods under study (2010–13) far outweighs those that moved out of food poverty. After controlled households' socio-economic and demographic characteristics in a multivariate analysis, large initial household size, unemployment, and low levels of initial education are identified as key factors that kept households in food poverty over time. This, however, varied across rural and urban households.

Osowole *et. al.* (2018) assessed the prospects of censoring in one-dimensional Poverty analysis in Nigeria. The conventional method involved truncation of the non-poor households and this led to the measurement error. Censoring instead of truncation was considered using data from the Nigeria General Household Survey (NGHS) Panel survey, they found that the estimated poverty indices obtained via censoring gave higher precision compared to the indices obtained traditionally.

Almas and Masomeh (2018) examined the extent of poverty in different provinces and districts in Rwanda using both consumption and income per capita from household surveys. In 2006, 2009, and 2012, they used 14,810 observations for the revenue-based data and 7498 observations from the user sample. The result found that old heads of households and female-headed households are more likely to be poor; living in rural and semi-urban areas increases the likelihood of being poor, and wealth ownership reduces the likelihood of being poor.

Farouq Md. *et. al.* (2018) study revealed that poverty is more complex in rural areas. The study used data from the National Representative Household Income and Expenditure Surveys (HIES) 2010, to identify the determinants of poverty in rural Bangladesh. The HIES follows a hierarchical structure hence, two-level random intercept binary logistic regression models were used to capture the unobserved heterogeneity between communities along with revealing important factors associated with poverty. The analysis found that 32% of the household was absolutely poor and 19% were extremely poor.

Osowole *et. al.* (2018) this study attempted an assessment of the effectiveness of the proxy means test (PMT) procedure in achieving better targeting of the poor in Oyo State, Nigeria. Using data from the National Living Standard Survey (NLLS) for the five poverty lines considered, they concluded that the proxy mean test gave a higher percentage of the poor compared to the conventional method.

Girma and Temesgen (2018) identified the extent and determinants of rural poverty in southern Ethiopia, Doyogera district. The study considered 150 households expenditure. FGT (Foster-Greer-Thorbecke) poverty index was used to determine the extent of rural poverty. The result showed that the total headcount index, poverty gap and poverty severity index were 0.438, 0.25, and 0.1452 respectively.

Adeyemi *et. al.* (2019) analysed the gender perspective of income inequality and poverty among sample of rural households in Southwest, Nigeria, Gini coefficient, Foster-Greer-Thorbecke (FGT) using the logistic regression model. Poverty lines N15,271.83, 53.7 percent male population and 47.22 percent female population were considered poor. The study showed that the male respondents had lower income disparities than the female counterparts.

Afeez and Amiena (2019) using the Nigeria General Household survey compared the different levels of distribution of income poverty using the Foster-Greer-Thorbecke Poverty index, the fixed count ratio, poverty gap, and square

poverty gap were determined. Income Variables were compared between three waves; wave 1 (2010-2011), wave 2 (2012-2013) in rural and urban areas and across the six geopolitical zones of Nigeria. The result showed that there was an overall deepening of poverty in Nigeria between 2010 and 2013 in the Northern zones especially in the North West Zone compared to the Southern Zones.

Mulatie and Andualem (2019) study investigated whether female headed households in south West Ethiopia are poorer than male- headed households. The study hired 395 household survey questionnaires based on data on consumer spending. The indices for calculating poverty indicate that households headed by women are more vulnerable to poverty than households headed by men.

CHAPTER THREE

METHODOLOGY

3.1 Measurement of Poverty

Researchers have used various techniques to measure Poverty in the past. These include Head count index, Poverty rate, Average Poverty gap, Square Poverty gap index, Foster-Greer- Thorbecke (FGT) index(1998), Sen index(1976),Watts index(1968), Sen-Shorrocks-Thon (SST) index (1995), the Poverty Box (Osberge and Xu,2008), the physical quality of life index (PQLI) (Morris, 1994), human development index (HDI) (UNDP, 1990), the food security index (FSI), integrated poverty index (IPI), basic needs index and relative welfare index (IFAD, 1993). The most widely used index is the Foster Greer Thombecke (FGT's) P_α weighted poverty measure that is based on income/expenditure of the household. Ravallion (1992) cited in Osowole (2011) supported the use of income/expenditure approach to poverty measurement. He maintained that although poverty is a multidimensional concept, it's characteristics (poor nutritional status, lack of physical assets and inability to work) are sufficiently associated with income and consumption expenditure to allow us focus on these two variables.

3.2 Basic Axioms of Poverty Measures

In 1976, Amartya Sen proposed a set of fundamental axioms as the basis for poverty measurement, which were modified by Shorrocks (1995).According to Hagenars (1986, 1991) as cited in Osberg *et al.* (2007), the seven best-known axioms for evaluating poverty measures are:

- i. **Focus Axiom (FA):** The poverty measure should be independent of the non-poor population.
- ii. **Weak Monotonicity Axiom (WMA):** A reduction in a poor person's income/expenditure holding other income/expenditures constant, must increase the value of the poverty measure.

- iii. **Impartiality Axiom (IA):** A poverty measure should be insensitive to the order of income/expenditure.
- iv. **Weak Transfer Axiom (WTA):** An increase in a poverty measure should occur if the poorer of the two individuals involved in an upward transfer of income/expenditure is poor and if the set of poor people does not change.
- v. **Strong Upward Transfer Axiom (SUTA):** An increase in a poverty measure should occur if the poorer of the two individuals involved in an upward transfer of income/Expenditure is poor. This axiom allows change in the set of the poor people.
- vi. **Continuity Axiom (CA):** The poverty measure must vary continuously with incomes/expenditure.
- vii. **Replication Invariance Axiom (RIA):** The value of a poverty measure does not change if it is computed based on an income/expenditure distribution that is generated by the k -fold replication of an original income/expenditure distribution.

3.3 Mathematical Representation of Selected Poverty Axioms

In this research ,a re-representation of four axioms out of the seven basic axioms for evaluating poverty will be attempted. These include ; Focus Axiom, Weak Monotonicity Axiom, Impartiality Axiom and Impartiality Axiom

Let λ be the universal set consisting of households in a given population. Let A and B be two subsets defined on λ where A is the subset of all poor households and B is the subset of all non-poor households. We note that;

$$\lambda = A \cup B \quad 3.1$$

$$\text{And } A \cap B = \emptyset \quad 3.2$$

3.3.1 Focus Axiom

Suppose P^1 is any poverty measure such that $P^1 \in A$ (that is, the poverty measure takes as elements only the poor subsets of households A), then P^1 is said to follow the focus axiom.

3.3.2 Weak Monotonicity Axiom

Suppose A and B are subsets defined on λ , the universal set of poor households where A and B are subsets of poor and non-poor households, then as before

$$\lambda = A \cup B \quad \text{and} \quad A \cap B = \emptyset$$

From the focus axiom, any poverty measure $P^1 \in A$. It is obvious from here that the only other set definable on λ greater than A is the power set of A defined as A^{power} . If poverty measure P^{11} is defined on A^{power} then $P^{11} \in A^{\text{power}}$. Since $A^{\text{power}} > A$, then $P^{11} > P^1$. It follows therefore that any reduction in the expenditure of the poor is another set of poor households. This implies that this reduced set $\in A^{\text{power}}$. Hence the weak monotonicity axiom is satisfied as long as the poor belongs to the A^{power} set.

3.3.3 Impartiality Axiom

Suppose A, B and C are subsets of where A & B are subsets of poor household and C is a subset of non-poor households then:

$$\lambda = A \cup B \cup C \tag{3.3}$$

$$A \cap C = \emptyset, \quad B \cap C = \emptyset$$

Suppose P'_i and P'_j are two poverty measures such that $P'_i = \{i_1, i_2, \dots, i_k\}$ and

$$P'_j = \{j_1, j_2, \dots, j_k\} \quad \text{if}$$

$$i_t = j_p \quad \forall \quad t=1,2,\dots,k; \quad p=1,2,\dots,k.$$

then the impartiality axiom is satisfied since $P'_i = P'_j$ there is a one-to-one mapping of elements in the two subsets irrespective of their different permutations.

3.3.4 Continuity Axiom

Suppose A, B, C and D are subsets defined λ on the universal set of poor households where A, B and C are subsets of poor household and D is a subset of non-poor households.

We note thus:

$$\lambda = A \cup B \cup C \cup D \tag{3.4}$$

$$A \cap D = \emptyset, \quad B \cap D = \emptyset \quad \text{and} \quad C \cap D = \emptyset$$

Suppose P'_i, P'_j and P'_k are three poverty measures defined on the subsets A, B and C respectively. From the focus axiom, $P'_i \in A$, $P'_j \in B$ and $P'_k \in C$. The implication of this is that $P'_i \alpha A$, $P'_j \alpha B$ and $P'_k \alpha C$. Since the computation of the poverty measures

are limited to the elements in each of the subsets A, B and C where $P_p' \alpha S$ means that “the poverty measure is determined by the corresponding set of poor households”. Hence P_i' will vary with respect to A, P_j' will also vary with B and P_k' will further vary with respect to C. Therefore, the continuity axiom has been satisfied by P_i', P_j' and P_k'

3.4 Poverty line (Z)

Poverty lines are lines that demarcate the poor from the non-poor. They can be monetary (e.g. a certain level of consumption) or non-monetary (e.g. a certain level of literacy). We can have more than one poverty line depending on the researcher’s work or interest e.g. multiple poverty lines can help in distinguishing different levels of poverty.

Assuming we have chosen to measure a household’s well-being – say consumption expenditure. The next step is to choose a poverty line. Households whose consumption expenditure falls below this line are considered to be poor. Following the common practice, the poor are defined as those who lack command over basic consumption needs including food and non-food components. The poverty line is obtained by specifying a consumption bundle considered adequate for basic consumption needs and then by estimating the costs of these basic needs. In other words, the poverty line is conceptualized as a minimum standard required by an individual to fulfill his or her basic food and non-food needs (Osowole, 2011). Therefore, poverty lines vary – time and place and each country use lines that are appropriate to its level of development, societal norms, and values (World Bank, 2010).

The poverty line defines the level of consumption (or income) needed for a household to escape poverty. The notion of a poverty line can imply a distinct turning point in the welfare function. It might make sense to define more than one poverty line; one poverty line may mark households that are “poor” and another lower level could indicate those that are “extremely poor”. Another approach is to construct a food poverty line, which is based on some notion of the minimum amount of money a household needs to purchase some basic needs – food bundles and non-food, then the food and non-food poverty lines added will give the overall poverty line.

Poverty lines can be computed for different households, this will help to take into account differences in the prices they face and their demographic composition. For example, a small household in a rural area may face low housing costs and relatively inexpensive food prices, thus its poverty line may be low compared to a large household living in a city where housing is more expensive and food prices are high.

Sen (1985) cited in Maxwell (1999) defined poverty to be either absolute or relative. This gave rise to two forms of poverty lines – Relative poverty lines and Absolute poverty lines.

3.4.1 Relative Poverty Line (Z_r): These are defined in relation to the overall distribution of income or consumption in a country. For example, the poverty line could be set at half the income or consumption of the country.

3.4.2 Absolute Poverty Line (Z_a): These are achieved in some absolute standard of what households should be able to count on to meet their basic needs. For monetary measures, their absolute poverty lines are often based on estimates of the cost of basic food needs (i.e. the cost of a nutritional basket considered minimal for the healthy survival of a family), to which a provision is added for non-food needs (Thomas and Canagarajah, 2002). The World Bank used a figure of US\$1 per day in 1985 (purchasing power dollars) for absolute poverty, \$1.25 and \$2 per day in 2005 and \$1.90 per day in 2015.

3.4.3 Merit/Demerit of relative and absolute poverty lines

The Absolute poverty line is usually fixed and independent of any changes in the income/expenditure standard (i.e it's very subjective). For example, when an income/expenditure standard (such as the mean) changes by 1 percent, an absolute poverty line changes by zero percent, so that the income/expenditure elasticity of the poverty line is zero.

The Relative poverty line is defined as a fixed proportion of a given income/expenditure standard. For this poverty line, if a county's income standard changes by 1 percent, then the poverty line also changes by 1 percent, implying that the poverty line's income/expenditure elasticity is 1. An argument against this approach is that it makes the poverty line too sensitive to changes.

3.4.4 Hybrid poverty line (Z_H)

The Poverty line, a threshold for classing households into poor and non-poor is germane to uni-dimensional poverty analysis.

For this study, the hybrid poverty line will be adopted. The Hybrid poverty line was proposed by Foster (1998) to address the problems of the sensitivity of the relative poverty line and that of the subjectivity of the absolute Poverty line. Madden (2000) also incorporated its use. This is a combination of relative and absolute poverty lines and given as;

$$Z_H = Z_r^\beta Z_a^{1-\beta} \quad \text{For } 0 < \beta < 1 \quad 3.5$$

Where Z_r = Relative poverty line, Z_a = Absolute poverty line, and β is the elasticity of poverty line with respect to income/expenditure.

Note that when,

$$\beta = 0, \quad Z_H = Z_a \quad \text{and when } \beta = 1, \quad Z_H = Z_r .$$

Thus the two extremes is avoided.

- Four relative poverty lines will be considered viz:

$$\begin{aligned} Z_{r1} &= \text{Mean per capita household expenditure} \\ &= \left[\frac{1}{N} \sum_{i=1}^N y_i \right] \end{aligned} \quad 3.6$$

$$\begin{aligned} Z_{r2} &= \frac{2}{3} \text{ Mean per capita household expenditure} \\ &= \frac{2}{3} \left[\frac{1}{N} \sum_{i=1}^N y_i \right] \end{aligned} \quad 3.7$$

$$Z_{r3} = \text{Median per capita household expenditure} \quad 3.8$$

$$Z_{r4} = \frac{2}{3} \text{ Median per capita household expenditure} \quad 3.9$$

$$Z_a = \$ 1.90 \text{ per day world bank, October 2015} \quad 3.10$$

where y_i is the total per capital expenditure for the household and N is the number of household in the survey. A household is considered poor if the

households expenditure per capital is less than or equal to the poverty line otherwise they are non-poor.

The hybrid poverty lines will be obtained using each relative poverty line (Z_r) and the absolute poverty line (Z_a) and denoted as $ZH_{r1}, ZH_{r2}, ZH_{r3}, ZH_{r4}$ for $0.1 \leq \beta \leq 0.9$ following the comment of madden (2000).

3.5 Poverty indices

Poverty analysis generally involves aggregation of information on the poor. This aggregation informs the use of poverty indices like FGT, Sen & Watts, e.t.c.

Foster-Greer-Thorbecke (1984) proposed generalized poverty index as cited in Haughton *et al.* (2009) and is given as;

$$P_\alpha = \frac{1}{N} \sum_1^N \left(\frac{z-y}{y} \right)^\alpha I(y \leq z) \quad 3.11$$

Where α is a measure of the sensitivity of the index to poverty,

P_0 =Head count index when $\alpha=0$ (incidence), P_1 = Poverty gap index when $\alpha=1$ (Measures poverty depth/intensity-how poor are the poor) and P_2 = Square poverty gap index when $\alpha=2$ (Measures Severity of poverty-distribution of income/expenditure among the poor), Z = Poverty line.

3.6 Modified poverty levels

According to poverty profile (NBS, 2005) two levels of poverty has been used, due to the present economic recession in the country there is need to reclassify the poverty levels to three so as to aid the proper identification of the poor .To achieve this, the household expenditure was sub-divided as follows; ($y < \frac{1}{3}Z$) to capture the households who are starving, ($\frac{1}{3} Z \leq y < \frac{2}{3} Z$) to capture extremely poor households and ($\frac{2}{3} \leq y \leq Z$) to capture the moderately poor households.

3.7 Modified Foster-Greer-Thorbecke (FGT) Index

$$P_\alpha = \frac{1}{N} \sum_1^N \left[\frac{y-z}{z} \right]^\alpha I(y \leq z) \quad 3.12$$

Foster-Greer-Thorbecke poverty index has been used extensively in literature by researchers and is still being used in Poverty Analysis. This is not unconnected with its mathematical appeal. It is observable in this definition of FGT Index that the indicators function $I(y \leq z)$ treats the poor alike, the poor are not the same and should be treated differently. The poorer individuals should be given higher weights. We note that there are three major classifications for any given household, namely extremely (core) Poor, Moderately Poor and Non-poor (two levels of Poverty) i.e. the extremely (core) Poor and Moderately Poor (see the final report of Poverty Profile, Africa (2011)). However, three levels of poverty will be considered in this work, viz Starvation, Extremely Poor and Moderately Poor and this will be incorporated into the FGT Index.

Based on the foregoing, we shall define the modified FGT index as.

$$P_{\alpha}^* = \frac{1}{N} \sum_1^N \left| \frac{y - z}{z} \right|^{\alpha} I^*(y \leq z) \quad 3.13$$

where;

$$I^*(y \leq z) = \left\{ \begin{array}{ll} \frac{3}{6}, & y < \frac{1}{3}z \quad (\text{Starvation}) \\ \frac{2}{6}, & \frac{1}{3}z \leq y < \frac{2}{3}z \quad (\text{Extremely - Poor}) \\ \frac{1}{6}, & \frac{2}{3}z \leq y \leq z \quad (\text{Moderately - Poor}) \\ 0, & y > z \quad (\text{Non - Poor}) \end{array} \right\} \quad 3.14$$

3.7.1 Modified FGT head count index

$$P_0^* = \frac{1}{N} \sum_1^N \left| \frac{y - z}{z} \right|^0 I^*(y \leq z) \quad 3.15$$

$$= \frac{1}{N} \sum_1^n I^*(y \leq z) \quad 3.16$$

n is the number of the poor, N is the total number of households. Suppose there are n_1 (Starving households), n_2 (extremely poor households) and n_3 (moderately poor households) then equation (12) becomes:

$$P_0^* = \frac{3n_1}{6N} + \frac{2n_2}{6N} + \frac{n_3}{6N} \quad 3.17$$

3.7.2 Modified FGT poverty gap index

$$P_1^* = \frac{1}{N} \sum_1^N \left| \frac{y-z}{z} \right| I^*(y \leq z) \quad 3.18$$

$$= \frac{3}{6N} \sum_1^{n_1} \left| \frac{y_i - Z}{Z} \right| + \frac{2}{6N} \sum_{n_1+1}^{n_1+n_2} \left| \frac{y_i - Z}{Z} \right| + \frac{1}{6N} \sum_{n_1+n_2+1}^{n_1+n_2+n_3} \left| \frac{y_i - Z}{Z} \right| \quad 3.19$$

3.7.3 Modified FGT square poverty gap index

$$P_2^* = \frac{1}{N} \sum_1^N \left| \frac{y-z}{z} \right|^2 I^*(y \leq z) \quad 3.20$$

$$= \frac{3}{6N} \sum_1^{n_1} \left| \frac{y_i - Z}{Z} \right|^2 + \frac{2}{6N} \sum_{n_1+1}^{n_1+n_2} \left| \frac{y_i - Z}{Z} \right|^2 + \frac{1}{6N} \sum_{n_1+n_2+1}^{n_1+n_2+n_3} \left| \frac{y_i - Z}{Z} \right|^2 \quad 3.21$$

Note:

Where n_1, n_2 and n_3 are the number of poor households in the three groups.

$n = n_1 + n_2 + n_3$ (the total number of poor households).

$N =$ Total number of households; ($n < N$).

Data: The data that will be used for this research is the 2012/2013 General Household Survey (GHS) data from the National Bureau of Statistics (NBS).

Descriptive analysis/Analyse Distributive (DAAD)/Easy Fit 5.6 softwares will be used in obtaining the estimates and basic descriptive statistics of the Poverty indices.

3.8 Probability distributions of modified Foster-Greer-Thorbecke (FGT) poverty indices and Distribution Fitting

Distribution fitting is fitting of a probability distribution to a series of data concerning the repeated measurement of a variable phenomenon. The distribution giving a close fit gives a good prediction.

For the purpose of this research, two distributions will be considered; Frechet and Weibull distributions. The choice was based on the exploratory initial search among possible and potential density functions. Goodness-of-fit test will be done using the Kolmogorov-Smirnov (K-S) test.

3.8.1 Frechet Distribution

The Frechet distribution, also known as inverse Weibull distribution is a special case of the generalized extreme value distribution. The probability density function of the Frechet distribution is given by

$$f(x; \alpha, s, \mu) = \frac{\alpha}{s} \left(\frac{x-\mu}{s}\right)^{-(\alpha+1)} e^{-\left(\frac{x-\mu}{s}\right)^{-\alpha}} \quad 3.22$$

Where α is the shape parameter, μ location parameter (minimum) and s the scale parameters.

3.8.2 Moments of Frechet Distribution

$$\text{Mean: } E(X) = \mu + s\Gamma\left(1 - \frac{1}{\alpha}\right); \quad \alpha > 1$$

$$\text{Variance: } \sigma_x^2 = s^2 \left[\Gamma\left(1 - \frac{2}{\alpha}\right) - \Gamma^2\left(1 - \frac{1}{\alpha}\right) \right]; \quad \text{for } \alpha > 3$$

$$\text{Mode: } \phi_x = \mu + s \left[\frac{\alpha}{1+\alpha} \right]^{\frac{1}{\alpha}}$$

Coefficient of skewness:

$$\gamma_1 = \frac{\Gamma\left(1 - \frac{3}{\alpha}\right) - 3\Gamma\left(1 - \frac{2}{\alpha}\right)\Gamma\left(1 - \frac{1}{\alpha}\right) + 2\Gamma^3\left(1 - \frac{1}{\alpha}\right)}{\left[\sqrt{\Gamma\left(1 - \frac{2}{\alpha}\right) - \Gamma^2\left(1 - \frac{1}{\alpha}\right)} \right]}; \quad \text{for } \alpha > 3$$

Coefficient of kurtosis:

$$\gamma_2 = -6 + \frac{\Gamma\left(1 - \frac{4}{\alpha}\right) - 4\Gamma\left(1 - \frac{3}{\alpha}\right)\Gamma\left(1 - \frac{1}{\alpha}\right) + 3\Gamma^2\left(1 - \frac{1}{\alpha}\right)}{\left[\sqrt{\Gamma\left(1 - \frac{2}{\alpha}\right) - \Gamma^2\left(1 - \frac{1}{\alpha}\right)} \right]^2} \quad \text{for } \alpha > 4$$

3.8.3 Weibull Distribution

The probability density function of a Weibull random variable is

$$f(x; \theta, k) = \begin{cases} \frac{k}{\theta} \left(\frac{x}{\theta}\right)^{k-1} e^{-\left(\frac{x}{\theta}\right)^k}; & x \geq 0 \\ 0 & x < 0 \end{cases} \quad 3.23$$

Where $k > 0$ is the shape parameter and $\theta > 0$ is the scale parameter of the distribution

3.8.4 Moments of Weibull Distribution

$$\text{Mean } E(x) = \theta \Gamma\left(1 + \frac{1}{k}\right)$$

$$\text{Variance } \sigma_x^2 = \theta^2 \left[\Gamma\left(1 + \frac{2}{k}\right) - \Gamma^2\left(1 + \frac{1}{k}\right) \right]$$

$$\text{Mode: } \begin{cases} \theta \left(\frac{k-1}{k}\right)^{\frac{1}{k}} & \text{for } k > 1 \\ 0 & k \leq 1 \end{cases}$$

Coefficient of skewness:

$$\frac{\Gamma\left(1 + \frac{3}{k}\right) \theta^3 - 3\mu\sigma^2 - \mu^3}{\sigma^3}$$

Excess of kurtosis:

$$\frac{\theta^4 \Gamma\left(1 + \frac{4}{k}\right) - 4\gamma_1 \sigma^3 \mu - 6\mu^2 \sigma^2 - \mu^4}{\sigma^4}$$

Where;

$$\gamma_1 = \frac{\Gamma\left(1 + \frac{3}{k}\right) \theta^3 - 3\mu\sigma^2 - \mu^3}{\sigma^3}$$

3.8.5 Goodness of Fit Test: Kolmogorov-Smirnov (K-S) Test

The goodness of fit tests measures the compatibility of a random sample with a theoretical probability function. These tests show how well the distribution selected fits well the data. The goodness of fit will be carried out for the three distributions used. Maximum likelihood method will be used to obtain the parameter estimates for the selected distributions.

The Kolmogorov-Smirnov (K-S) test is the goodness of fit test to be considered. This is so because it has the advantage of making no assumption about the distribution of data (technically speaking, it is non-parametric) (Kolmogorov-Smirnov Test, 2013).

This test is used to decide if a sample comes from a hypothesized continuous distribution. It is based on the empirical cumulative distribution function (ECDF). It should be noted the K-S test is often seen as a non-parametric method while the Chi-Square goodness of fit test is parametric alternative. The results from the two test may

not differ much when the sample size is large. Assume that we have a random sample x_1, \dots, x_n from some distribution with cumulative distribution function (CDF) $F(x)$. The empirical CDF is denoted by

$$Fn(x) = \frac{1}{n} (\text{Number of observations } \leq x) \quad 3.24$$

Definition:

The Kolmogorov-Smirnov Statistic (D) is based on the largest vertical difference between the theoretical and the empirical cumulative distribution function.

$$D = \max_{1 \leq i \leq n} \left[F(x) - \frac{i-1}{n}, \frac{1}{n} - F(x_i) \right] \quad 3.25$$

CHAPTER FOUR

RESULTS OF ANALYSIS AND DISCUSSION

The poverty analysis is based on the 2012/2013 General Household Survey (GHS) data conducted by National Bureau of Statistics (NBS). In calculating/finding the poverty lines, two methods are adopted, namely relative measure and hybrid measure as given in the methodology.

The relative poverty lines considered are mean per capita household expenditure, $\frac{2}{3}$ mean per capita household expenditure, median per capita household expenditure and $\frac{2}{3}$ median per capita household expenditure.

The hybrid measure is a combination of the relative (Z_r) and absolute (Z_a) poverty lines given as: $Z_H = Z_r^\beta Z_a^{1-\beta}$; $0 < \beta < 1$.

Where β is the elasticity of poverty line with respect to income/expenditure. The absolute poverty line is estimated at ₦11,400.00, using Two Hundred Naira as official exchange rate per US dollar.

The analysis was carried out for the following sub-units:

1. Expenditure data for the whole country-Nigeria.
2. Geo-political Zones:
 - (i) North Central
 - (ii) North East
 - (iii) North West
 - (iv) South East
 - (v) South South
 - (vi) South West
3. Sectors:
 - (i) Rural
 - (ii) Urban

Table 4.1: Relative Poverty Lines and Hybrid Poverty Lines for the whole country

N = 4536

β	Z_{r1} = 110,984.90	Z_{r2} = 73,989.93	Z_{r3} = 85,906.95	Z_{r4} = 57,271.30
	(₹)			
0.1	36,427.56	34,980.09	35,506.39	34,095.52
0.2	116,401.00	107,334.09	110,588.40	101,974.50
0.3	371,949.20	329,348.90	344,439.50	304,990.00
0.4	1,188,530.00	1,010,587.00	1,072,793.00	912,177.80
0.5	3,797,841.00	3,100,924.00	3,341,327.00	2,728,182.00
0.6	12,135,653.00	9,514,991.00	1,046,910.00	8,159,566.00
0.7	38,778,372.00	29,196,156.00	32,413,405.00	24,403,986.00
0.8	124,000,000.00	89,586,577.00	101,000,000.00	72,988,507.00
0.9	396,000,000.00	275,000,000.00	314,000,000.00	218,297,211.00

In unidimensional poverty analysis it is customary to use relative poverty lines (that is poverty lines derived from a fraction of an ideal measure of location) as seen above. Table 4.1 shows hybrid poverty lines for the whole country when household size is 4536.

When elasticity is minimum ($\beta=0.1$) hybrid poverty line is maximum for relative poverty line ($Z_{r1}=\text{₦}110,984.90$) and least for relative poverty line ($Z_{r4} = \text{₦}57,271.30$). When elasticity is maximum ($\beta=0.9$) the hybrid poverty line is maximum for relative poverty line ($Z_{r1} = \text{₦}110,984.90$) and least for relative poverty line ($Z_{r4} = \text{₦}57,271.30$).

For elasticity values ($0.2 \leq \beta \leq 0.8$), the trend as discussed is noticeable.

4.1: Relative Poverty Lines and Hybrid Poverty Lines based on the six (6) Geo-political Zones

Table 4.2 to table 4.7 give the relative poverty lines and hybrid poverty lines based on the six (6) geo-political zones.

Table 4.2: Relative Poverty Lines and Hybrid Poverty Lines for North Central

N = 771

β	$Z_{r1} =$ 98,859.44	$Z_{r2} =$ 65,906.29	$Z_{r3} =$ 83,738.77	$Z_{r4} = 55,825.85$
(₦)				
0.1	36,008.54	34,577.71	35,415.74	34,008.47
0.2	113,738.60	104,879.20	110,024.50	101,454.40
0.3	359,260.90	318,113.80	341,808.20	302,660.00
0.4	1,134,781.00	964,884.70	1,061,880.00	902,898.20
0.5	3,584,379.00	2,926,633.00	3,298,892.00	2,693,534.00
0.6	11,321,806.00	8,876,892.00	10,248,511.00	8,035,373.00
0.7	35,761,650.00	26,924,872.00	31,838,562.00	23,971,189.00
0.8	1.13E+08	8.17E+07	98,911,346.00	71,511,045.00
0.9	3.57E+08	2.48E+08	307,000,000.00	213,332,321.00

Table 4.2 shows hybrid poverty lines for North Central when household size is 771

When elasticity is minimum ($\beta=0.1$), hybrid poverty line is maximum for relative poverty line ($Z_{r1} = \text{N}98,859.44$) and least for relative poverty line ($Z_{r4} = \text{N}55,825.85$).

When elasticity is maximum ($\beta=0.9$) the hybrid poverty line is maximum for relative poverty line ($Z_{r1} = \text{N}98,859.44$) and least for relative poverty line ($Z_{r4} = \text{N}55,825.85$).

For elasticity values ($0.2 \leq \beta \leq 0.8$), the trend also followed as discussed above. Also, for each of the relative poverty lines, their hybrid poverty lines values increased as β increased.

Table 4.3: Relative Poverty Lines and Hybrid Poverty Lines for North East**N = 731**

B	Zr₁ = 99,216.21	Zr₂ = 66,144.14	Zr₃ = 74,086.50	Zr₄ = 49,391.00
		(₦)		
0.1	36,021.50	34,590.20	34,984.65	33,594.51
0.2	113,821.00	104,955.00	107,362.00	98,999.62
0.3	359,649.00	318,458.00	329,478.00	291,741.90
0.4	1,136,417.00	966,276.00	1,011,114.00	859,733.40
0.5	3,590,840.00	2,931,909.00	3,102,947.00	2,533,545.00
0.6	1.1E+07	8,896,100.00	9,522,441.00	7,466,095.00
0.7	3.6E+07	2.7E+07	29,222,825.00	22,001,805.00
0.8	1.13E+08	8.2E+07	89,680,105.00	64,837,028.00
0.9	3.58E+08	2.49E+08	275,213,682.00	191,067,969.00

Table 4.3 shows hybrid poverty lines for North East with household size 731

When elasticity is minimum ($\beta=0.1$), hybrid poverty line is maximum for relative poverty line ($Z_{r1} = \text{N}99,216.21$) and least for relative poverty line ($Z_{r4} = \text{N}49,391.90$).

When elasticity is maximum ($\beta=0.9$) the hybrid poverty line is maximum for relative poverty line ($Z_{r1} = \text{N}99,216.21$) and least for relative poverty line ($Z_{r4} = \text{N}49,391.00$).

For elasticity values ($0.2 \leq \beta \leq 0.8$), the trend also followed as discussed above. Also, for each of the relative poverty lines, their hybrid poverty lines values increased as β increased.

Table 4.4: Relative Poverty Lines and Hybrid Poverty Lines for North West**N = 862**

β	Z_{r1} = 75,896.80	Z_{r2} = 50,597.90 (₦)	Z_{r3} = 59,235.04	Z_{r4} = 39,490.03
0.1	35,069.20	33,675.70	34,210.66	32,851.28
0.2	107,882.00	99,478.80	102,664.40	94,667.61
0.3	331,873.00	293,862.00	308,090.30	272,803.90
0.4	102,926.00	868,076.00	924,562.20	786,139.50
0.5	3,140,628.00	2,564,313.00	2,774,560.00	2,265,419.00
0.6	9,661,374.00	7,575,029.00	8,326,300.00	6,528,258.00
0.7	3.00E+07	2.20E+07	24,986,759.00	18,812,480.00
0.8	9.10E+07	6.60E+07	74,983,860.00	54,211,923.00
0.9	2.80E+08	2.00E+08	225,022,356.00	156,222,494.00

Table 4.4 shows hybrid poverty lines for North West with household size 862.

When elasticity is minimum ($\beta=0.1$), hybrid poverty line is maximum for relative poverty line ($Z_{r1}=\text{N}75,896.80$) and least for relative poverty line ($Z_{r4}=\text{N}39,490.03$).

When elasticity is maximum ($\beta=0.9$) the hybrid poverty line is maximum for relative poverty line ($Z_{r1}=\text{N}75,896.80$) and least for relative poverty line ($Z_{r4}=\text{N}39,490.03$).

For elasticity values ($0.2 \leq \beta \leq 0.8$), the trend also followed as discussed above. Also, for each of the relative poverty lines, their hybrid poverty lines values increased as β increased.

Table 4.5: Relative Poverty Lines and Hybrid Poverty Lines for South East**N = 749**

B	Z_{r1} = 120,363.70	Z_{r2} = 80,242.00 (₹)	Z_{r3} = 94,049.59	Z_{r4} = 62,699.73
0.1	36,724.27	35,264.99	35,829.38	34,405.68
0.2	118,305.00	109,089.90	112,609.60	103,838.20
0.3	381,112.50	337,462.10	353,925.30	313,389.28
0.4	1,227,730.00	1,043,916.00	1,112,365.00	945,825.32
0.5	3,955,055.00	3,229,280.00	3,496,095.00	2,854,549.70
0.6	12,740,960.00	9,989,549.00	10,988,008.00	8,615,177.40
0.7	41,044,192.00	30,901,963.00	34,534,620.00	26,001,045.00
0.8	1.32E+08	95,593,034.00	108,540,139.00	78,472,481.00
0.9	4.26E+08	2.96E+08	341,134,832.00	236,833,947.00

Table 4.5 shows hybrid poverty lines for South East with household size 749. When elasticity is minimum ($\beta=0.1$), hybrid poverty line is maximum for relative poverty line ($Z_{r1}=\text{N}20,363.70$) and least for relative poverty line ($Z_{r4}=\text{N}62,699.70$). When elasticity is maximum ($\beta=0.9$) the hybrid poverty line is maximum for relative poverty line ($Z_{r1}=\text{N}20,363.70$) and least for relative poverty line ($Z_{r4}=\text{N}62,699.70$). For elasticity values ($0.2 \leq \beta \leq 0.8$), the trend also followed as discussed above. It can also be seen that for each of the relative poverty lines, their hybrid poverty lines values increased as β increased.

Table 4.6: Relative Poverty Lines and Hybrid Poverty Lines for South South

N = 722

B	Zr₁ = 25,228.10	Zr₂ = 83,485.40	Zr₃ = 97,213.30	Zr₄ = 64,808.90
	(₦)			
0.1	36,870.10	35,405.00	35,948.10	34,519.70
0.2	119,246.00	109,958.00	113,357.00	104,527.60
0.3	385,669.00	341,498.00	357,456.00	316,515.40
0.4	1,247,342.00	1,060,593.00	1,127,184.00	958,425.90
0.5	4,034,184.00	3,293,897.00	355,411.00	2,902,165.00
0.6	1.3E+07	1E+07	11,208,313.00	8,787,910.00
0.7	4.2E+07	3.2E+07	35,343,760.00	26,610,259.00
0.8	1.36E+08	9.9E+07	111,451,366.00	80,577,273.00
0.9	4.41+08	3.06E+08	351,445,484.00	243,992,252.00

Table 4.6 shows hybrid poverty lines for South South when household size is 722. When elasticity is minimum ($\beta=0.1$), hybrid poverty line is maximum for relative poverty line ($Z_{r1}=\text{N}25,228.10$) and least for relative poverty line ($Z_{r4}=\text{N}64,808.90$). When elasticity is maximum ($\beta=0.9$) the hybrid poverty line is maximum for relative poverty line ($Z_{r1}=\text{N}25,228.10$) and least for relative poverty line ($Z_{r4}=\text{N}64,808.90$). For elasticity values ($0.2 \leq \beta \leq 0.8$), the trend also followed as discussed above. Also, for each of the relative poverty lines, their hybrid poverty lines values increased as β increased.

Table 4.7: Relative Poverty Lines and Hybrid Poverty Lines for South West**N = 701**

B	Zr₁ = 55,049.10	Zr₂ = 103,366.10	Zr₃ = 128,150.40	Zr₄ = 85,433.60
	(₦)			
0.1	37,666.10	36,169.41	36,955.21	35,486.77
0.2	12,450.90	114,757.10	119,797.60	110,466.30
0.3	411,192.60	364,097.70	388,347.50	343,869.10
0.4	1,358,603.00	1,155,197.00	1,258,904.00	1,070,425.00
0.5	4,488,895.00	3,665,168.00	4,080,983.00	3,332,109.00
0.6	14,831,545.00	11,628,714.00	13,229,298.00	10,372,467.00
0.7	49,004,202.00	36,895,172.00	42,885,336.00	32,288,282.00
0.8	1.62E+08	1.17E+08	139,021,132.00	100,509,662.00
0.9	5.35E+08	3.71E+08	450,663,951.00	312,874,873.00

Table 4.7 shows hybrid poverty lines for South West with household size 701. When elasticity is minimum ($\beta=0.1$), hybrid poverty line is maximum for relative poverty line ($Z_{r1}=\text{N}55,049.10$) and least for relative poverty line ($Z_{r4}=\text{N}85,433.60$). When elasticity is maximum ($\beta=0.9$) the hybrid poverty line is maximum for relative poverty line ($Z_{r1}=\text{N}55,049.10$) and least for relative poverty line ($Z_{r4}=\text{N}85,433.60$). For elasticity values ($0.2 \leq \beta \leq 0.8$), the trend also followed as discussed above. It can also be seen that for each of the relative poverty lines, their hybrid poverty lines values increased as β increased.

4.2: Relative Poverty Lines and Hybrid Poverty Lines Based on Sectoral Division

Table 4.8: Relative Poverty Lines and Hybrid Poverty Lines for Rural Sector.

N = 3164

B	Zr₁ = 91,526.87	Zr₂ = 61,017.91	Zr₃ = 71,405.35	Zr₄ = 47,603.57
	(₦)			
0.1	5,732.10	34,312.26	34,855.93	33,470.91
0.2	111,998.90	103,275.10	106,573.70	98,272.47
0.3	351,050.10	310,843.40	325,854.50	288,533.50
0.4	1,100,333.00	935,594.40	996,315.70	847,150.30
0.5	3,448,888.00	2,816,005.00	3,046,282.00	2,487,279.00
0.6	10,810,207.00	8,475,771.00	9,314,151.00	7,302,785.00
0.7	33,883,547.00	25,510,852.00	29,478,451.00	21,441,369.00
0.8	1.06E+08	76,783,996.00	87,074,191.00	62,953,005.00
0.9	3.33E+08	2.31E+08	266,233,393.00	184,833,386.00

Table 4.8 shows hybrid poverty lines for Rural sector with household size N3164. When elasticity is minimum ($\beta=0.1$), hybrid poverty line is maximum for relative poverty line ($Z_{r1}=\text{N}55,049.10$) and least for relative poverty line ($Z_{r4}=\text{N}85,433.60$). When elasticity is maximum ($\beta=0.9$) the hybrid poverty line is maximum for relative poverty line ($Z_{r1}=\text{N}55,049.10$) and least for relative poverty line ($Z_{r4}=\text{N}85,433.60$). For elasticity values ($0.2 \leq \beta \leq 0.8$), the trend also followed as discussed above. It can also be seen that for each of the relative poverty lines, their hybrid poverty lines values increased as β increased.

Table 4.9: Relative Poverty Lines and Hybrid Poverty Lines for Urban Sector.

N = 1372

β	Zr ₁ = 155,995.10	Zr ₂ = 103,996.70 (₹)	Zr ₃ = 123,700.20	Zr ₄ = 82.466.80
0.1	37,689.02	36,191.42	36,824.83	35,361.57
0.2	124,602.00	114,896.80	118,953.80	109,688.20
0.3	411,943.70	364,762.60	384,251.60	340,242.20
0.4	1,361,912.00	1,158,011.00	1,241,232.00	1,055,398.00
0.5	4,502,568.00	3,676,331.00	4,009,498.00	327,374.00
0.6	14,885,774.00	11,671,228.00	12,951,709.00	10,154,822.00
0.7	49,213,303.00	37,052,587.00	41,837,346.00	31,499,252.00
0.8	1.63E+08	1.18E+08	135,145,370.00	97,707,559.00
0.9	5.38E+08	3.73E+08	436,554,241.00	303,079,163.00

Table 4.9 shows hybrid poverty lines for Urban Sector when household size is 1372

When elasticity is minimum ($\beta=0.1$), hybrid poverty line is maximum for relative poverty line ($Z_{r1}=\text{N}155,995.10$) and least for relative poverty line ($Z_{r4}=\text{N}82,466.80$).

When elasticity is maximum ($\beta=0.9$) the hybrid poverty line is maximum for relative poverty line ($Z_{r1}=\text{N}155,995.10$) and least for relative poverty line ($Z_{r4}=\text{N}82,466.80$).

For elasticity values ($0.2 \leq \beta \leq 0.8$), the trend also followed as discussed above. Also, for each of the relative poverty lines, their hybrid poverty lines values increased as β increased.

4.3 Analysis of the three levels of poverty

Three levels of poverty were adopted in this research viz starvation (n_1), extremely poor (n_2) and moderately poor (n_3). Those at starvation point are households whose expenditure fall below $\frac{1}{3}$ of the poverty line (i.e $y < \frac{1}{3}Z$),extremely poor are households whose expenditure fall within the range $\frac{1}{3} Z \leq y < \frac{2}{3} Z$ and moderately poor falls within the range $\frac{2}{3} Z \leq y \leq Z$.

Mean per capita poverty line for the whole country is $\text{N}110,984.90$, the starvation line was calculated as $\text{N}36,994.97$, households whose expenditure fall below $\text{N}36,994.97$ are considered to be starving. Households whose expenditure is a value between $\text{N}36,994.94$ but less than $\text{N}73,989.93$ are considered to be extremely poor. Households whose expenditure is $\text{N}73,989.93$ and equal to $\text{N}110,984.90$ are considered to be moderately poor.

The number of households and proportion of those who fall under these poverty levels for the relative poverty lines and hybrid poverty lines are given in the below tables.

4.4: Poverty levels and their poverty lines.

Tables 4.10 to table 4.54 gives the Poverty levels and their poverty lines for the whole Country, Geo-political zones and Sectoral Divisions.

Table 4.10: poverty levels and their poverty lines for the whole country

Z	Starving Households	Extremely Poor Households	Moderately Poor Households
Z _{r1} = (₦ 110,984.90)	y < ₦ 36,994.97	₦ 36,994.97 ≤ y < ₦ 73,989.93	₦ 73,989.93 ≤ y ≤ ₦ 110,984.90
Z _{r2} = (₦ 73,989.90)	y < ₦ 24,663.30	₦ 24,663.30 ≤ y < ₦ 49,326.60	₦ 49,326.60 ≤ y ≤ ₦ 73,989.90
Z _{r3} = (₦ 85,906.95)	y < ₦ 28,635.65	₦ 28,635.65 ≤ y < ₦ 57,271.30	₦ 57,271.30 ≤ y ≤ ₦ 85,906.95
Z _{r3} = (₦ 57,271.30)	y < ₦ 19,090.33	₦ 19,090.33 ≤ y < ₦ 38,180.67	₦ 38,180.67 ≤ y ≤ ₦ 57,271.30

Table 4.10 shows the four poverty lines used in this study as well as the three newly proposed poverty levels (Starving households, extremely poor households and moderately poor households). For the $Zr_1 = \text{N}110,984.90$, when the per capita expenditure (y) of a given household is less than $\text{N}36,994.97$, the household is said to be a starving household, for the same mean per capita poverty line, if a given household has a per capita expenditure less than $\text{N}73,989.93$ and it's greater than or equal to $\text{N}36,994.97$, the household is said to be an extremely poor household. Additionally, for mean per capita poverty line, a moderately poor household is that household whose per capita expenditure is strictly between $\text{N}73,989.93$ and $\text{N}110,984.90$.

For $Zr_2 = \text{N}73,989.90$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{N}24,663.30$; extremely poor when it's per capita expenditure is less than $\text{N}49,326.60$ but greater than $\text{N}24,663.30$ and moderately poor when the per capita expenditure is strictly between $\text{N}49,326.60$ and $\text{N}73,989.90$. For $Zr_3 = \text{N}85,906.95$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{N}28,635.65$; extremely poor, when it's per capita expenditure is less than $\text{N}57,271.30$ but greater than or equal to $\text{N}28,635.65$ and moderately poor when the per capita expenditure is strictly between $\text{N}57,271.30$ and $\text{N}85,906.95$.

For $Zr_4 = \text{N}57,271.30$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{N}19,090.33$; extremely poor, when it's per capita expenditure is less than $\text{N}38,180.67$ but greater than or equal to $\text{N}19,090.33$ and moderately poor when the per capita expenditure is strictly between $\text{N}19,090.33$ and $\text{N}57,271.30$.

Table 4.11: Poverty Levels and Their Poverty Lines For North Central

Z	Starving Households	Extremely Poor Households	Moderately Poor Households
Z _{r1} = (98,859.44)	y < 32,953.15	32,953.15 ≤ y < 65,906.29	65,906.29 ≤ y ≤ 98,859.44
Z _{r2} = (65,906.29)	y < 21,968.76	21,968.76 ≤ y < 43,937.53	43,937.53 ≤ y ≤ 65,906.29
Z _{r3} = (83,738.77)	y < 27,912.92	27,912.92 ≤ y < 55,825.86	55,825.85 ≤ y ≤ 83,738.77
Z _{r4} = (55,825.85)	y < 18,608.62	18,608.62 ≤ y < 37,217.23	37,217.23 ≤ y ≤ 55,825.85

Table 4.11 shows the four poverty lines used in this study as well as the three newly proposed poverty levels (Starving households, extremely poor households and moderately poor households). For $Z_{r_1} = \text{₦}98,859.44$, when the per capita expenditure (y) of a given household is less than $\text{₦}32,953.15$, the household is said to be a starving household, for the same mean per capita poverty line, if a given household has a per capita expenditure less than $\text{₦}65,906.29$ and it's greater than or equal to $\text{₦}32,953.15$, the household is said to be an extremely poor household. Additionally, for mean per capita poverty line, a moderately poor household is that household whose per capita expenditure is strictly between $\text{₦}65,906.29$ and $\text{₦}98,859.44$.

For $Z_{r_2} = \text{₦}65,906.29$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}21,968.76$; extremely poor when it's per capita expenditure is less than $\text{₦}43,937.53$ but greater than or equal to $\text{₦}21,968.76$ and moderately poor when the per capita expenditure is strictly between $\text{₦}43,937.53$ and $\text{₦}65,906.29$.

For $Z_{r_3} = \text{₦}83,738.77$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}27,912.92$; extremely poor, when it's per capita expenditure is less than $\text{₦}55,825.86$ but greater than or equal to $\text{₦}27,912.92$ and moderately poor when the per capita expenditure is strictly between $\text{₦}55,825.86$ and $\text{₦}83,738.77$.

For $Z_{r_4} = \text{₦}55,825.85$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}18,608.62$; extremely poor, when it's per capita expenditure is less than $\text{₦}37,217.23$ but greater than or equal to $\text{₦}18,608.62$ and moderately poor when the per capita expenditure is strictly between $\text{₦}37,217.23$ and $\text{₦}55,825.85$.

Table 4.12: Poverty levels and their poverty lines for North East

Z	Starving Households	Extremely Poor Households	Moderately Poor Households
$Z_{r_1} =$ (₦ 99,216.21)	$y < \text{₦}33,072.07$	$\text{₦}33,072.07 \leq y < \text{₦}66,144.14$	$\text{₦}66,144.14 \leq y \leq \text{₦}99,216.21$
$Z_{r_2} =$ (₦ 66,144.14)	$y < \text{₦}22,048.05$	$\text{₦}22,048.05 \leq y < \text{₦}44,096.09$	$\text{₦}44,096.09 \leq y \leq \text{₦}66,144.14$
$Z_{r_3} =$ (₦ 74,086.50)	$y < \text{₦}24,695.50$	$\text{₦}24,695.50 \leq y < \text{₦}49,391.00$	$\text{₦}49,391.00 \leq y \leq \text{₦}74,086.50$
$Z_{r_4} =$ (₦ 49,391.00)	$y < \text{₦}16,463.67$	$\text{₦}16,463.67 \leq y < \text{₦}32,927.33$	$\text{₦}32,927.33 \leq y \leq \text{₦}49,391.00$

Table 4.12 shows the four poverty lines used in this study as well as the three newly proposed poverty levels (Starving households, extremely poor households and moderately poor households). For $Z_{r1} = \text{₦}99,216.21$, when the per capita expenditure (y) of a given household is less than $\text{₦}33,072.07$, the household is said to be a starving household, for the same mean per capita poverty line, if a given household has a per capita expenditure less than $\text{₦}66,144.14$ and it's greater than or equal to $\text{₦}33,072.07$, the household is said to be an extremely poor household. Additionally, for mean per capita poverty line, a moderately poor household is that household whose per capita expenditure is strictly between $\text{₦}66,144.14$ and $\text{₦}99,216.21$.

For $Z_{r2} = \text{₦}66,144.14$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}22,048.05$; extremely poor when it's per capita expenditure is less than $\text{₦}44,096.09$ but greater than or equal to $\text{₦}22,048.05$ and moderately poor when the per capita expenditure is strictly between $\text{₦}44,096.09$ and $\text{₦}66,144.14$.

For $Z_{r3} = \text{₦}74,086.50$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}24,695.50$; extremely poor, when it's per capita expenditure is less than $\text{₦}49,391.00$ but greater than or equal to $\text{₦}24,695.50$ and moderately poor when the per capita expenditure is strictly between $\text{₦}49,391.00$ and $\text{₦}74,086.50$.

For $Z_{r4} = \text{₦}49,391.00$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}16,463.67$; extremely poor, when it's per capita expenditure is less than $\text{₦}32,927.33$ but greater than or equal to $\text{₦}16,463.67$ and moderately poor when the per capita expenditure is strictly between $\text{₦}32,927.33$ and $\text{₦}49,391.00$.

Table 4.13: Poverty Levels and Their Poverty Lines for North West

Z	Starving Households	Extremely Poor Households	Moderately Poor Households
$Z_{r_1} =$ ($\text{₦}75,896.80$)	$y < \text{₦}25,298.93$	$\text{₦}25,298.93 \leq y < \text{₦}50,597.87$	$\text{₦}50,597.87 \leq y \leq \text{₦}75,896.80$
$Z_{r_2} =$ ($\text{₦}50,597.87$)	$y < \text{₦}16,865.96$	$\text{₦}16,865.96 \leq y < \text{₦}33,731.91$	$\text{₦}33,731.91 \leq y \leq \text{₦}50,597.87$
$Z_{r_3} =$ ($\text{₦}59,235.04$)	$y < \text{₦}19,745.01$	$\text{₦}19,745.01 \leq y < \text{₦}39,490.03$	$\text{₦}39,490.03 \leq y \leq \text{₦}59,235.04$
$Z_{r_4} =$ ($\text{₦}39,490.03$)	$y < \text{₦}13,163.34$	$\text{₦}13,163.34 \leq y < \text{₦}26,326.69$	$\text{₦}26,326.69 \leq y \leq \text{₦}39,490.03$

Table 4.13 shows the four poverty lines used in this study as well as the three newly proposed poverty levels (Starving households, extremely poor households and moderately poor households). For $Z_{r1} = \text{₦}75,896.80$, when the per capita expenditure (y) of a given household is less than $\text{₦}25,298.93$, the household is said to be a starving household, for the same mean per capita poverty line, if a given household has a per capita expenditure less than $\text{₦}50,597.87$ and it's greater than or equal to $\text{₦}25,298.93$, the household is said to be an extremely poor household. Additionally, for mean per capita poverty line, a moderately poor household is that household whose per capita expenditure is strictly between $\text{₦}50,597.87$ and $\text{₦}75,896.80$.

For $Z_{r2} = \text{₦}50,597.87$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}16,865.96$; extremely poor when it's per capita expenditure is less than $\text{₦}44,096.09$ but greater than or equal to $\text{₦}16,865.96$ and moderately poor when the per capita expenditure is strictly between $\text{₦}44,096.09$ and $\text{₦}50,597.87$.

For $Z_{r3} = \text{₦}59,235.04$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}19,745.01$; extremely poor, when it's per capita expenditure is less than $\text{₦}39,490.03$ but greater than or equal to $\text{₦}19,745.01$ and moderately poor when the per capita expenditure is strictly between $\text{₦}39,490.03$ and $\text{₦}59,235.04$.

For $Z_{r4} = \text{₦}39,490.03$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}13,163.34$; extremely poor, when it's per capita expenditure is less than $\text{₦}26,326.69$ but greater than or equal to $\text{₦}13,163.34$ and moderately poor when the per capita expenditure is strictly between $\text{₦}26,326.69$ and $\text{₦}39,490.03$.

Table 4.14: Poverty Levels and Their Poverty Lines For South East

Z	Starving Households	Extremely Poor Households	Moderately Poor Households
$Z_{r_1} =$ (₦ 120,363.70)	$y < \text{₦} 40,121.23$	$\text{₦}40,121.23 \leq y < \text{₦}80,242.47$	$\text{₦}80,242.47 \leq y \leq \text{₦}120,363.70$
$Z_{r_2} =$ (₦ 80,242.47)	$y < \text{₦}26,747.49$	$\text{₦}26,747.49 \leq y < \text{₦}53,494.98$	$\text{₦}53,494.98 \leq y \leq \text{₦}80,242.47$
$Z_{r_3} =$ (₦ 94,049.59)	$y < \text{₦}31,349.86$	$\text{₦}31,349.86 \leq y < \text{₦}62,699.73$	$\text{₦}62,699.73 \leq y \leq \text{₦}94,049.59$
$Z_{r_4} =$ (₦ 62,699.73)	$y < \text{₦}20,899.91$	$\text{₦}20,899.91 \leq y < \text{₦}41,799.82$	$\text{₦}41,799.82 \leq y \leq \text{₦}62,699.73$

Table 4.14 shows the four poverty lines used in this research as well as the three newly proposed poverty levels (Starving households, extremely poor households and moderately poor households). For $Zr_1 = \text{₦}120,363.70$, when the per capita expenditure (y) of a given household is less than $\text{₦} 40,121.23$, the household is said to be a starving household, for the same mean per capita poverty line, if a given household has a per capita expenditure less than $\text{₦}80,242.47$ and it's greater than or equal to $\text{₦} 40,121.23$, the household is said to be an extremely poor household. Additionally, for mean per capita poverty line, a moderately poor household is that household whose per capita expenditure is strictly between $\text{₦}80,242.47$ and $\text{₦}120,363.70$.

For $Zr_2 = \text{₦}80,242.47$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}26,747.49$; extremely poor when it's per capita expenditure is less than $\text{₦}53,494.98$ but greater than or equal to $\text{₦}26,747.49$ and moderately poor when the per capita expenditure is strictly between $\text{₦}53,494.98$ and $\text{₦}80,242.47$.

For $Zr_3 = \text{₦}94,049.59$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}31,349.86$; extremely poor, when it's per capita expenditure is less than $\text{₦}62,699.73$ but greater than or equal to $\text{₦}31,349.86$ and moderately poor when the per capita expenditure is strictly between $\text{₦}62,699.73$ and $\text{₦}94,049.59$.

For $Zr_4 = \text{₦}62,699.73$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}20,899.91$; extremely poor, when it's per capita expenditure is less than $\text{₦}41,799.82$ but greater than or equal to $\text{₦}20,899.91$ and moderately poor when the per capita expenditure is strictly between $\text{₦}41,799.82$ and $\text{₦}62,699.73$.

Table 4.15: Poverty Levels and Their Poverty Lines for South South

Z	Starving Households	Extremely Poor Households	Moderately Poor Households
$Z_{r_1} =$ (₦ 125,228.10)	$y < \text{₦} 41,742.70$	$\text{₦}41,742.70 \leq y < \text{₦}83,485.4$	$\text{₦}83,485.4 \leq y \leq \text{₦}125,228.10$
$Z_{r_2} =$ (₦ 83,485.40)	$y < \text{₦}27,828.47$	$\text{₦}27,828.47 \leq y < \text{₦}55,656.93$	$\text{₦}55,656.93 \leq y \leq \text{₦}83,485.40$
$Z_{r_3} =$ (₦ 97,213.30)	$y < \text{₦}32,404.43$	$\text{₦}32,404.43 \leq y < \text{₦}64,808.87$	$\text{₦}64,808.87 \leq y \leq \text{₦}97,213.30$
$Z_{r_4} =$ (₦ 64,808.90)	$y < \text{₦}21,602.97$	$\text{₦}21,602.97 \leq y < \text{₦}43,205.93$	$\text{₦}43,205.93 \leq y \leq \text{₦}64,808.90$

Table 4.15 shows the four poverty lines used in this research as well as the three newly proposed poverty levels (Starving households, extremely poor households and moderately poor households). For $Zr_1 = \text{₦}125,228.10$, when the per capita expenditure (y) of a given household is less than $\text{₦}41,742.70$, the household is said to be a starving household, for the same mean per capita poverty line, if a given household has a per capita expenditure less than $\text{₦}83,485.4$ and it's greater than or equal to $\text{₦}41,742.70$, the household is said to be an extremely poor household. Additionally, for mean per capita poverty line, a moderately poor household is that household whose per capita expenditure is strictly between $\text{₦}83,485.40$ and $\text{₦}125,228.10$.

For $Zr_2 = \text{₦}83,485.40$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}27,828.47$; extremely poor when it's per capita expenditure is less than $\text{₦}55,656.93$ but greater than or equal to $\text{₦}27,828.47$ and moderately poor when the per capita expenditure is strictly between $\text{₦}55,656.93$ and $\text{₦}83,485.40$.

For $Zr_3 = \text{₦}97,213.30$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}32,404.43$; extremely poor, when it's per capita expenditure is less than $\text{₦}64,808.87$ but greater than or equal to $\text{₦}32,404.43$ and moderately poor when the per capita expenditure is strictly between $\text{₦}64,808.87$ and $\text{₦}97,213.30$.

For $Zr_4 = \text{₦}64,808.87$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}21,602.97$; extremely poor, when it's per capita expenditure is less than $\text{₦}41,799.82$ but greater than or equal to $\text{₦}21,602.97$ and moderately poor when the per capita expenditure is strictly between $\text{₦}41,799.82$ and $\text{₦}64,808.87$.

Table 4.16: Poverty Levels and Their Poverty Lines For South West

Z	Starving Households	Extremely Poor Households	Moderately Poor Households
$Z_{r_1} =$ ($\text{N}155,049.10$)	$y < \text{N}51,683.03$	$\text{N}51,683.03 \leq y < \text{N}103,366.07$	$\text{N}103,366.07 \leq y \leq \text{N}155,049.10$
$Z_{r_2} =$ ($\text{N}103,366.07$)	$y < \text{N}34,455.36$	$\text{N}34,455.36 \leq y < \text{N}68,910.71$	$\text{N}68,910.71 \leq y \leq \text{N}103,366.07$
$Z_{r_3} =$ ($\text{N}128,154.40$)	$y < \text{N}42,718.13$	$\text{N}42,718.13 \leq y < \text{N}85,436.27$	$\text{N}85,436.27 \leq y \leq \text{N}128,154.40$
$Z_{r_4} =$ ($\text{N}85,433.60$)	$y < \text{N}28,478.76$	$\text{N}28,478.76 \leq y < \text{N}56,957.51$	$\text{N}56,957.51 \leq y \leq \text{N}85,433.60$

Table 4.16 shows the four poverty lines used in this research as well as the three newly proposed poverty levels (Starving households, extremely poor households and moderately poor households). For $Zr_1 = \text{₦}155,049.10$, when the per capita expenditure (y) of a given household is less than $\text{₦}51,683.03$, the household is said to be a starving household, for the same mean per capita poverty line, if a given household has a per capita expenditure less than $\text{₦}103,366.07$ and it's greater than or equal to $\text{₦}51,683.03$, the household is said to be an extremely poor household. Additionally, for mean per capita poverty line, a moderately poor household is that household whose per capita expenditure is strictly between $\text{₦}103,366.07$ and $\text{₦}155,049.10$.

For $Zr_2 = \text{₦}103,366.07$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}34,455.36$; extremely poor when it's per capita expenditure is less than $\text{₦}68,910.71$ but greater than or equal to $\text{₦}34,455.36$ and moderately poor when the per capita expenditure is strictly between $\text{₦}68,910.71$ and $\text{₦}103,366.07$.

For $Zr_3 = \text{₦}128,154.40$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}42,718.13$; extremely poor, when it's per capita expenditure is less than $\text{₦}68,910.71$ but greater than or equal to $\text{₦}42,718.13$ and moderately poor when the per capita expenditure is strictly between $\text{₦}68,910.71$ and $\text{₦}128,154.40$.

For $Zr_4 = \text{₦}68,910.71$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}28,478.76$; extremely poor, when it's per capita expenditure is less than $\text{₦}56,957.51$ but greater than or equal to $\text{₦}28,478.76$ and moderately poor when the per capita expenditure is strictly between $\text{₦}56,957.51$ and $\text{₦}68,910.71$.

Table 4.17: Poverty Levels and Their Poverty Lines for Rural Sector

Z	Starving Households	Extremely Poor Households	Moderately Poor Households
$Z_{r1} =$ (₦ 91,526.87)	$y < \text{₦}30,508.96$	$\text{₦}30,508.96 \leq y < \text{₦}61,017.91$	$\text{₦}61,017.91 \leq y \leq \text{₦}91,526.87$
$Z_{r2} =$ (₦ 61,017.91)	$y < \text{₦}20,339.30$	$\text{₦}20,339.30 \leq y < \text{₦}40,678.61$	$\text{₦}40,678.61 \leq y \leq \text{₦}61,017.91$
$Z_{r3} =$ (₦ 71,405.35)	$y < \text{₦}23,801.78$	$\text{₦}23,801.78 \leq y < \text{₦}47,603.57$	$\text{₦}47,603.57 \leq y \leq \text{₦}71,405.35$
$Z_{r4} =$ (₦ 47,603.57)	$y < \text{₦}15,867.85$	$\text{₦}15,867.85 \leq y < \text{₦}31,735.71$	$\text{₦}31,735.71 \leq y \leq \text{₦}47,603.57$

Table 4.17 shows the four poverty lines used in this research as well as the three newly proposed poverty levels (Starving households, extremely poor households and moderately poor households). For $Z_{r1} = \text{₦}91,526.87$, when the per capita expenditure (y) of a given household is less than $\text{₦}30,508.96$, the household is said to be a starving household, for the same mean per capita poverty line, if a given household has a per capita expenditure less than $\text{₦}61,017.91$ and it's greater than or equal to $\text{₦}30,508.96$, the household is said to be an extremely poor household. Additionally, for mean per capita poverty line, a moderately poor household is that household whose per capita expenditure is strictly between $\text{₦}61,017.91$ and $\text{₦}91,526.87$.

For $Z_{r2} = \text{₦}61,017.91$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}20,339.30$; extremely poor when it's per capita expenditure is less than $\text{₦}40,678.61$ but greater than or equal to $\text{₦}20,339.30$ and moderately poor when the per capita expenditure is strictly between $\text{₦}40,678.61$ and $\text{₦}61,017.91$.

For $Z_{r3} = \text{₦}71,405.35$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}23,801.78$; extremely poor, when it's per capita expenditure is less than $\text{₦}47,603.57$ but greater than or equal to $\text{₦}23,801.78$ and moderately poor when the per capita expenditure is strictly between $\text{₦}47,603.57$ and $\text{₦}71,405.35$.

For $Z_{r4} = \text{₦}47,603.57$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}15,867.85$; extremely poor, when it's per capita expenditure is less than $\text{₦}31,735.71$ but greater than or equal to $\text{₦}15,867.85$ and moderately poor when the per capita expenditure is strictly between $\text{₦}31,735.71$ and $\text{₦}47,603.57$.

Table 4.18: Poverty Levels and Their Poverty Lines for Urban Sector

Z	Starving Households	Extremely Poor Households	Moderately Poor Households
$Z_{r_1} =$ (₦ 155,995.10)	$y < \text{₦}51,998.30$	$\text{₦}51,998.30 \leq y < \text{₦}103,996.73$	$\text{₦}103,996.73 \leq y \leq \text{₦}155,995.10$
$Z_{r_2} =$ (₦ 103,996.70)	$y < \text{₦}34,665.57$	$\text{₦}34,665.57 \leq y < \text{₦}69,331.13$	$\text{₦}69,331.13 \leq y \leq \text{₦}103,996.70$
$Z_{r_3} =$ (₦ 123,700.20)	$y < \text{₦}41,233.40$	$\text{₦}41,233.40 \leq y < \text{₦}82,466.80$	$\text{₦}82,466.80 \leq y \leq \text{₦}123,700.20$
$Z_{r_4} =$ (₦ 82,466.80)	$y < \text{₦}27,488.93$	$\text{₦}27,488.93 \leq y < \text{₦}54,977.89$	$\text{₦}54,977.89 \leq y \leq \text{₦}82,466.80$

Table 4.18 shows the four poverty lines used in this study as well as the three newly proposed poverty levels (Starving households, extremely poor households and moderately poor households). For $Z_{r_2} = \text{₦}155,995.10$, when the per capita expenditure (y) of a given household is less than $\text{₦}51,998.30$, the household is said to be a starving household, for the same mean per capita poverty line, if a given household has a per capita expenditure less than $\text{₦}103,996.73$ and it's greater than or equal to $\text{₦}51,998.30$, the household is said to be an extremely poor household. Additionally, for mean per capita poverty line, a moderately poor household is that household whose per capita expenditure is strictly between $\text{₦}103,996.73$ and $\text{₦}155,995.10$.

For $Z_{r_2} = \text{₦}103,996.73$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}34,665.57$; extremely poor when it's per capita expenditure is less than $\text{₦}69,331.13$ but greater than or equal to $\text{₦}34,665.57$ and moderately poor when the per capita expenditure is strictly between $\text{₦}69,331.13$ and $\text{₦}103,996.73$.

For $Z_{r_3} = \text{₦}123,700.20$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}41,233.40$; extremely poor, when it's per capita expenditure is less than $\text{₦}82,466.80$ but greater than or equal to $\text{₦}41,233.40$ and moderately poor when the per capita expenditure is strictly between $\text{₦}82,466.80$ and $\text{₦}123,700.20$.

For $Z_{r_4} = \text{₦}82,466.80$, a household is said to be a starving household when the per capita expenditure (y) is less than $\text{₦}27,488.93$; extremely poor, when it's per capita expenditure is less than $\text{₦}54,977.89$ but greater than or equal to $\text{₦}27,488.93$ and moderately poor when the per capita expenditure is strictly between $\text{₦}54,977.89$ and $\text{₦}82,466.80$.

4.5: Number of Households and Proportion of Those Who Fall Under These Poverty Levels For The Relative Poverty Lines And Hybrid Poverty Lines.

Table 4.19 to table 4.54 give the number of households and proportions of those who fall under these poverty levels for the relative poverty lines and hybrid poverty lines for the whole Country, the Geo-political zones and Sectoral Divisions.

Table 4.19: Poverty Levels and Their Proportions/Number of poor Households for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for the Whole country.

Z(code)	B	Z Value	Starvation (n₁)	Extremely Poor (n₂)	Moderately Poor (n₃)
Zr ₁	-	110,984.90	0.6609 (389)	0.3175(1478)	0.2467 (1132)
	0.1	36,427.56	0.0011 (5)	0.0174 (79)	0.0628 (285)
	0.2	116,401.00	0.1027 (466)	0.3397 (1541)	0.2447 (1110)
	0.3	371,949.20	0.7198 (3265)	0.2172 (985)	0.0450 (204)
	0.4	1,188,530.00	0.9868 (4476)	0.0112 (51)	0.0013 (6)
	0.5	3,797,841.00	0.9998 (4533)	0.0004 (2)	0.0000 (0)
	0.6	12,135,653.00	0.9998 (4535)	0.0002 (1)	0.0000(0)
	0.7	38,778,372.00	1.0000 (4536)	0.0000 (0)	0.0000 (0)
	0.8	124,000,000.00	1.0000 (4536)	0.0000 (0)	0.0000 (0)
	0.9	396,000,000.00	1.0000 (4536)	0.0000 (0)	0.0000 (0)

Table 4.19 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r1} and Z_H for Whole Country. The Z_{r1} was obtained at ₦110,984.90 conventionally with 389 starving households, 1478 extremely poor households and 1132 moderately poor households. At $\beta = 0.1$, Z_H was obtained as ₦36,427.56 with 5 starving households, 79 extremely poor households and 285 moderately poor households. From $\beta = 0.1$ to 0.7 an increase in the starving households is observe. Maximum number of household (4536) was attained at $\beta = 0.7$ were all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decrease from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.7$ to $\beta = 0.9$.

Table 4.20: Poverty Levels and Their Proportions/Number of poor Households for Relative (2/3 Mean Per Capital Exp) and Hybrid Poverty Lines(Z_H) for the Whole country

Z(code)	B	Z Value	Starvation (n₁)	Extremely Poor (n₂)	Moderately Poor (n₃)
Z_{r2}	-	73,989.90	0.0198 (90)	0.1704 (773)	0.2213 (1004)
	0.1	34,980.09	0.0009 (4)	0.0146 (66)	0.0549 (249)
	0.2	107,334.30	0.0772 (350)	0.3186 (1445)	0.2436 (1105)
	0.3	329,348.90	0.6568 (2979)	0.2575 (1168)	0.0573 (260)
	0.4	1,010,587.00	0.9742 (4419)	0.0227 (103)	0.0018 (8)
	0.5	3,100,924.00	0.9987 (4530)	0.0009 (4)	0.0002 (1)
	0.6	9,514,491.00	0.9998 (4535)	0.0002 (1)	0.0000 (0)
	0.7	29,196,156.00	1.0000 (4536)	0.0000 (0)	0.0000 (0)
	0.8	89,586,577.00	1.0000 (4536)	0.0000 (0)	0.0000 (0)
	0.9	275,000,000.00	1.0000 (4536)	0.0000 (0)	0.0000 (0)

Table 4.20 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r2} and Z_H for Whole Country. The Z_{r2} was obtained at ₦73,989.90 conventionally with 90 starving households, 773 extremely poor households and 1004 moderately poor households. At $\beta = 0.1$, Z_H was obtained as ₦34,980.09 with 4 starving households, 66 extremely poor households and 294 moderately poor households. From $\beta = 0.1$ to 0.7 an increase in the starving households is observe. Maximum number of household (4536) was attained at $\beta = 0.7$ where all households are starving. . For the extremely and moderately poor poverty level, the number of house in these categories, decrease from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.7$ to $\beta = 0.9$.

Table 4.21: Poverty Levels and Their Proportions/Number of poor Households for Relative (Median Per Capita Exp) and Hybrid Poverty Lines (Z_H) for the Whole country

Z (Code)	B	Z Value	Starvation (n_1)	Extremely Poor (n_2)	Moderately Poor (n_3)
Z_{r_3}	-	85,906.95	0.0355 (161)	0.2315 (1050)	0.5377 (2439)
	0.1	35,506.39	0.0009 (4)	0.0163 (74)	0.0732 (332)
	0.2	110,588.40	0.0847 (384)	0.3256 (1477)	0.3093 (1403)
	0.3	344,439.50	0.6788 (3079)	0.2467 (1119)	0.0622 (282)
	0.4	1,072,793.00	0.9788 (4440)	0.0073 (33)	0.0132 (60)
	0.5	3,341,327.00	0.9957 (4533)	0.0004 (2)	0.0000 (0)
	0.6	1,046,910.00	0.9998 (4535)	0.0002 (1)	0.0000 (0)
	0.7	32,413,405.00	1.0000 (4536)	0.0000 (0)	0.0000 (0)
	0.8	101,000,000.00	1.0000 (4536)	0.0000 (0)	0.0000 (0)
	0.9	314,000,000.00	1.0000 (4536)	0.0000 (0)	0.0000 (0)

Table 4.21 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r3} and Z_H for Whole Country. The Z_{r3} was obtained at ₦85,906.95 conventionally with 161 starving households, 1050 extremely poor households and 2439 moderately poor households. At $\beta = 0.1$, Z_H was obtained as ₦35,506.39 with 4 starving households, 74 extremely poor households and 332 moderately poor households. From $\beta = 0.1$ to 0.7 an increase in the starving households is observe. Maximum number of household (4536) was attained at $\beta = 0.7$ where all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decrease from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.7$ to $\beta = 0.9$.

Table 4.22: Poverty Levels and Their Proportions/Number of poor Households for Relative (2/3 Median Per Capita Exp) and Hybrid Poverty Lines (Z_H) for the Whole country.

Z (Code)	B	Z Value	Starvation (n ₁)	Extremely Poor (n ₂)	Moderately Poor (n ₃)
Zr ₄	-	57,271.30	0.0075 (34)	0.0873 (396)	0.1722 (78)
	0.1	34,095.52	0.0009 (4)	0.0137 (62)	0.0518 (235)
	0.2	101,974.50	0.0641 (291)	0.3047 (1382)	0.2416 (1096)
	0.3	304,990.00	0.6083 (2759)	0.2881 (1307)	0.0686 (311)
	0.4	912,177.80	0.9985 (4529)	0.0000 (0)	0.0000 (0)
	0.5	2,728,182.00	0.9985 (4529)	0.0011 (5)	0.0002 (1)
	0.6	8,159,566.00	0.9998 (4535)	0.0002 (1)	0.0000 (0)
	0.7	24,403,986.00	1.0000 (4536)	0.0000 (0)	0.0000 (0)
	0.8	72,988,507.00	1.0000 (4536)	0.0000 (0)	0.0000 (0)
	0.9	218,297,211.00	1.0000 (4536)	0.0000 (0)	0.0000 (0)

Table 4.22 shows the poverty levels, number of households in each poverty level and their proportions for Z_r and Z_H for Whole Country. The Z_{r4} was obtained as ₦57,271.30 conventionally with 34 starving households, 396 extremely poor households and 78 moderately poor households. At $\beta = 0.1$, Z_H was obtained as ₦34,095.52 with 4 starving households, 62 extremely poor households and 235 moderately poor households. From $\beta = 0.1$ to 0.7 an increase in the starving households is observe. Maximum number of household (4536) was attained at $\beta = 0.7$ where all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decrease from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.7$ to $\beta = 0.9$.

Table 4.23: Poverty Levels and Proportions/Number of Poor Households for Relative (Mean Per Capita Exp.) and Hybrid Poverty Lines (Z_H) for North Central

Z (Code)	B	Z Value	Starvation (n₁)	Extremely Poor (n₂)	Moderately Poor (n₃)
Zr ₁	-	98,859.44	0.0545 (42)	0.2931 (226)	0.2646 (204)
	0.1	26,008.54	0.0013 (1)	0.0104 (8)	0.0182 (14)
	0.2	113,738.60	0.0817 (63)	0.3489 (269)	0.2737 (211)
	0.3	359,260.90	0.7367(568)	0.2283 (176)	0.0272 (21)
	0.4	1,134,781.00	0.9961 (768)	0.0000 (0)	0.0039 (3)
	0.5	3,584,379.00	1.0000 (771)	0.0000 (0)	0.0000 (0)
	0.6	11,321,806.00	1.0000 (771)	0.0000 (0)	0.0000 (0)
	0.7	35,761,650.00	1.0000 (771)	0.0000 (0)	0.0000 (0)
	0.8	113,000,000.00	1.0000 (771)	0.0000 (0)	0.0000 (0)
	0.9	357,000,000.00	1.0000 (771)	0.0000 (0)	0.0000 (0)

Table 4.23 shows the poverty levels, number of households in each poverty level and their proportions for the relative poverty line (Z_{r1}) = mean per capita expenditure and hybrid poverty lines for North Central. The Z_{r1} was obtained at ₦98,859.44 conventionally with 42 starving households, 226 extremely poor households and 204 moderately poor households. At $\beta = 0.1$, hybrid poverty line was obtained at ₦26,008.54 with 1 starving household, 8 extremely poor households and 14 moderately poor households. From $\beta = 0.1$ to 0.5 an increase in the starving households is observed. Maximum number of household (771) was attained at $\beta = 0.5$ where all households are starving. For the extremely and moderately poor poverty level, the number of households in these categories, decrease from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.5$ to $\beta = 0.9$.

Table 4.24: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Mean Per Capital Exp) and Hybrid Poverty Lines (Z_H) for North Central

Z (Code)	B	Z Value	Starvation (n₁)	Extremely Poor (n₂)	Moderately Poor (n₃)
Zr ₂	-	65,906.29	0.0259 (20)	0.0947 (73)	0.2270(175)
	0.1	34,577.71	0.0026(2)	0.0246 (19)	0.0402 (31)
	0.2	104,879.20	0.0687 (53)	0.3139 (242)	0.2724 (210)
	0.3	318,113.80	0.6615 (510)	0.2879 (222)	0.0363 (28)
	0.4	964,884.70	0.9857 (760)	0.0143 (11)	0.0000 (0)
	0.5	2,926,633.00	1.0000(771)	0.0000 (0)	0.0000 (0)
	0.6	8,876,892.00	1.0000 (771)	0.0000 (0)	0.0000 (0)
	0.7	26,924,872.00	1.0000 (771)	0.0000 (0)	0.0000 (0)
	0.8	81,700,000.00	1.0000 (771)	0.0000 (0)	0.0000 (0)
	0.9	248,000,000.00	1.0000 (771)	0.0000 (0)	0.0000 (0)

Table 4.24 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r2} and Z_H for North Central. The Z_{r2} was obtained at ₦65,906.29 conventionally with 20 starving households, 73 extremely poor households and 175 moderately poor households. At $\beta = 0.1$, Z_H was obtained at ₦34,577.71 with 2 starving households, 19 extremely poor households and 31 moderately poor households. From $\beta = 0.1$ to 0.5 an increase in the starving households is observe. Maximum number of household (771) was attained at $\beta = 0.5$ where all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decrease from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.5$ to $\beta = 0.9$.

Table 4.25: Poverty Levels and Proportions/Number of Poor Households for Relative (Median Per Capita Exp) and Hybrid Poverty Lines(Z_H) for North Central

Z (Code)	B	Z Value	Starvation (n₁)	Extremely Poor (n₂)	Moderately Poor (n₃)
Z_{r3}	-	83,738.77	0.3372 (26)	0.1894 (146)	0.2776 (214)
	0.1	35,415.74	0.0026 (2)	0.0259 (20)	0.0441 (34)
	0.2	110,024.50	0.0791 (61)	0.3294 (254)	0.2789 (215)
	0.3	341,808.20	0.7069 (545)	0.2542 (196)	0.2828 (22)
	0.4	1,061,880.00	0.9909 (545)	0.00091 (7)	0.0000 (0)
	0.5	3,298,892.00	1.0000 (771)	0.0000 (0)	0.0000 (0)
	0.6	10,248,511.00	1.0000 (771)	0.0000 (0)	0.0000 (0)
	0.7	31,838,562.00	1.0000 (771)	0.0000 (0)	0.0000 (0)
	0.8	98,911,346.00	1.0000 (771)	0.0000 (0)	0.0000 (0)
	0.9	307,000,000.00	1.0000 (771)	0.0000 (0)	0.0000 (0)

Table 4.25 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r3} and Z_H for North Central. The Z_{r3} was obtained at ₦83,738.77 conventionally with 26 starving households, 146 extremely poor households and 214 moderately poor households. At $\beta = 0.1$, Z_H was obtained as ₦35,415.74 with 2 starving households, 20 extremely poor households and 34 moderately poor households. From $\beta = 0.1$ to 0.5 an increase in the starving households is observe. Maximum number of household (771) was attained at $\beta = 0.5$ where all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decrease from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.5$ to $\beta = 0.9$.

Table 4.26: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 median per capital exp) and Hybrid Poverty Lines (Z_H) for North Central

Z (Code)	B	Z Value	Starvation (n_1)	Extremely Poor (n_2)	Moderately Poor (n_3)
Z_{r4}	-	55,825.85	0.0156 (12)	0.0645 (50)	0.1427 (110)
	0.1	34,008.47	0.0026 (2)	0.0246 (19)	0.0363 (28)
	0.2	101,454.40	0.0584 (45)	0.3074 (237)	0.2659 (205)
	0.3	302,660.00	0.6265 (483)	0.3126 (241)	0.04540 (35)
	0.4	902,898.20	0.9812 (758)	0.0169 (13)	0.0000 (0)
	0.5	2,693,534.00	1.0000 (771)	0.0000 (0)	0.0000 (0)
	0.6	8,035,373.00	1.0000 (771)	0.0000 (0)	0.0000 (0)
	0.7	23,971,189.00	1.0000 (771)	0.0000 (0)	0.0000 (0)
	0.8	71,511,045.00	1.0000 (771)	0.0000 (0)	0.0000 (0)
	0.9	213,332,321.00	1.0000 (771)	0.0000 (0)	0.0000 (0)

Table 4.26 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r4} and Z_H for North Central. The Z_{r4} was obtained as ₦55,825.85 conventionally with 12 starving households, 50 extremely poor households and 110 moderately poor households. At $\beta = 0.1$, Z_H was obtained as ₦34,008.47 with 2 starving households, 19 extremely poor households and 28 moderately poor households. From $\beta = 0.1$ to 0.5 an increase in the starving households is observed. Maximum number of household (771) was attained at $\beta = 0.5$ where all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decrease from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.5$ to $\beta = 0.9$.

Table 4.27: Poverty Levels and Proportions/Number of Poor Households for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for North East

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor (n_2)	Moderately Poor (n_3)
Z_{r1}	-	99,216.21	0.0670 (49)	0.3488 (225)	0.2777 (203)
	0.1	36,021.51	0.0000 (0)	0.0205 (15)	0.0711 (52)
	0.2	113,820.50	0.1067 (78)	0.4268 (312)	0.2339 (171)
	0.3	359,649.30	0.7975 (582)	0.1519 (111)	0.0274 (20)
	0.4	1,136,417.00	0.9781 (715)	0.0192 (14)	0.0014 (1)
	0.5	3,590,840.00	0.9986 (730)	0.0014 (1)	0.0000 (0)
	0.6	11,346,304.00	1.0000 (731)	0.0000 (0)	0.0000 (0)
	0.7	35,851,942.00	1.0000 (731)	0.0000 (0)	0.0000 (0)
	0.8	113,000,000.00	1.0000 (731)	0.0000 (0)	0.0000 (0)
	0.9	358,000,000.00	1.0000 (731)	0.0000 (0)	0.0000 (0)

Table 4.27 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r1} and Z_H for North East. The Z_{r1} was obtained at $\text{N}99,216.21$ conventionally with 49 starving households, 225 extremely poor households and 203 moderately poor households. At $\beta = 0.1$, Z_H was obtained as $\text{N}36,021.51$ with no starving households, 15 extremely poor households and 52 moderately poor households. From $\beta = 0.2$ to 0.6 an increase in the starving households is observe. Maximum number of household (731) was attained at $\beta = 0.6$ were all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decrease from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.6$ to $\beta = 0.9$.

Table 4.28: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Mean Per Capital Exp) and Hybrid Poverty Lines(Z_H) for North East

Z (Code)	B	Z Value	Starvation (n₁)	Extremely Poor(n₂)	Moderately Poor(n₃)
Z_{r2}	-	66,144.14	0.0151 (11)	0.1546 (113)	0.2462 (180)
	0.1	34,590.17	0.0000 (0)	0.0151 (11)	0.0670 (49)
	0.2	104,954.80	0.0876 (64)	0.3735 (273)	0.2599 (190)
	0.3	318,457.80	0.7387 (540)	0.2107 (154)	0.0219 (16)
	0.4	966,276.10	0.9716 (710)	0.0246 (18)	0.0074 (1)
	0.5	2,931,909.00	0.9973 (729)	0.0027 (2)	0.0000 (0)
	0.6	8,896,100.00	1.0000 (731)	0.0000 (0)	0.0000 (0)
	0.7	26,992,854.00	1.0000 (731)	0.0000 (0)	0.0000 (0)
	0.8	81,902,649.00	1.0000 (731)	0.0000 (0)	0.0000 (0)
	0.9	249,000,000.00	1.0000 (731)	0.0000 (0)	0.0000 (0)

Table 4.28 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r2} and Z_H for North East. The Z_{r2} was obtained at ₦66,144.14 conventionally with 11 starving households, 113 extremely poor households and 180 moderately poor households. At $\beta = 0.1$, Z_H was obtained at ₦34,590.17 with 0 starving households, 11 extremely poor households and 49 moderately poor households. From $\beta = 0.2$ to 0.6 an increase in the starving households is observed. Maximum number of household (731) was attained at $\beta = 0.6$ where all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decrease from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.6$ to $\beta = 0.9$.

Table 4.29: Poverty Levels and Proportions/Number of Poor Households for Relative (Median Per Capita Exp) and Hybrid Poverty Lines (Z_H) for North East

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor(n_2)	Moderately Poor(n_3)
Z_{r3}	-	74,086.50	0.023 (17)	0.1943 (142)	0.2832 (207)
	0.1	34,984.65	0.0000 (0)	0.0164 (12)	0.0711 (52)
	0.2	107,362.00	0.0889 (65)	0.3871 (283)	0.2531 (185)
	0.3	329,478.00	0.7524 (550)	0.1806 (132)	0.0397 (29)
	0.4	1,011,114.00	0.9767 (714)	0.0205 (15)	0.0000 (0)
	0.5	3,102,947.00	1.0000 (731)	0.0000 (0)	0.0000 (0)
	0.6	9,522,441.00	1.0000 (731)	0.0000 (0)	0.0000 (0)
	0.7	29,222,825.00	1.0000 (731)	0.0000 (0)	0.0000 (0)
	0.8	89,680,105.00	1.0000 (731)	0.0000 (0)	0.0000 (0)
	0.9	275,213,682.00	1.0000 (731)	0.0000 (0)	0.0000 (0)

Table 4.29 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r3} and Z_H for North East. The Z_{r3} was obtained at ₦74,086.65 conventionally with 17 starving households, 142 extremely poor households and 207 moderately poor households. At $\beta = 0.1$, Z_H was obtained at ₦34,984.65 with 0 starving households, 12 extremely poor households and 52 moderately poor households. From $\beta = 0.2$ to 0.5 an increase in the starving households is observe. Maximum number of household (731) was attained at $\beta = 0.5$ where all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decrease from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.5$ to $\beta = 0.9$.

Table 4.30: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Median Per Capita Exp) and Hybrid Poverty Lines (Z_H) for North East

Z (Code)	B	Z Value	Starvation (n₁)	Extremely Poor(n₂)	Moderately Poor(n₃)
Zr ₄	-	49,391.00	0.0014 (1)	0.0657 (48)	0.1505 (110)
	0.1	33,594.51	0.0000 (0)	0.0151 (11)	0.0575 (42)
	0.2	98,999.62	0.0670 (49)	0.3447 (252)	0.2818 (206)
	0.3	291,741.90	0.6840 (500)	0.2271 (166)	0.0575 (42)
	0.4	859,733.40	0.9672 (707)	0.0274 (20)	0.0027 (2)
	0.5	2,533,545.00	0.9973 (729)	0.0027 (2)	0.0000 (0)
	0.6	7,466,095.00	1.0000 (731)	0.0000 (0)	0.0000 (0)
	0.7	22,001,805.00	1.0000 (731)	0.0000 (0)	0.0000 (0)
	0.8	64,837,028.00	1.0000 (731)	0.0000 (0)	0.0000 (0)
	0.9	191,067,969.00	1.0000 (731)	0.0000 (0)	0.0000 (0)

Table 4.30 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r4} and Z_H for North East. The Z_{r4} was obtained as ₦49,391.00 conventionally with 1 starving households, 48 extremely poor households and 110 moderately poor household. At $\beta = 0.1$, Z_H was obtained as ₦33,594.51 with no starving household, 11 extremely poor households and 42 moderately poor households. From $\beta = 0.2$ to 0.7 an increase in the starving households is observe. Maximum number of household (731) was attained at $\beta = 0.6$ were all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decreased from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.6$ to $\beta = 0.9$.

Table 4.31: Poverty Levels and Proportions/Number of poor Households for Relative (Mean Per capita Exp) and Hybrid Poverty Lines(Z_H) for North West

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor(n_2)	Moderately Poor(n_3)
Z_{r_1}	-	75,896.80	0.0325 (28)	0.3376 (291)	0.3063 (264)
	0.1	35,069.20	0.0325 (28)	0.0858 (74)	0.0000 (0)
	0.2	107,882.00	0.1311 (113)	0.5081 (438)	0.2401 (207)
	0.3	331,873.00	0.8840 (762)	0.1021 (88)	0.0093 (8)
	0.4	1,020,926.00	0.9965 (859)	0.0023 (2)	0.0000 (0)
	0.5	3,140,628.00	0.9988 (861)	0.0000 (1)	0.0000 (0)
	0.6	9,661,374.00	0.9988 (861)	0.0012 (1)	0.0000 (0)
	0.7	30,000,000.00	1.0000 (862)	0.0000 (0)	0.0000 (0)
	0.8	91,000,000.00	1.0000 (862)	0.0000 (0)	0.0000 (0)
	0.9	280,000,000.00	1.0000 (862)	0.0000 (0)	0.0000 (0)

Table 4.31 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r1} and Z_H for North West. The Z_{r1} was obtained as ₦75,896.80 conventionally with 28 starving households, 291 extremely poor households and 264 moderately poor household. At $\beta = 0.1$, Z_H was obtained as ₦35,069.20 with 28 starving household, 74 extremely poor households and no moderately poor households. From $\beta = 0.2$ to 0.7 an increase in the starving households is observe. Maximum number of household (862) was attained at $\beta = 0.7$ were all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decreased from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.7$ to $\beta = 0.9$.

Table 4.32: Poverty Levels and Proportions/Number of poor Households for Relative (2/3 Mean Per Capital Exp) and Hybrid Poverty Lines (Z_H) for North West

Z(Code)	β	Z Value	Starvation (n_1)	Extremely Poor(n_2)	Moderately Poor(n_3)
Z_{r_2}	-	50,597.87	0.0058 (5)	0.0975 (84)	0.2657 (229)
	0.1	33,675.70	0.0023 (2)	0.0116 (10)	0.0882 (76)
	0.2	99,478.80	0.0975 (84)	0.4919 (424)	0.2448 (211)
	0.3	293,862.00	0.8260(712)	0.1473 (127)	0.0186 (16)
	0.4	868,076.00	0.9919(855)	0.0071 (6)	0.0000 (0)
	0.5	2,564,313.00	0.9988(861)	0.0000 (1)	0.0000 (0)
	0.6	7,575,029.00	0.9988(861)	0.0012 (1)	0.0000 (0)
	0.7	22,000,000.00	1.0000(862)	0.0000 (0)	0.0000 (0)
	0.8	66,000,000.00	1.0000(862)	0.0000 (0)	0.0000 (0)
	0.9	200,000,000.00	1.0000(862)	0.0000 (0)	0.0000 (0)

Table 4.32 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r2} and Z_H for North West. The Z_{r2} was obtained as ₦50,597.87 conventionally with 5 starving households, 84 extremely poor households and 229 moderately poor household. At $\beta = 0.1$, Z_H was obtained as ₦33,675.70 with 2 starving household, 10 extremely poor households and 76 moderately poor households. From $\beta = 0.2$ to 0.7 an increase in the starving households is observe. Maximum number of household (862) was attained at $\beta = 0.7$ were all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decreased from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.6$ to $\beta = 0.9$.

Table 4.33: Poverty Levels and Proportions/Number of poor Households for Relative (Median Per Capita Exp) and Hybrid Poverty Lines(Z_H) for North West

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor(n_2)	Moderately Poor(n_3)
Z_{r_3}	-	59,235.04	0.0070 (6)	0.4930 (425)	0.0000 (0)
	0.1	34,210.66	0.0023 (2)	0.0139 (12)	0.0940 (81)
	0.2	102,664.40	0.1102 (95)	0.4988 (430)	0.2425 (209)
	0.3	308,090.30	0.8515 (734)	0.1102 (95)	0.0325 (28)
	0.4	924,562.20	0.9846 (857)	0.0046 (4)	0.0000 (0)
	0.5	2,774,560.00	0.9988 (861)	0.0000 (0)	0.0000 (0)
	0.6	8,326,300.00	0.9988 (861)	0.0012 (1)	0.0000 (0)
	0.7	24,986,759.00	1.0000 (862)	0.0000 (0)	0.0000 (0)
	0.8	74,983,860.00	1.0000 (862)	0.0000 (0)	0.0000 (0)
	0.9	225,022,356.00	1.0000 (862)	0.0000 (0)	0.0000 (0)

Table 4.33 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r3} and Z_H for North West. The Z_{r4} was obtained as ₦59,235.04 conventionally with 6 starving households, 425 extremely poor households and no moderately poor household. At $\beta = 0.1$, Z_H was obtained as ₦34,210.66 with 2 starving household, 12 extremely poor households and 81 moderately poor households. From $\beta = 0.2$ to 0.7 an increase in the starving households is observe. Maximum number of household (862) was attained at $\beta = 0.7$ were all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decreased from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.5$ to $\beta = 0.9$.

Table 4.34: Poverty Levels and Proportions/Number of poor Households for Relative (2/3 Median Per Capita Exp) and Hybrid Poverty Lines (Z_H) for North West

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor(n_2)	Moderately Poor(n_3)
Z_{r4}	-	39,490.03	0.0023 (2)	0.0383 (33)	0.1531 (132)
	0.1	32,851.28	0.0012 (1)	0.0112 (10)	0.0615 (53)
	0.2	94,667.61	0.0789 (68)	0.4722 (407)	0.2610 (225)
	0.3	272,803.90	0.7900 (681)	0.1821 (157)	0.0197 (17)
	0.4	786,139.50	0.9896 (853)	0.0093 (8)	0.0012 (1)
	0.5	2,265,419.00	0.9988 (861)	0.0013 (1)	0.0000 (0)
	0.6	6,528,258.00	0.9988 (861)	0.0012 (1)	0.0000 (0)
	0.7	18,812,480.00	1.0000 (862)	0.0000 (0)	0.0000 (0)
	0.8	54,211,923.00	1.0000 (862)	0.0000 (0)	0.0000 (0)
	0.9	156,222,494.00	1.0000 (862)	0.0000 (0)	0.0000 (0)

Table 4.34 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r4} and Z_H for North west. The Z_{r4} was obtained as ₦39,490.03 conventionally with 2 starving households, 33 extremely poor households and 132 moderately poor households. At $\beta = 0.1$, Z_H was obtained as ₦32,851.28 with 1 starving household, 10 extremely poor households and 53 moderately poor households. From $\beta = 0.2$ to 0.7 an increase in the starving households is observe. Maximum number of household (862) was attained at $\beta = 0.7$ were all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decreased from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.7$ to $\beta = 0.9$

Table 4.35: Poverty Levels and Proportions/Number of Poor Households for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for South East

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor(n_2)	Moderately Poor (n_3)
Z_{r1}	-	120,363.70	0.1188 (89)	0.2790 (209)	0.2630 (197)
	0.1	36,724.27	0.0000 (0)	0.0093 (7)	0.0801 (60)
	0.2	118,305.00	0.1122 (84)	0.2790 (209)	0.2590 (194)
	0.3	381,112.50	0.6889 (516)	0.2310 (173)	0.0587 (44)
	0.4	1,227,730.00	0.9826 (736)	0.0134 (10)	0.0040 (3)
	0.5	3,955,055.00	1.0000 (749)	0.0000 (0)	0.0000 (0)
	0.6	12,740,960.00	1.0000 (749)	0.0000 (0)	0.0000 (0)
	0.7	41,044,192.00	1.0000 (749)	0.0000 (0)	0.0000 (0)
	0.8	132,000,000.00	1.0000 (749)	0.0000 (0)	0.0000 (0)
	0.9	426,000,000.00	1.0000 (749)	0.0000 (0)	0.0000 (0)

Table 4.35 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r1} and Z_H for South East. The Z_{r1} was obtained at ₦120,363.70 conventionally with 89 starving households, 209 extremely poor households and 197 moderately poor households. At $\beta = 0.1$, Z_H was obtained at ₦36,724.27 with no starving households, 7 extremely poor households and 60 moderately poor households. From $\beta = 0.2$ to 0.6 an increase in the starving households is observe. Maximum number of household (749) was attained at $\beta = 0.5$ were all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decrease from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.5$ to $\beta = 0.9$

Table 4.36: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Mean Per Capital Exp) and Hybrid Poverty Lines (Z_H) for South East

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor(n_2)	Moderately Poor (n_3)
Z_{r_2}	-	80,242.47	0.0200 (15)	0.1924 (144)	0.1856 (139)
	0.1	35,264.99	0.0000 (0)	0.0080 (6)	0.0641 (48)
	0.2	109,089.90	0.0854 (64)	0.2724 (204)	0.2483 (186)
	0.3	37,462.10	0.6235 (467)	0.2737 (205)	0.0668 (50)
	0.4	1,043,916.00	0.9693 (726)	0.0267 (20)	0.0013 (1)
	0.5	3,229,280.00	0.9987 (746)	0.0000 (0)	0.0013 (1)
	0.6	9,989,549.00	1.0000 (749)	0.0000 (0)	0.0000 (0)
	0.7	30,901,963.00	1.0000 (749)	0.0000 (0)	0.0000 (0)
	0.8	95,593,034.00	1.0000 (749)	0.0000 (0)	0.0000 (0)
	0.9	296,000,000.00	1.0000 (749)	0.0000 (0)	0.0000 (0)

Table 4.36 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r2} and Z_H for South East. The Z_{r2} was obtained at ₦80,242.47 conventionally with 15 starving households, 144 extremely poor households and 139 moderately poor households. At $\beta = 0.1$, Z_H was obtained as ₦35,264.99 with no starving households, 6 extremely poor households and 48 moderately poor households. From $\beta = 0.2$ to 0.6 an increase in the starving households is observe. Maximum number of household (749) was attained at $\beta = 0.6$ where all households are starving. For the extremely poor level, the number of house in these categories, decrease from $\beta = 0.3$ and number of households in moderately poor decrease in $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.6$ to $\beta = 0.9$.

Table 4.37: Poverty Levels and Proportions/Number of Poor Households for Relative (Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for South East

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor(n_2)	Moderately Poor (n_3)
Z_{r3}	-	94,049.59	0.04005 (30)	0.2403 (180)	0.2209 (165)
	0.1	35,829.38	0.0000 (0)	0.00935 (7)	0.0708 (53)
	0.2	112,609.60	0.0975 (73)	0.2697 (202)	0.2563 (192)
	0.3	353,925.30	0.6489 (486)	0.2577 (193)	0.0628 (47)
	0.4	1,112,365.00	0.9746 (730)	0.0214 (16)	0.0040 (3)
	0.5	3,496,095.00	1.0000 (749)	0.0000 (0)	0.0000 (0)
	0.6	10,988,008.00	1.0000 (749)	0.0000 (0)	0.0000 (0)
	0.7	34,534,620.00	1.0000 (749)	0.0000 (0)	0.0000 (0)
	0.8	108,540,139.00	1.0000 (749)	0.0000 (0)	0.0000 (0)
	0.9	341,134,832.00	1.0000 (749)	0.0000 (0)	0.0000 (0)

Table 4.37 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r3} and Z_H for South East. The Z_{r3} was obtained at ₦94,049.59 conventionally with 30 starving households, 180 extremely poor households and 165 moderately poor households. At $\beta = 0.1$, Z_H was obtained at ₦35,829.38 with no starving households, 7 extremely poor households and 53 moderately poor households. From $\beta = 0.2$ to 0.5 an increase in the starving households is observe. Maximum number of household (749) was attained at $\beta = 0.5$ where all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decrease from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.5$ to $\beta = 0.9$.

Table 4.38: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for South East

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor(n_2)	Moderately Poor (n_3)
Z_{r_4}	-	62,699.73	0.0013 (1)	0.1322 (99)	0.1469 (110)
	0.1	34,405.68	0.0000 (0)	0.0067 (5)	0.0588 (44)
	0.2	103,838.20	0.1122 (84)	0.2737 (205)	0.1789 (134)
	0.3	313,389.28	0.5701 (427)	0.3084 (231)	0.0774 (58)
	0.4	945,825.32	0.9559 (716)	0.0401 (30)	0.0013 (1)
	0.5	2,854,549.70	0.9973 (747)	0.0027 (2)	0.0000 (0)
	0.6	8,615,177.40	1.0000 (749)	0.0000 (0)	0.0000 (0)
	0.7	26,001,045.00	1.0000 (749)	0.0000 (0)	0.0000 (0)
	0.8	78,472,481.00	1.0000 (749)	0.0000 (0)	0.0000 (0)
	0.9	236,833,947.00	1.0000 (749)	0.0000 (0)	0.0000 (0)

Table 4.38 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r4} and Z_H for South East. The Z_{r4} was obtained as ₦62,699.73 conventionally with 1 starving households, 99 extremely poor households and 110 moderately poor households. At $\beta = 0.1$, Z_H was obtained as ₦34,405.68 with no starving households, 5 extremely poor households and 44 moderately poor households. From $\beta = 0.3$ to 0.6 an increase in the starving households is observe. Maximum number of household (7.94) was attained at $\beta = 0.6$ where all households are starving. For the extremely poor level, the number of house in these categories, decrease from $\beta = 0.3$ and number of households in moderately poor decrease in $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.6$ to $\beta = 0.9$.

Table 4.39: Poverty Levels and Proportions/Number of Poor Households for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for South South

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor(n_2)	Moderately Poor (n_3)
Z_{r1}	-	125,228.10	0.1108 (80)	0.2798 (202)	0.2465 (178)
	0.1	36,870.06	0.0000 (0)	0.0208 (15)	0.0526 (48)
	0.2	119,246.20	0.0928 (67)	0.2756 (199)	0.2452 (177)
	0.3	385,669.30	0.6482 (468)	0.2645 (191)	0.0720 (52)
	0.4	1,247,342.00	0.9861 (712)	0.0111 (8)	0.0028 (2)
	0.5	4,034,184.00	1.0000 (722)	0.0000 (0)	0.0000 (0)
	0.6	13,047,458.00	1.0000 (722)	0.0000 (0)	0.0000 (0)
	0.7	42,198,411.00	1.0000 (722)	0.0000 (0)	0.0000 (0)
	0.8	136,000,000.00	1.0000 (722)	0.0000 (0)	0.0000 (0)
	0.9	441,000,000.00	1.0000 (722)	0.0000 (0)	0.0000 (0)

Table 4.39 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r1} and Z_H for South South. The Z_{r1} was obtained at ₦125,228.10 conventionally with 80 starving households, 202 extremely poor households and 178 moderately poor households. At $\beta = 0.1$, Z_H was obtained as ₦36,870.06 with no starving households, 15 extremely poor households and 48 moderately poor households. From $\beta = 0.2$ to 0.5 an increase in the starving households is observe. Maximum number of household (722) was attained at $\beta = 0.5$ where all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decrease from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.5$ to $\beta = 0.9$.

Table 4.40: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for South South

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor(n_2)	Moderately Poor (n_3)
Z_{r_2}	-	83,485.40	0.0319 (23)	0.1704 (123)	0.1884 (136)
	0.1	35,405.01	0.0000 (0)	0.0180 (13)	0.0443 (32)
	0.2	109,957.80	0.0706 (51)	0.2632 (190)	0.2438 (176)
	0.3	341,497.60	0.5886 (425)	0.2964 (214)	0.0859 (62)
	0.4	1,060,593.00	0.9765 (705)	0.0208 (15)	0.0028 (2)
	0.5	3,293,897.00	1.0000 (722)	0.0000 (0)	0.0000 (0)
	0.6	10,229,894.00	1.0000 (722)	0.0000 (0)	0.0000 (0)
	0.7	31,771,097.00	1.0000 (722)	0.0000 (0)	0.0000 (0)
	0.8	98,671,851.00	1.0000 (722)	0.0000 (0)	0.0000 (0)
	0.9	306,000,000.00	1.0000 (722)	0.0000 (0)	0.0000 (0)

Table 4.40 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r2} and Z_H for South South. The Z_{r2} was obtained at ₦83,485.40 conventionally with 23 starving households, 123 extremely poor households and 136 moderately poor households. At $\beta = 0.1$, Z_H was obtained as ₦35,405.01 with no starving households, 13 extremely poor households and 32 moderately poor households. From $\beta = 0.2$ to 0.5 an increase in the starving households is observe. Maximum number of household (722) was attained at $\beta = 0.5$ where all households are starving. For the extremely poor level, the number of house in these categories, decrease from $\beta = 0.3$ and number of households in moderately poor decrease in $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.5$ to $\beta = 0.9$.

Table 4.41: Poverty Levels and Proportions/Number of Poor Households for Relative (Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for South South

Z (Code)	β	Z Value	Starvation (n₁)	Extremely Poor(n₂)	Moderately Poor (n₃)
Zr ₃	-	97,213.30	0.0471 (34)	0.2285 (165)	0.2244 (162)
	0.1	35,948.10	0.0000 (0)	0.0180 (13)	0.0485 (35)
	0.2	113,357.00	0.0790 (57)	0.2673 (193)	0.2410 (174)
	0.3	357,456.00	0.6136 (443)	0.2853 (206)	0.0776 (56)
	0.4	1,127,184.00	0.9834 (710)	0.0139 (10)	0.0028 (2)
	0.5	355,411.00	0.9765 (705)	0.0000 (0)	0.0000 (0)
	0.6	11,208,313.00	1.0000 (722)	0.0000 (0)	0.0000 (0)
	0.7	35,343,760.00	1.0000 (722)	0.0000 (0)	0.0000 (0)
	0.8	111,451,366.00	1.0000 (722)	0.0000 (0)	0.0000 (0)
	0.9	351,445,484.00	1.0000 (722)	0.0000 (0)	0.0000 (0)

Table 4.41 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r3} and Z_H for South South. The Z_{r3} was obtained at ₦97,213.30 conventionally with 34 starving households, 165 extremely poor households and 162 moderately poor households. At $\beta = 0.1$, Z_H was obtained as ₦35,948.10 with no starving households, 13 extremely poor households and 35 moderately poor households. From $\beta = 0.2$ to 0.6 an increase in the starving households is observe. Maximum number of household (722) was attained at $\beta = 0.6$ where all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decrease from $\beta = 0.3$. No extremely poor and moderately poor households were found for $\beta = 0.5$ to $\beta = 0.9$.

Table 4.42: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for South South

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor(n_2)	Moderately Poor (n_3)
Zr ₄	-	64,808.90	0.0097 (7)	0.1108 (80)	0.1551 (112)
	0.1	34,519.70	0.000 (0)	0.0166 (12)	0.0402 (29)
	0.2	104,527.60	0.0568 (41)	0.2549 (184)	0.2341 (169)
	0.3	316,515.40	0.5526 (399)	0.3047 (220)	0.0983 (71)
	0.4	958,425.90	0.9571 (691)	0.0388 (28)	0.0028 (2)
	0.5	2,902,165.00	1.0000 (722)	0.0000 (0)	0.0000 (0)
	0.6	8,787,910.00	1.0000 (722)	0.0000 (0)	0.0000 (0)
	0.7	26,610,259.00	1.0000 (722)	0.0000 (0)	0.0000 (0)
	0.8	80,577,273.00	1.0000 (722)	0.0000 (0)	0.0000 (0)
	0.9	243,992,252.00	1.0000 (722)	0.0000 (0)	0.0000 (0)

Table 4.42 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r4} and Z_H for South South. The Z_{r4} was obtained as ₦64,808.90 conventionally with 7 starving households, 80 extremely poor households and 112 moderately poor households. At $\beta = 0.1$, Z_H was obtained as ₦34,519.70 with no starving households, 12 extremely poor households and 29 moderately poor households. From $\beta = 0.2$ to 0.5 an increase in the starving households is observe. Maximum number of household (722) was attained at $\beta = 0.6$ where all households are starving. For the extremely poor level, the number of house in these categories, decrease from $\beta = 0.3$ and number of households in moderately poor decrease in $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.5$ to $\beta = 0.9$.

Table 4.43: Poverty Levels and Proportions/Number of Poor Households for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for South West

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor (n_2)	Moderately Poor (n_3)
Z_{r1}	-	155,049.10	0.0442 (31)	0.2981 (209)	0.2967 (208)
	0.1	37,666.10	0.0014 (1)	0.0128 (9)	0.0000 (0)
	0.2	124,450.90	0.0200 (14)	0.1826 (128)	0.2753 (193)
	0.3	411,192.60	0.5535 (388)	0.3438 (241)	0.0813 (57)
	0.4	1,358,603.00	0.9829 (689)	0.0157 (11)	0.0000 (0)
	0.5	4,488,895.00	1.0000 (701)	0.0000 (0)	0.0000 (0)
	0.6	14,831,545.00	1.0000 (701)	0.0000 (0)	0.0000 (0)
	0.7	49,004,202.00	1.0000 (701)	0.0000 (0)	0.0000 (0)
	0.8	162,000,000.00	1.0000 (701)	0.0000 (0)	0.0000 (0)
	0.9	535,000,000.00	1.0000 (701)	0.0000 (0)	0.0000 (0)

Table 4.43 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r1} and Z_H for South West. The Z_{r1} was obtained at ₦155,049.10 conventionally with 31 starving households, 209 extremely poor households and 208 moderately poor households. At $\beta = 0.1$, Z_H was obtained at ₦37,666.10 with 1 starving households, 9 extremely poor households and no moderately poor households. From $\beta = 0.2$ to 0.5 an increase in the starving households is observe. Maximum number of household (701) was attained at $\beta = 0.5$ where all households are starving. For the extremely poor level, the number of house in these categories, decrease from $\beta = 0.3$ and number of households in moderately poor decrease in $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.5$ to $\beta = 0.9$.

Table 4.44: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for South West

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor (n_2)	Moderately Poor (n_3)
Z_{r_2}	-	103,366.10	0.1201 (9)	0.1056 (74)	0.2240 (157)
	0.1	36,169.41	0.0014 (1)	0.0057 (4)	0.0057 (4)
	0.2	114,757.10	0.0157 (11)	0.1412 (99)	0.2582 (181)
	0.3	364,097.70	0.4608 (323)	0.4094 (287)	0.0884 (62)
	0.4	1,155,197.00	0.9715 (681)	0.0271 (19)	0.0000 (0) ^h
	0.5	3,665,168.00	0.9986 (700)	0.0014 (1)	0.0000 (0)
	0.6	11,628,714.00	1.0000 (701)	0.0000 (0)	0.0000 (0)
	0.7	36,895,172.00	1.0000 (701)	0.0000 (0)	0.0000 (0)
	0.8	117,000,000.00	1.0000 (701)	0.0000 (0)	0.0000 (0)
	0.9	371,000,000.00	1.0000 (701)	0.0000 (0)	0.0000 (0)

Table 4.44 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r2} and Z_H for South West. The Z_{r2} was obtained at ₦103,366.40 conventionally with 9 starving households, 74 extremely poor households and 157 moderately poor households. At $\beta = 0.1$, Z_H was obtained at ₦36,169.41 with 1 starving households, 4 extremely poor households and 4 moderately poor households. From $\beta = 0.2$ to 0.6 an increase in the starving households is observe. Maximum number of household (701) was attained at $\beta = 0.6$ where all households are starving. For the extremely poor level, the number of house in these categories, decrease from $\beta = 0.3$ and number of households in moderately poor decrease in $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.5$ to $\beta = 0.9$.

Table 4.45: Poverty Levels and Proportions/Number of Poor Households for Relative (Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for South West

Z (Code)	B	Z Value	Starvation (n₁)	Extremely Poor (n₂)	Moderately Poor (n₃)
Zr ₃	-	128,150.40	0.0200 (14)	0.1969 (138)	0.1698 (119)
	0.1	36,955.21	0.0014 (1)	0.0071 (5)	0.0043 (3)
	0.2	119,797.60	0.0186 (13)	0.1612 (113)	0.1683 (118)
	0.3	388,347.50	0.5107 (358)	0.3752 (263)	0.088 (62)
	0.4	1,258,904.00	0.9800 (687)	0.0186 (13)	0.0000 (0)
	0.5	4,080,983.00	0.9986 (700)	0.0014 (1)	0.0000 (0)
	0.6	13,229,298.00	1.0000 (701)	0.0000 (0)	0.0000 (0)
	0.7	42,885,336.00	1.0000 (701)	0.0000 (0)	0.0000 (0)
	0.8	139,021,132.00	1.0000 (701)	0.0000 (0)	0.0000 (0)
	0.9	450,663,951.00	0.0000 (0)	0.0000 (0)	1.0000 (701)

Table 4.45 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r3} and Z_H for South West. The Z_{r3} was obtained at ₦128,150.40 conventionally with 14 starving households, 138 extremely poor households and 119 moderately poor households. At $\beta = 0.1$, Z_H was obtained at ₦36,955.21 with 1 starving households, 5 extremely poor households and 3 moderately poor households. From $\beta = 0.2$ to 0.6 an increase in the starving households is observe. Maximum number of household (701) was attained at $\beta = 0.6$ where all households are starving. For the extremely poor level, the number of house in these categories, decrease from $\beta = 0.3$ and number of households in moderately poor decrease in $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.5$ to $\beta = 0.9$.

Table 4.46: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for South West

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor (n_2)	Moderately Poor (n_3)
Z_{r_4}	-	85,433.60	0.0086 (6)	0.0628 (44)	0.1455 (102)
	0.1	35,486.77	0.0000 (0)	0.0071 (5)	0.0057 (4)
	0.2	110,466.30	0.0128 (9)	0.1327 (93)	0.2397 (168)
	0.3	343,869.10	0.4137 (290)	0.4380 (307)	0.1013 (71)
	0.4	1,070,425.00	0.9558 (670)	0.0400 (28)	0.0014 (1)
	0.5	3,332,109.00	0.9986 (700)	0.0014 (1)	0.0000 (0)
	0.6	10,372,467.00	1.0000 (701)	0.0000 (0)	0.0000 (0)
	0.7	32,288,282.00	1.0000 (701)	0.0000 (0)	0.0000 (0)
	0.8	100,509,662.00	1.0000 (701)	0.0000 (0)	0.0000 (0)
	0.9	312,874,873.00	1.0000 (701)	0.0000 (0)	0.0000 (0)

Table 4.46 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r4} and Z_H for South West. The Z_{r4} was obtained as ₦85,433.60 conventionally with 6 starving households, 44 extremely poor households and 102 moderately poor households. At $\beta = 0.1$, hybrid poverty line was obtained as ₦35,486.77 with no starving households, 5 extremely poor households and 4 moderately poor households. From $\beta = 0.2$ to 0.6 an increase in the starving households is observe. Maximum number of household (701) was attained at $\beta = 0.6$ where all households are starving. For the extremely poor level, the number of house in these categories, decrease from $\beta = 0.3$ and number of households in moderately poor decrease in $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.6$ to $\beta = 0.9$.

**Table 4.47: Poverty Levels and Proportions/Number of Poor Households for
Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for Rural Sector**

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor(n_2)	Moderately Poor (n_3)
Z_{r1}	-	91,526.87	0.0601 (190)	0.3319 (1050)	0.2626 (831)
	0.1	35,732.10	0.0013 (4)	0.0221 (70)	0.0806 (255)
	0.2	111,998.90	0.1210 (383)	0.4061 (1285)	0.2446 (774)
	0.3	351,050.10	0.7924 (2507)	0.1704 (539)	0.0269 (85)
	0.4	1,100,333.00	0.9918 (3138)	0.0076 (24)	0.0003 (1)
	0.5	3,448,888.00	0.9997 (3163)	0.0000 (0)	0.0000 (0)
	0.6	10,810,207.00	0.9997 (3163)	0.0003 (1)	0.0000 (0)
	0.7	33,883,547.00	1.0000 (3164)	0.0000 (0)	0.0000 (0)
	0.8	106,000,000.00	1.0000 (3164)	0.0000 (0)	0.0000 (0)
	0.9	333,000,000.00	1.0000 (3164)	0.0000 (0)	0.0000 (0)

Table 4.47 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r1} and Z_H for Rural sector. The Z_{r1} was obtained at ₦91,526.87 conventionally with 190 starving households, 1050 extremely poor households and 831 moderately poor households. At $\beta = 0.1$, Z_H was obtained as ₦35,732.10 with 4 starving households, 70 extremely poor households and 255 moderately poor households. From $\beta = 0.2$ to 0.7 an increase in the starving households is observe. Maximum number of household (3164) was attained at $\beta = 0.7$ where all households are starving .For the extremely and moderately poor poverty level, the number of house in these categories, decrease from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.5$ to $\beta = 0.9$.

Table 4.48: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for Rural Sector

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor(n_2)	Moderately Poor (n_3)
Zr ₂	-	61,017.91	0.0120 (38)	0.1470 (4657)	0.2329 (737)
	0.1	34,312.26	0.0013 (4)	0.0180 (57)	0.0711 (225)
	0.2	103,275.10	0.0913 (289)	0.3827 (1211)	0.2570 (813)
	0.3	310,843.40	0.7320 (2316)	0.2127 (673)	0.0395 (125)
	0.4	935,594.40	0.9842 (3114)	0.0142 (45)	0.0009 (3)
	0.5	2,816,005.00	0.9994 (3162)	0.0003 (1)	0.0000 (0)
	0.6	8,475,771.00	0.9997 (3163)	0.0003 (1)	0.0000 (0)
	0.7	25,510,852.00	1.0000 (3164)	0.0000 (0)	0.0000 (0)
	0.8	76,783,996.00	1.0000 (3164)	0.0000 (0)	0.0000 (0)
	0.9	231,000,000.00	1.0000 (3164)	0.0000 (0)	0.0000 (0)

Table 4.48 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r2} and Z_H hybrid poverty lines for Rural sector. The Z_{r2} was obtained at ₦61,017.9140 conventionally with 38 starving households, 4657 extremely poor households and 737 moderately poor households. At $\beta = 0.1$, Z_H was obtained as ₦34,312.26 with 4 starving households, 57 extremely poor households and 225 moderately poor households. From $\beta = 0.2$ to 0.7 an increase in the starving households is observed. Maximum number of household (3164) was attained at $\beta = 0.7$ where all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decrease from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.7$ to $\beta = 0.9$.

Table 4.49: Poverty Levels and Proportions/Number of Poor Households for Relative (Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for Rural Sector

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor(n_2)	Moderately Poor (n_3)
Z_{r3}	-	71,405.35	0.0000 (0)	0.2086 (660)	0.2914 (922)
	0.1	34,855.93	0.0013 (4)	0.0190 (60)	0.0740 (234)
	0.2	106,573.70	0.1018 (322)	0.3954 (2151)	0.2487 (787)
	0.3	325,854.50	0.7566 (2394)	0.1956 (619)	0.0341 (108)
	0.4	996,315.70	0.9880 (3126)	0.0108 (34)	0.0010 (3)
	0.5	3,046,282.00	0.9997 (3163)	0.0000 (0)	0.0000 (0)
	0.6	9,314,151.00	0.9997 (3163)	0.0003 (1)	0.0000 (0)
	0.7	29,478,451.00	1.0000 (3164)	0.0000 (0)	0.0000 (0)
	0.8	87,074,191.00	1.0000 (3164)	0.0000 (0)	0.0000 (0)
	0.9	266,233,393.00	1.0000 (3164)	0.0000 (0)	0.0000 (0)

Table 4.49 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r3} and Z_H for Rural sector. The Z_{r3} was obtained at ₦71,405.35 conventionally with no starving households, 660 extremely poor households and 922 moderately poor households. At $\beta = 0.1$, Z_H was obtained as ₦34,855.93 with no starving households, 660 extremely poor households and 922 moderately poor households. From $\beta = 0.2$ to 0.7 an increase in the starving households is observed. Maximum number of household (3164) was attained at $\beta = 0.7$ where all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decrease from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.7$ to $\beta = 0.9$.

Table 4.50: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for Rural Sector

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor(n_2)	Moderately Poor (n_3)
Z_{r4}	-	47,603.57	0.0601 (190)	0.1719 (544)	0.0000 (0)
	0.1	33,470.91	0.0010 (3)	0.0168 (53)	0.0645 (204)
	0.2	98,272.47	0.0765 (242)	0.3644 (1153)	0.2560 (810)
	0.3	288,533.50	0.6824 (2159)	0.2481 (785)	0.0490 (155)
	0.4	847,150.30	0.9776 (3093)	0.0205 (65)	0.0013 (4)
	0.5	2,487,279.00	0.9994 (3162)	0.0003 (1)	0.0000 (0)
	0.6	7,302,785.00	0.9996 (3163)	0.0003 (1)	0.0000 (0)
	0.7	21,441,369.00	1.0000 (3164)	0.0000 (0)	0.0000 (0)
	0.8	62,953,005.00	1.0000 (3164)	0.0000 (0)	0.0000 (0)
	0.9	184,833,386.00	1.0000 (3164)	0.0000 (0)	0.0000 (0)

Table 4.50 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r4} and Z_H for Rural. The Z_{r4} was obtained as ₦47,603.57 conventionally with 190 starving households, 544 extremely poor households and no moderately poor households. At $\beta = 0.1$, Z_H was obtained as ₦33,470.91 with 3 starving households, 53 extremely poor households and 204 moderately poor households. From $\beta = 0.2$ to 0.7 an increase in the starving households is observe. Maximum number of household (3167) was attained at $\beta = 0.7$ where all households are starving. .For the extremely and moderately poor poverty level, the number of house in these categories, decrease from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.7$ to $\beta = 0.9$.

Table 4.51: Poverty Levels and Proportions/Number of Poor Households for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for Urban Sector

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor (n_2)	Moderately Poor (n_3)
Z_{r1}	-	155,995.10	0.0569 (78)	0.3105 (426)	0.2806 (385)
	0.1	37,689.02	0.0007 (1)	0.0036 (5)	0.0109 (15)
	0.2	124,602.00	0.0262 (36)	0.1924 (262)	0.2828 (388)
	0.3	411,943.70	0.5678 (779)	0.3258 (447)	0.0787 (108)
	0.4	1,361,912.00	0.9803 (1345)	0.0160 (22)	0.0022 (3)
	0.5	4,502,568.00	0.9993 (1371)	0.0007 (1)	0.0000 (0)
	0.6	14,885,774.00	1.0000 (1372)	0.0000 (0)	0.0000 (0)
	0.7	49,213,303.00	1.0000 (1372)	0.0000 (0)	0.0000 (0)
	0.8	163,000,000.00	1.0000 (1372)	0.0000 (0)	0.0000 (0)
	0.9	538,000,000.00	1.0000 (1372)	0.0000 (0)	0.0000 (0)

Table 4.51 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r1} and Z_H for Urban sector. The Z_{r1} was obtained at ₦155,955.10 conventionally with 78 starving households, 426 extremely poor households and 385 moderately poor households. At $\beta = 0.1$, Z_H was obtained as ₦37,689.02 with 78 starving households, 426 extremely poor households and 385 moderately poor households. From $\beta = 0.1$ to 0.5 an increase in the starving households is observe. Maximum number of household (1372) was attained at $\beta = 0.5$ where all households are starving. For the extremely and moderately poor poverty level, the number of house in these categories, decrease from $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.6$ to $\beta = 0.9$.

Table 4.52: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for Urban Sector

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor (n_2)	Moderately Poor (n_3)
Z_{r2}	-	103,996.70	0.0117 (16)	0.1305 (179)	0.2252 (309)
	0.1	36,191.42	0.0007 (1)	0.0036 (5)	0.0095 (13)
	40.2	114,896.80	0.0168 (23)	0.1625 (223)	0.2566 (352)
	0.3	364,462.60	0.4818 (661)	0.3819 (524)	0.0926 (127)
	0.4	1,158,011.00	0.9665 (1326)	0.0284 (39)	0.0036 (5)
	0.5	3,676,331.00	0.9985 (1370)	0.0015 (2)	0.0000 (0)
	0.6	11,671,228.00	1.0000 (1372)	0.0000 (0)	0.0000 (0)
	0.7	37,052,587.00	1.0000 (1372)	0.0000 (0)	0.0000 (0)
	0.8	118,000,000.00	1.0000 (1372)	0.0000 (0)	0.0000 (0)
	0.9	373,000,000.00	1.0000 (1372)	0.0000 (0)	0.0000 (0)

Table 4.52 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r2} and Z_H for Urban sector. The Z_{r2} was obtained at ₦103,996.70 conventionally with 16 starving households, 179 extremely poor households and 309 moderately poor households. At $\beta = 0.1$, Z_H was obtained as ₦36,191.42 with 1 starving households, 5 extremely poor households and 13 moderately poor households. From $\beta = 0.1$ to 0.6 an increase in the starving households is observe. Maximum number of household (1372) was attained at $\beta = 0.6$ where all households are starving. For the extremely poor level, the number of house in these categories, decrease from $\beta = 0.3$ and number of households in moderately poor decrease in $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.6$ to $\beta = 0.9$.

Table 4.53: Poverty Levels and Proportions/Number of Poor Households for Relative (Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for Urban Sector

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor (n_2)	Moderately Poor (n_3)
Z_{r3}	-	123,700.20	0.0255 (35)	0.1895 (260)	0.6232 (855)
	0.1	36,824.83	0.0007 (1)	0.3911 (5)	0.0131 (18)
	0.2	118,953.80	0.0190 (26)	0.1771 (243)	0.3593 (495)
	0.3	384,251.60	0.5768 (709)	0.3630 (498)	0.1013 (139)
	0.4	1,241,232.00	0.9723 (1334)	0.0226 (31)	0.0044 (6)
	0.5	4,009,498.00	0.9985 (1370)	0.0000 (0)	0.0000 (0)
	0.6	12,951,709.00	1.0000 (1372)	0.0000 (0)	0.0000 (0)
	0.7	41,837,346.00	1.0000 (1372)	0.0000 (0)	0.0000 (0)
	0.8	135,145,370.00	1.0000 (1372)	0.0000 (0)	0.0000 (0)
	0.9	436,554,241.00	1.0000 (1372)	0.0000 (0)	0.0000 (0)

Table 4.53 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r3} and Z_H for Urban sector. The Z_{r3} was obtained at ₦123,700.20 conventionally with 35 starving households, 260 extremely poor households and 855 moderately poor households. At $\beta = 0.1$, Z_H was obtained at ₦36,824 with 1 starving households, 5 extremely poor households and 18 moderately poor households. For the extremely poor level, the number of house in these categories, decrease from $\beta = 0.3$ and number of households in moderately poor decrease in $\beta = 0.2$. No extremely poor and moderately poor households were found for $\beta = 0.5$ to $\beta = 0.9$.

Table 4.54: Poverty Levels and Proportions/Number of Poor Households for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for Urban Sector

Z (Code)	β	Z Value	Starvation (n_1)	Extremely Poor (n_2)	Moderately Poor (n_3)
Z_{r4}	-	82,466.80	0.0044 (6)	0.0656 (90)	0.2828 (388)
	0.1	35,361.57	0.0000 (0)	0.0036 (5)	0.0117 (16)
	0.2	109,688.20	0.0139 (19)	0.0717 (16)	0.0000 (0)
	0.3	340,242.20	0.4300 (590)	0.4082 (560)	0.1334 (183)
	0.4	1,055,398.00	0.9497 (1303)	0.0430 (59)	0.0058 (8)
	0.5	327,374.00	0.9978 (1369)	0.0022 (3)	0.0000 (0)
	0.6	10,154,822.00	1.0000 (1372)	0.0000 (0)	0.0000 (0)
	0.7	31,499,252.00	1.0000 (1372)	0.0000 (0)	0.0000 (0)
	0.8	97,707,559.00	1.0000 (1372)	0.0000 (0)	0.0000 (0)
	0.9	303,079,163.00	1.0000 (1372)	0.0000 (0)	0.0000 (0)

Table 4.54 shows the poverty levels, number of households in each poverty level and their proportions for Z_{r4} and Z_H for Urban sector. The Z_{r4} was obtained as ₦82,466.80 conventionally with 6 starving households, 90 extremely poor households and 388 moderately poor households. At $\beta = 0.1$, Z_H was obtained as ₦35,361.57 with no starving households, 5 extremely poor households and 16 moderately poor households. From $\beta = 0.2$ to 0.6 an increase in the starving households is observe. Maximum number of household (1372) was attained at $\beta = 0.6$ where all households are starving. .For the extremely and moderately poor poverty level, the number of house in these categories, decrease from $\beta = 0.3$. No extremely poor and moderately poor households were found for $\beta = 0.6$ to $\beta = 0.9$.

4.6: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) And Modified Square Poverty Gap Index (P_2^*).

Table 4.55 to Table 4.90 gives the Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) And Modified Square Poverty Gap Index (P_2^*) for the whole Country ,Geo-political zones and the Sectoral Divisions.

Table 4.55: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for the whole Country.

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Zr ₁	-	110,984.90	0.1931	0.0936	0.0535.6
	0.1	36,427.56	0.0165	0.0020	0.0018
	0.2	116,401.00	0.2054	0.1021	0.0593
	0.3	371,949.20	0.4398	0.3334	0.2621
	0.4	1,188,531.00	0.4974	0.4526	0.4141
	0.5	3,797,842.00	0.4998	0.4854	0.4716
	0.6	12,135,653.00	0.5000	0.4954	0.4909
	0.7	38,778,396.00	0.5000	0.4986	0.4971
	0.8	24,000,000.00	0.5000	0.4996	0.4991
	0.9	396,000,000.00	0.5000	0.4999	0.4997

Table 4.55 shows the relative and hybrid poverty lines for the modified poverty indices for the whole country. For $Z_{r1} = \text{₦}110,984.90$; P_0^* , P_1^* and P_2^* were obtained as 0.1931, 0.0936 and 0.0536 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}36,427.56$ ($\beta = 0.1$) the indices were obtained as 0.0165, 0.0020 and 0.0018. From the table, P_0^* increased as β increased and converged at $\beta = 0.6$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.56: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for the whole Country.

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Z_{r2}	-	73,989.93	0.1036	0.0408	0.0201
	0.1	34,980.09	0.0144	0.0038	0.0015
	0.2	1,073,34.30	0.4959	0.4469	0.4054
	0.3	329,348.90	0.4238	0.3120	0.2396
	0.4	1,010,587.00	0.4950	0.4433	0.3999
	0.5	3,100,924.00	0.4995	0.4820	0.4655
	0.6	9,514,9 91.00	0.4999	0.4822	0.4656
	0.7	29,196,156.00	0.5000	0.4981	0.4962
	0.8	89,586,577.00	0.5000	0.4994	0.4988
	0.9	275,000,000.00	0.5000	0.4998	0.4996

Table 4.56 shows the relative and hybrid poverty lines for the modified poverty indices for the whole country. $Z_{r2} = \text{₦}73,989.93$; P_0^* , P_1^* and P_2^* were obtained at 0.1036, 0.0408 and 0.0201 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}34,98.09$ ($\beta = 0.1$) the indices were obtained as 0.0144, 0.0038 and 0.0015. From the table, P_0^* increased as β increased and converged at $\beta = 0.7$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.57: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for the whole Country.

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Z_{r3}	-	85,906.95	0.3837	0.0573	0.0299
	0.1	35,506.39	0.0154	0.0041	0.0016
	0.2	110,58.40	0.1925	0.0931	0.0513
	0.3	344,439.50	0.4301	0.3200	0.2479
	0.4	1,072,793.00	0.4959	0.4469	0.4053
	0.5	3,341,327.00	0.4998	0.4834	0.4679
	0.6	10,406,910.00	0.5000	0.4947	0.4894
	0.7	32,413,405.00	0.5000	0.4983	0.4966
	0.8	101,000,000.00	0.5000	0.4995	0.4989
	0.9	314,000,000.00	0.5000	0.4998	0.4997

Table 4.57 shows the relative and hybrid poverty lines for the modified poverty indices for the whole country. For $Z_{r3} = \text{₦}85,906.39$; P_0^* , P_1^* and P_2^* were obtained at 0.3837, 0.0573 and 0.0299 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}35,506.39$ ($\beta = 0.1$) the indices were obtained as 0.0154, 0.0041 and 0.0016. From the table, P_0^* increased as β increased and converged at $\beta = 0.6$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.58: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for the whole Country.

Z (Code)	β	Z Value	(P_0^*)	(P_1^*)	(P_2^*)
Zr ₄	-	57,271.30	0.0616	0.0207	0.0093
	0.1	34,095.52	0.0135	0.0035	0.0014
	0.2	101,974.50	0.1739	0.0807	0.0447
	0.3	304,989.96	0.4116	0.2969	0.2245
	0.4	912,177.76	0.4934	0.4406	0.3938
	0.5	2,728,182.00	0.4996	0.4796	0.4609
	0.6	8,159,565.70	0.5000	0.4932	0.4866
	0.7	24,403,986.00	0.5000	0.4977	0.4955
	0.8	72,988,507.00	0.5000	0.4992	0.4985
	0.9	218,297,211.00	0.5000	0.4998	0.4995

Table 4.58 shows the relative and hybrid poverty lines for the modified poverty indices for the whole country. For $Z_{r4} = \text{₦}57,271.30$; P_0^* , P_1^* and P_2^* were obtained at 0.0616, 0.0207 and 0.0093 respectively (traditional estimate when $(\beta = 0)$). For $Z_H = \text{₦}34,095.52$ ($\beta = 0.1$) the indices were obtained as 0.0135, 0.0035 and 0.0014. From the table, P_0^* increases as β increases and converges at $\beta = 0.6$ with the value 0.5000. P_1^* and P_2^* also increase as β increases.

Table 4.59: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for North Central

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Z_{r1}	-	98859.44	0.1691	0.0591	0.0406
	0.1	36,008.54	0.0177	0.0061	0.0021
	0.2	113,738.60	0.1887	0.096	0.0678
	0.3	359,260.90	0.4483	0.3393	0.2644
	0.4	1,134,781.00	0.4987	0.4554	0.4173
	0.5	3,584,379.00	0.4994	0.4856	0.4723
	0.6	11,321,806.00	0.4994	0.495	0.4907
	0.7	35,761,650.00	0.4994	0.498	0.4966
	0.8	113,000,000.00	0.4994	0.4989	0.4985
	0.9	357,000,000.00	0.4994	0.4992	0.4991

Table 4.59 shows the relative and hybrid poverty lines for the modified poverty indices for the North Central. For $Z_{r1} = ₦98859.44$; P_0^* , P_1^* and P_2^* were obtained at 0.1691, 0.0591 and 0.0406 respectively (traditional estimate when $\beta = 0$). For $Z_H = ₦36,008.54$ ($\beta = 0.1$) the indices were obtained as 0.0177, 0.0061 and 0.0021. From the table, P_0^* increased as β increased and converged at $\beta = 0.5$ with the value 0.4994. P_1^* and P_2^* also increased as β increased.

Table 4.60: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for North Central

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Zr ₂	-	65,906.29	0.0815	0.0296	0.0151
	0.1	34,577.71	0.0158	0.0056	0.0028
	0.2	104,879.20	0.1312	0.587	0.0339
	0.3	318,113.80	0.431	0.3163	0.2402
	0.4	964,884.70	0.4963	0.4467	0.4034
	0.5	2,926,633.00	0.4994	0.4825	0.4664
	0.6	8,876,892.00	0.4994	0.4938	0.4883
	0.7	26,924,872.00	0.4994	0.4975	0.4957
	0.8	81,700,000.00	0.4994	0.4988	0.4981
	0.9	248,000,000.00	0.4994	0.4992	0.499

Table 4.60 shows the relative and hybrid poverty lines for the modified poverty indices for the North Central. For $Z_{r2} = ₦65,906.29$; P_0^* , P_1^* and P_2^* were obtained at 0.0815, 0.0296 and 0.0151 respectively (traditional estimate when $\beta = 0$). $Z_H = ₦34,577.71$ ($\beta = 0.1$) the indices were obtained as 0.0158, 0.0056 and 0.0028. From the table, P_0^* increased as β increased and converged at $\beta = 0.5$ with the value 0.4994. P_1^* and P_2^* also increased as β increased.

Table 4.61: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for North Central

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Zr ₃	-	83,738.77	0.1252	0.0296	0.0269
	0.1	35,415.74	0.1169	0.0056	0.0029
	0.2	110,024.50	0.1952	0.0587	0.0512
	0.3	341,808.20	0.4423	0.3163	0.2547
	0.4	1,061,880.00	0.4978	0.4467	0.4117
	0.5	3,298,892.00	0.4994	0.4825	0.47
	0.6	10,248,511.00	0.4994	0.4938	0.4898
	0.7	31,838,562.00	0.4994	0.4975	0.4963
	0.8	98,911,346.00	0.4994	0.4988	0.4984
	0.9	307,000,000.00	0.4994	0.4992	0.499

Table 4.61 shows the relative and hybrid poverty lines for the modified poverty indices for the North Central. For $Z_{r3} = \text{₦}83,738.77$; P_0^* , P_1^* and P_2^* were obtained at 0.1252, 0.0296 and 0.0269 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}35,415.74$ ($\beta = 0.1$) the indices were obtained as 0.1169, 0.0056 and 0.0029. From the table, P_0^* increased as β increased and converged at $\beta = 0.5$ with the value 0.4994. P_1^* and P_2^* also increased as β increased.

Table 4.62: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for North Central

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Zr ₄	-	55,825.85	0.045	0.0192	0.0098
	0.1	34,008.47	0.0156	0.0054	0.0026
	0.2	101,454.40	0.1755	0.0783	0.0428
	0.3	302,660.00	0.4157	0.306	0.2298
	0.4	902,898.20	0.4965	0.443	0.3973
	0.5	2,693,534.00	0.4994	0.481	0.4636
	0.6	8,035,373.00	0.4994	0.4932	0.4872
	0.7	23,971,189.00	0.4994	0.4973	0.4952
	0.8	71,511,045.00	0.4994	0.4987	0.4980
	0.9	213,332,321.00	0.4994	0.4991	0.4989

Table 4.62 shows the relative and hybrid poverty lines for the modified poverty indices for the North Central. For $Z_{r4} = \text{₦}55,825.85$; P_0^* , P_1^* and P_2^* were obtained as 0.045, 0.0192 and 0.0098 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}34,008.47$ ($\beta = 0.1$) the indices were obtained at 0.0156, 0.0054 and 0.0026. From the table, P_0^* increased as β increased and converged at $\beta = 0.5$ with the value 0.4994. P_1^* and P_2^* also increased as β increased.

Table 4.63: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for North East

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Zr ₁	-	99,216.21	0.1961	0.0905	0.0493
	0.1	36,021.51	0.0187	0.0049	0.0019
	0.2	113,820.50	0.2346	0.1169	0.0669
	0.3	359,649.30	0.4533	0.3532	0.2824
	0.4	1,136,417.00	0.4957	0.4547	0.4194
	0.5	3,590,840.00	0.4998	0.4861	0.4731
	0.6	11,346,304.00	0.5000	0.4956	0.4913
	0.7	35,851,942.00	0.5000	0.4986	0.4972
	0.8	113,000,000.00	0.5000	0.4996	0.4991
	0.9	358,000,000.00	0.5000	0.4999	0.4997

Table 4.63 shows the relative and hybrid poverty lines for the modified poverty indices for the North East. For $Z_{r1} = \text{₦}99,216.21$; P_0^* , P_1^* and P_2^* were obtained at 0.1961, 0.0905 and 0.0493 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}36,021.51$ ($\beta = 0.1$) the indices were obtained as 0.0187, 0.0049 and 0.0019. From the table, P_0^* increased as β increased and converged at $\beta = 0.6$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.64: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for North East

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Z_{r_2}	-	66,144.14	0.1000	0.036	0.0169
	0.1	34,590.17	0.0162	0.004	0.0015
	0.2	104,954.80	0.2116	0.1014	0.057
	0.3	318,457.80	0.4378	0.3321	0.2596
	0.4	966,276.10	0.4900	0.4445	0.4054
	0.5	2,931,909.00	0.4995	0.4828	0.4672
	0.6	8,896,100.00	0.5000	0.4944	0.489
	0.7	26,992,854.00	0.5000	0.4982	0.4963
	0.8	81,902,649.00	0.5000	0.4994	0.4988
	0.9	249,000,000.00	0.5000	0.4998	0.4996

Table 4.64 shows the relative and hybrid poverty lines for the modified poverty indices for the North East. For $Z_{r2} = \text{₹}66,144.14$; P_0^* , P_1^* and P_2^* were obtained at 0.1000, 0.036 and 0.0169 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₹}34,590.17$ ($\beta = 0.1$) the indices were obtained as 0.0162, 0.004 and 0.0015. From the table, P_0^* increased as β increased and converged at $\beta = 0.6$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.65: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for North East

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Z_{r3}	-	74,086.50	0.1236	0.0475	0.0233
	0.1	34,984.65	0.0173	0.0043	0.0016
	0.2	107,362.00	0.2157	0.1048	0.0589
	0.3	329,478.00	0.443	0.3387	0.2664
	0.4	1,011,114.00	0.4948	0.0047	0.0029
	0.5	3,102,947.00	0.4990	0.4835	0.4687
	0.6	9,522,441.00	0.5000	0.4948	0.4897
	0.7	29,222,825.00	0.5000	0.4983	0.4966
	0.8	89,680,105.00	0.5000	0.4995	0.4989
	0.9	275,213,682.00	0.5000	0.4998	0.4996

Table 4.65 shows the relative and hybrid poverty lines for the modified poverty indices for the North East. For $Z_{r3} = \text{₹}74,086.50$; P_0^* , P_1^* and P_2^* were obtained at 0.1236, 0.0475 and 0.0233 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₹}34,984.65$ ($\beta = 0.1$) the indices were obtained as 0.0187, 0.0049 and 0.0019. From the table, P_0^* increased as β increased and converged at $\beta = 0.6$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.66: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for North East

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Zr ₄	-	49,391.00	0.0477	0.0148	0.0062
	0.1	33,594.51	0.0146	0.0146	0.0146
	0.2	98,999.62	0.1954	0.0661	0.0308
	0.3	291,741.90	0.4273	0.0449	0.0252
	0.4	859,733.40	0.4931	0.4403	0.3965
	0.5	2,533,545.00	0.5000	0.4804	0.4624
	0.6	7,466,095.00	0.5000	0.4934	0.4869
	0.7	22,001,805.00	0.5000	0.4978	0.4955
	0.8	64,837,028.00	0.5000	0.4992	0.4985
	0.9	191,067,069.00	0.5000	0.4997	0.4995

Table 4.66 shows the relative and hybrid poverty lines for the modified poverty indices for the North East. For $Z_{r4} = \text{₦}49,391.00$; P_0^* , P_1^* and P_2^* were obtained at 0.0477, 0.0148 and 0.0062 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}33,594.51$ ($\beta = 0.1$) the indices were obtained as 0.0146, 0.0146 and 0.0146. From the table, P_0^* increased as β increased and converged at $\beta = 0.6$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.67: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for North West

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Zr ₁	-	75,896.80	0.176	0.0749	0.0372
	0.1	35,069.20	0.023	0.0056	0.0023
	0.2	107,882.00	0.9046	0.1432	0.0840
	0.3	331,873.00	0.4772	0.3833	0.1434
	0.4	1,020,926.00	0.4851	0.4518	0.4217
	0.5	3,140,628.00	0.4990	0.4882	0.4773
	0.6	9,661,374.00	0.4998	0.4960	0.4923
	0.7	30,000,000.00	0.5000	0.4989	0.4967
	0.8	91,000,000.00	0.5000	0.4998	0.4992
	0.9	280,000,000.00	0.5000	0.4999	0.4992

Table 4.67 shows the relative and hybrid poverty lines for the modified poverty indices for the North West. For $Z_{r1} = \text{₦}75,896.80$; P_0^* , P_1^* and P_2^* were obtained as 0.176, 0.0749 and 0.0372 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}35,069.20$ ($\beta = 0.1$) the indices were obtained as 0.023, 0.0056 and 0.0023. From the table, P_0^* increased as β increased and converged at $\beta = 0.7$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.68: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for North West

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Zr ₂	-	50,597.87	0.5000	0.4999	0.4997
	0.1	33,675.70	0.1225	0.0461	0.0214
	0.2	99,478.80	0.2531	0.1186	0.0695
	0.3	293,862.00	0.4648	0.3643	0.2906
	0.4	868,076.00	0.4975	0.4581	0.4223
	0.5	2,564,313.00	0.4994	0.4857	0.4725
	0.6	7,575,029.00	0.4998	0.4949	0.4902
	0.7	22,000,000.00	0.5000	0.4983	0.4966
	0.8	66,000,000.00	0.5000	0.4994	0.4989
	0.9	200000000;	0.5000	0.4998	0.4996

Table 4.68 shows the relative and hybrid poverty lines for the modified poverty indices for the North West. For $Z_{r2} = \text{₦}50,597.87$; P_0^* , P_1^* and P_2^* were obtained as 0.5000, 0.4999 and 0.04997 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}33,675.70$ ($\beta = 0.1$) the indices were obtained as 0.0461, 0.0056 and 0.0214. From the table, P_0^* increased as β increased and converge at $\beta = 0.7$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.69: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for North West

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Z_{r3}	-	59,235.04	0.0356	0.0036	0.0026
	0.1	34,210.66	0.0174	0.0050	0.0020
	0.2	102,664.40	0.2318	0.1187	0.0669
	0.3	308,090.30	0.4698	0.372	0.2994
	0.4	924,562.20	0.4987	0.4608	0.4269
	0.5	2,774,560.00	0.4994	0.4867	0.4745
	0.6	8,326,300.00	0.4998	0.4953	0.4910
	0.7	24,986,759.00	0.5000	0.4985	0.4969
	0.8	74,983,860.00	0.5000	0.4995	0.4990
	0.9	225,022,356.00	0.5000	0.4998	0.4996

Table 4.69 shows the relative and hybrid poverty lines for the modified poverty indices for the North West. For $Z_{r3} = \text{₦}59,235.04$; P_0^* , P_1^* and P_2^* were obtained as 0.0356, 0.0036 and 0.0026 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}34,210.66$ ($\beta = 0.1$) the indices were obtained as 0.0174, 0.0050 and 0.0020. From the table, P_0^* increased as β increased and converged at $\beta = 0.7$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.70: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for North West

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Z_{r4}	-	39,490	0.0050	0.0029	0.0017
	0.1	32851.28	0.0174	0.0035	0.0013
	0.2	94,667.61	0.2291	0.1026	0.0542
	0.3	272,803.90	0.4537	0.4412	0.3945
	0.4	786,139.50	0.4973	0.4528	0.4119
	0.5	2,265,419.00	0.4988	0.4833	0.4684
	0.6	6,528,258.00	0.4994	0.4941	0.4887
	0.7	18,812,480.00	0.4994	0.4967	0.4984
	0.8	54,211,923.00	0.5000	0.4993	0.4986
	0.9	156,222,494.00	0.5000	0.4998	0.4995

Table 4.70 shows the relative and hybrid poverty lines for the modified poverty indices for the North West. For $Z_{r4} = \text{N}39,490.03$; P_0^* , P_1^* and P_2^* were obtained as 0.005, 0.0029 and 0.0017 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{N}32,851.28$ ($\beta = 0.1$) the indices were obtained as 0.0147, 0.0035 and 0.0013. From the table, P_0^* increased as β increased and converged at $\beta = 0.8$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.71: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for South East

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Z_{r1}	-	120,363.70	0.196	0.0979	0.0578
	0.1	36,724.27	0.016	0.0031	0.0007
	0.2	118,305.00	0.1918	0.0951	0.0558
	0.3	381,112.50	0.4312	0.3226	0.2714
	0.4	1,227,730.00	0.4964	0.1208	0.0936
	0.5	3,955,055.00	0.5000	0.4848	0.4704
	0.6	12,740,969.00	0.5000	0.4953	0.4906
	0.7	41,044,192.00	0.5000	0.4985	0.4971
	0.8	132,000,000.00	0.5000	0.4990	0.4980
	0.9	426,000,000.00	0.5000	0.4998	0.4997

Table 4.71 shows the relative and hybrid poverty lines for the modified poverty indices for the South East. For $Z_{r1} = \text{₦}120,363.70$; P_0^* , P_1^* and P_2^* were obtained as 0.196, 0.0979 and 0.0578 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}36,724.27$ ($\beta = 0.1$) the indices were obtained at 0.016, 0.0031 and 0.0007. From the table, P_0^* increased as β increased and converged at $\beta = 0.5$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.72: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for South East

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Zr ₂	-	80,242.00	0.1050	0.0442	0.0223
	0.1	35,264.99	0.0134	0.0025	0.0006
	0.2	109,089.90	0.1745	0.0826	0.0472
	0.3	337,462.10	0.4141	0.3005	0.2288
	0.4	1,043,9,6.00	0.4987	0.4424	0.3962
	0.5	3,229,280.00	0.4998	0.4810	0.4637
	0.6	9,989,549.00	0.5000	0.4940	0.4881
	0.7	30,901,963.00	0.5000	0.4980	0.4961
	0.8	95,593,034.00	0.5000	0.4994	0.4987
	0.9	296,000,000.00	0.5000	0.4998	0.4996

Table 4.72 shows the relative and hybrid poverty lines for the modified poverty indices for the South East. For $Z_{r2} = \text{₦}80,242.00$; P_0^* , P_1^* and P_2^* were obtained as 0.1050, 0.0442 and 0.0223 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}35,264.99$ ($\beta = 0.1$) the indices were obtained at 0.016, 0.0031 and 0.0007. From the table, P_0^* increased as β increased and converged at $\beta = 0.6$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.73: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for South East

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Z_{R3}	-	94,049.59	0.1368	0.1312	0.1272
	0.1	35,829.38	0.0149	0.0027	0.0008
	0.2	112,609.60	0.1814	0.087	0.0504
	0.3	353,925.30	0.4208	0.3092	0.2377
	0.4	1,112,365.00	0.4947	0.4437	0.4006
	0.5	3,496,095.00	0.5000	0.4828	0.4666
	0.6	10,988,008.00	0.5000	0.4945	0.4892
	0.7	34,534,620.00	0.5000	0.4983	0.4965
	0.8	108,540,139.00	0.5000	0.4983	0.4967
	0.9	341,134,832.00	0.5000	0.4998	0.4996

Table 4.73 shows the relative and hybrid poverty lines for the modified poverty indices for the South East. For $Z_{r3} = \text{R}94,049.59$; P_0^* , P_1^* and P_2^* were obtained as 0.1368, 0.1312 and 0.1272 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{R}35,892.38$ ($\beta = 0.1$) the indices were obtained at 0.0149, 0.0027 and 0.0008. From the table, P_0^* increased as β increased and converged at $\beta = 0.5$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.74: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for South East

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Z_{r4}	-	62,699.73	0.0688	0.0247	0.0109
	0.1	34,405.68	0.0120	0.0066	0.0037
	0.2	103,838.20	0.1595	0.5627	0.0292
	0.3	313,389.28	0.4008	0.2851	0.2139
	0.4	945,825.32	0.4915	0.4327	0.3844
	0.5	2,854,549.70	0.4996	0.4786	0.4592
	0.6	8,615,177.40	0.5000	0.4930	0.4862
	0.7	26,001,045.00	0.5000	0.4977	0.4954
	0.8	78,472,481.00	0.5000	0.4992	0.4985
	0.9	236,833,947.00	0.5000	0.4998	0.4995

Table 4.74 shows the relative and hybrid poverty lines for the modified poverty indices for the South East. For $Z_{r4} = \text{R}62,699.73$; P_0^* , P_1^* and P_2^* were obtained as 0.0688, 0.0247 and 0.0109 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{R}34,405.68$ ($\beta = 0.1$) the indices were obtained at 0.0120, 0.0066 and 0.0037. From the table, P_0^* increased as β increased and converged at $\beta = 0.6$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.75: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for South South

Z (Code)	β	Z Value	P_0^*	P_2^*	P_2^*
Z_{r1}	-	125,228.10	0.1898	0.0962	0.0571
	0.1	36,870.01	0.0157	0.0042	0.0015
	0.2	119,246.20	0.1791	0.0885	0.0517
	0.3	385,669.30	0.4123	0.3130	0.2420
	0.4	1,247,342.00	0.4972	0.4485	0.4071
	0.5	4,034,184.00	0.5000	0.4845	0.4699
	0.6	13,047,458.00	0.5000	0.4952	0.4905
	0.7	42,198,411.00	0.5000	0.4985	0.4970
	0.8	136,000,000.00	0.5000	0.4995	0.4991
	0.9	441,000,000.00	0.5000	0.4999	0.4997

Table 4.75 shows the relative and hybrid poverty lines for the modified poverty indices for the South South. For $Z_{r1} = \text{N}125,228.10$; P_0^* , P_1^* and P_2^* were obtained as 0.1898, 0.0962 and 0.0571 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{N}36,870.01$ ($\beta = 0.1$) the indices were obtained at 0.0157, 0.0042 and 0.0015. From the table, P_0^* increased as β increased and converged at $\beta = 0.5$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.76: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for South South

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Z_{r2}	-	83,485.40	0.1041	0.0448	0.0235
	0.1	35,405.01	0.0134	0.0036	0.0013
	0.2	109,957.80	0.1637	0.0769	0.0437
	0.3	341,497.60	0.4074	0.2909	0.2198
	0.4	1,060,593.00	0.4956	0.4389	0.3920
	0.5	3,293,897.00	0.5000	0.4810	0.4632
	0.6	10,229,894.00	0.5000	0.4939	0.4879
	0.7	31,771,097.00	0.5000	0.4980	0.4961
	0.8	98,671,851.00	0.5000	0.4994	0.4987
	0.9	306,000,000.00	0.5000	0.4998	0.4996

Table 4.76 shows the relative and hybrid poverty lines for the modified poverty indices for the South South. For $Z_{r2} = \text{₦}83,485.40$; P_0^* , P_1^* and P_2^* were obtained at 0.1041, 0.0448 and 0.0235 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}35,405.01$ ($\beta = 0.1$) the indices were obtained at 0.0134, 0.0036 and 0.0013. From the table, P_0^* increased as β increased and converged at $\beta = 0.5$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.77: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for South South

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Zr ₃	-	97,213.30	0.1293	0.061	0.0334
	0.1	35,948.10	0.0141	0.0037	0.0014
	0.2	113,357.00	0.1687	0.0812	0.0467
	0.3	357,456.00	0.4148	0.2997	0.2284
	0.4	1,127,184.00	0.4968	0.4430	0.3981
	0.5	3,554,411.00	0.5000	0.4824	0.2327
	0.6	11,208,313.00	0.5000	0.4944	0.4889
	0.7	35,343,760.00	0.5000	0.4982	0.4965
	0.8	111,451,366.00	0.5000	0.4994	0.4989
	0.9	351,445,484.00	0.5000	0.4998	0.4996

Table 4.77 shows the relative and hybrid poverty lines for the modified poverty indices for the South South. For $Z_{r3} = \text{₦}97,213.30$; P_0^* , P_1^* and P_2^* were obtained as 0.1293, 0.061 and 0.0334 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}35,948.10$ ($\beta = 0.1$) the indices were obtained at 0.0141, 0.0037 and 0.0014. From the table, P_0^* increased as β increased and converged at $\beta = 0.5$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.78: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Median Per capita Exp) and Hybrid Poverty Lines (Z_H) for South South

Z (Code)	β	Z Value	P_0^*	P_2^*	P_2^*
Z_{r4}	-	64,808.90	0.0676	0.0247	0.0116
	0.1	34,519.70	0.0122	0.0033	0.0011
	0.2	104,527.60	0.1524	0.0699	0.0391
	0.3	316,515.40	0.3943	0.2764	0.2058
	0.4	958,425.90	0.4919	0.4307	0.3807
	0.5	2,902,165.00	0.5000	0.4784	0.4584
	0.6	8,787,910.00	0.5000	0.4929	0.4859
	0.7	26,610,259.00	0.5000	0.4977	0.4953
	0.8	80,577,273.00	0.5000	0.4992	0.4985
	0.9	243,992,252.00	0.5000	0.4997	0.4995

Table 4.78 shows the relative and hybrid poverty lines for the modified poverty indices for the South South. For $Z_{r4} = \text{₦}64,808.90$; P_0^* , P_1^* and P_2^* were obtained as 0.0676, 0.0247 and 0.0116 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}34,519.70$ ($\beta = 0.1$) the indices were obtained at 0.0122, 0.0033 and 0.0011. From the table, P_0^* increased as β increased and converged at $\beta = 0.5$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.79: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for South West

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Zr ₁	-	155,049.10	0.1705	0.0577	0.0387
	0.1	37,666.10	0.0040	0.0016	0.0008
	0.2	124,450.90	0.0863	0.0441	0.0217
	0.3	411,192.60	0.3476	0.2810	0.2047
	0.4	1,358,603.00	0.4967	0.4419	0.3954
	0.5	4,488,895.00	0.4998	0.4826	0.4664
	0.6	14,831,545.00	0.5000	0.4948	0.4896
	0.7	49,004,202.00	0.5000	0.4984	0.4968
	0.8	162,000,000.00	0.5000	0.4995	0.4990
	0.9	535,000,000.00	0.5000	0.4999	0.4997

Table 4.79 shows the relative and hybrid poverty lines for the modified poverty indices for the South West. For $Z_{r1} = \text{N}155,049.10$; P_0^* , P_1^* and P_2^* were obtained as 0.1705, 0.0577 and 0.0387 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{N}37,666.10$ ($\beta = 0.1$) the indices were obtained at 0.0040, 0.0016 and 0.0008. From the table, P_0^* increased as β increased and converged at $\beta = 0.6$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.80: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Mean Per Capital Exp) and Hybrid Poverty Lines (Z_H) for South West

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Zr ₂	-	103,366.10	0.0616	0.0272	0.0129
	0.1	36,169.41	0.0037	0.0014	0.0007
	0.2	114,757.10	0.0980	0.0356	0.0172
	0.3	364,097.70	0.3279	0.2539	0.1789
	0.4	1,155,197.00	0.4948	0.4310	0.3785
	0.5	3,665,168.00	0.4995	0.4788	0.4591
	0.6	11,628,714.00	0.5000	0.4933	0.4868
	0.7	36,895,172.00	0.5000	0.4979	0.4958
	0.8	117,000,000.00	0.5000	0.4993	0.4987
	0.9	371,000,000.00	0.5000	0.0500	0.0050

Table 4.80 shows the relative and hybrid poverty lines for the modified poverty indices for the South West. For $Z_{r2} = \text{N}103,169.41$; P_0^* , P_1^* and P_2^* were obtained as 0.0616, 0.0272 and 0.0129 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{N}36,169.41$ ($\beta = 0.1$) the indices were obtained at 0.0037, 0.0014 and 0.0007. From the table, P_0^* increased as β increased and converged at $\beta = 0.6$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.81: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Median Per Capita Exp) and Hybrid Poverty Lines (Z_H) for South West

Z (Code)	B	Z Value	P_0^*	P_1^*	P_2^*
Zr ₃	-	128,150.40	0.1374	0.0471	0.0233
	0.1	36,955.21	0.0038	0.0016	0.0008
	0.2	119,797.60	0.1255	0.0310	0.0195
	0.3	388,347.50	0.3331	0.2688	0.1928
	0.4	1,258,904.00	0.3329	0.2926	0.2592
	0.5	480,983.00	0.4998	0.4809	0.4631
	0.6	13,229,298.00	0.5000	0.4941	0.4884
	0.7	42,885,336.00	0.5000	0.4982	0.4964
	0.8	139,021,132.00	0.5000	0.4994	0.4989
	0.9	450,663,951.00	0.5000	0.4998	0.4997

Table 4.81 shows the relative and hybrid poverty lines for the modified poverty indices for the South West. For $Z_{r3} = \text{₦}128,150.40$; P_0^* , P_1^* and P_2^* were obtained at 0.1374, 0.0471 and 0.0233 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}36,95.21$ ($\beta = 0.1$) the indices were obtained at 0.0038, 0.0016 and 0.0008. From the table, P_0^* increased as β increased and converged at $\beta = 0.6$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.82: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Median Per Capita Exp) and Hybrid Poverty Lines (Z_H) for South West

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Z_{r_4}	-	85,433.60	0.0632	0.0160	0.0074
	0.1	35,486.77	0.0033	0.0012	0.0006
	0.2	110,466.30	0.0906	0.0324	0.0155
	0.3	343,869.10	0.3695	0.2473	0.2024
	0.4	1,070,425.60	0.4923	0.4241	0.3691
	0.5	333,210,9.00	0.4708	0.4517	0.4335
	0.6	10,372,467.00	0.5000	0.4925	0.4852
	0.7	32,288,282.00	0.5000	0.4976	0.4952
	0.8	100,509,662.00	0.5000	0.4992	0.4985
	0.9	312,874,873.00	0.5000	0.4998	0.4995

Table 4.82 shows the relative and hybrid poverty lines for the modified poverty indices for the South West. For $Z_{r4} = \text{₦}85,433.60$; P_0^* , P_1^* and P_2^* were obtained as 0.0632, 0.0160 and 0.0274 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}35,486.77$ ($\beta = 0.1$) the indices were obtained at 0.0033, 0.0012 and 0.0006. From the table, P_0^* increased as β increased and converged at $\beta = 0.6$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.83: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for Rural Sector

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Z_{r1}	-	91,526.87	0.1629	0.1114	0.1629
	0.1	35,732.10	0.0315	0.0056	0.0022
	0.2	111,998.90	0.2101	0.1205	0.0706
	0.3	35,050.10	0.4291	0.3551	0.2843
	0.4	1,100,333.00	0.4988	0.4582	0.4229
	0.5	3,448,888.00	0.4998	0.4868	0.4743
	0.6	10,810,207.00	0.4999	0.4957	0.4916
	0.7	33,883,547.00	0.5000	0.4987	0.4973
	0.8	106,000,000.00	0.5000	0.4996	0.4991
	0.9	333,000,000.00	0.5000	0.4999	0.4997

Table 4.83 shows the relative and hybrid poverty lines for the modified poverty indices for the Rural Sector. For $Z_{r1} = \text{₹}91,526.87$; P_0^* , P_1^* and P_2^* were obtained as 0.1629, 0.1114 and 0.1629 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₹}35,732.10$ ($\beta = 0.1$) the indices were obtained at 0.0315, 0.0056 and 0.0022. From the table, P_0^* increased as β increased and converged at $\beta = 0.7$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.84: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Mean Per Capital Exp) and Hybrid Poverty Lines (Z_H) for Rural Sector

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Z_{r2}	-	61,017.91	0.1081	0.0270	0.0140
	0.1	34,312.26	0.0273	0.0048	0.0019
	0.2	103,275.10	0.0273	0.1051	0.0597
	0.3	310,843.40	0.4137	0.3278	0.2662
	0.4	935,594.40	0.497	0.4503	0.4101
	0.5	2,816,005.00	0.4998	0.4838	0.4687
	0.6	8,475,771.00	0.5000	0.4946	0.4893
	0.7	25,510,852.00	0.5000	0.4982	0.4964
	0.8	76,783,996.00	0.5000	0.4994	0.4988
	0.9	231,000,000.00	0.5000	0.4998	0.4996

Table 4.84 shows the relative and hybrid poverty lines for the modified poverty indices for the Rural Sector. For $Z_{r2} = \text{₦}61,017.91$; P_0^* , P_1^* and P_2^* were obtained as 0.1081, 0.0270 and 0.0140 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}34,312.26$ ($\beta = 0.1$) the indices were obtained at 0.03273, 0.0048 and 0.0019. From the table, P_0^* increased as β increased and converged at $\beta = 0.6$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.85: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Median Per Capita Exp) and Hybrid Poverty Lines (Z_H) for Rural Sector

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Zr ₃	-	71,405.35	0.0911	0.0494	0.0243
	0.1	34,855.93	0.0283	0.0051	0.002
	0.2	106,573.70	0.2245	0.1110	0.0638
	0.3	325,854.50	0.4492	0.3077	0.271
	0.4	996,315.70	0.4957	0.4536	0.4153
	0.5	3,046,282.00	0.4998	0.04851	0.471
	0.6	9,314,151.00	0.4999	0.4952	0.492
	0.7	29,478,451.00	0.5000	0.4984	0.4969
	0.8	87,074,191.00	0.5000	0.4995	0.499
	0.9	266,233,393.00	0.5000	0.4998	0.4997

Table 4.85 shows the relative and hybrid poverty lines for the modified poverty indices for the Rural Sector. For $Z_{r3} = \text{₦}71,405.35$; P_0^* , P_1^* and P_2^* were obtained as 0.0911, 0.0494 and 0.0243 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}34,855.93$ ($\beta = 0.1$) the indices were obtained at 0.0283, 0.0051 and 0.002. From the table, P_0^* increased as β increased and converged at $\beta = 0.7$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.86: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Median Per Capita Exp) and Hybrid Poverty Lines (Z_H) for Rural Sector

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Z_{r4}	-	47,603.57	0.5000	0.0154	0.0065
	0.1	33,470.91	0.0248	0.0434	0.0017
	0.2	98,272.47	0.1291	0.0774	0.0397
	0.3	288,533.50	0.3907	0.0785	0.0298
	0.4	847,150.30	0.4929	0.4447	0.4013
	0.5	2,487,279.00	0.4998	0.4817	0.4646
	0.6	7,302,785.00	0.1668	0.0063	0.0023
	0.7	21,441,369.00	0.5000	0.4979	0.4958
	0.8	62,953,005.00	0.5000	0.4993	0.4986
	0.9	184,833,386.00	0.5000	0.4998	0.4995

Table 4.86 shows the relative and hybrid poverty lines for the modified poverty indices for the Rural Sector. For $Z_{r4} = \text{₦}47,603.57$; P_0^* , P_1^* and P_2^* were obtained as 0.5000, 0.0154 and 0.0065 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}33,470.91$ ($\beta = 0.1$) the indices were obtained at 0.0248, 0.0434 and 0.0017. From the table, P_0^* increased as β increased and converged at $\beta = 0.7$ with the value 0.5000. P_1^* and P_2^* also increased as β increased.

Table 4.87: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Mean Per capita Exp) and Hybrid Poverty Lines (Z_H) for Urban Sector

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Z_{r1}	-	155,996.10	0.17869	0.0799	0.0429
	0.1	37,689.02	0.0034	0.0011	0.0005
	0.2	124,602.00	0.1244	0.0485	0.0242
	0.3	411,943.70	0.4056	0.2838	0.2084
	0.4	1,361,912.00	0.4959	0.4413	0.3953
	0.5	4,502,568.00	0.4999	0.4826	0.4663
	0.6	14,885,774.00	0.5000	0.4948	0.4896
	0.7	49,213,303.00	0.5000	0.4984	0.4968
	0.8	163,000,000.00	0.5000	0.4995	0.499
	0.9	538,00,000.00	0.5000	0.4999	0.4997

Table 4.87 shows the relative and hybrid poverty lines for the modified poverty indices for the Urban sector. For $Z_{r1} = ₦155,996.10$; P_0^* , P_1^* and P_2^* were obtained as 0.17869, 0.0799 and 0.0429 respectively (traditional estimate when $\beta = 0$). For $Z_H = ₦37,689.02$ ($\beta = 0.1$) the indices were obtained at 0.0034, 0.0011 and 0.0005. From the table, P_0^* increased as β increased and converged at $\beta = 0.6$ with the value 0.5. P_1^* and P_2^* also increased as β increased.

Table 4.88: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Mean Per Capita Exp) and Hybrid Poverty Lines (Z_H) for Urban Sector

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Z_{r2}	-	103,996.70	0.0869	0.0307	0.0145
	0.1	36,191.42	0.0032	0.001	0.0005
	0.2	114,896.80	0.0511	0.0395	0.192
	0.3	364,462.60	0.2232	0.2572	0.1831
	0.4	1,158,011.00	0.4933	0.4302	0.3784
	0.5	3,676,331.00	0.4998	0.4787	0.459
	0.6	11,671,288.00	0.5	0.4933	0.4868
	0.7	37,052,587.00	0.5	0.4979	0.4958
	0.8	118,000,000.00	0.5	0.4993	0.4987
	0.9	373,000,000.00	0.5	0.4998	0.04996

Table 4.88 shows the relative and hybrid poverty lines for the modified poverty indices for the Urban. For $Z_{r2} = \text{₺}103,996.70$; P_0^* , P_1^* and P_2^* were obtained as 0.0869, 0.0307 and 0.0145 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₺}36,191.42$ ($\beta = 0.1$) the indices were obtained at 0.0032, 0.001 and 0.0005. From the table, P_0^* increased as β increased and converged at $\beta = 0.6$ with the value 0.5. P_1^* and P_2^* also increased as β increased.

Table 4.89: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (Median Per Capita Exp) and Hybrid Poverty Lines (Z_H) for Urban Sector

Z (Code)	β	Z Value	P_0^*	P_1^*	P_2^*
Zr ₃	-	123,700.20	0.0684	0.0477	0.0237
	0.1	36,824.83	0.0033	0.0009	0.0004
	0.2	118,953.80	0.1138	0.036	0.0158
	0.3	384,251.60	0.3937	0.2687	0.1939
	0.4	1,241,232.00	0.4943	0.4353	0.3859
	0.5	4,009,498.00	0.4995	0.1602	0.1541
	0.6	12,951,709.00	0.5000	0.4940	0.4881
	0.7	41,837,346.00	0.5000	0.4981	0.4963
	0.8	135,145,370.00	0.5000	0.4994	0.4989
	0.9	436,554,241.00	0.5000	0.4998	0.4996

Table 4.89 shows the relative and hybrid poverty lines for the modified poverty indices for the Urban. For $Z_{r3} = \text{₦}123,700.20$; P_0^* , P_1^* and P_2^* were obtained as 0.0684, 0.0477 and 0.0237 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}36,824.83$ ($\beta = 0.1$) the indices were obtained at 0.0033, 0.0009 and 0.0004. From the table, P_0^* increased as β increased and converged at $\beta = 0.6$ with the value 0.5. P_1^* and P_2^* also increased as β increased.

Table 4.90: Estimates of Modified Head Count Index (P_0^*), Modified Poverty Gap Index (P_1^*) and Modified Squared Poverty Gap (P_2^*) for Relative (2/3 Median Per Capita Exp) and Hybrid Poverty Lines (Z_H) for Urban Sector

Z (Code)	B	Z Value	P_0^*	P_1^*	P_2^*
Zr ₄	-	82,466.80	0.0482	0.0157	0.0069
	0.1	35,361.57	0.0027	0.0008	0.0004
	0.2	109,688.20	0.0973	0.0282	0.0153
	0.3	340,242.20	0.3686	0.2481	0.1704
	0.4	1,055,398.00	0.4985	0.4266	0.3698
	0.5	3,273,741.00	0.5	0.4762	0.4542
	0.6	10,154,822.00	0.5	0.4923	0.4848
	0.7	31,499,252.00	0.5	0.4975	0.4951
	0.8	97707559	0.5	0.4992	0.4984
	0.9	303079163	0.5	0.4997	0.4995

Table 4.90 shows the relative and hybrid poverty lines for the modified poverty indices for the Urban. For $Z_{r4} = \text{₦}82,466.80$; P_0^* , P_1^* and P_2^* were obtained as 0.0482, 0.0157 and 0.0069 respectively (traditional estimate when $\beta = 0$). For $Z_H = \text{₦}35,361.57$ ($\beta = 0.1$) the indices were obtained at 0.0027, 0.0008 and 0.0004. From the table, P_0^* increased as β increased and converged at $\beta = 0.5$ with the value 0.5. P_1^* and P_2^* also increased as β increased.

4.7 Estimates of parameters of selected distributions and Descriptive statistics for the modified FGT poverty indices

Based on the 2012/2013 General household survey(GHS) data used for this analysis, a sample of 2500 households were selected from 4536 households and replicated 5000 times using resampling method. The data was used to obtain the descriptive statistics of the modified FGT poverty indices ,the parameter estimates of selected distributions and their distributional fittings.

Table 4.91 Parameter Estimate for selected Distributions

Distribution	Parameter Estimate
Weibull	$\alpha=3847.7, \beta=0.4998$
Frechet	$\alpha=2012.9, \beta=0.4817$
Frechet	$\alpha=1017.1, \beta=0.4647$

The Appropriate distributions of the modified FGT poverty indices were selected as obtained in Table 4.91. The Weibull distribution was selected for the modified head count index, Frechet distribution was selected for the both the modified poverty gap index and the modified square poverty gap index.. Easy fit 5.6 distribution software was used to obtain the parameter estimates of these distributions. The estimates were: $\alpha=3.3847.7$, $\beta=0.4998$ for the Weibull distribution(Modified head count index), $\alpha=2012.9$, $\beta=0.4647$ for Frechet distribution(Modified poverty gap index), and $\alpha=1017.1$, $\beta= 0.4647$ for Frechet distribution(Modified square poverty gap index

Table 4.92 Descriptive Statistics for modified Head Count Index for the whole Country ($Z_{r1}, \beta=0.6$)

Statistic	Value	Percentile	Value
Sample Size	5000	Min	0.49853
Range	0.00147	5%	0.4994
Mean	0.49974	10%	0.49953
3Varianc	2.3828E-8	25% (Q1)	0.49973
Std. Deviation	1.5436E-4	50% (Median)	0.4998
Coef. of Variation	3.0889E-4	75% (Q3)	0.4998
Std. Error	2.1830E-6	90%	0.49987
Skewness	-2.0585	95%	0.49987
Excess Kurtosis	5.3888	Max	0.5

Table 4.92 gives the descriptive statistics for modified head count index for the whole country ($Z_{r1}, \beta = 0.6$). Some of the descriptive status tabulated include mean, variance, standard deviation and others.

Table 4.93 Descriptive Statistics for modified Poverty Gap index for the whole Country ($Z_{r1}, \beta=0.6$)

Statistic	Value	Percentile	Value
Sample Size	5000	Min	0.48105
Range	0.00205	5%	0.4816
Mean	0.48181	10%	0.48162
Variance	8.3529E-8	25% (Q1)	0.48162
Std. Deviation	2.8901E-4	50% (Median)	0.48162
Coef. of Variation	5.9985E-4	75% (Q3)	0.482
Std. Error	4.0873E-6	90%	0.48226
Skewness	1.1963	95%	0.4824
Excess Kurtosis	0.68491	Max	0.4831

Table 4.93 give the descriptive statistics for modified Poverty Gap index for the whole country ($Z_{r1}, \beta = 0.6$). Some of the descriptive status tabulated include mean, variance, standard deviation and others.

Table 4.94 Descriptive Statistics for modified Square Poverty Gap Index for the whole Country ($Z_{r1}, \beta=0.6$)

Statistic	Value	Percentile	Value
Sample Size	5000	Min	0.46364
Range	0.00366	5%	0.46455
Mean	0.46492	10%	0.46455
Variance	3.0354E-7	25% (Q1)	0.46455
Std. Deviation	5.5094E-4	50% (Median)	0.46455
Coef. of Variation	0.00119	75% (Q3)	0.46531
Std. Error	7.7915E-6	90%	0.4658
Skewness	1.1419	95%	0.46603
Excess Kurtosis	0.34898	Max	0.4673

Table 4.94 Descriptive Statistics for modified Square Poverty Gap Index for the whole Country ($Z_{r1}, \beta=0.6$)

Statistic	Value	Percentile	Value
Sample Size	500	Min	0.46364
Range	0.00366	5%	0.46455
Mean	0.46492	10%	0.46455
Variance	3.0354E-7	25% (Q1)	0.46455
Std. Deviation	5.5094E-4	50% (Median)	0.46455
Coef. of Variation	0.00119	75% (Q3)	0.46531
Std. Error	7.7915E-6	90%	0.4658
Skewness	1.1419	95%	0.46603
Excess Kurtosis	0.34898	Max	0.4673

Table 4.94 give the descriptive statistics for modified Square Poverty Gap index for the whole country ($Z_{r1}, \beta = 0.6$). Some of the descriptive status tabulated include mean, variance, standard deviation and others .

Table 4.95: Results of K-S Goodness of Fit Test for distributions of Modified FGT indices for the whole Country

Distribution	k-s statistics	p-value
Weibull (Modified head count index)	0.3077	0.4022
Frechet (Modified Poverty Gap index)	0.2879	1.2011
Frechet (Modified square Poverty Gap index)	0.2944	1.2011

Table 4.95 shows the Kolmogorov-Smirnov (K-S) goodness of fit result for the selected distributions, Weibull distribution and Frechet distribution. They have K-S statistics value as 0,3077, 0.2879 and 0.2944 and their P_{value} as 0.4022,1.2011 and 1.2011 respectively. All the distributions were suitable for the data.

The probability density functions and cumulative distribution functions graphs of the modified poverty indices are given in Appendix 1 and Appendix 2 (Modified head count index), Appendix 3 and Appendix 4 (Modified poverty gap index) , Appendix 5 and Appendix 6 (Modified square poverty gap index) respectively.

CHAPTER FIVE

SUMMARY AND CONCLUSION

5.1 Summary and Conclusion

An attempt was made to re-represent some selected basic Poverty Axioms viz Focus Axiom, Weak Monotonicity Axiom, Impartiality Axiom, and Continuity Axiom. Three Poverty Levels were used in this research viz, the Starving, Extremely poor and Moderately poor as against the two poverty levels (Core poor and Moderately poor) that has been in use. The number of households in these new levels was also estimated using the household expenditure.

The Hybrid Poverty line was adopted instead of the traditional relative or absolute Poverty lines which are arbitrary and highly sensitive to extreme observations. Also, the existing Foster-Greer-Thorbecke (FGT) poverty index is limited by its exclusion of variations among the poor. Hence, this study developed a Modified Generalised Foster-Greer-Thorbecke (MGFGT) poverty index incorporating the new poverty levels and the use of hybrid poverty lines thereby allowing the inclusion of variations among the poor and addressing the problems of arbitrariness and sensitivity to extreme observations.

Close observation of the values of the estimates considering the hybrid poverty lines reveals that there was a constant increase in their values from $\beta = 0.1$ to $\beta = 0.5$ and little or no change in the values from $\beta = 0.6$ to $\beta = 0.9$. Results agree with Madden (2000) who obtained the same result for $\beta = 0.5$ and $\beta = 0.7$ in his analysis using House Budget Survey.

From the foregoing, the below poverty lines with their corresponding values of β and modified poverty indices (P_0^* , P_1^* and P_2^*) are selected as the poverty lines and Modified Generalised Foster-Greer-Thorbecke (MGFGT) estimates for the analyses.

For Nigeria as a whole, the selected elasticity (β) value was 0.6 for the mean per capita expenditure poverty line value of ₦12,135,653.00. This gave rise estimates of 0.5000, 0.4954 and 0.4909 respectively for modified headcount index, modified poverty gap, and modified Square poverty gap indices. With the same elasticity value of 0.6 at different poverty lines the following are observed.

The estimates of the modified head count, modified poverty gap and modified square poverty gap indices were 0.4999, 0.4822, and 0.4656 respectively for $\frac{2}{3}$ Mean per capita expenditure poverty line of ₦9,514,991.00.

The estimates of the modified headcount, modified poverty gap, and modified square poverty gap indices were 0.4999, 0.4947, and 0.4966 respectively for the Median per capita expenditure poverty line of ₦10,406,910.00.

The estimates of the modified headcount, modified poverty gap, and modified square poverty gap indices were 0.5000, 0.4932, and 0.4866 respectively for $\frac{2}{3}$ Median per capita expenditure poverty line of ₦3,159,565.70.

For North central, the selected elasticity (β) value was 0.5 for the mean per capita expenditure poverty line value of ₦3,298,892.00. This gave rise to estimates of 0.4994, 0.4856, and 0.4723 respectively for modified headcount index, modified poverty gap and modified Square poverty gap indices. With the same elasticity value of 0.5 at different poverty lines the following are observed.

The estimates of the modified headcount, modified poverty gap, and modified square poverty gap indices were 0.4994, 0.4825, and 0.4664 respectively for $\frac{2}{3}$ Mean per capita expenditure poverty line of ₦2,926,633.00.

The estimates of the modified headcount, modified poverty gap, and modified square poverty gap indices were 0.4994, 0.4810 and 0.4636 respectively for the Median per capita expenditure poverty line of ₦3,298,892.00.

The estimates of the modified headcount, modified poverty gap, and modified square poverty gap indices were 0.5000, 0.4932, and 0.4866 respectively for $\frac{2}{3}$ Median per capita expenditure poverty line of ₦2,693,534.00.

For North East, the selected elasticity (β) value was 0.6 for the mean per capita expenditure poverty line value of ₦11,346,304.00. This gave rise to estimates of 0.5000, 0.4956, and 0.4913 respectively for modified headcount index, modified poverty gap, and modified Square poverty gap indices. With the same elasticity value of 0.5 at different poverty lines the following are observed.

The estimates of the modified headcount, modified poverty gap, and modified square poverty gap indices were 0.5000, 0.4944, and 0.4890 respectively for $\frac{2}{3}$ Mean per capita expenditure poverty line of ₦8,96,100.00.

The estimates of the modified headcount, modified poverty gap, and modified square poverty gap indices were 0.5000, 0.4948, and 0.4897 respectively for the Median per capita expenditure poverty line of ₦9,522,441.00.

The estimates of the modified headcount, modified poverty gap, and modified square poverty gap indices were 0.5000, 0.4934, and 0.4869 respectively for $\frac{2}{3}$ Median per capita expenditure poverty line of ₦7,466,095.00.

For North West, the selected elasticity (β) value was 0.6 for the mean per capita expenditure poverty line value of ₦9,661,374.00. This gave rise to estimates of 0.4998, 0.4960, and 0.4923 respectively for modified headcount index, modified poverty gap, and modified Square poverty gap indices. With the same elasticity value of 0.5 at different poverty lines the following are observed.

The estimates of the modified headcount, modified poverty gap and modified square poverty gap indices were 0.4998, 0.4949, and 0.4902 respectively for $\frac{2}{3}$ Mean per capita expenditure poverty line of ₦7,575,029.00.

The estimates of the modified headcount, modified poverty gap, and modified square poverty gap indices were 0.4998, 0.4953, and 0.4910 respectively for the Median per capita expenditure poverty line of ₦8,326,300.00.

The estimates of the modified headcount, modified poverty gap, and modified square poverty gap indices were 0.4994, 0.4941, and 0.4887 respectively for $\frac{2}{3}$ Median per capita expenditure poverty line of ₦6,528,258.00.

For South East, the selected elasticity (β) value was 0.4 for the mean per capita expenditure poverty line value of ₦12,227,730.00. This gave rise to estimates of 0.4964, 0.1208, and 0.0936 respectively for modified headcount index, modified poverty gap, and modified Square poverty gap indices.

The estimates of the modified headcount, modified poverty gap, and modified square poverty gap indices were 0.4998, 0.4810, and 0.4632 respectively for $\frac{2}{3}$ Mean per capita expenditure poverty line of ₦3,229,280.00 and for $\beta = 0.5$.

The estimates of the modified headcount, modified poverty gap and modified square poverty gap indices were 0.4947, 0.4437, and 0.4006 respectively for the Median per capita expenditure poverty line of ₦1,112,365.00 and for $\beta = 0.4$.

The estimates of the modified headcount, modified poverty gap and modified square poverty gap indices were 0.4996, 0.4786, and 0.45892 respectively for $\frac{2}{3}$ Median per capita expenditure poverty line of ₦2,854,549.00 and for $\beta = 0.5$.

For South South, the selected elasticity (β) value was 0.4 for the mean per capita expenditure poverty line value of ₦1,247,342.00. This gave rise to estimates of 0.4972, 0.4485, and 0.4071 respectively for modified headcount index, modified poverty gap, and modified Square poverty gap indices. With the same elasticity value of 0.5 at different poverty lines the following are observed.

The estimates of the modified headcount, modified poverty gap, and modified square poverty gap indices were 0.4956, 0.4389, and 0.3920 respectively for $\frac{2}{3}$ Mean per capita expenditure poverty line of ₦1,060,593.00.

The estimates of the modified headcount, modified poverty gap, and modified square poverty gap indices were 0.4968, 0.4430, and 0.3981 respectively for the Median per capita expenditure poverty line of ₦1,127,184.00.

The estimates of the modified headcount, modified poverty gap, and modified square poverty gap indices were 0.4919, 0.4307, and 0.3807 respectively for $\frac{2}{3}$ Median per capita expenditure poverty line of ₦958,425,90.

For South West, the selected elasticity (β) value was 0.5 for the mean per capita expenditure poverty line value of ₦4,488,895.00. This gave rise to estimates of 0.4998, 0.4826, and 0.4664 respectively for modified headcount index, modified poverty gap, and modified Square poverty gap indices. With the same elasticity value of 0.5 at different poverty lines the following are observed.

The estimates of the modified headcount, modified poverty gap, and modified square poverty gap indices were 0.4995, 0.4788, and 0.4591 respectively for $\frac{2}{3}$ Mean per capita expenditure poverty line of ₦3,665,168.00.

The estimates of the modified head count, modified poverty gap and modified square poverty gap indices were 0.4998, 0.4809 and 0.4631 respectively for the Median per capita expenditure poverty line of ₦4,080,983.00.

The estimates of the modified headcount, modified poverty gap and modified square poverty gap indices were 0.4708, 0.4517 and 0.4335 respectively for $\frac{2}{3}$ Median per capita expenditure poverty line of ₦3,332,109.00.

For the Rural Sector, the selected elasticity (β) value was 0.6 for the mean per capita expenditure poverty line value of ₦10,810,207.00. This gave rise to estimates of 0.4999, 0.4957, and 0.4916 respectively for modified headcount index, modified poverty gap, and modified Square poverty gap indices. With the same elasticity value of 0.5 at different poverty lines the following are observed.

The estimates of the modified headcount, modified poverty gap, and modified square poverty gap indices were 0.5000, 0.4946 and 0.4893 respectively for $\frac{2}{3}$ Mean per capita expenditure poverty line of ₦8,475,771.00.

The estimates of the modified headcount, modified poverty gap and modified square poverty gap indices were 0.4999, 0.4952, and 0.4920 respectively for the Median per capita expenditure poverty line of ₦9,314,151.00.

The estimates of the modified headcount, modified poverty gap, and modified square poverty gap indices were 0.4999, 0.4883, and 0.4863 respectively for $\frac{2}{3}$ Median per capita expenditure poverty line of ₦7,302,785.00.

For the Urban Sector, the selected elasticity (β) value was 0.6 for the mean per capita expenditure poverty line value of ₦4,502,568.00. This gave rise to estimates of 0.4999, 0.4826, and 0.4663 respectively for modified headcount index, modified poverty gap, and modified Square poverty gap indices. With the same elasticity value of 0.5 at different poverty lines the following are observed.

The estimates of the modified headcount, modified poverty gap, and modified square poverty gap indices were 0.4998, 0.4787, and 0.4590 respectively for $\frac{2}{3}$ Mean per capita expenditure poverty line of ₦3,676,331.00.

The estimates of the modified headcount, modified poverty gap and modified square poverty gap indices were 0.4995, 0.4602, and 0.4541 respectively for the Median per capita expenditure poverty line of ₦4,009,498.00.

The estimates of the modified headcount, modified poverty gap, and modified square poverty gap indices were 0.5000, 0.4762, and 0.4542 respectively for $\frac{2}{3}$ Median per capita expenditure poverty line of ₦3,273,741.00.

The probability distributions of the modified poverty indices-weibull distribution for headcount index, Frechet distribution for both modified poverty gap index, and modified square poverty gap indices have been determined. Their suitability was further confirmed using Kolmogorov goodness of fit tests. The test showed good fits by the distributions at the national level. The estimates of the parameters of these distributions were close to those obtained theoretically.

The use of the hybrid poverty line vis-à-vis the appropriate choice of β indicates that more of the households are experiencing starvation.

The poverty situation of an individual/household already experiencing starvation could be said to be deep and severe at the same time. This position is supported by minimal variations in the values of P_0^* , P_1^* , and P_2^* respectively. The hybrid approach could therefore be recommended for intervention purposes (policy formulation and poverty eradication programmes). The implication of this is germane to the appropriate determination of those who are truly poor. The estimation of 50% of the population being starved is corroborated by Kazeem (2018) who opined that “The 86.9 million Nigerians now living in extreme poverty represent nearly 50% of it’s estimated 180 million population”.

5.2 Contributions to Knowledge

The following are my contributions to knowledge;

- i. Attempt was made to re-represent four poverty axioms out of seven, via set theory, these include- The Focus Axiom, Weak Monotonicity Axiom, Impartiality Axiom and Continuity Axiom.
- ii. Three poverty levels (Starving households, Extremely poor and Moderately poor) were used in this study as against two poverty levels(Core poor and Moderately poor) that has been in use.
- iii. The Conventional Foster Greer Thonbecke (FGT) index was modified to incorporate the three new poverty levels as against the unitary approach of classifying the poor.
- iv. This study has helped to bring to light the relative potentials of hybrid poverty lines in uni-dimensional poverty analysis since it has received little attention in the past.

5.3 Areas of Further Research

This Study limited itself to the re-representation of four basic axioms(The Focus Axiom, Weak Monotonicity Axiom, Impartiality Axiom and Continuity Axiom) of poverty out of Seven, attempt should be made by other researchers to do same to the remaining three(Weak Transfer Axiom, Strong Upward Transfer Axiom and Replication Invariance Axiom).

This research incorporated the three poverty levels into the Conventional Foster Greer Thonbecke poverty index, researchers should attempt incorporating these three

levels into other poverty indices such as the Watts index, Sen index, and Sen-Shorrocks Thon index.

REFERENCES

- Adeyemi A., Adebayo O., Olagunju K, and Asaley A. 2019. Poverty and Income inequality in Rural Agrarian household of Southwestern Nigeria. The Gender perspective. *The Open Agricultural Journal* 13:51-57. Retrieved January 31, 2020, from <https://openagricultural.journal.com>.
- Afeez, O. and Amiena, B. 2019. Assessment of trends in income Poverty in Nigeria from 2010-2013: An Analysis based on the Nigeria General Household Survey. *Journal of Poverty*. Retrieved January 29, 2020, from <http://www.tandfonline.com>.
- Apata G., Apata M., Igbalajobi and Awoniyi S. 2010. Determinants of Rural Poverty in Nigeria. Evidence from small holder farmers in South-Western, Nigeria. *Journal of Science and Technology Education Research* 1(4): 85-91. Retrieved January 31, 2020, from <https://www.academicjournals.org>.
- Ahmed Tazmeen 2012. Measuring Off-Reserve Aboriginal Poverty and Income Inequality in Canada. Ph.D. Thesis, Department of Economics, University of Manitoba, Winnipeg.
- Almas H. Ed and Masoomah R. 2018. Measurement and Analysis of Poverty in Rwanda. SE-551 11. EARP-EF No. 2018:20. Sweden. 1-26.
- Anon 2013. "Tackling Poverty in Nigeria. Vanguard Newspaper 27th November 2013. Retrieved December 14, 2014, from www.vanguardng.com.
- Anyanwu J.C. 2010. Poverty in Nigeria: A Gendered Analysis. *Journal Statistique Africain, Numero* 11: 1-24. Retrieved January 30, 2020, from <https://www.afdb.org>
- _____ 2011. Towards reducing poverty in Nigeria: The case of Igboland. *Journal of Economics and International Finance*. 29:513-528. Retrieved February 4, 2020, from <https://academicjournals.or/journal/JEIF/article/36E3d785031>
- Asogwa S.N. 2012. Rural Women Empowerment for Poverty Alleviation in Nigeria: The Situation Analysis, Challenges and Way Out. *Internal Journal of Social Sciences* 1(1): 1-21. Retrieved January 31, 2020, from <https://www.iises.net>.
- Atkinson and Bourguignon 2000. A unified approach to measuring poverty and inequality by World Bank. Retrieved October 23, 2015, from <https://issliu.com/worldbank.publications/docs>.
- Ayoade A.R. and Adeola R. 2012. Effects of Poverty on Rural Households Welfare in Oyo State, Nigeria. *Global Journal of Science Frontier Research Agriculture and Biology* 12(4): 45-52. Retrieved January 31, 2020, from <https://globaljournals.org>.

- Bagheri F. and Kavand H. 2006. Measurement of Poverty Intensity in Iran: Applying Sen-Shorrocks-Thon (SST) Index. *Social Welfare – Spring* (2006), 5(20): 181-192.
- Baulch, B. and McCulloch, N. 1198. Being Poor and Becoming Poor:Poverty Status and Poverty Transitions in Rural Pakistan. IDS Working Paper 79.
- Booth, C. 1892. Inequry into the Life and Labour of the People in London (1886-1903). Retrieved October 10, 2015, from booth.lse.ac.uk/static/a/3.html.
- Ceriolli and Zani 2003. Totally fuzzy and relative Measures of Poverty in Dynamic Context An application to the British Household Panel Survey 1991-1992. Retrieved November 13, 2016, from <https://www.researchgate.net/>.
- Charles O. Ebojei, Sukura A. Sanni, Ejor N. Tiku and Ayoola O. Oladele 2010. Determining the Poverty Level of Bee Farmers involved in Non-governmental Organisations Activities in Kaduna State, Nigeria: *Advances in Agriculture and Botany – International Journal of the Bioflux Society*.
- Cheli, B. and Lemmi, A. 1995. A Totally Fuzzy and Relative Approach to the Multi-dimensional Analysis of Poverty. *Economic Notes*, 24(1): 115-134.”.
- Chimanikire, D. 2012. 'Poverty and sustainable Development in Africa'. Retrieved December 15, 2014 from [url/http//cfs.unipv.it/](http://cfs.unipv.it/).
- Compassion International 2021. Children and Poverty: Poverty around the World. Retrieved January 23, 2021 from compassion.com/poverty/povertyaroundtheworld.thm#
- Editors of Encyclopedia Britannica 1963. “Poverty: Definitions, Cases and Types”. Retrieved July 16, 2019, from <https://www.britannica.com/>.
- Edson. S., Pilar T., Emmanuel O. and Sandra, S. 2014. Women`s Forum-Focus on Mexico Ethnic inequities. *Women's Forum for the Economy and Society*. Retrieved October 10, 2015, from www.women`sforum.com.
- Egibiremolen G. 2018. Poverty Trends and Poverty Dynamics: Analysis of Nigerians First-ever National Panel Survey Data. *Journal of International Development* 30(4):691-706. Retrieved on January 31, 2020, from <https://onlinelibrary.wiley.com>.
- Egibiremolen, G.O. & Jonathan E. O., 2018. "Measurement and Determinants of Food Poverty: A Dynamic Analysis of Nigeria's First Panel Survey Data," *African Development Review*, *African Development Bank*, vol. 30(4): 423-433.
- Ellaman, M. 1994. The Increase in Death and Disease under Katastraika. *Cambridge Journal of Economics*, 18: 329-355.

- E.U Cookie Directive 2012. What is Social Exclusion?. Retrieved January 18,2014 ,from <http://www.welfareie/en/pages/whatispoverty-and-social-exclusion/>.
- Esanov, A. 2013. The Growth-Poverty Nexus: Evidence from Kazakhstan. Retrieved October 10, 2015, from www.adb.org.
- Farouq I.Md., Mohammad A. and Hossain M. 2018. Factors affecting Poverty in Rural Bangladesh; An Analysis using Multilateral Modeling. *Journal of Bangladesh Agricultural University* 16(1): 123-130. Retrieved January 30, 2020, from <https://baures.bau.edu.bd/jbau>.
- Foster .J. 1998. “New Frontiers in Poverty Measurement: Hybrid poverty Line” Retrieved October 24, 2015, from <https://www.ophi.org.uk/wp-content/uploads/New-Frontiers-Oxford2.pdf>.
- Foster and Szekely 2006. A unified approach to measuring poverty and inequality by World Bank. Retrieved October 23,2015 from <https://issliu.com/worldbank.publications/docs>
- Girma M. and Temesgen Y. 2018. Determinants and its extent of rural poverty in Ethiopia : Evidence from Doyogena District, Southern Part of Ethipia. *Journal of Economic and International* 10.3.22-29. Retrieved February 4, 2020 from <https://doi.ng/10.5897/JEIF2017.08.37>.
- Hakovirta, M. 2011. Child Maintenance and Child Poverty. A Comparative Analysis. *Journal of Poverty and Social Justice* 3: 249-262.Retrieved January 29, 2020, from <https://www.ingentaconnect.com>.
- Haughton, J. and Khandker R. 2009. ”Handbook on poverty and Inequality”. Retrieved August 5, 2015 from worldbank.org.
- Jalan, J. and Martin R. 1996. World Bank Policy Research Working Paper No. 1616. Available at SSRN. Retrieved May 20, 2017, from: <https://ssrn.com/abstract=636123>.
- Ifad, 1993. The stayer of world Rural Poverty .A profile of Latin America and the Caribbean International Fund for Agricultural Development. Discussion paper 10. Retrieved July 22, 2019, from <https://www.ifad.org/en/>.
- Ijaiya G., Ijaiya M., Bello R. and Ajayi M. 2011. Economic Growth and Poverty Reduction in Nigeria. *Internal Journal of Business and Social Sciences* 2(15): 147-154. Retrieved January 31,2020, from <https://www.ijbssnet.com>.
- Ikande, M. 2018. Current poverty alleviation programmes in Nigeria. Retrieved July 22, 2019, from <https://www.legit.ng/1137082-current-poverty-alleviation-programmes-nigeria>.

- Investopedia 2014. Poverty. Retrieved December 15,2014, from www.investopedia.com.
- James Chen 2019. "Poverty" *Investopedia*. Retrieved August 16,2019, from <https://www.investopedia.com/>.
- Kazeem 2018. Nigeria has become the poverty capital of the world. Retrieved July11, 2019, from <https://qz.com/afria>.
- Khandker, S. R. 1998. *Fighting poverty with microcredit: experience in Bangladesh (English)*. New York, NY: Oxford University Press. <http://documents.worldbank.org/curated/en/549951468768619206/Fighting-poverty-with-microcredit-experience-in-Bangladesh>. Retrieved December 14, 2014, from www.cabdirect.org.
- Klasen, S. 2000. "Measuring Poverty and Deprivation in South Africa". *Review of Income and Wealth*, 46(1): 33-58.
- Kolmogorov-Smirnov Test 2013. Kolmogorov-smirnov Test. Retrieved August 5,2019, from https://en.wikipedia.org/wiki/Kolmogorov%E2%80%93Smirnov_test.
- Madden 2000. "New frontiers–poverty measurement". Retrieved November 12, 2015, from <https://www.ophi.org.uk/wp-content/uploads/New-Frontiers-Oxford2.pdf>.
- Maxwell Simon, 1999. "The Meaning and Measurement of Poverty", Odi Briefing, 3 February, 1999. Retrieved November 13, 2015, from <http://www.oneworld.org/odi/>
- Michael Foster and Horacio Levy 2013. The OECD Approach f measure and monitor income poverty across countries. United Nations Economic Commission For Europe Conference Of European Statisticians Working Paper1725 November 2013. Retrieved October 24, 2015, from https://www.unece.org/fileadmin/DAM/stats/documents/ece/ces/ge.15/2013/WP_17_OECD_D_En.pdf on 24th October, 2015
- Morris, M.O. 1994."Measuring the condition of the World's Poor. The Physical of Life index". New York; Perganon Press.
- Mulatie C. and Andualem B. 2019. Gender difference in Poverty: An empirical analysis in Bench Maji, Maffa and Sheka Zones, South West Ethiopia. *Journal of Economics and International Finance*. 11(1):15-24. Retrieved February 4, 2020 from <https://doi.ng/10.5897/JEIF2018.0945>
- NBS 1999. "Poverty profile Nigeria-IHSN Survey catalog". Retrieved January 31,2016, from catalog.ihsn.org.

- NBS 2011. Poverty profile for Nigeria: Based on the 2010 Nigeria living Standard. National Bureau of Statistics, Abuja, Nigeria.
- NBS 2005. Poverty profile for Nigeria. National Bureau of Statistics, Abuja, Nigeria.
- Nwoke, F.C. 2014. “Efficiency of median per capita method for measuring the levels of poverty in Nigeria”, M.PHIL Thesis, Statistics Department, University of Ibadan.
- Ogbeide E., and Agu D. 2015. Poverty and Income Inequality in Nigeria, ANY CAUSALITY? *Asian Economic and Financial Review*, 2015, 5(3):439-452. Accessed from <https://www.eduuniversity.edu.ng> on the 31st of January 2018.
- Ogwumike, F.O. 1987. Poverty and Basic Needs: An Approach to Development in Nigeria, Ph.D Thesis, Department of Economics, University of Ibadan.
- Ogwumike, F.O. 2002. “An Appraisal of Poverty Reduction Strategies in Nigeria”. Retrieved October 10,2015, from www.cenbank.org.
- Olatomide W.O. 2012. Concept, Measurement and Causes of Poverty: Nigeria in perspective. *American Journal of Economics* 2(1): 25-36. Retrieved January 30, 2020, from <https://doi:10.5923/j.economics.20120201.04>.
- Olorunsanya, E., Falola A. and Ogundeji F. 2011. Comparative Analysis of Poverty Status of Rural and Urban households in Kwara State, Nigeria. *International Journal of Agricultural Economics and Rural Development* 4(2): 44-52. Retrieved January 31, 2020, from <https://www.ijaerd.lautechae.edu.com>.
- Olowa O. W., Awoyemi, T. T, Shittu M. A and Olowa O.A 2013. Effects of remittances on poverty among Rural Households in Nigeria. *European journal of Sustainable Development* 2(4).263-284. Retrieved February 4, 2020, from <https://ecsdev.org/images/conference/si/CSD2013/olowa%20>.
- Osberg, I. and Xu, K. 2000. “International Comparisons of Poverty Intensity: Index Decomposition and Bootstrap Inference, *Journal of Human Resources, Volume 35, Number 1, Winter 2000, pp. 51-81*. Errata Corrected Volume 35, Number 3, Summer 2000.
- Osberg, I. and Xu, K. 2007. “How should we measure poverty in a changing world? Methodological issues and Chinese case study”. *Review of Development Economics*. 12: 419-441. 10.1111/j.1467-9361.2008.00449.x. Retrieved August 5, 2015, from <https://ideas.repec.org/>.
- Osberg, Lars & Xu, Kuan. 2008. How Should We Measure Poverty in a Changing World? Methodological Issues and Chinese Case Study. *Review of Development Economics*. 12:419-441. 10.1111/j.1467-9361.2008.00449.x. Retrieved September 20, 2016, from <https://online>.

- Osberg, Iars and Xu, K. 1999. "Poverty Intensity: How Well Do Canadian Provinces Compare? *Canadian Public Policy* 25(2), (1999): 179-195.
- Osohole O.I, Uba E., Ugbechie R. Aghamie S.O. and Olusola T.J. 2014. Statistical Analysis of Income Poverty and Inequality in Nigeria. *Elixir International Journal in Statistics* 76(2014): 28464 – 28465. ISSN: 2229 – 712X.
- Osohole O.I. and Ugbechie, R. 2011. An analysis of Rural Poverty in Oyo State: A Principal Component Approach. *Journal of Research in National Development (JORIND)* Vol. 9. No. 2: 100 – 104 (Nigeria)
- Osohole O.I., Ugbechie, R. and Uba E. 2012. On the Identification of Core Determinants of Poverty: A Logistic Regression Approach. *Mathematical Theory and Modeling* Vol. 2 No. 10: 45-52. ISSN 2224 – 5804 (Paper). ISSN 2225 – 0522 (on line) (USA).
- Osohole, O.I. 2011. "Statistical Modelling of Poverty-Incidence in Nigeria. Ph.D Thesis, University of Ibadan, Ibadan, Nigeria.
- Osohole O. and Bamiduro A. 2013. On the derivation of estimators of Foster-Greer-Thorbecke (FGT) Poverty indices. *CBN Journal of Applied Statistics* 4(1): 1-3. Retrieved 30 January 2020, from <https://soholar.google.com>.
- Osohole O.I. 2015. On Variations in Poverty Determinants in Nigeria. *Jorind* 13(1).1-8.Retrieved January 29,2020, from www.transcampus.org/journal.
- Osohole O.I., Ajibola J., Nwaka R.N. Balogun K.O. 2018. Censored Foster Greer Thombecke (FGT) indexes in poverty analysis in Nigeria. *International Journal of Basic, Applied and Innovative Research IJBAIR*, 2018, 7(3): 62-67. Retrieved January 13, 2019, from: www.arpjournals.com; www.antrescentpub.com.
- Osohole O.I., Uba E., Ugbechie R.N. Aghamie s.o.and Olusola T.J. 2014.Statistical Analysis of Income Poverty and inequality in Nigeria.*Elixir International Journal in Statistics* 76(2014):28464-28465.: ISSN:2229-712X. Retrieved January 13, 2019, from: www.elixirpublishers.com.
- Osohole O.I., Awomokun G., Nwaka R.N., Balogun K.O. 2018. Proxy means Test (PMT) analysis of poverty in Oyo State. *International Journal of Basic, Applied and Innovative Research IJBAIR*, 2018, 7(3): 62-67. Retrieved January 13, 2019, from <https://www.ajol.info/>.
- Otu J. E., Eja I., Joy E. A., Emeka J. O. 2014. "Analysis of Poverty Indices in Underdeveloped Countries: Nigeria Scenario". *Mediterranean Center of Social and Educational Research*; Saturday 08, February, 2014.
- Pradhan, M. and Ravallion, M. 2000. Measuring Poverty Using Qualitative Perceptions Of Consumption Adequacy. *The Review of Economics and*

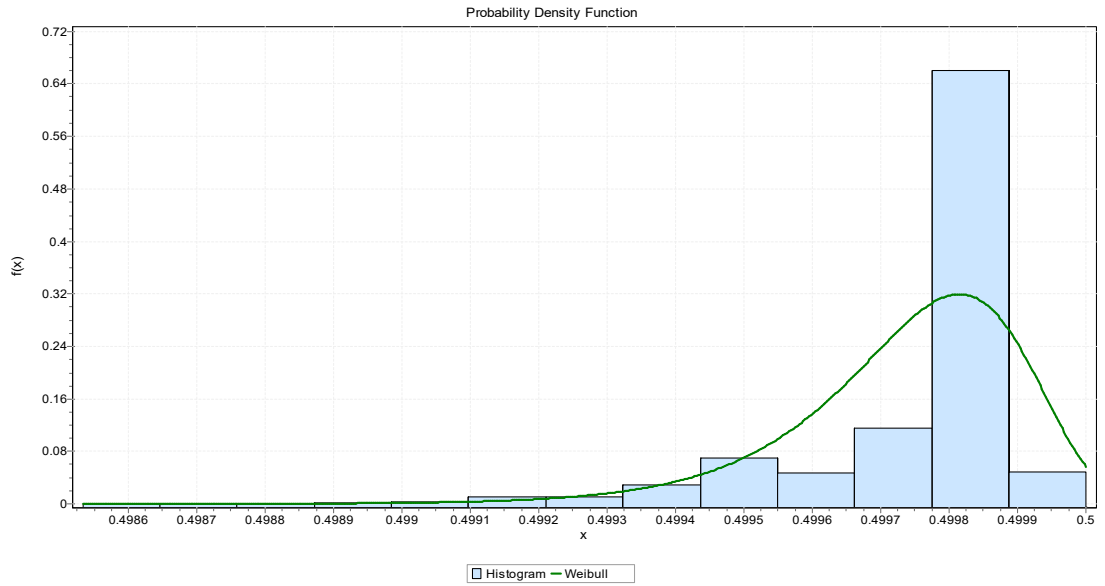
- Statistics*. 82: 462-471. 10.1162/003465300558821. Retrieved December 15, 2014, from [https:// ideas.repec.org/](https://ideas.repec.org/).
- Ratan, K.G. 2012. "Growth, Poverty and Inequality Paradox in India: A Panal Data Approach". A Paper Presented at the 32nd General Conference of the International Association of Research Income and Wealth.
- Ravallion and Chen 2011. Weakly relative poverty. Retrieved October 23,2015, from <https://widdronline.worldbank.com> .
- Robeyns I. 2003. The capability approach: An interdisciplinary introduction; A paper presented at the 3rd International conference on the capability Approach, Pavia, Italy, 6th September, 2003.
- Rowntree, B. S. 1901. Poverty: A study of town life. London: Macmillan and Co.
- Schokkaert, E. and Van Otegem L. 1990. Sen's concept of the living standard applied to the Belgium Unemployed. *Researches Economiques de Louvain*. 56:429-450.
- Sen, A. K. 1976. "Poverty: An Ordinal Approach to Measurement". *Econometrica*, 44: 219-231.
- Shaohua, C. and Ravallions, M. 2007. Absolute Poverty Measures for the developing World, 1981-2004. *Journal of Pnas* 43: 16757-16762. Retrieved January 30, 2020, from <https://www.pnas.org/>.
- Shorrocks, A.F. 1995. "Revisiting the Sen Poverty Index". *Econometrica*, 63: 1225-1230.
- Slottje, D. 1991. Measuring the quality of Life across Countries. *Review of Economics and Statistics*, 73(4):684-693.
- Smith, A. 1976; 1961. The Wealthy Nations (1904 Edition of Edwin Cannan) Methuen and Co., London, 1961.
- Suman S. 2009. Inequality, Interactions, and Human Development, *Journal of Human Development and Capabilities*, 10:3: 375-396, DOI: [10.1080/19452820903048878](https://doi.org/10.1080/19452820903048878) Retrieved November 23,2016, from <https://www.ophi.uk/wp>.
- Surbhi S. 2019. Difference between Absolute and Relative Poverty in key differences. Retrieved July 16,2019,from <https://key.difference.com/>.
- Thomas and Canagarajah 2002. Poverty in a Wealthy Economy: The Case of Nigeria. IMF Working Paper (WP/02/114).
- Tejvan Pettinger 2017. Definition of absolute and relative Poverty in Economics help. Retrieved June 27,2018, from <https://www.economicshelp.org/>.

- Townsend P. (1979): "Poverty in the United Kingdom". Middle Sex, English; Penguin Book, 1979.
- Ugbechie R.N. 2015. Determination of Head Count and Sen-shorrocks than Poverty Indices in Delta State based on the desirable axioms. M.PHIL/Ph.D Thesis, University of Ibadan, Ibadan, Nigeria.
- UNDP 1990. Human Development Report. New York: Oxford University Press. Word Bank (2006) Report on Nigeria. Retrieved July 16, 2018, from <https://www.worldBank.org/Nigeria>.
- UNICEF Nigeria 2007. Overview, The Nigeria Situation. Retrieved October 15, 2014, from www.unicef.org/nigeria/1971_2199.html/.
- Victoria D. 2017. Analysing poverty in Nigeria through lenses journal of sustainable development 11(1).20-31. Retrieved January 31, 2020, from <https://doi.org/>.
- Watts, H.W. 1968. An Economic Definition of Poverty in D. Pmoynihan (ed) on understanding poverty .New York: Basic Books(1968).
- Weber, B, Jensen, L, Miller, K, Mosley, J, and Fisher, M. 2005. A Critical Review of Rural Poverty Literature; Is There Truly a Rural Effect? Institute for Research on Poverty Discussion Paper no.1309-05.RUPRI Rural Poverty Research Centre.
- Wikipedia 2014. "Poverty". Retrieved December 14, 2014, from en. wikipedia. org.
- World Bank 2001. World Bank Institute. Poverty Manual, World Bank Group.
- World Bank 2000. World Development Report 2000-2001.Washington DC.
- World Bank 2010. "Overview – Understanding, Measuring and Overcoming Poverty", The World Bank (2010). Retrieved January 18,2014, from <http://web.worldbank.org/WEBSITE/EXTERNAL/TOPICS/EXTPOVERTY/EXTPA/>.
- World Bank 2014. "Poverty". Retrieved December 14,2014, from en. wikipedia. org.
- World Bank 2015. "Poverty threshold". Retrieved October 24, 2015, from <https://en.wikepedia.org/wiki/poverty-threshold>.
- XU K. 2013. "The Sen-Shorrocks-Thon Index of Poverty Intensity". Encyclopedia of the Quality of Life Research. Edited by Alex C. Michalos. Published by Springer 2013. Retrieved August 5,2015, from web.dab,ca/kxu/SSt index.pdf.
- Xu K. and Osberg 2002. "On Sen's Approach to Poverty measures and Recent Developments. The Sixth International Meeting of the Society for Social Choice and Welfare. July11-14, 2002.1-34. Retrieved August 5,2015 from web.dab,ca/kxu/SSt index.pdf.

Zadeh L.A. 1965. Fuzzy Sets. *Journal of Information and Control*, 8;338-353.
Retrieved October 12, 2016, from
<https://www.sciencedirect.com/science/article/pii/S001999586590241X>.

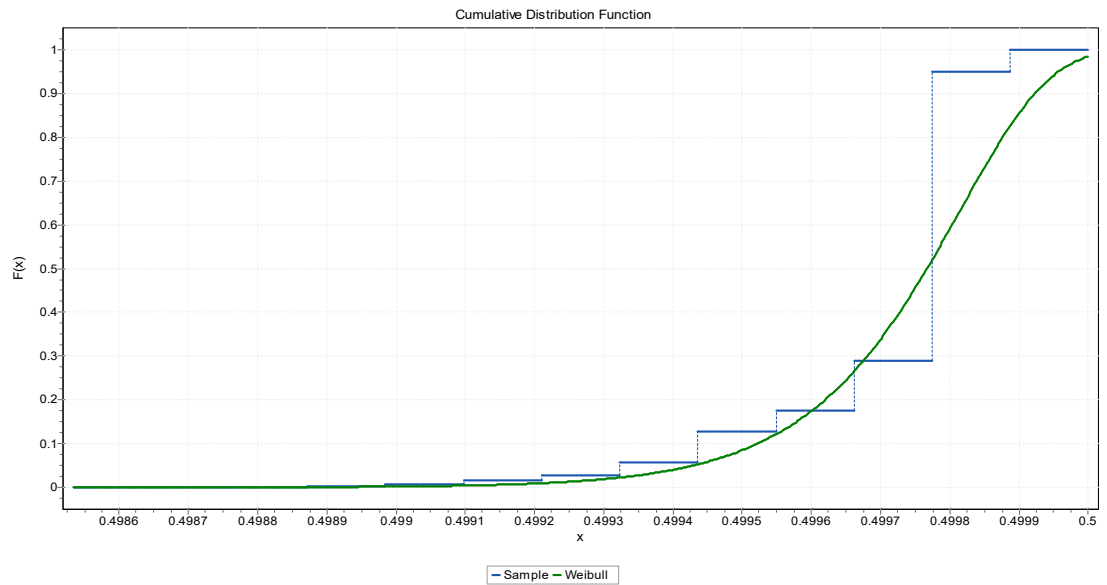
APPENDIX 1

Probability Distribution Function of Modified Head Count Index for the whole Country ($Z_{r1}, \beta = 0.6$)



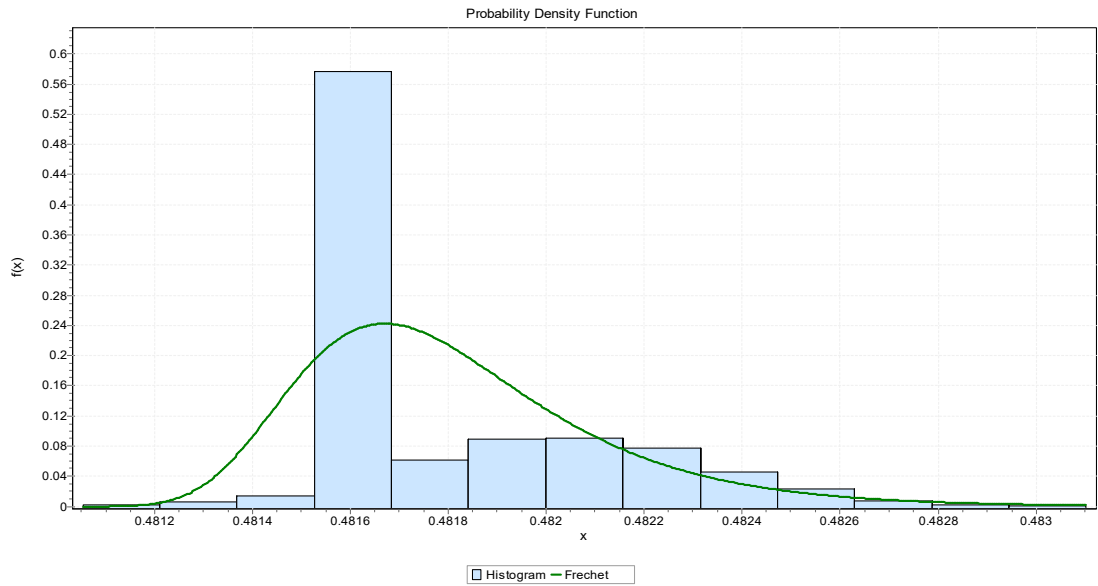
APPENDIX 2

Cumulative Distribution Function of Modified Heat Count Index for the whole Country ($Z_{r1}, \beta = 0.6$)



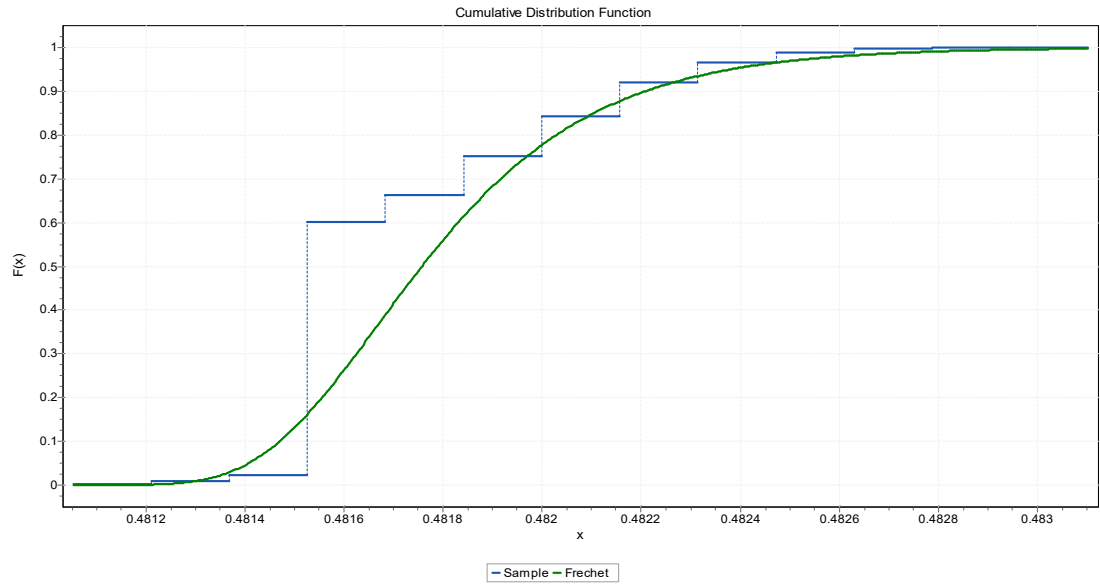
APPENDIX 3

Probability Distribution Function of Modified Poverty Gap Index for the whole Country ($Z_{r1}, \beta = 0.6$)



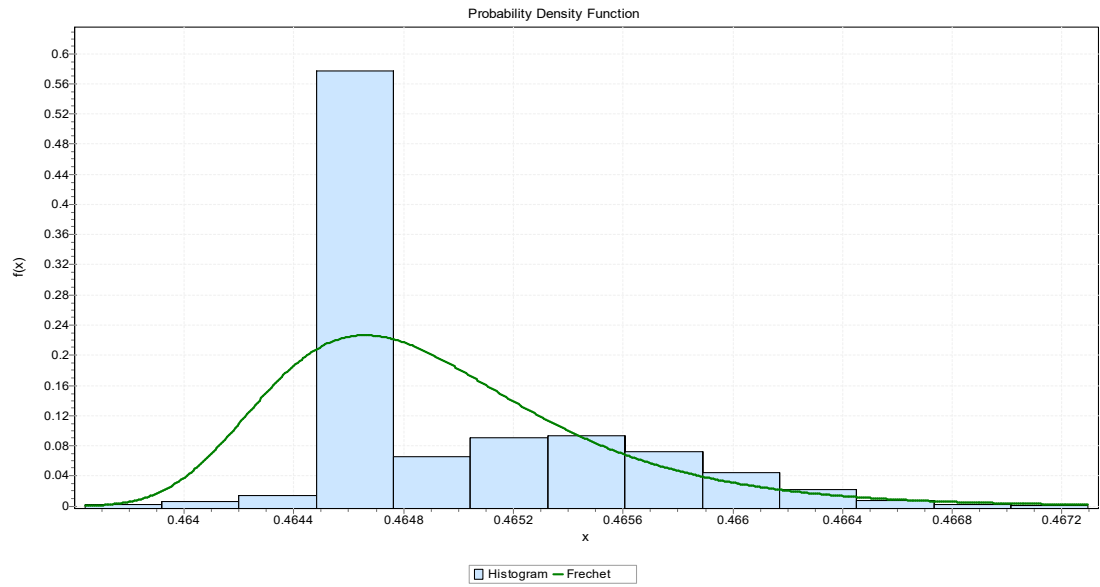
APPENDIX 4

Cumulative Distribution Function of Modified Poverty Gap Index for the whole Country ($Z_{r1}, \beta = 0.6$)



APPENDIX 5

Probability Distribution Function of Modified Square Poverty Gap Index for the whole Country ($Z_{r1}, \beta = 0.6$)



APPENDIX 6

Cumulative Distribution Function of Modified Square Poverty Gap Index for the whole Country ($Z_{r1}, \beta = 0.6$)

