AN ECONOMIC ANALYSIS OF QUALITY OF LIFE AND LIVING CONDITIONS IN ZARIA LOCAL GOVERNMENT AREA OF KADUNA STATE

BY

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DECLARATION

I, ISMAIL HAYATU SANUSI hereby solemnly declare that the whole of this work submitted now for the award of Master of Science (M.Sc) Degree in Economics at the Ahmadu Bello University, is a result of my research and has not been presented to any University for the award of a degree. All references in the work have been duly acknowledged. All errors in this work are solely mine.

Ismail Hayatu Sanusi Date

CERTIFICATION

This thesis titled "An Economic Analysis of Quality of Life and Living Conditions in Zaria Local Government Area of Kaduna State" meets the regulations governing the award of the degree of Master of Science (M.Sc) of Ahmadu Bello University, and is approved for its contribution to knowledge and literary presentation.

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ABSTRACT

Recent measures of welfare tend to go beyond the conventional focus on resources to a wide range of other aspects due to the multidimensional nature of quality of life. Such an approach is however limited by lack of clear framework for evaluating quality of life particularly at the micro level. This study evaluates the quality of life, living conditions and the effectiveness of governance in Zaria Local Government Area from an economic perspective. The Capability Deprivation Index (CDI) was developed and estimated across the thirteen wards of the study area. Using a combination of stratified and systematic random sampling, data were collected on key dimensions of quality of life - education, health and living conditions, to determine the nature and extent of capability deprivation and its disparity across the thirteen Wards and Zaria Local Government Area as a whole. With the use of descriptive statistical method of analysis, findings from the study suggest the existence of capability deprivation in all dimensions with great disparity across households. The results also point to living conditions as the greatest source of deprivation, which is evident in poor living standards and significant governance deficit. The study therefore recommends that government should scale up commitments in the living conditions dimension, and welfare intervention policies should be ward-specific based on a scale of preference.

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ACRONYMS

ANS	Adjusted Net Savings
CDI	Capability Deprivation Index
CFC	Consumption of Fixed Capital
EAs	Enumeration Areas
EDI	Education Deprivation Index
GDI	Gender Development Index
GDP	Gross Domestic Product
GDS	Gross Domestic Savings
GFI	Grassroots Focused Index
GII	Gender Inequality Index
GNP	Gross National Product
HDI (1)	Human Development Index
HDI (2)	Health Deprivation Index
IHDI	Inequality-adjusted Human Development Index
ILO	International Labour Organization
LDCs	Less Developed Countries
LDI	Living Conditions Deprivation Index
MDGs	Millennium Development Goals
MPI	Multidimensional Poverty Index acronym
NDP	Net Domestic Product
NDS	Net Domestic Savings
NNP	Net National Product
NPC	National Population Commission
OECD	Organization for Economic Cooperation and Development
SDGs	Sustainable Development Goals
SPI	Social Progress Index
SWF	Social Welfare Function
UNDP	United Nations Development Programme

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Quality of life is tied to the extent with which the welfare of the people is promoted across space and time. This can be achieved either through market mechanism as a first-best option, or by way of government interference as a second-best alternative. From whichever perspective, the role of government is typically the provision and equitable allocation of public goods (Barr, 1987). Therefore people's access to, and effective distribution of goods and services can be an important yardstick for evaluating quality of life and the effectiveness of governance.

Determination of economic criteria for welfare evaluation has been a subject of debate among economists. The source of this debate is the inability to decide on purely economic grounds how the goods and services produced in an economy should be distributed among individuals, arising from the political, economic, and moral considerations surrounding issues of distribution and equity (Just, Hueth and Schmitz, 2004). Welfare economics provides an economist with tools of analysis for making normative statements about the ideal policy choice in any given situation, and the basis for evaluating the achievements of markets and governments in resource allocation.

The approaches for the assessment of human welfare have evolved from the utility-based to resource-based approach, and more recently to the capability approach. According to Walle (1996), the evolution of these approaches can be attributed to three important revolutions in economics. First is the marginalist revolution associated with the independent works of Calrl Menger, Leon Walras, and Alfred Marshal. Their most notable contribution is the idea of

diminishing marginal utility which has been the basis for consumption theory and the backbone of welfare measurement up to early twentieth century. The second is the ordinalist revolution which, starting with the work of Lionel Robbins in 1932, synthesized the contributions of the marginalists into a coherent school of neoclassical economics. The ordinalists maintained that utility is a subjective concept that can be measured only through revealed preference. The third revolution is attributed to the work of John Rawls in a 1971 publication *A Theory of Justice.* Drawing on the philosophy of Rawls, Amartya Sen developed the capability approach with focuses on human potentials rather than merely on resources. This is known as the humanist revolution which has been influential particularly in development policy circles (Cooter and Rappoport, 1984; Stanton, 2007).

Most recently, the evolution is towards an integrated approach that combines all approaches to welfare with emphasis on sustainable development (see Costanza et al. 2008; Stiglitz, Sen and Fitoussi, 2009). However, the empirical application of this heterodox approach is limited by a lack of workable framework for welfare evaluation. In addition, the Millennium Development Goals (MDGs) have been used as a framework for public policy and evaluation especially in the developing world. But as at 2015, many countries in Sub-Saharan Africa including Nigeria have not achieved the targets for MDGs despite sustained periods of growth, calling for a shift of focus to a post-MDGs world. The prospects of most of these countries even in a post-MDG era are unclear especially when growth forecasts are being adjusted downwards. As such, it is important to have a clear and measurable framework for quality of life evaluation as a basis for government action in less developed countries.

Empirically, studies on quality of life use diverse indicators as healthcare, education, housing, and earnings as components of welfare. However, studies on developed countries focus on happiness and satisfaction with the components since public goods are available and readily accessible in those countries. On the other hand, studies on developing countries emphasize on access to such welfare components due to the prevalence of resource poverty and other forms of deprivations in less developed countries. For example, observations from reports on a global scale show a wide disparity in quality of life between the developed economies of Latin America, Europe, Europe and Central Asia, and the developing economies of Sub-Saharan Africa and South Asia (see Helliwell, Layard and Sachs, 2013; Porter, Stern and Green, 2013; UNDP, 2014). The differences in the level of development across countries indicate that different societies face different types of problems at varying degrees, and therefore have differing needs. This provides a basis for evaluating quality of life using different standards for different societies.

Contemporary studies on quality of life tend to follow the growth-centred model of development in focusing exclusively on the macro economy while neglecting the human potentials that are lost to other forms of deprivations. Thus the entry point in this study is the recognition that multidimensional deprivations exist at the micro level that conventional approaches to welfare scarcely capture, and which coexist with high inequalities in many dimensions.

1.2 Statement of the Research Problem

Despite high rates of economic growth in the last decade, Nigeria's Human Development Index (HDI) ranks 152 out of 187 countries in the 2014 Human Development Report. This places Nigeria among countries with low human development. The report further ranks Nigeria ninth of the 42 countries in the low human development category. The HDI ranking of the country and its economic growth seems to be incompatible. Real GDP growth rate averaged 7.4 percent in 2000-

2013 which should have boosted Nigeria's HDI. The divergence between growth and HDI suggests that the windfall from sustained GDP growth trajectory has not translated to high human development.

Economic and social statistics of the Nigerian economy reveal the depth of poverty, inequality and low living standards across all states and communities with women and children as the most vulnerable group. The National Bureau of Statistics poverty profile for 2010 estimated 69% of Nigerians as relatively poor with 60.9% in absolute poverty while 93% as subjectively poor based on self-assessment (National Bureau of Statistics, 2012).

States and local governments in Nigeria are heterogeneous. Therefore, state and local government (micro) level research is important to improving the information required for effective welfare policy intervention. In addition, there is the need to expand the analysis of welfare beyond traditional poverty measures, toward expanding options and enhancing capability. The literature indicates a diverse set of welfare measures with focus on particular aspects of welfare such as happiness, inequality, and poverty, without due regard to the multidimensional nature of quality of life. It is thus necessary to determine the appropriate measure for policy at the micro level.

Within states, there seems to be over concentration of intervention projects in state capitals and cities. The population in smaller communities may be neglected and conditions at local levels tend to be underreported by government survey agencies because of over-aggregation and apparent bias toward the macro economy. Hence, models of community-based development require studies of local government areas and communities.

Zaria local government is one of 23 local government areas in Kaduna State. Given the multiple deprivations in Kaduna State relative to the national average, a measurement of the quality of life in Zaria local government is imperative. The study was guided by the following questions:

i. What is the appropriate framework for evaluating quality of life at the micro level?

ii. What is the quality of life and living conditions of the population in Zaria local government area?

iii. To what extent is governance effective in Zaria local government area?

1.3 Objectives of the Study

The major objective of this study was to evaluate the quality of life and living conditions of the population in Zaria local government area. The specific objectives were:

i. To develop a framework for evaluating quality of life at the micro level.

ii. To measure the quality of life of the population in Zaria local government area.

iii. To evaluate the effectiveness of governance in Zaria local government area.

1.4 Significance of the Study

This study could be useful in providing a broader knowledge base for policy makers at state and local government levels on the living standards of the people so that appropriate policies could be designed to promote their quality of life. It could help in identifying priority areas where the use of public resources will result in better outcomes. Information on the state of public goods and service delivery may be valuable in setting policy targets for their improvement. The need for

partnership between state and local governments in providing essential services may also be made to be critical in achieving government policy objectives.

An empirical framework for public policy evaluation such as this one, may assist in providing an alternative measure of quality of life especially at the expiration of the MDGs. With countries far from achieving the MDG targets, there is the need for other policy targets that would fill in the gap and augment the global development agenda. Such framework could help in identifying the relevant space for welfare expansion and policy evaluation.

Due to the debates surrounding issues of welfare, it is hoped that this study would contribute to the development of better measures of welfare that suit less developed countries without compromising their cultural values. This may make the process of economic development more compatible with the circumstances of individuals in different societies. It may also add empirical content to the human development approach that is still evolving.

1.5 Scope and Limitations of the Study

This study was limited to Zaria Local Government Area of Kaduna State. Zaria local government is one of the 23 local government areas in Kaduna state. It is a socio-economic model that represents diverse values which characterize a heterogeneous society. Data was collected from households based on cross-sectional units surveyed according to wards. However, results from the study should be treated with caution since the data set used was mainly from survey, which depends on the sincerity of the responses therefrom. Yet in spite of the limited scope of this study, the findings can be generalized as a representative of quality of life in Kaduna state.

CHAPTER TWO

LITERATURE REVIEW

This section reviews the theoretical and empirical literatures relevant for this study. The theoretical aspect discusses the various theories and frameworks that are related to quality of life[1] including the key concepts in each. The empirical aspect reviews different studies covering divergent themes in quality of life and living conditions. Such reviews could help in providing a clear direction throughout the rest of the study.

2.1 Theoretical Approaches to Welfare and Quality of Life

2.1.1 Utility-based Approach

Following the marginalist revolution of the early nineteenth century, the utility approach emerges as the oldest notion of welfare. This approach is analysed broadly through the neoclassical and axiomatic approaches. The neoclassical model of consumption is based on the premise of utility and profit maximization. This claim is validated through the total effect of price changes on quantity demanded of a commodity, which is decomposed into *income effect* and *substitution effect* (Hunt and Lautzenheister, 2011:375).

According to Hunt and Lautzenheister (2011), neoclassical welfare economics is divided along *indifference curve analysis,* based on Pareto's recast of Walras's ideas, and the *Austrian School's* perspective in the tradition of Menger and Walras. In particular, the indifference curve analysis represents ordinal ranking of utility by dropping the requirement of interpersonal comparisons of

[1] Quality of life is an umbrella concept that embodies the overall well-being of people within a society. It is often used as synonymous with welfare, well-being and living standard. Factors such as wealth, employment, the built environment, physical and mental health, education, recreation and leisure time, and social belonging often form into the quality of life equation.

utility. The cardinality assumption in marginal utility analysis is also replaced by the property of 'consistency', which posits that consumers choose without reversals. These conditions permit the representation of consumer's utility maximization in a two-commodity sense using the Cartesian geometry.

Given competitive equilibrium conditions, social welfare is maximized through the ambitious exchanges of utility-maximizing consumers as well as profit-maximizing enterprisers. Given that the marginal rate of transformation and the marginal utilities of, say A and B for each consumer reflects the price ratio of A and B, it is not possible to increase one consumer's utility without decreasing anyone else's utility. This would lead to a point of bliss on society's *utility-possibility frontier*. Each point on the utility-possibility frontier represents a position in which no change in production and exchange could possibly increase the lot of a single individual without making the next individual worse off. Therefore, given the initial distribution of wealth, social utility is maximized through production and exchange, to a level consistent with that initial endowment. This position is what neoclassical economists refer to as *Pareto optimum* to mean the maximum welfare that a society can derive from a given social state (Hunt and Lautzenheister, 2011:380).

Exchange equilibrium represents the maximum social welfare possible in which all agents are better off. To show this, let $I = \{1, \dots, N\}$ be an index of the set of consumers, and suppose there are n goods. Each consumer $i \in I$ has a preference relation $\succsim^i$, and is endowed with a non-negative vector of the n goods $\boldsymbol{e^i} = (e^i, \dots, e_n^i)$. Altogether, the collection $\boldsymbol{\varepsilon} = (\succsim^{\boldsymbol{i}}, e^{\boldsymbol{i}})_{i \in I}$ defines an exchange economy. Again certain conditions characterise exchange equibliria in this economy. The first is that the assignment of goods to individuals not exceed the amounts available. Let $\boldsymbol{e} = (e^1, \dots e^N)$ denote the economy's endowment vector, and define an allocation as a vector $\boldsymbol{x} \equiv (\boldsymbol{x}^1, \dots, \boldsymbol{x}^N)$**,** where $\boldsymbol{x}^i = (x_1^i, \dots, x_n^i)$ denotes consumer $i's$ bundle according to the allocation. The

set of feasible allocations in this economy is given by equation 2.1 and it contains all allocations of goods across individuals that, in total, exhaust the available amount of every good.

$$F(\boldsymbol{e}) \equiv \left\{\boldsymbol{x}\middle|\sum_{i\in I}\boldsymbol{x}^i = \sum_{i\in I}\boldsymbol{e}^i\right\}, \qquad 2.1$$

An important requirement on $\boldsymbol{x}$ as an exchange equilibrium is therefore that $\boldsymbol{x} \in F(\boldsymbol{e})$. At equilibrium, no Pareto improvements are possible because no consumer can possibly be made better off without making any other worse off (Jehle and Reny, 2011).

On the other hand, the axiomatic approach builds on the neoclassical analysis of utility by specifying some conditions under which general equilibrium is attained in a perfectly competitive scenario. Axioms are defined by Cowell (2004 p.28) as purpose-driven assumptions formally stated in such a way that they cannot be proven right or wrong but can be scrutinized within the framework of an economic model. Thus, it is the axioms in this approach that distinguishes it from the traditional neoclassical approach.

Jehle and Reny (2011) provide an elaborate formal treatment of the axiomatic approach. Among the notions in the axiomatic model of choice, the preference relation is considered the primitive, most fundamental characterization of preferences in modern consumption theory. The idea of preference relation is typically to specify the limits, if any, on the consumer's ability to perceive in choice situations the form of consistency or inconsistency in his own choices, and information about his tastes for the different objects of choice. Consumer's preferences are formalised by a binary relation $\succsim$, defined on the consumption set, X such that if $X^1 \geq X^2$, then $X^1$is at least as good as X^2 for this consumer. To guarantee that the preference relation $\succsim$ can be represented by a continuous real valued (utility) function such as $u: \mathbb{R}^n_+ \to \mathbb{R}$, $\forall\, X^0, X^1 \in \mathbb{R}^n_+$, then $u(X^0) \geq$

$u(X^1) \Leftrightarrow X^0 \geq X^1$ must satisfy the axioms of completeness; transitivity; continuity; strict monotonicity; and strict convexity.

The essence of using axioms to describe preferences is to appreciate their individual and collective implications for the structure and representation of consumer preferences as modelled in the *utility function*. Altogether, these axioms empower the consumer with the rational ability to completely rank goods from best to worst, differentiate between consumption bundles, make consistent choices without sudden reversals as he gradually approaches an equilibrium point, given that wants are infinite and tastes fixed.

Recall that one of the primitive notions in the axiomatic model is consumption set which totally depends on consumer's income (y) and price (p) of the product. This leads to the indirect utility function as a precise way of describing consumer behaviour. It is the maximum-value function corresponding to the consumer's utility maximisation problem. Consumer's maximisation problem thus becomes

$$v(\boldsymbol{p}, y) = \max_{\boldsymbol{x} \in \boldsymbol{R}_+^n} u(\boldsymbol{x}) \qquad \text{s.t.} \qquad \boldsymbol{p} \cdot \boldsymbol{x} \leq y.$$

A counterpart measure of consumer's utility maximisation problem is the expenditure function. With **p** and y, the problem becomes that of expenditure minimisation. The expenditure function is defined as the minimum-value function, for all $\boldsymbol{p} \gg \boldsymbol{0}$ and all attainable utility levels

$$u.\, e(\boldsymbol{p}, u) \equiv \min_{x \in R_+^n} \boldsymbol{p} \cdot \boldsymbol{x} \qquad \text{s.t.} \qquad u(\boldsymbol{x}) \geq u$$

It is now plausible to suggest that firms' profit maximisation behaviour has the same formalisations as consumer's utility maximisation behaviour. This is essential for the existence of competitive equilibrium and the analysis of welfare in a perfectly competitive market. Thus, for general

equilibrium to exist there must be simultaneous goal equilibrium in consumption, production and exchange.

2.1.2 Resource-based Approach

Welfare can be assessed in terms of availability of a wide range of primary goods including nonmonetary resources and public services such as health, education, water, electricity and roads (Rawls, 1999:79). Thus, the resource-based approach focuses on economic welfare concerning issues as national income accounting, social indicators, and sustainability.

Firstly, the national income accounting framework is associated with the economic growth school of thought which views welfare as an overall increase in national income. Growth in national income was implicitly emphasized by Smith as a national welfare goal based on the premise that economic growth increases employment and the goods available for consumption, which in turn increases overall welfare. Because income distribution is assumed to be given, the national income criterion favours the status quo as ethical and just (Koutsoyiannis, 1975). Economists use proxies for the amount of goods and services (output) produced within an economy. That an economy can meet societal demands better as it produces more output shows the primacy of resources to individual and collective welfare (Miles and Scott, 2005 p.13).

According to Miles and Scott (2005), output as a measure of welfare although does not reflect social values like cultural and political freedoms nor reveal the level of inequality and other social problems, it is however an approximation of wider aspects of welfare. This is why output is regarded as an important determinant of standard of living in applied welfare analysis. In this direction, there have been debates among economists about the right measure of overall level of

output in an economy as a proxy for welfare in which Gross Domestic Product (GDP) appears to be the most commonly used measure.

According to Blanchard, Amighini and Giavazzi (2010), the national income (GNP) or aggregate output is typically decomposed into consumption (C), investment (I), government spending (G) and net exports $X - M$ as stated in equation 2.2. Each component is crucial for welfare through their combined effect on aggregate output. Assuming $X - M = 0$, equation 2.3 gives the equilibrium output, that is the level of output which maximizes welfare.

$$Y = C + I + G + (X - M). \qquad 2.2$$

$$Y = \frac{1}{1-c_1}[c_0 + \bar{I} + G - c_1 T] \qquad 2.3$$

The term $[c_0 + \bar{I} + G - c_1 T]$ from equation 2.3 stands for autonomous spending which is defined as that part of aggregate demand that does not depend on the level of output. The other term $\frac{1}{1-c_1}$ stands for the multiplier which amplifies autonomous spending. Because the propensity to consume (c_1) is between 0 and 1, the value of the multiplier $\frac{1}{1-c_1}$ is greater than one. The larger the c_1, the higher would be the multiplier.

An even better picture of economic welfare is the household approach which accounts for the per capita after tax income from all sources available to households and the proportion they consume of that, including public goods and services. Usually, the household disposable income per head is lower than GDP per capita both of which are generally higher than household per capita consumption levels. What this implies is a discrepancy between average per capita GDP and actual household consumption (Boarini, Johansson and dErcole, 2006).

Secondly, social indicators provide a prominent criterion for welfare evaluation in terms of access to basic needs. The basic needs approach was first introduced by the World Bank and has been a workable framework in development policy circles throughout the 1980s. The impetus for the basic needs approach is dissatisfaction with growth-centred development outcomes with two elements identified as its core. The first includes certain minimum requirements of a family for private consumption such as food, shelter and clothing including household equipment and furniture. The second element encompasses essential public services like potable water, sanitation, public transport, health, education and recreation provided for the community. Moreover, the International Labour Organization (ILO), regards policy on employment as a key strategy for welfare, serving both as a means and an end. Employment yields an output which provides income and gives a feeling of self-respect to the employed, dignity and of being a worthy member of society. Proponents of the basic needs approach also tend to advocate for interventionist policies in the form of taxes, subsidies, rationing and price control due to the need for complementarities between demand and supply in all markets (Overseas Development Institute, 1978).

A number of indicators such as nutrition, health, longevity, literacy, educational level and opportunities, access to water and sewerage are used for welfare comparison across populations. These measures relate to outcomes rather than inputs of welfare and have strong relationship with national income averages. The performance of such indicators has greater scope at relatively higher levels of national income than at lower levels (Clunies-Ross, Forsyth and Huq, 2009 p. 280). The most comprehensive framework of social indicators at work in contemporary development is the *Millennium Development Goals,* which now resurges as Sustainable Development Goals.

Thirdly, sustainable development focuses on the possibility of incorporating environmental accounting in resource management. Sustainability is concerned with the inter-temporal synergy between economic welfare and the environment as expressed in capital consumption (Bartelmus, 1999). A sustainable development is defined as that development which meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland, 1987).

Resource depletion is believed to be a major barrier to sustainable development. It is a situation in which the stock of natural resource (both renewable and non-renewable) is run down and eventually exhausted due to production activities upon which long term economic growth depends. The distinction between renewable and non-renewable resources calls for a different approach to sustainable resource exploitation and usage. Renewables are resources such as plants, animals, air, water, soil and entire biosphere which stocks can be replenished by natural or artificial processes. In contrast, non-renewable resources are those non-organic substances such as mineral deposits and fossil fuels whose reserves are finite and irreplaceable. However, not all renewables are capable of regenerating beyond a certain limit since the replenishing capacity is dictated by climatic differences. Accordingly, these may require active stewardship in order to avoid overuse, degradation and possible exhaustion (Clunies-Ross *et al*., 2009:289).

According to Clunies-Ross *et al*. (2009), non-sustainability in resource use is caused by factors such as industrial expansion, population growth, resource-intensive food provision, rapid urbanization and poverty, and intensified as a whole by global warming emanating from the emission of greenhouse gases. Effects of such threats manifest as changes in land use (deforestation); degradation of land resources; soil degradation and hunger; air pollution; water pollution and scarcity; biodiversity; and diminishing absorption capacity for sinks.

2.1.3 Capability-based Approach

Due to the inability of traditional welfare approaches to capture deeper aspects of quality of life, the capability approach emerges recently as the leading alternative. It is an approach to quality of life in terms of one's capability to function in ways that are valuable, and of attaining valuable states of being. Quality of life here is viewed in terms of the capability to achieve valuable functionings (Sen, 1982; 1985; 1999). The approach stresses the importance of assessing quality of life directly in terms of functionings and capabilities instead of utility or resources. (Alkire, 2002). A key contribution of this approach is differentiating between the achievements of ends (e.g decent living standard) over means (e.g income per capita).

The capability approach was developed in a series of articles through much of Amartya Sen's work, drawing from the ideas of moral philosophers like Aristotle, Adam Smith, Karl Marx and John Rawls. The empirical link can be associated with the works of William Petty, Francois Quesnay, Antoine-Laurent Lavoisier, and Joseph-Luis Langrange (Sen 1985; 1999). Sen originally proposed the capability approach at the 1979 Tanner Lecture on human values. According to Sen (1980), the issue of welfare distribution is better understood in the notion of basic capabilities as opposed to the idea of utility or the Rawlsian index of primary goods. The advantage of basic capabilities is its focus on the ability of individuals to do certain things beyond the availability of primary goods or the utility attached to that.

Over time, the approach moves away from the narrow context of distribution toward a more general framework of quality of life with plurality of purposes. There are at least four different uses to which the capability approach can be put, namely: well-being achievement, well-being freedom, agency achievement, and agency freedom (Sen, 1993 p. 49). Although these purposes are interrelated, they are distinct from each other in scope. This distinction restricts the focus of

well-being assessment to intrapersonal achievement and that of agency to interpersonal comparison. Thus the approach is especially relevant for quality of life evaluation both in the achievement of capability and/or freedom from capability deprivation (ibid).

The philosophical premise of the Capability approach is embodied in Sen's critique of utilitarianism and resourcism as alternative approaches to welfare evaluation. According to Wells (2016), Sen justifies the development of the capability approach with respect to four key concerns. First, individual differences characterize their differing abilities to convert the same resources to valuable use. For this reason, emphasis should be on what particular people can do with resources, which are only a means. Second, the tendency of individuals to internalize the severity of their circumstances so that they do not desire what they cannot possibly achieve highlights the defects of the utilitarian criteria. As such, the phenomenon of adaptive preference rules out people's perception of their well-being as being sufficient without a standard for verifying their objective circumstances. Third, what is of significance for quality of life is the availability of valuable options regardless of what people do with such alternatives. Thus, an evaluation criteria should entail the freedom to choose between alternative ways of living without restriction. Fourth, proper quality of life evaluation requires a detailed information that is often neglected in other criteria and therefore, an evaluation procedure should be sensitive to both actual achievements (functionings) and effective freedom (capability) as against paternalism. This requires that questions regarding the evaluation of welfare be open-ended in order to reflect the complex nature of reality (ibid).

Essentially, the capability approach provides an evaluative framework for the assessment of human welfare in all its forms by differentiating between resources, functionings and capabilities. Sen argues that what matters fundamentally for well-being is not the resources that a person has, or the feelings these provide (utility), but what a person is, or can be, and does, or can do. Therefore

development has to be more concerned with enhancing the lives of the people and the freedoms they enjoy (Sen, 1985, 1999).

In development literature, the capability approach is usually discussed with reference to the concepts of human development, functionings and capabilities. The concept of human development is seen by Nussbaum (2011) as the approach for which capability is analogous, with special focus on human well-being. Functionings represent the various uses to which individuals can put the commodity characteristics that they come to possess. Capabilities on the other hand reflect a person's ability to achieve a given functioning. That is, the freedoms that people have given their personal features and their command over resources (Clark 2006, Todaro and Smith 2011: 18). Nussbaum (2000) went further to differentiate between basic capabilities, internal capabilities and combined capabilities.

An important milestone in the development of the capability approach is the UNDP's 1990 Human Development Report, which began by operationalizing the key concepts in the approach. According to UNDP (1990), given that people are the real wealth of nations, the expansion of output and wealth is only a means, the end of development must be human well-being. Thus, human development has three components. The first relates to capabilities which entails people's ability to enjoy activities and states of being that they value and have reason to value. The second component is process freedoms. It refers to empowerment and democratic practice, where people are regarded as both beneficiaries and agents of human development. Here, human development is development by the people of the people and for the people. The third is principles of justice, which gives special consideration to the poor and disadvantaged with regards to the principles of equity, efficiency, participation, sustainability, responsibility and respect for human rights (Alkire, 2010).

The human development approach as embodied in the subsequent series of human development reports provides a synthesis of the normative focus of the capability approach and its practical application. In effect, the human development approach assesses welfare by bringing together the production and distribution of commodities and expanding human choices based on the attainment of certain important capabilities. According to this approach, three dimensions are critical to improving substantial freedoms for an individual's capability set. The first is standard of living as measured by income per capita; the second is education as measured by a combination of school enrolment and adult literacy; and the third is health as measured by healthy life expectancy (see UNDP 1990; 2010). This remains the most pragmatic application of the capability approach to date.

In summary, the capability approach is an evaluative framework for assessing quality of life in terms of human capabilities and freedom from capability deprivation. Capability is a combination of valuable activities and conditions that shapes quality of life with special focus on human potentials. That is the ability to function freely for the achievement of an optimal level of well-being without undue impediments. This perspective essentially considers the promotion of freedom from all forms of deprivations as the goal of development policy and practice, which should invariably aim at human development. Therefore, a policy is capability-based if and only if it is aimed at, and succeeds in expanding options that guarantee adequate amount of freedom for the enhancement of human capabilities.

2.2 Measures of Welfare and Quality of Life

Several measures of quality of life have been identified in the literature. These can be categorized yet again according to the approaches discussed in the previous section. Hence, we have the utility-based, resource-based, and capability-based quality of life measures.

2.2.1 Utility-based Measures

(i) Revealed Preference

The general approach of the revealed preference presupposes that the actual objectives pursued by individuals in the market are reflected in their actions. By definition, *a bundle* x is revealed preferred *to a bundle* x' (written symbolically as $x \rhd x'$) *if x is selected when* x' *was also available to the consumer*. The revealed preference theory is characterized by the axioms of rational choice which states that *the consumer always makes a choice, and selects the most preferred bundle that is available*, and weak axiom of revealed preference which states that if $x \rhd x' \; then \; x \not\rhd x'$. The first of the axioms suggests that inferences can be drawn about a person's preferences by simply observing their choices. The second axiom means that if a consumer does not choose today what he chose yesterday (when today's bundle was available and affordable) it must be because now he cannot afford yesterday's bundle (Cowell, 2004 p.73).

The only axiom necessary for this type of ranking is the *Generalised Axiom of Revealed Preference* (GARP). This axiom requires the behavioural assumption of utility maximization and local non-satiation. Thus, the consumer is said to revealed prefer bundle $\boldsymbol{x}^t$ to $\boldsymbol{x}$ (i.e $\boldsymbol{x}^t \rhd \boldsymbol{x}$) if and only if $u(\boldsymbol{x}^t) \geqq u(\boldsymbol{x})$.

A major implication of the revealed preference theory is seen in applied welfare analysis, in which consumers' welfare is determined indirectly using money metrics in terms of revealed willingness to pay (WTP), which in turn is related to the consumer's utility function.

(ii) Compensating and Equivalent Variations

Recent literatures analyse individual welfare in terms of compensating and equivalent variations to measure the income and substitution effects on consumers' utility on the one hand, and the effects of price change on firms' profit on the other. To a consumer, compensating and equivalent variations are income adjustments that maintain the consumer at particular levels of welfare. They absorb the effects of price shocks on consumer's utility (see Varian, 1992). To demonstrate how compensating and equivalent variations measure changes in consumer's welfare, let (p^0, y^0) and (p^1, y^1) represent two budgets that measure the prices and incomes of a given consumer under two different policy regimes. Also, let the first budget represent the status quo and the second, a proposed change. Then the welfare change involved in moving from (p^0, y^0) to (p^1, y^1) is the difference in indirect utility as shown in equation 2.4,

$$W'((p^0, y^0) = u(p^1, y^1) - u\ (p^0, y^0). \qquad 2.4$$

If the result is positive, then the policy change is worthwhile, but when it turns out negative, then the consumer is better off with the status quo. However, the magnitude of the change in welfare as a result of changes in price or income is more of interest to economists and is measured in monetary terms by the compensating and equivalent variations.

In order to use the compensating and equivalent variations, the (indirect) money metric utility function is employed. This now requires a base price, the choice of which is discretionary to using either of the prices in the two budget regimes (Varian, 1992 p.161).

For now we use p^b to denote the base price, in which case equation (2.4) will now take the form in equation (2.5)

$$W'(p^0, y^0) = \mu(\boldsymbol{p^b}, p^1, y^1) - \mu(\boldsymbol{p^b}, p^0, y^o). \quad (2.5)$$

If the current price is used as the base, the resulting utility difference is the equivalent variation in equation (2.6) and if the new price is used as the base, the measure of utility difference is the compensating variation in equation (2.7).

$$EV = \mu(p^0, p^1, y^1) - \mu(p^0, p^0, y^0) = \mu(p^0, p^1, y^1) - y^0 \quad (2.6)$$
$$CV = \mu(p^1, p^1, y^1) - \mu(p^1, p^0, y^0) = y^1 - \mu(p^1, p^0, y^0) \quad (2.7)$$

Therefore, the equivalent variation in equation (2.6) measures the equivalent income change to the proposed change in welfare at current prices, while equation (2.7) measures the change in income necessary to compensate for the change in consumer's welfare at new prices.

The compensating and equivalent variations are used to compute the consumer's price index, which is used to analyse changes in the cost of living. This is done by measuring the appropriate change in consumer's purchasing power and ultimately the level of utility resulting from price changes (Cowell, 2004).

(iii) Social Welfare Function (SWF)

When talking about welfare, it should be made clear that social preference ordering is the societal utility function which embodies individual preferences with all the axioms that make up a real-valued function. It is only logical to maintain that *social welfare function* (or constitution in some literatures) sums up individual utility functions based on the *fundamental ethical postulate*. The fundamental ethical postulate suggests that the social welfare function is a function of the utilities of all individuals and that a higher SWF is preferred to a lower one (Just et al 2004 p. 40).

A central issue in welfare is the question of whether a SWF can be reasonably established. In this respect, the *Impossibility Theorem* by Arrow (1951) specify the conditions under which individual preferences can be aggregated into a SWF. These are the axioms of (i) *Universality or unrestricted domain,* (ii) *Weak Pareto principle or Pareto unanimity, (iii) Independence of irrelevant alternatives, and* (iv) *Non-dictatorship.* The first axiom requires the SWF to be defined over all individual preferences. The second applies when a society strictly prefers that social state that is unanimously agreed by individuals as strictly preferred to another. The third axiom states that when there are two identical alternatives over some sub-set, then the social orderings corresponding to each of these alternatives are identical over the sub-set. The fourth axiom requires that no individual or a sub-group of individuals is always decisive as to which social state is preferred to another (Cowell, 2004:229).

Despite the disagreement among economists as to the possibility of a SWF, some formulations exist albeit with different degrees of appeal to moral considerations. For instance, classical Benthamite SWF as modified by Harsanyi[2] (1953) of the form in equation 2.8 shows that the SWF is a weighted sum of individual utilities on the assumption of *Hammond equity.* Also, Rawls[3] (1971) based his version on the ideal of equity in the minimax SWF of the form in equation 2.9. According to Rawls, the social welfare of an allocation should depend only on the welfare of the poorest individual.

[2] Harsanyi's approach is based on the assumption that preferences satisfy the vonNeumann-Morgenstern axioms of choice under uncertainty, in which social choice reflects expected utility due to the rational nature of individual preferences. This approach gives special power to economic agents, who are presumed by the positivists as being omnipotent.

[3] Rawls' own argument for the maximin over the utilitarian version of SWF explicitly assumes that people are risk averse and hence choices do not always follow the expected utility assumption, but rather a matter of complete ignorance. This entails that rationality of individual preferences is limited by information asymmetries.

A synthesis of Harsanyi and Rawls' views gives rise to a system of social choice with emphasis on distributional equity (Just *et al*, 2004; Jehle and Reny, 2011)[4].

$$W = \alpha_1 U^1 + \alpha_2 U^2 + \cdots + \alpha_n U^n \qquad 2.8$$

$$W = \min(U^1, U^2, \ldots, U^n) \qquad 2.9$$

It appears that the social welfare function is an important normative device, but with limited applicability regarding critical policy choices. At best it points out the need for fair allocations by identifying potential losers and gainers of a policy change which serves as a useful guide for social welfare evaluation. More generally, fairness in allocations can be an important measure of social welfare, and thus it may suffice to say that social states with more equal allocations rank better than those with less equality in the distribution of welfare. Hence the inherent trade-off between efficiency on one hand, and distributional equity can be neutralised through fair allocations. The relevant measures of inequality in the literature are Gini coefficient, Lorenz curve, Theil index and the Atkinson measure.

(iv) Compensation Test

The compensation principle is attributed to the works of Kaldor (1939) and Hicks (1939), it provides an important basis for selecting among multiple Pareto optima. The *Kaldor-Hicks compensation test* narrows down the range of possibilities of a preferred first-best to one with emphasis on ideal income distribution (Just et al 2004). The compensation principle states that "state B is preferred to state A if, in making the move from A to B, the gainers can compensate the

[4] The two opposing views of Harsanyi and Rawls have been reconciled by a 'just' social welfare criterion in which a rational person is expected to choose like a fair-minded individual, a notion in which fair-minded individuals imagine an original position behind some 'veil of ignorance' not knowing what the social outcome of their choices might actually yield. With this dilemma, each individual makes uncertain choices about their potential positions in the society they prescribe.

losers such that at least one person is better off and no one is worse off." The rule is stated in terms of potential rather than actual compensation because the payment of compensation in form of taxes or subsidies is a value judgement (Just *et al.*, 2004 p.33).

For an illustration, consider two allocations x and x'. The allocation x' is said to Pareto dominate x if everyone prefers x' to x. This implies that x' is better than x and therefore any project that moves the society from x to x' should be undertaken. This is the Pareto criterion. But since there are hardly projects that are unanimously preferred, some people would typically prefer x' to x while others may prefer x to x'. In this case, the compensation criterion suggests the following test: x' is potentially Pareto preferred to x if there is a way to reallocate x' so that everyone prefers the reallocation to the original allocation x. More formally, x' is potentially Pareto preferred to x if there exists some allocation x'' with $\sum_{i=1}^{n} x_i'' = \sum_{i=1}^{n} x_i'$ (i.e., $x''$is a reallocation of x') such that $x_i'' \succ_i x'$ for all agents i. Thus, the compensation test requires that x' be a *potential* Pareto improvement on x. Those that prefer x' to x are "winners" and those that prefer x to x' are "losers". Hence x' is better than x if the winners can compensate the losers. The compensation principle suggests that a change from x to x' is a good one if the gainers can give away part of their gains so as to ensure that everyone is made better off (Varian, 1992).

In addition to the Kaldor-Hicks compensation principle, the *reversal paradox* was developed by Scitovsky to serve as a complementary test in making comparisons between social states. The reversal test suggests that it is not enough for the gainers to be able to compensate the losers, but that the losers must be unable to bribe the gainers into maintaining the status quo. So the losers can resist the change if they can potentially pay off the gainers more than what they (gainers) can potentially compensate them (Just *et al.* 2004 p. 36).

(v) Money Metrics/Cost Benefit Analysis

Money metrics is related to the expenditure function that appears in a variety of contexts in welfare economics. The most common appearance of the money metrics is found in *money metric utility function* (Varian, 1992). This can be generalised to every aspect of welfare economics that concerns choice and the limits imposed by the budget constraint. In the context of revealed preference, choices are governed by the *money metric expenditure function* which can be ascertained only by looking at the preferences of individuals. Also, the equivalent and compensating variations are stated in monetary terms.

Perhaps the prospects of the Pareto and compensation criteria to be described in money metrics represents their most pragmatic application in welfare analysis. These criteria are implemented in terms of *willingness to pay* and *willingness to accept* the effects of policy changes. The compensation criterion in particular would support a policy change if the WTP of the gainers is more than the WTA of the losers (Just *et al.* 2004).

2.2.2 Resource-based Measures

a. National income measures

Measures of national income fall within three alternative specifications (see Rangaraian and Dholakia, 1979). These are (i) gross versus net measures, (ii) national versus domestic measures and (iii) market price versus factor cost measures.

The first category differentiates between gross and net measures of aggregate income. Gross national income (GNP) is the most comprehensive and broad-based measure of national income which shows the market value of total final goods and services produced in a country. The net

measure (NNP) refers to the market value of total products after deducting for capital depreciation. The relationship between these two measures is stated in equation 2.10 and more precisely in 2.11.

$$NNP = GNP - depreciation \qquad 2.10$$

$$NNP = [C + I + G + (X - M)] - depreciation \qquad 2.11$$

In the second category, national income could also be measured as national versus domestic aggregate. National here is used to mean that the aggregate under consideration represents the overall income that flows to the citizens of a country regardless of where they reside. Thus, the aggregate income is 'national' when it considers the total factor income that accrues to the nationals of a country irrespective of where they are located (home or abroad). Domestic aggregates on the other hand measure only the total income flowing within the geographical territory of a country regardless of the citizenship of the owners. Usually, the national and domestic products are distinguished by the inclusion of net income from abroad in the former. The net income from abroad is the difference between the inflow and outflow of factor incomes from abroad (equivalent to exports and imports respectively). The identity in equation 2.12 shows the relationship between national product (NP) and domestic product (DP).

$$NP = DP + (inflow - outflow) \qquad 2.12$$

On a third note, the measurement of national income is done at market prices or at factor costs in consideration of the obvious discrepancy between the market value of all final products and the total income accruing to the factors of production due to indirect taxes and subsidies. National product valued at market prices estimates the total money amount actually paid by the final consumers. But when national product is valued at factor cost, the total money amount earned by

factors of production for their contribution to final output is estimated. This relationship is stated mathematically in equation 2.13,

$$GNP\ at\ market\ prices\ =\ GNP\ at\ factor\ cost\ +\ indirect\ taxes\ -\ subsidies \qquad 2.13$$

The three categories of measures specified yield eight distinct measures of national income as summarized in Table 2.1 below.

Table 2.1: National income measures

	Category A	**Category B**
TYPE I	1) GNP at market prices 2) NNP at market prices	1) GDP at market prices 2) NDP at market prices
TYPE II	1) GNP at factor cost 2) NNP at factor cost	1) GDP at factor cost 2) NDP at factor cost

Source: Rangaraian and Dholakia (1979)

From the specifications, we note that national income measures can broadly be classified as *income measures* and *output measures* as both gross and net, or national and domestic measures basically estimate either income or output flows. There are indications that gross and net 'national' income measures estimate liquid income flows valued at factor costs while gross and net domestic measures estimate output flows at market prices. Also, as opposed to gross domestic measures which do not regard trade balance, gross national measures provide a more accurate description of national income in relation to welfare because of the inclusion of foreign sector in the model. Again, net measures provide a better picture of national income since it makes allowance for the tendency of capital to depreciate. However, the difficulty in calculating capital depreciation makes the gross aggregates more applicable in national income accounting. Thus, applied national income

estimation would typically consider *gross national income (GNI)* and/or *gross domestic product (GDP)* as aggregate measures of welfare.

b. Index measures

The development of index measures of welfare is the result of disappointment with the performance of social indicators and their relative divergence with higher growth rates (Sharpe, 1999). In fact present research is fast tending towards composite indexes as summary measures of well-being. Yang (2014) identifies about 101 composite measures of welfare covering divergent concepts of quality of life in varying capacities. Table 2.2 below shows a sample of index measures one for each of the 19 welfare foci identified in Yang (2014).

Table 2.2: Sample of index measures

INDEX /DEVELOPER	FOCUS	DIMENSIONS	WEIGHTS	METHODOLOGY
Child Development Index (CDI) by Save the Children (2008)	Children's well-being	Health; nutrition; education	Equal dimension weighting	Indicators are expressed on a 0-100 scale; indicator scores are averaged by unweighted arithmetic mean to obtain the overall index score
Index of Economic Well-being (IEWB) by Osberg and Sharpe (Center for the Study of Living Standards) (1998)	Economic progress	Consumption flows; wealth stocks; equality; economic security.	The use of IEWB tool in Microsoft Excel format allows the user to explore the effects of different dimension weights on trends in the index. Therefore, dimensions are weighted based on the number of indicators	Indicators are summed into dimension components; each dimension is linearly scaled to the range 0-1, and aggregated by arithmetic mean with equal weighting (0.25 for each dimension) to obtain the IEWB
Environmental Performance Index (EPI) by Yale Center for Environmental Law and Policy, Columbia Center for International Earth Science Information Network, and World Economic Forum (2000)	Environment	Environmental health; ecosystem vitality	Determined by expert judgements regarding quality of the underlying data, or closeness of a given proxy measure to the parameter of interest	A proximity-to-target value is calculated for each indicator based on the gap between a country's current results and the policy target; indicators are aggregated into the overall index by weighted arithmetic mean
Gender Equity Index (GEI) by Social Watch (2004)	Gender disparities	Education; economic activity; empowerment	Equal weighting of indicators within dimensions and equal weighting of dimensions within the overall index	All indicators are first converted into female/male ratios; weighted by male and female share of the population; indicators are aggregated by unweighted arithmetic mean into the overall index of 0-100 in scale
KOF Index of Globalization by Dreher (2002)	Globalization	Economic globalization; social globalization; political globalization	Weights are determined by principal component analysis	Each indicator is first transformed to the scale of 0-100, using predefined maximum and minimum goalposts; indicators are then aggregated by weighted arithmetic mean into dimension sub-indices, which are aggregated again by weighted arithmetic mean into the overall index

Index of Economic Freedom by the Heritage Foundation and the Wall Street Journal (1995)	Governance	Rule of law; limited government; regulatory efficiency; open markets	Equally weighted indicators within the overall index	Each of the 10 indicators is scored on a scale of 0-100, which are then aggregated by arithmetic mean to obtain the overall index
Education for All Development Index (EDI) by UNICEF (2002)	Human capabilities	Universal primary education; adult literacy; quality of education; gender	Equal weighting of indicators within the overall index	One indicator is used as a proxy measure for each of the four dimensions; indicators are equally weighted and aggregated by arithmetic mean
Genuine Progress Indicator (GPI) by Redefining Progress (1995)	Human Progress	Income distribution; housework, volunteering and higher education; crime; resource depletion; pollution; long term environmental damage; changes in leisure time; defensive expenditures; lifespan of consumer durables and public infrastructure; dependence on foreign assets.	Weights are incorporated in the indicators as the unit value/cost of the factors (i.e. their prices or shadow prices)	GPI = adjusted GDP (based on the identified indicators) (see Yang (2014)
Human Sustainable Development Index (HSDI) by the Togtokh, International Geosphere-Biosphere Programme (2010)	Sustainability	Health; education; standard of living; environment	Equal weighting of the four dimension indices	Indicators are transformed into a scale of 0-1 using defined minimum and maximum goalposts for each dimension; indicators are then aggregated by arithmetic mean into dimension indices before being aggregated into the overall index by unweighted arithmetic mean
Multidimensionl Poverty Index (MPI) by UNDP and Oxford Poverty and Human	Poverty	Health; education; standard of living	Equal weighting in indicators and dimensions	Indicators are scored 1 if true and 0 otherwise for individual households; households are assigned deprivation scores calculated as the sum of each indicator value multiplied by its weight; households

Development Initiative (OPHI) (2010)				with > 33.3% are classified as multidimensionally poor; the overall MPI value is the sum of deprivation scores above 33.3% divided by the whole population
Index of Individual Living Conditions by Social indicators Research Center; Leibniz Institute for Social Research (1995)	Quality of living	Income; housing; housing area; education; health; social relations; work	Equal indicator weighting within dimensions, equal dimension weighting within the overall index	The indicators use individual-level response to survey questions scored from 1-5; indicators are aggregated by either unweighted arithmetic mean, or summed and recoded into dimension sub-indices, which are then aggregated by unweighted arithmetic mean into the overall index
Human Security Index by Hastings	Safety and security	Economic fabric; environmental fabric; social fabric	Equal weighting of sub-indicators within indicators; equal weighting of indicators within dimensions; equal weighting of dimensions with the overall index	Indicators are first transformed into a scale of 0-1 using defined minimum and maximum goalposts for each indicator; sub-indices are formed by aggregating the respective indicators by unweighted arithmetic mean; sub-indices are aggregated by arithmetic mean into dimension indices, which are then aggregated into the overall index by unweighted arithmetic mean
Human Opportunity Index (HOI) by the World Bank (2008)	Social exclusion	Education; housing	Equal weighting between the two dimensions	Dimension HOI = Coverage rate* (1 – Dissimilarity index); Dissimilarity index is given by $(1/2C)\sum 1/N)\,(P-C)$; Overall HOI = arithmetic mean of education and housing HOIs
Social Progress Index (SPI) by Social Progress Imperative (2013)	Social progress	Basic human needs; foundations of well-being; opportunity.	Weights determined by factor analysis	Indicators are first transformed so that a higher score corresponds to better social progress, then a weighted linear transformation is applied to aggregate the indicators.
Gross National Happiness (GNH) by the Centre for Bhutan Studies (1972)	Subjective well-being	Psychological wellbeing; time use; community vitality; cultural diversity; ecological resilience; living standard; health; education; good governance	Indicators considered to be highly subjective carry less weight; dimensions are equally weighted in the overall index	The index uses individual-level data; a threshold 'sufficiency' level is applied to each variable; an individual is considered happy when they have 66% sufficiency or more in the weighted indicators; the overall GNH value is the sum of individual sufficiency scores (above 66%) divided by the whole population
Index of Sustainable Economic Welfare (ISEW) by Daly and Cobb (1989)	Sustainability	Personal consumption; public non-defensive expenditures; private	Weights are incorporated in the indicators as the unit value/cost of the factors (i.e. their shadow prices)	Adjusted GDP based on identified dimensions (see Yang, 2014)

		defensive expenditures; capital formation; services from domestic labour; costs of environmental degradation; depreciation of natural capital		
ICT Development Index (IDI) by International Telecommunication Union (2009)	Technology and innovation	ICT infrastructure and access; ICT use; ICT skills	Indicators are equally weighted with sub-indices, which are then weighted by PCA within the overall index	Indicators are first normalized according to indicator goalposts, then rescaled to a 0-10 scale; indicators are aggregated by arithmetic mean into sub-indices and sub-indices are then aggregated by weighted arithmetic mean into the overall index
Economic Vulnerability Index (EVI) by the UN Committee for Development Planning (1999)	Vulnerability	Exposure; shock	Equal indicator weight within the overall index	Indicators are first normalized to the scale of 0-100 using observed maximum and minimum goalposts, and re-scaled to remove significant outliers; normalized indicators are then aggregated by weighted arithmetic mean into the overall index
Quality of Life Index (QLI) by the Economist Intelligence Unit (2005)	Wellbeing	Material well-being; health; political stability and security; family life; community life; climate and geography; job security; political freedom; gender equality.	Unequal indicator-weights which depends on the values assigned to indicator variables	Subjective life satisfaction responses on a scale of 1-10 are regressed on the objective indicators of quality of life across countries; the resulting coefficients are used to construct predicted values of the life satisfaction scores using the weighted sum of the nine indicators, which then becomes a country's QLI

Source: Author's Compilation, 2016

c. Sustainability measures

The sustainable development measures basically take account of the prospects for the welfare of future generations. Although there is no sufficient information on resource usage and availability, some indicators may serve as data on sustainability. Basically two measures are identified in the literature – the *adjusted net saving* and the *biological-footprint* (Clunies-Ross *et al*. 2009).

i) Adjusted net saving

The concept of adjusted net saving (ANS) serves as a modification of the traditional accounting measure of savings by including allowance for environmental factors. From this perspective, what matters for sustainability is the level of genuine national saving which is given by the value of investment in produced wealth and human capital, less the value of natural resource depletion and accumulated pollutants. The description of savings contrasts with the traditional one because it allows for the cost of natural capital stock depreciation including the cost of externalities from carbon dioxide, and regards education expenditure as saving rather than consumption (Clunies-Ross *et al*. 2009:316).

An important sustainability rule requires, by assuming the absence of technological progress, that output in any given year be sufficient enough to provide the same level of consumption as in the previous year and to replace the depreciation of stocks on manufactured and human capital over the previous year (ibid). To demonstrate this, if GDP represents a money metric of the total annual output, part of which goes either to consumption (C) or investment, the money value of the annual deprecation (d) of the capital stock (comprising manufactured, human and natural capital) needed to produce such output, sustainability (without growth)

requires equality between GDP and net consumption as shown in equation 2.14 which also implies equation 2.15

$$GDP = c + d \quad 2.14$$

$$c = GDP - d \quad 2.15$$

In contrast, sustainable growth as shown in equation 2.16 requires that gross output be larger than consumption (C) to permit expansion of the capital stock at the new GDP^*. Sustainable growth in any year is given by equation 2.17 shown by decomposing capital stock into manufactured capital (d_M), human capital (d_H), and natural capital (d_N).

$$GDP^* > C + d \quad 2.16$$

$$GDP^* > C + (d_M + d_H + d_N) \quad 2.17$$

$$C < GDP^* - (d_M + d_H + d_N) \equiv C < NDP^*$$

Thus, sustainable consumption falls short of NDP^* as shown in equation 2.17. Note that GDP^* less capital depreciation gives net domestic product (NDP^*). Also, averages for these values can be obtained by converting to per capita measures.

An implicit assumption in this analysis is the perfect substitutability between environmental capital and manufactured or human capital. The implication being that the depletion of environmental capital can be offset by increasing the stock of non-environmental capital. This is known as *very weak sustainability* because all that is required for sustainable long-run development is the provision of sufficient capital resources of whatever form for investment. Hence, a market-led approach to development which maximizes growth is opted for. A similar perspective is the *weak sustainability* as embodied in equation 2.18

$$Z = S/GDP - [d_M + d_H + d_N]/GDP \quad 2.18$$

where Z stands for index of sustainability, S for aggregate national saving, and GDP and d_M, d_H and d_N as already defined.

If $Z > 0$, then the per capita income of future generation is at least as much as that of present generation. This is a necessary condition for the possibility of sustained growth on the basis of perfect substitutability of man-made capital for natural capital. However, concerns on the feasibility of these forms of capital to be perfect substitutes with the risk of leaving future generations with inadequate natural stock led to a less precarious option of *stronger-sustainability*. An even less precarious path is very-strong-sustainability which aims at achieving a zero-growth steady state with minimum impact on the environment.

More precisely, adjusted net savings (changes in wealth) provides a good measure of a nation's capacity to maintain a sustainable consumption stream rather than the consumption flow at a given time. ANS is estimated by subtracting resource depletion and environmental degradation from gross savings (Nafziger, 2006:453). Equations below show the expression of ANS.

$$ANS = NDS - d \qquad 2.19$$

$$NDS = GDS - CFC + E \qquad 2.20$$

where ANS stands for adjusted net savings; NDS for net domestic savings; d represents depreciation of capital in all forms (i.e energy depletion, mineral depletion, net forest depletion, and carbon dioxide damage); GDS for gross domestic savings; CFC for consumption of fixed capital; and E for education expenditure.

The pattern of ANS for the world indicates that most country groupings with the exception of Sub-Saharan Africa are on average within the 'sustainable zone'. Overall, this pattern puts

most countries in non-sustainable growth trajectory. This measure reveals a paradox between the affluent resource-rich countries like Saudi Arabia and Nigeria, and other non-resource dependent countries of Asia in terms of apparent long term sustainability of their growth paths (World Bank, 2011).

ii) Biological-footprint

The biological-footprint attempts to answer the sustainability question of whether a country is within the regenerative capacity of the biosphere. The concept of ecological footprint (EF) is used to measure the regenerative capacity of a country over a period of time. The EF is expressed in terms of land area of the 'ecological demand' placed on the carrying capacity of the natural environment by a given population (Clunies-Ross et al. 2009).

A 'footprint' is defined as the land area required to maintain the consumption and waste-disposal level of such population. On a global scale, the EF of humanity is the relevant measure which estimates the minimum 'biological productive area' needed for all production and waste absorption activities using data on aggregate human demands on the environment. Human activities like agriculture, forestry, industry, power generation, housing, transportation and other facilities are supported by how much area is required to host without too much pressure on the biosphere. According to this measure, countries can be biologically-footprint surplus or deficit (ibid).

The biological footprint is a product of two measures – the ecological footprint which measures the demand pressure from human activities on the biosphere, given the prevailing technology and resource management in a given year; biocapacity which is a measure of biologically productive land and water area available to support human consumption of ecosystem services,

and is simply the ecological budget of humanity or nature's regenerative capacity (Borucke *et al.* 2013).

According to Borucke *et al.* (2013), the ecological footprint (EF_P) for a given nation represents primary demand for biocapacity and is calculated using equation 2.21 below,

$$EF_P = \sum_i \frac{P_i}{Y_{N,i}} \cdot YF_{N,i} \cdot EQF_i = \sum_i \frac{P_i}{Y_{w,i}} \cdot EQF_i \qquad 2.21$$

where P is the amount of primary product i that is harvested (or $C0_2$ emitted) in the nation; $Y_{N,i}$ is the annual national average yield for the production of commodity i (or its carbon uptake capacity in cases where P is $C0_2$); $YF_{N,i}$ is the country-specific yield factor for the production of each product i; $Y_{w,i}$ is the average world yield for commodity i; and EQF_i is the equivalent factor for the land use type producing product i. Note that $YF_{N,i}$ is defined as the ratio between $Y_{N,i}$ and $Y_{w,i}$. $Y_{w,i}$ is given by the expression in equation 2.22

$$Y_{w,D} = Y_{w,P} \cdot EXTR_D \qquad 2.22$$

where $Y_{w,D}$ and $Y_{w,P}$ are the world-average yield for the derived and the primary product respectively, $EXTR_D$ is the technical conversion factor for the derived product (defined as the mass ratio of derived product to primary input required), denoted as TCF_D expressed in equation 2.23 where FAF_D is the footprint allocation factor also expressed in equation 2.24 and in which V_i is the market price for each simultaneous derived product.

$$EXTR_D = \frac{TCF_D}{FAF_D} \qquad 2.23$$

$$FAF_D = \frac{TCF_D \cdot V_D}{\sum TCF_i \cdot V_i} \qquad 2.24$$

The biocapacity of a country for a given year is calculated using equation 2.25

$$BC = \sum_i A_{N,i} \cdot YF_{N,i} \cdot EQF_i \qquad 2.25$$

where $A_{N,i}$ is the bioproductive area that is available for the production of each product i at the country level, $YF_{N,i}$ is the country-specific yield factor for the land producing products i and EQF_i is the equivalence factor for the land use type producing each product i.

2.2.3 Capability-based Measures

Almost the entire empirical frame of measurement in the capability approach is provided by the United Nations Development Program (UNDP) beginning with the 1990 Human Development Report. UNDP (2014a) provide five human development indexes that measure specific aspects of welfare in the space of capabilities. These are discussed below:

(i) Human Development Index (HDI)

The HDI is the primary measure of the human development paradigm from which most other indices are estimated, it is a composite measure of achievement in key dimensions of human welfare, namely: a long and healthy life, access to knowledge, and a decent standard of living. An index is computed for each of the three dimensions which are then aggregated as a geometric mean to arrive at the final HDI.

There are two steps to calculating the HDI. The first step requires the creation of dimension indices which involves setting maximum and minimum values as goalposts. The second step pertains aggregating the dimension indices to produce the HDI. Minimum and maximum values are set as goalposts in order to transform the indicators expressed in different units into indices between 0 and 1. These goalposts act as the respective ‘natural zeros’ and ‘aspirational goals’, from which component indicators are standardized. These are set at the values in Table 2.3.

Table 2.3: Goalposts for HDI indicators

Dimension	Indicator	Minimum	Maximum
Health	Life expectancy (years)	20	85
Education	Expected years of schooling	0	18
	Mean years of schooling	0	15
Standard of living	Gross national income per capita (PPP 2011 $)	100	75,000

Source: UNDP 2014

In light of the defined minimum and maximum values, the dimension indices are calculated as

$$\frac{actual\ value - minimum\ value}{maximum\ value - minimum\ value}$$

For the education dimension, the above formula is first applied to each of the two indicators before taking their arithmetic mean. As for income, the natural logarithm for the actual, minimum and maximum values is used due to the propensity of the transformation function from income to capabilities to be concave (UNDP, 2014).

The second step is aggregating the dimensional indices to compute the HDI by taking the geometric mean of the three dimensional indices (health, education, and standard of living) as expressed in the formula below

$$HDI = [(Health\ index)(Education\ index)(Income\ index)]^{1/3}$$

The HDI value ranges between 0 – 1 in which 0 indicates the lowest HDI while 1 indicates the highest.

(ii) Inequality-adjusted Human Development Index (IHDI)

The IHDI measures the level of human development by accounting for inequality. It adjusts the HDI for inequality in the distribution of each dimension across the population. This index has the same dimensions and indicators with the HDI but differ in the dimension indexes used in arriving at the final IHDI. Drawing on the Atkinson family of inequality measures, the IHDI sets the aversion parameter equals to 1, in which case the inequality measure is $A = 1 - g/\mu$, where g is the geometric mean and μ the arithmetic mean. This is expressed in equation 2.26

$$A_x = 1 - \frac{\sqrt[n]{X_1 \dots X_n}}{\bar{X}} \qquad 2.26$$

where $\{X_{1,} \dots, X_n\}$ denotes the underlying distribution in the dimension concerned. A_x is obtained for each indicator (life expectancy, mean years of schooling and disposable income/consumption per capita). The geometric mean in equation 2.26 rules out zero value for A_x. To compute the inequality for the mean years of schooling, one year is added to all observations. Possible outliers for the income per capita are eliminated by truncating the top 0.5 percentile of the distribution to reduce the influence of extremely high incomes and by replacing the negative and zero incomes with the minimum value of the bottom 0.5 percentile of the distribution of positive incomes.

Then the dimension indices are adjusted for inequality by multiplying each of the dimension indices of the HDI $I_x$by $(1 - A_x)$ as shown in equation 2.27 in which A_x is the corresponding Atkinson measure as defined in equation 2.26

$$I_x^* = (1 - A_x) \cdot I_x. \qquad 2.27$$

The final step is to combine the dimension indices used to calculate the IHDI by taking the geometric mean of the three dimension indices adjusted for inequality. This is shown in equation 2.28 while equation 2.29 shows the percentage loss in HDI due to inequality.

$$IHDI^* = (I^*_{Health} \cdot I^*_{Education} \cdot I^*_{Income})^{1/3} = [(1 - A_{Health}) \cdot 1 - A_{Education}) \cdot (1 - A_{Income})]^{1/3} \cdot HDI. \quad 2.28$$

$$Loss\ \% = 1 - [(1 - A_{Health}) \cdot (1 - A_{Education}) \cdot (1 - A_{Income})]^{1/3} \quad 2.29$$

(iii) Gender Inequality Index (GII)

The gender-based disadvantage manifesting in the dimensions of reproductive health, empowerment and the labour market is reflected in the GII. Unlike the IHDI, computing GII for most countries is hampered by data limitation in the three dimensions. The GII shows the loss in potential human development due to gender inequality in the dimensions concerned. It ranges between 0 and 1 where 0 means perfect equality between men and women, 1 means perfect inequality between genders in all concerned dimensions.

In calculating the GII, the first step is to treat zeros and extreme values. Since the use of geometric mean requires nonzero values, a minimum value for all component indicators is set at 0.1 percent. Also the minimum value for maternal mortality ratio is set at 10 deaths per 100,000 births and the maximum value is truncated at 1,000. The second step involves aggregating across dimensions for each gender group by the geometric mean. This is done by the use of formula 2.30 and 2.31 for male and female respectively.

$$G_F = \sqrt[3]{\left(\frac{10}{MMR} \cdot \frac{1}{ABR}\right)^{1/2} \cdot (PR_F \cdot SE_F)^{1/2} \cdot LFPR_F}, \quad 2.30$$

$$G_M = \sqrt[3]{1 \cdot (PR_M \cdot SE_M)^{1/2} \cdot LFPR_M} \qquad 2.31$$

Next is the use of harmonic mean to aggregate across gender groups. The male and female indices are aggregated by the harmonic mean as shown in formula 2.32 to form the equally distributed gender index.

$$HARM(G_F, G_M) = \left[\frac{(G_F)^{-1}+(G_F)^{-1}}{2}\right]^{-1} \qquad 2.32$$

The logic behind the use of harmonic mean of geometric mean within groups is to capture gender-based inequality and adjust for correlation between dimensions.

Also, the geometric mean of the arithmetic means is calculated for each indicator by aggregating male and female indices on equal weights and then aggregating the indices across dimensions using the following formula

$$G_{\bar{F},\bar{M}} = \sqrt[3]{\overline{Health} \cdot \overline{Empowerment} \cdot \overline{LFPR}} \qquad 2.34$$

where $\overline{Health} = \left(\sqrt{\frac{10}{MMR} \cdot \frac{1}{ABR}} + 1\right)/2$,

$\overline{Empowerment} = \left(\sqrt{PR_F \cdot SE_F} + \sqrt{PR_M \cdot SE_M}\right)/2$, and

$\overline{LFPR} = \frac{LFPR_F+LFPR_M}{2}$.

In the final step, the GII is calculated by comparing the equally distributed gender index to the reference standards using formula 2.35 below:

$$GII = 1 - \frac{HARM(G_F,G_M)}{G_{\bar{F},\bar{M}}} \qquad 2.35$$

(iv) Gender Development Index (GDI)

The GDI measures gender inequalities in achievements in three basic capabilities: health measured by male and female life expectancies at birth; education measured by male and female expected years of schooling for children, together with male and female expected years of schooling for adults; and standard of living, measured by male and female estimated earned income.

Computation of the GDI begins with estimating male and female earned incomes. This is done by calculating the share of the wage bill for each gender. The female share of the wage bill (S_f) is calculated as:

$$S_f = \frac{W_f/W_m \cdot EA_f}{W_f/W_m \cdot EA_f + EA_m} \qquad 2.36$$

where W_f/W_m is the ratio of female to male wage, EA_f is the female share of the economically active population and EA_m is the male share of the economically active population.

The male share of wage bill is calculated as:

$$S_m = 1 - S_f \qquad 2.37$$

Estimated female earned per capita income is obtained from GNI per capita, by first multiplying it by female share of the wage bill, S_f, and then rescaling it by the female share of the population, $P_f = N_f/N$,

$$GNIpc_f = GNIpc \cdot S_f/P_f \qquad 2.38$$

In the same way, estimated male earned income per capita is obtained using equation 2.39 as

$$GNIpc_m = GNIpc \cdot S_m/P_m \qquad 2.39$$

To construct the male and female HDIs, first the indicators, which are in different units are transformed into indices and then dimension indices for each sex are aggregated by taking the geometric mean.

Another step requires normalizing the indicators into a scale of 0 to 1 using the same goalposts for the HDI except for life expectancy at birth, which is adjusted for the average of the five years biological advantage that women have over men. The subindices are calculated by imputing the minimum and maximum values using the formula

$$Dimension\ index = \frac{actual\ value - minimum\ value}{maximum\ value - minimum\ value}$$

The dimension index for education is first obtained for each of the two subcomponents, and then the unweighted arithmetic mean of the two resulting indices is taken.

In the last step, the male and female HDI values are calculated by taking the geometric means of the three dimensional indices for each gender

$$HDI_f = (I_{Health_f} \cdot I_{Education_f} \cdot I_{Income_f})^{1/3}$$

$$HDI_m = (I_{Health_m} \cdot I_{Education_m} \cdot I_{Income_m})^{1/3}$$

Finally, the GDI is simply the ratio of female HDI and male HDI:

$$GDI = \frac{HDI_f}{HDI_m}$$

(v) Multidimensional Poverty Index (MPI)

The MPI estimates the extent of deprivations in the three dimensions of the HDI at the household level. In computing the MPI, micro data from household surveys is used to measure multiple deprivations in education, health and standard of living.

The methodology requires the assigning of deprivation scores to each member according to his household's deprivations in each individual component indicator as indicated in Table 2.4. Assigning an equal weight to each dimension gives 33.3 percent for each on a scale of 100. The education and health dimensions have two indicators each so that each is worth 16.7 percent (i.e 33.3/2). The standard of living dimension has six indicators so that each is worth 5.6 percent (i.e 33.3/6).

Table 2.4: Households MPI deprivation benchmarks

DIMENSION	INDICATOR
Education	• School attainment: no household member has completed at least six years of schooling • School attendance: a school-age child (up to grade 8) is not attending school
Health	• Nutrition: a household member (for whom there is nutrition information) is malnourished, as measured by the body mass index for adults (women ages 15-49 in most surveys) and by the height-for-age z score calculated using WHO standards for children under age 5. • Child mortality: a child has died in the household within the five years prior to the survey.
Standard of living	• Electricity: not having access to electricity • Drinking water: not having access to clean drinking water or if the source is located more than 30 minutes away by walking. • Sanitation: not having access to improved sanitation or if improved, it is shared. • Cooking fuel: using 'dirty' cooking fuel (dung, wood or charcoal). • Having a home with a dirt, sand or dung floor. • Assets: not having at least one asset related to access to information (radio, TV, telephone) and not having at least one asset related to mobility (bike, motorbike, car, truck, animal cart, motorboat) or at least one asset related to livelihood (refrigerator, arable land, livestock).

Source: UNDP (2014)

To identify the multidimensionally poor, the deprivation scores for each indicator are summed up to obtain the household deprivation score, c. A cutoff of 33.3 percent, which is equivalent to $1/3$

of the weighted indicators, is used to distinguish between the poor and nonpoor. A deprivation score greater than or equals to 33.3 percent means that a household (and everyone in it) is multidimensionally poor. A deprivation score between 20 to 33.3 percent identifies a household as near multidimensional poverty. Still a score of 50 percent and above means that a household is severely (or extremely) multidimensionally poor.

As stated in equation 2.40, the MPI value is the product of two measures: the multidimensional poverty headcount ratio and the intensity of poverty.

$$MPI = H \cdot A \qquad 2.40$$

The headcount ratio, H, is the proportion of the multidimensionally poor in the population

$$H = \frac{q}{n} \qquad 2.41$$

where q is the number of people who are multidimensionally poor and n the total population.

The intensity of poverty, A, reflects the proportion of the weighted component indicators in which, on average, poor people are deprived. For poor households only (deprivation score c greater than or equal to 33.3 percent), the deprivation scores are summed and divided by the total number of poor people:

$$A = \frac{\sum_i^q c_i}{q} \qquad 2.42$$

where c is the deprivation score that the ith poor individual experiences.

The deprivation score c of a poor person can be expressed as the sum of deprivations in each dimension ($j = 1,2,3$), $c = c_1 + c_2 + c_3$.

The contribution of dimension j to multidimensional poverty can be expressed as in equation 2.43

$$Contrib_j = \frac{\sum_1^q c_j}{n} / MPI \qquad 2.43$$

Overall, the review of approaches to, and measures of quality of life in the forgoing makes the following points apparent:

i. Quality of life is multidimensional and could be evaluated from at least three interrelated approaches, namely: utilitarian perspective, resource perspective, and the capability perspective.
ii. A unified theory of welfare does not exist nor is it feasible for these related approaches to converge into a single all-encompassing theory of wellbeing. However, each of the approaches can benefit from a better understanding of the others.
iii. The utility-based approach provides a theoretical basis for the study of welfare through a micro model of consumer behaviour. The resource-based approach provides a synthesis of welfare theory and its practical application. While the capability approach presents a normative theory of welfare by contrasting the role of resources from the ultimate goal of human development.
iv. Resources are primary to quality of life and central to the analysis of welfare from whichever perspective. The degree of importance attached depends on the level of inequality and to a large extent on the level of development of the society concerned.
v. Although utility and capability levels do not solely depend on the availability of resources, the chances of attaining higher levels of both utility and capability are increased with more resources, other things being equal.
vi. The relevance of any approach (utilitarianism, resourcism, or capabilism) would depend on the level of development of the society concerned. This is because utility may be more relevant in affluent societies where resource poverty is less of a serious concern. But resources are critical to the welfare of extremely poor societies where the people are mostly

desperately poor. However, capabilism can be applied to any social setting due to the existence of deprivation in every society regardless of its level of development.

vii. The capability approach embodies the inclusion of utility and resources in the welfare evaluation space as the n-tuple of functionings directly correlates with resources in achieving valuable capabilities. This provides a unique opportunity for integrating every important dimension of welfare and quality of life.

viii. Measures of welfare could be classified broadly into single indicators and composite index measures. These measures could also be efficiency-centred (with focus on optimization) or equity-centred (with focus on distribution).

ix. Composite index measures provide a more comprehensive view of welfare evaluation as they lay focus on specific welfare concepts informed by the objective of the evaluation exercise. However, such measures are based on weighting and benchmarking standards at different levels[5].

x. Sustainability concerns are likely to become the dominant paradigm in both national and international development[6].

[5]Weighing and benchmarking are emerging as crucial aspects of development research. While weighing is purely a positive (scientific) exercise, benchmarking is largely dependent upon value judgements.

[6] Sustainability is at the core of the global development agenda as emphasized in international policy frameworks such as the Millennium Development Goals (MDGs), Sustainable Development Goals (SDGs) etc.

2.3 Empirical Studies on Quality of Life and Living Conditions

Given the objectives of this study and the questions it intends to answer, this section presents various quality of life-related empirical studies in Nigeria and other countries. These studies provide a great deal of insight on the state and distribution of welfare and the effectiveness of governance in improving quality of life. This is relevant in identifying gaps as well as the appropriate methodology for the current study. The review focuses on empirical works that dealt with issues of welfare while the effectiveness of governance in providing the conditions for welfare improvement is inferred.

As far as overall welfare is concerned, existing empirical literature is grouped into two. In the first group are studies that relate to the description and analysis of social welfare. The studies include: Kenny (2005); Isah (2008); Larida (2009); Statistics South Africa (2009); Oni and Adepoju (2011); Umar and Hamidu (2012); Anyanwu (2012); Ayinde et al. (2012); Aluko (2012); Helliwell, Layard and Sachs (2013); Maiwada (2013); U.S. Census Bureau (2013); Porter, Stern and Green (2013), OECD (2013); Ajakaiye et al (2014); Oyeronke and Kayode (2014); Idowu, Ambali and Onasanya (2014) and UNDP (2014b). In the second group are studies that evaluated the effectiveness of governance in promoting living conditions. The studies include: Scully (2000); Anyanwu and Erhijakpor (2007); World Bank (2011); Olofin, Olaniyan and Folawewo (2011); Dimian and Barbu (2012); Lionel and Samuel (2013); Iwuoha (2013); Mariano and Rebelatto (2013); and Popoola (2016).

Studies on the analysis of social welfare across countries like those of Kenny (2005) and Helliwell, Layard and Sachs (2013) focused on happiness and life satisfaction as measures of quality of life. Kenny (2005) estimated the Quality of Life index (QOL) in order to present a worldwide country ranking linking the results of life satisfaction (utility) with social indicators like GDP per person,

life expectancy, unemployment, and security. Secondary data on 111 countries were examined using the simple regression technique. The results showed that the top ten countries are Ireland, Switzerland, Norway, Luxembourg, Sweden, Australia, Ireland, Italy, Denmark and Spain, while the lowest ranking countries are Turkmenistan, Kyrgyz Republic, Botswana, Russia, Uzbekistan, Tajikistan, Nigeria, Haiti and Zimbabwe. The findings indicate that the top ten countries were the developed countries of Europe while the lowest ranking were mostly the developing countries of Africa and Asia, suggesting that life satisfaction is associated with a country's level of development.

In a similar study by Helliwell, Layard and Sachs (2013) on the global distribution of happiness across countries, the Cantril ladder was used to rank countries based on their general level of happiness. Data from Gallup World Poll on 156 countries were used to show the evidence of a strong correlation between human development and happiness. In terms of ranking, top five most happy countries were Denmark, Norway, Switzerland, Netherlands and Sweden while top five least happy countries were Rwanda, Burundi, Central African Republic, Benin and Togo. The gap between the top and the bottom is wide with average Cantril ladder of 7.48 in the top five countries, over 2.5 times that of the bottom countries. By observation, all the top five countries are developed in sharp contrast to the low ranking countries, which are all in Africa and less developed.

Other studies used composite indices in showing the distribution of welfare across the globe based on specific dimensions of quality of life. In one such study, Porter, Stern and Green (2013) constructed and estimated the Social Progress Index (SPI) for 132 countries across the globe. Countries were ranked based on their ability to achieve overall quality of life using secondary data on twelve (12) indicators. The SPI ranking placed New Zealand, Switzerland, Iceland, Netherlands, Norway, Sweden, Finland, Denmark, Canada and Australia as the top ten with scores

between 88.24 and 86.10, while Nigeria, Pakistan, Yemen, Niger, Angola, Sudan, Guinea, Burundi, Central African Republic, and Chad were the bottom ten countries with SPIs between 42.65 and 32.60. Regionally, the SPI places Europe, North America, and Oceania as the best performing while Sub-Saharan Africa, Central Asia, and South Asia are the worst performing regions.

UNDP (2014) in its Human Development Report assessed long term progress in three basic dimensions of human development across countries. The study estimated the Human Development Index (HDI) using data on standard of living, health, and education for 187 countries. According to the report, world average HDI is 0.702 with most developing countries advancing at uneven pace. Also, the lowest HDI regional values are for Sub-Saharan Africa and South Asia, while the highest are for Latin America and the Caribbean, then followed closely by Europe and Europe and Central Asia. Notably, the HDI ranking places Norway, Australia, and Switzerland as the top three with very high human development; Uruguay, Bahamas, and Montenegro as the top three with high human development; Maldives, Mongolia, and Turkmenistan as the top three with medium human development; and Nepal, Pakistan, and Kenya topping the low human development category. This further stresses the note that quality of life is distributed unequally between the developed and the developing economies of the world.

However, suggestive of this unequal distribution is the fact that dimensions and components of quality of life are not the same for all countries, with outcomes showing better for developed economies. For example, OECD (2013) estimated the Better Life Index (BLI) to measure wellbeing in OECD countries and other major economies. The study used a web-based survey method to collect data on material conditions in eleven dimensions of well-being. Findings from the study suggested that life satisfaction, health status, and education are dimensions found to be

most important on average across countries although all eleven dimensions are found to resonate with people's sense of wellbeing. Similarly, U.S. Census Bureau (2013) examined the well-being of households in five domains of living conditions. The study used panel data from 2011 periodic well-being survey module covering the domains of appliances and electronic goods; housing conditions; neighbourhood conditions and community services; basic needs; and social inclusion and satisfaction. A key finding from the study is that U.S. households enjoy very high quality of life in all five domains with slight differences across demographic divides.

On the contrary, evidence from Africa shows a much lower quality of life for most countries. Anyanwu (2012) accounted for poverty in Africa by verifying the relative role of the various factors that determine poverty status and the policy implication of such. Using descriptive and multivariate analysis, the study used evidence from Nigeria to establish that, (i) the probability of a household being poor depends on household size, level of education, zone of residence, marital status and religious affiliation, and (ii) the north is having the highest probability of being poor. In another report, Statistics South Africa (2009) surveyed the living conditions of households with respect to income and consumption. Primary data on income and consumption expenditure were collected and analyzed using descriptive statistics. The study observed that most of the households' income and expenditure is allocated to basic needs like housing, food, water and other utilities.

In Nigeria, studies such as those of Oni and Adepoju (2011), Anyanwu (2012), and Ajakaiye *et al* (2014) show that poverty is more prevalent in the Northern regions and states, attributing this mostly to both social and economic factors. For example, Ajakaiye *et al* (2014) examined non-monetary multidimensional poverty in Nigeria using the first order dominance approach. The study appraised five dimensions of deprivation (education, water, sanitation, shelter, and energy) using comparable secondary survey datasets. Evidence from the study stresses the note that the incidence

of poverty has not kept pace with the rapid economic growth recorded in the last decade. Another key finding is the existence of profound regional inequalities with huge disparities among States, with the ten worst-ranked states located in the northern part of the country. Following the style of Ajakaiye *et al* (2014), Oni and Adepoju (2011) applied the capability approach for the study of wellbeing in rural Nigeria. Data were analyzed using a combination of fuzzy set and logistic regression techniques. Findings from the study revealed that the capability to attain a desired state of wellbeing is highest with respect to asset ownership and lowest with respect to security; and the probability of attaining the mean capability wellbeing level is higher for male headed rural households depending on their education and age, household size, employment in the public sector, and residence in any geopolitical zone other than the North western zone.

Other studies within Nigeria identified and examined various welfare components with direct bearing on quality of life and living conditions. For example, Umar and Hamidu (2012) identified access to education, income, transport/power, potable water and access to healthcare as factors that have significant influence on quality of life in the Mambilla Plateau of Taraba State. A study by Aluko (2012) examined the impact of poverty on housing condition in Mushin Local Government Area of Lagos State. A major finding from the study revealed that income poverty results in poor health of the respondents due to exposure to different forms of pollution which has adverse impact on the lives and housing condition of the residents.

In terms of inequality, Oyeronke and Kayode (2014) examined the level of polarization in Nigeria within a socio-economic context. The study used Duclos, Esteban and Ray (DER) decomposition to analyze secondary data on poverty. Findings from the study suggest that, (i) rural sector is more polarized than the urban sector, (ii) the northern zones have a higher level of polarization than the southern zones with high vulnerability to conflicts, (iii) polarization is higher amongst male than

female category, and (iii) poverty is higher in the rural sector, North-west zone and the non-educated members of the society. Similarly, Isah (2008) showed the existence of poverty and inequality in wealth and income in Kaduna State, with wide disparity among individuals and groups despite evidence of improvement in access to health, education, and paid employment.

Across groups, the study of Maiwada (2013) analyzed the livelihood coping strategies of female headed households in Zaria local government area of Kaduna State. The study used descriptive statistical techniques for analysis using mainly primary data. A key finding from the study revealed that majority of female household heads engage in low-paying domestic labour as household survival strategy, with low living standards of households in terms of income and paid employment. Also, Idowu *et al* (2014) made an empirical assessment of the livelihood and crop diversification of rural farm households in Remo Division of Ogun State. The study estimated the Simpson index using the technique of Tobit regression analysis. According to findings from the study, marginal increases in crop diversification were associated with increase in household size, farm size and level of education, and that public goods like roads, schools, water supply are in poor states.

In summary, evidence from the first group of empirical studies may be summarized on three fronts. First, the supply of welfare components like education, health, income and employment, sanitation, housing and infrastructure is higher for developed than less developed economies. Second, developed countries have higher quality of life by all measures because LDCs are characterized by intense deprivations with wide disparities across groups and locations. Third, the construction and use of composite index measures of welfare provides a robust methodology for quality of life evaluation across social groups and over time. The composite index measure is appropriate because of its potential for precision especially in multidimensional analysis.

The second group of studies mainly evaluated the effectiveness of governance in promoting quality of life, with particular reference to cross-country and country case studies. Scully (2000) examined the effects of government spending on social progress. Using data on GDP and other socioeconomic indicators, the study constructed and estimated the Index of Government Consumption Spending (IG) for 112 countries. Findings from the study suggest that (i) there is a positive relationship between government spending and social welfare, (ii) the impact of government spending is higher for less developed countries than developed countries, and (iii) there is little difference in social outcomes among the developed countries regardless of the amount they spend on welfare.

Dimian and Barbu (2012) investigated how public service can enhance quality of life in Eurozone countries. Using the nonparametric correlation technique, socioeconomic and life satisfaction indicators were analyzed. Evidence from the study shows that health services and services for the elderly seem to have the most impact on life satisfaction in EU countries, and that low confidence in public institutions hampers people's ability to access quality public services in developing countries.

Also, Mariano and Robelatto (2013) studied the social efficiency of nation-states in their ability to transform economic prosperity into quality of life for their populations. The study adopted the DEA's triple index using secondary data on social indicators across regions. Findings from the study suggested that developed countries do not excel in efficiency despite better social indicators. The study also noted that former Soviet republics and eastern European countries have remarkable efficiency, while Southern African countries ranked the lowest in efficiency and social indicators.

Across Africa, empirical studies show modest levels of governance effectiveness. Anyanwu and Erhijakpor (2007) studied the relationship between government expenditure on education and school enrolment rates in SANE countries (South Africa, Algeria, Nigeria and Egypt). The study employed the Panel regression technique to estimate data on government education expenditure and education enrolment from 1990 to 2002. Findings indicated that government spending on education has a positive and significant impact on primary and secondary education enrolment rates, in which, Nigeria has the greatest positive influence on increasing primary and secondary enrolment rates among the SANE countries. This is the same for Olofin *et al*. (2011) in which the Grassroots Focused Index (GFI) was developed and estimated in order to measure the grassroots perception of the impact of development programs in Cameroon, Nigeria, and South Africa. On the whole, the GFI score of 53.4 shows that Nigeria ranks higher than South Africa and Cameroon with respective GFI scores of 48.1 and 48.5. These studies indicated that governance effectiveness is high in Nigeria relative to other African countries.

World Bank (2011) examined the progress Nigeria has made in improving the socioeconomic conditions of citizens during the recent period of high economic growth and significant oil revenues. The study analyzed secondary data using both descriptive and inferential statistical techniques. Findings from the study were threefold. First, socioeconomic outcomes are improving at a rather sluggish pace with more room for improvement. Secondly, there is evidence of strong regional disparity in socioeconomic outcomes with the southern region faring better than the northern region. Also, there exists a weak correlation between per capita social spending and socioeconomic outcomes.

Studies by Iwuoha (2013), Lionel and Samuel (2013), and Popoola (2016) were based on the state of infrastructure in Nigeria and what the government is doing in promoting development. Excerpts from such studies indicate significant infrastructural deficit in Nigeria. For instance, Lionel and Samuel (2013) explored the relationship between electricity and economic development in Nigeria using the technique of Ordinary Least Squares/ECM. The study found out that GDP, electricity supply and capital are significant variables influencing economic development in Nigeria. However, the poor state of electricity supply in Nigeria makes its impact very little on the economic development of the country. Also, Iwuoha (2013) examined the level of implementation of the MDGs in Nigeria and the prospects of attaining the target goals by 2015. The study concluded that the MDGs made Nigerians worse off than they were in terms of the environment, education, health and nutrition, and infrastructure.

Again, the studies reviewed in the second group show a striking contrast between the developed and less developed countries in terms of governance. One common feature of studies on the effectiveness of governance particularly in Nigeria is that they illuminate the high level of governance deficit that is accompanied by many forms of institutional disincentives. A general implication is that there is a strong relationship between the effectiveness of governance and quality of life outcomes, and that the effectiveness of governance in any society may be inferred from its quality of life outcomes.

More broadly, studies were further categorised based on methodology used. The alternative methodologies are: utility-based, resource-based and capability-based methodologies. Firstly, the utility-based studies reviewed basically used happiness and life satisfaction as proxies for utility. For example, Olofin *et al*. (2011) developed and estimated the Grassroots Focused Index (GFI) to assess citizens' perception about the government in promoting welfare. Similarly, Helliwell *et al*.

(2013) used utility indicators to rank countries based on their levels of happiness and life satisfaction. Studies in this category have no clear methods of analysis as they employed measurement scales such as the Cantril ladder. Findings from these studies suggested that countries with higher economic welfare also tend to have higher levels of happiness and life satisfaction.

Secondly, all the studies reviewed (except Olofin et al. 2011; Oni and Adepoju, 2011; Helliwell *et al*. 2013; Ajakaiye et al 2014; and UNDP, 2014b) used the resource-based methodology. Some of the studies such as Statistics South Africa (2009); World Bank (2011); Umar and Hamidu (2012); Anyanwu (2012); Dimian and Barbu (2012); Aluko (2012); Lionel and Samuel (2013); Porter et al. (2013); Mariano and Robelatto (2013) and Idowu *et al*. (2014) used social indicators as measures of welfare while others such as Kenny (2005); OECD (2013); Porter *et al*. (2013) and UNDP (2014) used composite indexes to measure quality of life. Moreover, studies on resource distribution like Isah (2008) and Ayinde (2012) based their analysis on inequality measures such as the Gini coefficient and Theil index.

Most of these works are similar in terms of methods of analysis. It is apparent that resource-based studies tended to use descriptive statistical tools for analysis but it is not clear whether the choice of statistical techniques is informed by the source of data. It is however obvious that case studies used survey data and country or cross-country level studies used secondary sources of data. Altogether, findings from these studies suggest that developed countries have higher quality of life and by implication have more effective governments than less developed countries. Moreover, aspects of welfare like education, health, employment, and infrastructure that are deemed essential for quality of life are inadequate in less developed countries.

Thirdly, of the studies reviewed, only Oni and Adepoju (2011), Ajakaiye et al (2014) and UNDP (2014b) are capability-based, which used diverse methods of analysis. For instance, Oni and Adepoju (2011) employed fuzzy set theory while Ajakaiye *et al.* (2014) used the first order dominance method in analysing capabilities. In contrast, UNDP (2014b) used the HDI as a primary composite indicator of welfare to rank countries based on their attainment of certain capabilities.

Finally, a comparison between Nigerian and non-Nigerian studies reveals certain important differences. There are indications that Nigerian studies are relatively narrow in scope since they focus on specific aspects of welfare. In other terms, most Nigerian studies are unidimensional rather than multidimensional. For example, Isah, (2008), Ayinde (2012) and Oyeronke and Kayode (2014) focused on inequality in the distribution of welfare. Similarly, studies such as Umar and Hamidu (2012); Lionel and Samuel (2013), Iwuoha (2013); Maiwada (2013); and Idowu *et al*. (2014) measured socio-economic outcomes and the availability of resources. In the same vein, Anyanwu (2012) and Aluko (2012) studied the level of poverty in resource ownership. In sum, all Nigerian studies except Ajakaiye *et al* (2014) are resource-based, thematic and are also similar in their use of descriptive statistical techniques for analysis. Moreover, studies conducted in Nigeria seemed to use single indicators rather than composite indicators to measure quality of life. This current study intends to fill this gap in two ways: firstly by approaching quality of life multidimensionally; and secondly by using a composite index to evaluate quality of life and living conditions.

By contrast, non-Nigerian studies seemed to have a wider focus in their analysis of welfare with more diverse analytical techniques. Porter *et al*. (2013) for example used about 54 indicators to arrive at the SPI as a quality of life measure. Most cross-national studies like UNDP (2014) and Olofin *et al*. (2011) tend to use composite indices to summarize varying dimensions of welfare.

In sum, the empirical studies reviewed indicate the following points:

(i) It is not possible to employ more than one methodology to cover two or more approaches at the same time because each approach exclusively targets specific aspect of quality of life. However, due to the implied links between the approaches identified, some researchers complement one approach with another (see for example Kenny, 2005; U.S. Census Bureau, 2013; and OECD, 2013).

(ii) The choice between measures (single indicator or composite index) depends on the discretion of researchers but most composite indexes are computed using secondary data.

(iii) In practice, the capability-based measures recognize the critical importance of resources in expanding options and enhancing capabilities. However, capability-based evaluation, in principle, considers resources as means (rather than ends) in achieving greater capabilities.

(iv) Nigerian studies mostly use single indicators while non-Nigerian studies use composite indexes as measures of quality of life. Composite indexes go beyond estimating indicators to providing a baseline measure for easier comparison.

(v) In terms of the distribution of welfare between countries, there is wide disparity and inequality between the developed and less developed countries in all aspects of quality of life (Kenny, 2005; Porter et al, 2013; and UNDP, 2014).

2.4 Implications of Reviewed Literature for the Study

From the diverse set of literature reviewed, it becomes apparent that quality of life depends on many variables that form into components. It has been observed though that there is no unified theory of welfare that covers all concerns, the various approaches to welfare evaluation are complementary each with an exclusive focus. The utilitarian approach exclusively focuses on the subjective feelings that result from consumption, the resource-based approach focuses exclusively on the availability of resources while the capability approach goes beyond utility and resources by exclusively focusing on the freedoms those provide.

Of the approaches, the capability framework is one very normative criteria based not just on philosophical reason, but also on its broader focus as to what is important for optimal quality of life. But despite wide acceptance of the capability approach among economists especially in the context of human development, a formal methodology is yet to be finalized, if ever. This makes the framework susceptible of many different applications based on the objective of the exercise. While some regard this open-endedness a confusing limitation (see Nussbaum, 2003), others, including Sen, perceive this non commensurability as a fundamental strength (Sen, 1999). Such flexibility and openness make the capability approach particularly appropriate for our purpose in achieving the objectives of this study.

In light of the discussions and arguments raised in the literature, at least three implications were deduced for this study. First, the capability-based approach provides both conceptual and empirical footing for proper quality of life evaluation. Its wider focus broadens the horizon for incorporating potential considerations into the capability set. For instance, to understand the quality of life individuals enjoy, there has to be information on their preferences especially when there are multiple alternatives. But where alternatives are not readily available, as in many poor societies, it

is hard to know the actual preference of individuals aside their perceptions. In this case, the task is to expand the options available to individuals, which is usually facilitated by providing more resources as seen in the evidence from empirical studies reviewed.

Secondly, among the capability-based measures, the MPI represents a good framework for assessing quality of life at the micro level (local government areas) because of the opportunity it provides for measuring quality of life outcomes using area-specific household survey data to reflect the peculiarities of different societies. On the bright side, the framework has the advantage of using disaggregated data from household survey that is necessary in understanding real problems that are usually hidden in macro data aggregates. However, in order to reflect the peculiarities of the case study, a conceptual and empirical modification of the MPI becomes necessary for at least three reasons[7].

The first reason is conceptual with regards to how poverty should be viewed. According to the capability approach, poverty is, and should be conceptualized more broadly in terms of capability deprivation rather than resource poverty as the MPI seems to suggest. Second, the indicators measured by the index are inadequate for a truly multidimensional evaluation in less developed societies. In response to this, more indicators[8] were identified to be critical in the study area and hence were added and streamlined to the ones in the MPI framework. Third, the benchmarks for deprivation are too ambitious and arbitrary as far as poor societies are concerned. As such, the benchmarks were adjusted to the standard model of demand and supply in welfare achievement,

[7] Other reasons include: (1) The MPI penalizes households with large family sizes even though such are regarded as sources of pride, insurance and affluence in many African societies. (2) Recent developments are not captured by the MPI because it uses irregular and secondary household survey data that may not be up to date.

[8] In addition to the six indicators in the living conditions dimension of the MPI, two more indicators (earnings and nutrition) were included due to their criticality on living conditions in the study area, and the fact that they were not captured in any dimension or by any other indicator.

which was important for a theoretically grounded and robust benchmarking procedure as a basis for indicator-standardization. Moreover, the weighting procedure in the MPI is illogical and arbitrary as indicator weights are determined by the need to impose equal dimension weights. This weakness is in fact common to all capability-based measures by the UNDP. A possible conclusion with respect to the issues raised is that the development of an alternative index is necessary for a more robust evaluation of quality of life at the micro level.

Thirdly, concerning methodology, the gaps identified in the literature suggest the application of a multidimensional composite index in evaluating quality of life and living conditions. Therefore, building on the MPI methodology by Alkire and Santos (2010)[9] and UNDP (2014), we developed the Capability Deprivation Index (CDI) for this study as a framework for evaluating quality of life and living conditions at micro level, which can then be aggregated to state, and possibly to national levels. The CDI further suggests that understanding deprivation at the most basic level is key to understanding quality of life at the macro level, and thus important for effective policy intervention.

[9] The MPI was originally developed by Sabina Alkire and Maria Santos under the auspices of the Oxford Poverty and Human Development Initiative at the University of Oxford. Later, the UNDP adopted and launched the MPI in its 2014 Human Development Report.

CHAPTER THREE

METHODOLOGY

The objectives of this study were to develop a framework for evaluating quality of life at the micro level; measure the quality of life of the population in Zaria Local Government Area; and to evaluate the effectiveness of governance in Zaria Local Government Area. To achieve these objectives, the capability framework was chosen. The framework is explained and justified in section 3.1. In section 3.2, we provide the empirical methods along with the models.

3.1 Conceptual Framework

The capability approach represents a framework for the evaluation of individual welfare and social states which provides a basis for welfare analysis and policy prescriptions. The core concepts are functionings and capabilities. According to Sen (2003),

> The primitive notion in the approach is that of functioning – seen as constitutive elements of living. A functioning is an achievement of a person: what he or she manages to do or be, any such functioning reflects, as it were, a part of the state of that person. The capability of a person is a derived notion. It reflects the various combinations of functionings (doings and beings) he or she can achieve. It takes a certain view of living as combination of various 'doings and beings'. Capability represents a person's freedom to choose between different ways of living.

A welfare evaluation would involve the identification of capability set, X_i, as defined over the different potential activities or states of being **b** of individual i as stated in equation 3.1

$$X_i(Q_i) = \{\boldsymbol{b}_i | b_i = f_i(c(\boldsymbol{q}_i), \boldsymbol{z}_i) \; \forall \; f_i \in F_i \; and \; \forall \; \boldsymbol{q}_i \in Q_i\}, \quad 3.1$$

where $\boldsymbol{q}_i$is a vector of commodities chosen by an individual, $c(\cdot)$ is a function that maps goods into the space of characteristics, $\boldsymbol{z}_i$ is a vector of individual characteristics in a particular social and environmental circumstance, f_i is a function that maps characteristics

of goods into states of being or activities $\boldsymbol{b}_i$, conditional on $\boldsymbol{z}_i$. X_i is a set of all possible $\boldsymbol{b}_i$, given the entitlement constraint Q_i (Sen, 1985 p. 7-10).

The vector of commodities $\boldsymbol{q}_i$ is the demand for both market and non-market goods and services. Also, Q_i represents a restriction on an individual's access to $\boldsymbol{q}_i$. The space of functionings, **b**, is the states of being and activities (doings) while the capability space, X, is the space of potential functionings.

The choice of the capability framework is informed by the opportunity it provides for measuring welfare outcomes and opportunities directly in the space of functionings. It has the advantage of permitting the incorporation of relevant variables that relate to poverty and inequality as major welfare issues in LDCs. Perhaps most importantly, the capability approach allows for the inclusion of any number of components broadly falling into valuable functionings as it centres on human development. This will already suggest a capability-based methodology for this study that is provided empirically by the Capability Deprivation Index (CDI) developed and presented in section 3.2. According to this methodology, three broad dimensions are considered to be the most important for human development – health, education and living conditions. The approach provides an important basis for evaluating the effectiveness of governance indirectly through the provision of public goods and expanding opportunities for individuals to attain optimal quality of life.

The central concepts in this methodology are *capability* and *deprivation*. The former is used to describe the various doings and beings of individuals that make meaning to them. Although capability is determined primarily by the availability of goods and services (both public and private), other individual and social forces affect people's preferences which may shape their

capability set (see equation 3.1). Hence, the distribution of capability between and among social groups depends substantially on the rationality[10] of individual preferences on the one hand and allocative efficiency on the other.

In the context of development economics, the concepts of deprivation and poverty are used in the same fashion[11]. While the traditional view of poverty focuses on income and related measures, deprivation is broader and implies lacking enough capability to function. Going by the latter perspective, poverty can be viewed as multidimensional and operationalized in the sense of capability deprivation.

Thus within the context of this study, capability deprivation is conceptualized as referring to all forms of impediments (both physical and psychological) that constrain the freedom of individuals to attain optimal quality of life. Barriers to optimal quality of life may be individual manifestations (such as physical or mental disability, poverty and the like) or institutional disincentives (such as poor governance, coordination failure, corruption etc.).

3.2 Empirical Framework

The Capability Deprivation Index (CDI) has been developed essentially for this study. The CDI uses three critical dimensions of quality of life at the household and community levels to reveal the attainment of capability or otherwise its deprivation. The index tries to harmonize the complementarity between households and the government in welfare achievement. The CDI framework in figure 1 allows for the study of welfare by looking at various indicators of welfare

[10] The basis for this assumption is the model of rational choice, which suggests that preferences are governed by hedonistic tendencies limited only by information and allocative imperfections.
[11] The concept of deprivation is broader than poverty because the former is not necessarily economic but the latter strictly is. Moreover, poverty as a concept is too suggestive in contrast to deprivation, which is more neutral.

deprivation at the same time. Virtually any relevant indicator can be added and streamlined to the standard welfare dimensions in the capability approach. It can also be used as a baseline measure for comparing welfare opportunities between social groups and over time.

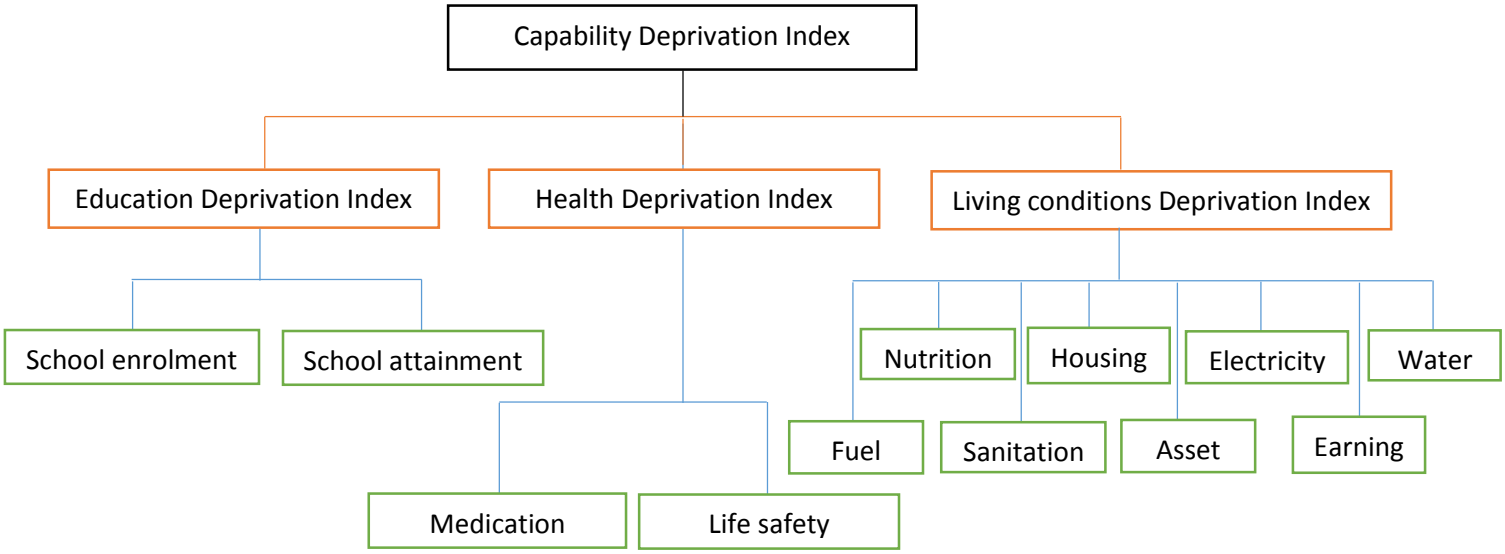


Figure 1: Capability Deprivation Index Framework
Source: Author's Conception, 2016

Details of the indicators at household and community levels are shown in Appendix I. The first column shows the three capability dimensions and their related indicators. There are a total of twelve indicators with education and health dimensions having two indicators each and the living conditions dimension having eight indicators. The next two columns represent household needs (capability demand) and household capability attainment (capability supply) while the fourth column represents community-wide attainment. The net difference between what households require and what is actually available to them is the benchmark for deprivation. In addition to quality of life outcomes, the community-wide attainment serves as governance effectiveness indicator.

3.2.1 Weighting Scheme

Component indicators are implicitly assigned equal weights so that dimension weights could be determined by the number of indicators in each dimension. This is justified by the need to base the dimension weighting on a plausible logic. Thus, the CDI is based on a weighted arithmetic mean which shares the dimension weights according to the number of indicators in each of the three dimensions. The weighting procedure are summarized in Table 3.1 below.

Table 3.1a: CDI indicator-weights

INDICATOR	***INDICATOR WEIGHT***	***PERCENTAGE***
School enrolment	1/12 = 0.0833	8.33%
School attainment	1/12 = 0.0833	8.33%
Medication	1/12 = 0.0833	8.33%
Life safety	1/12 = 0.0833	8.33%
Earnings	1/12 = 0.0833	8.33%
Nutrition	1/12 = 0.0833	8.33%
Housing	1/12 = 0.0833	8.33%
Water	1/12 = 0.0833	8.33%
Electricity	1/12 = 0.0833	8.33%
Cooking fuel	1/12 = 0.0833	8.33%
Asset ownership	1/12 = 0.0833	8.33%
Sanitation	1/12 = 0.0833	8.33%
TOTAL	**12/12 = 1.000**	**100.00%**

Source: Computed from figure 1

Table 3.1b: CDI dimension weights

DIMENSION	***NUMBER OF INDICATORS***	***DIMENSION WEIGHT***	***PERCENTAGE***
Education	2	2/12 = 0.1667	16.67%
Health	2	2/12 = 0.1667	16.67%
Living conditions	8	8/12 = 0.667	66.67%
TOTAL	**12**	**12/12 = 1.00**	**100.00%**

Source: Computed from Table 3.1a

According to the table, living conditions dimension contains twice the number of indicators in both education and health, which therefore carries double their weight put together. This is apparently because living conditions has a more direct impact on welfare than education and health

dimensions. Also, attainment in living conditions increases the chances of attaining higher levels of health and education. For instance, if the source of deprivation in education is a lack of awareness or due to long distance, it can be addressed by improving information infrastructure or transportation respectively. In another instance, the use of dirty cooking fuel may increase the chances of asthma the same way that a dirty environment breeds malaria and typhoid parasites.

3.2.2 Calculating the CDI (Model Specification)

The CDI is computed using three indices of the education, health, and living conditions dimensions. It shows the extent and source of capability deprivation in each household. There are three steps to the indexation of the CDI. The first is that of determining the indicator-deprivation in each household. The second step is computing the dimension indices and the third is aggregating the dimension indices to arrive at the CDI.

Step 1: Benchmarking the indicator-deprivation[12]

Capability deprivation is premised on the notion of equilibrium, which is central to the theory of demand and supply. Given the household capability set $W = (w_1, w_2, \dots, w_n)$, the desired capability level of any given household i is $w_d(W) \geq w_s(W) \; \forall \; w_i \in W$

where w_d is the household capability demand and w_s the household capability supply.

Thus, deprivation in any indicator is the net difference between household capability requirement and its actual attainment, as shown in formula 3.1 below,

$$Capability\ deprivation = \sum_i w_d - \sum_i w_s \qquad 3.1$$

[12] Excess demand in an indicator indicates deprivation while equal and/or excess supply indicates non-deprivation.

Step 2: Creating the dimension indices

The standard unit for deprivation or non-deprivation in an indicator is 1 and 0 respectively. Dimension indices are obtained by dividing the sum of household deprivation scores in a given dimension by the corresponding number of indicators. This is shown in formula 3.2

$$Dimension\ index = \frac{sum\ of\ deprivation\ scores}{total\ number\ of\ indicators} \qquad 3.2$$

Thus, education, health and living conditions dimension indices are denoted by equations 3.3, 3.4 and 3.5

$$EDI = \frac{\sum ED_S}{2} \qquad 3.3$$

$$HDI = \frac{\sum HD_S}{2} \qquad 3.4$$

$$LDI = \frac{\sum LD_S}{8} \qquad 3.5$$

where EDI, HDI and LDI are education, health and living conditions deprivation indices respectively; whereas EDs, HDs and LDs stand for respective education, health and living conditions deprivation scores. The dimension deprivation scores provide information about the configuration of deprivation in the CDI.

Step 3: Aggregating the dimensional indices to produce the Capability Deprivation Index

The CDI is the weighted sum of the three dimensional indices as shown in equation 3.6. The weight attached to any one dimension depends on the number of indicators as well as the scale of its impact on welfare.

$$CDI = d_1(EDI) + d_2\ (HDI) + d_3\ (LDI) \qquad 3.6$$

where d_1, d_2 and d_3 represent the corresponding education, health and living conditions dimension weights as stated in Table 3.1b

3.3 Data Collection and Analysis

3.3.1 Population, Sample and Sampling Technique

Total number of households in Zaria Local Government Area is the population of this study. The population of households was estimated to be 90,543 according to National Population Commission projection for 2015. The population is distributed across the 13 Wards of Zaria Local Government, namely: Dambo Ward; Dutsen Abba Ward; Gyallesu Ward; Kaura Ward; Kwarbai A Ward; Kwarbai B Ward; Limancin Kona Ward; Kufena Ward; Tukur Tukur Ward; Tudun wada Ward; Unguwan juma Ward; Unguwan fatika Ward; and Wuciciri Ward.

The sample size was determined following Yamane (1967). Thus, a sample of 400 households was drawn and surveyed across the population, with 95% level of precision (a sampling error of 5%). The sample of households surveyed from each ward reflects the variation in population across the 13 wards as shown in table 3.2

Table 3.2: Distribution of population in Zaria local government area by ward

S/N	WARD	TOTAL POPULATION	POPULATION OF HOUSEHOLDS (17% OF TOTAL POPULATION)	NUMBER OF SETTLEMENTS (ENUMERATION AREAS)	SAMPLE
1	Dambo	41,021	6973.57	22	32
2	D. Abba	56,501	9605.17	96	42
3	Gyallesu	38,565	6556.05	28	29
4	Kaura	35,361	6011.37	36	27
5	Kufena	35,404	6018.68	22	27
6	Kwarbai A	38,021	6463.57	30	28
7	Kwarbai B	37,984	6457.28	24	28
8	L. Kona	52,441	8914.97	35	39
9	T. Tukur	47,522	8078.74	28	36
10	T. Wada	45,871	7798.07	66	34
11	U. fatika	33,307	5662.19	20	25
12	U. Juma	35,915	6105.55	53	27
13	Wuciciri	34,692	5897.64	56	26
	TOTAL	**532,606**	**90542.85**	**516**	**400**

Source: Author's computation based on NPC (2015)

For the sampling technique, the survey adopted a systematic random sampling in which a sample of households was taken from across identified enumeration areas (EAs) based on the sample from each ward. In each EA, the sample was distributed according to streets and households were selected at intervals depending on the sample size. In settlements where there were no streets but clusters of houses, especially in rural areas, households were selected at random in each cluster. The use of systematic random sampling is justified by the need to minimize possible bias in the survey results. The technique also provides a strong basis for making inference about the population from which the sample was drawn.

3.3.2 Survey Instrument

The questionnaire instrument was used for the survey and data was obtained covering demographic and quality of life-related questions that are deemed relevant for the study as expressed in the empirical framework (See appendix II). The questionnaire was administered with the help of

enumerators, who were familiar with the local language and could interpret the content to respondents across the study area. This was necessary because some of the respondents could neither understand nor respond accurately to the questions. The survey spanned from January to February, 2016, during which the author covered 54 percent of the wards (i.e. Dambo, D. Abba, Gyallesu, Kufena, and L. Kona), while four other enumerators surveyed 46 percent of the wards (Kaura, Kwarbai A, Kwarbai B, T. Tukur, T. Wada, and Wuciciri). A 100 percent response rate was recorded as all the 400 questionnaires distributed were filled with appropriate responses.

3.3.3 Data Analysis

The data collected for this study was analysed using the indices developed in the empirical framework (see equations 3.2 and 3.3). The main indices used in the analysis were the Capability Deprivation Index (CDI), the Education Deprivation Index (EDI), the Health Deprivation Index (HDI) and the Living conditions Deprivation Index (LDI). These measures were estimated for each household and presented at ward-level, then aggregated to produce estimates at local government level. The essence of disaggregating the data is to reveal the underlying trends and patterns of disparities across different community groupings that may often be hidden in aggregated data. This may enable policy makers to identify priorities and direct resources to where they are needed most. The use of such measures was necessary in achieving the overall objective of the study.

For the purpose of data presentation, the study used descriptive statistical tools in which tables and graphs were constructed to show the distribution, patterns and variations in quality of life outcomes as well as governance effectiveness in those outcomes. Statistical measures such as average, mean, percentage, range, and standard deviation were used for analysis.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS OF RESULTS

In this chapter, estimates of the survey data are presented and analysed in view of the objectives of the study and the empirical framework developed in the previous chapter. Given the micro nature of the study area, estimates are presented at ward level across households, at local government area level across wards, and then at aggregate level. The presentation and analysis of results at ward level was useful in showing the disparity in quality of life across households and by implication across wards. At the aggregate level, the results were intended to highlight summary averages for easier comparison across indicators and dimensions. The results point to a mixed degree of achievement in quality of life outcomes across and overall.

4. 1 Households Socio-Economic Characteristics

Information about the socio-economic characteristics of the respondents is essential for revealing the homogeneity and demographic composition of the respondents. With the 100 percent response recorded, such characteristics could serve as a demographic picture of Zaria local government area. It could also explain the trends in quality of life outcomes across communities.

Figures 2, 3, 4 and 5 contain a summary of major socio-economic characteristics of the respondents which were mainly household heads. With respect to location, 32% reside in rural areas while 68% live in urban communities. Results on educational level of respondents indicate that 49% have completed secondary school or higher, 46% have only Koranic education, 4% have only completed primary school, and 1% have absolutely no formal education. Concerning occupation, 27% were engaged in Business/Trading, another 27% in Farming, 25% in Civil service, 7% in Transportation, 5% in Teaching/Lecturing, 4% in Tailoring and design, 3% in Manufacturing and processing, 1%

were retired and another 1% unemployed. In terms of earnings, while some 1% were not having any earnings, about 39% of respondents were earning below the minimum wage of N18,000 a month, 44% between N18,000 to N60,000 (mostly civil servants), 12% between N61,000 to N100,000, 4% between N101,000 to N200,000 and just about 1% were earning above N200,000. Estimates show that the mean age of household heads is 47 years with an average household size of 11 persons. The estimates also show that about 99% of households were headed by male and only 1% by female. On religion, majority of the households were Muslims (92%) and only about 2% were Christians.

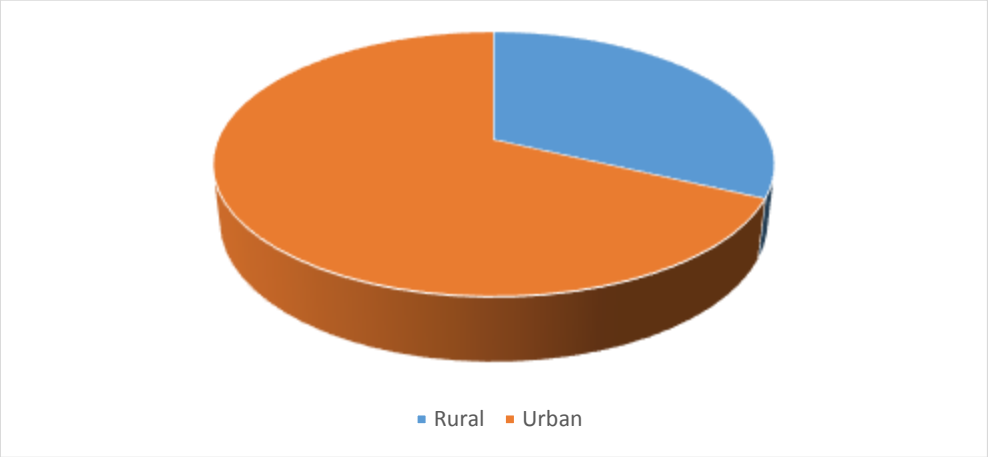


Figure 2: Percentage distribution of households by location

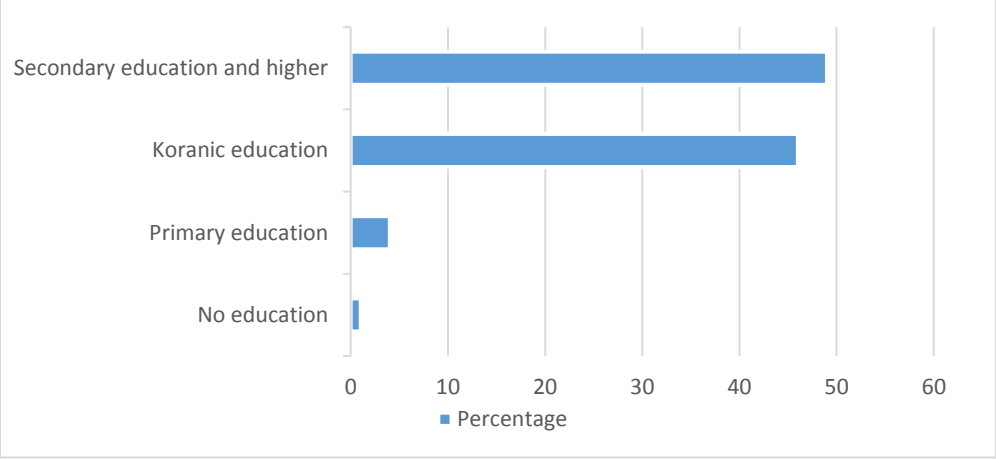


Figure 3: Percentage distribution of respondents by level of education

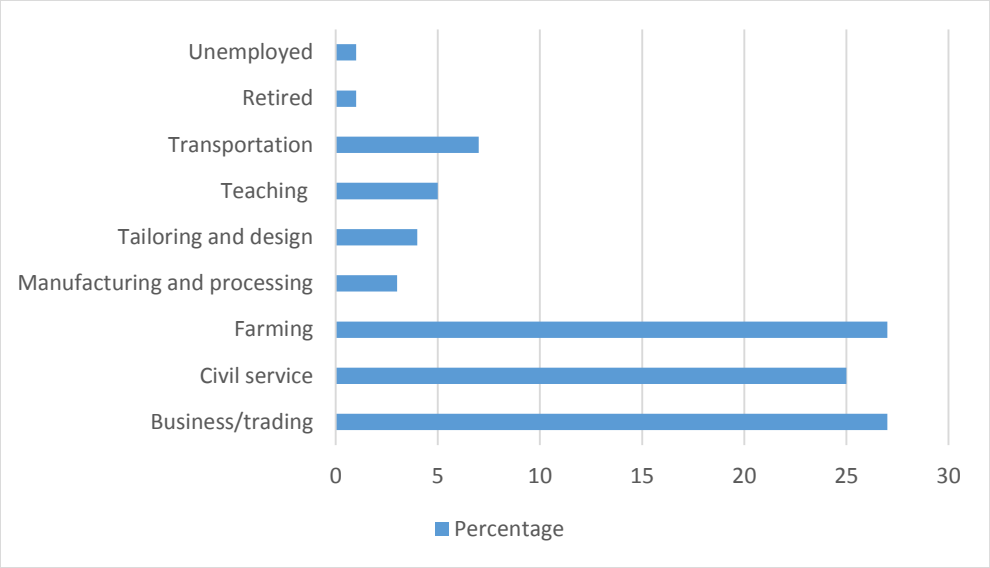


Figure 4: Percentage distribution of respondents by occupation

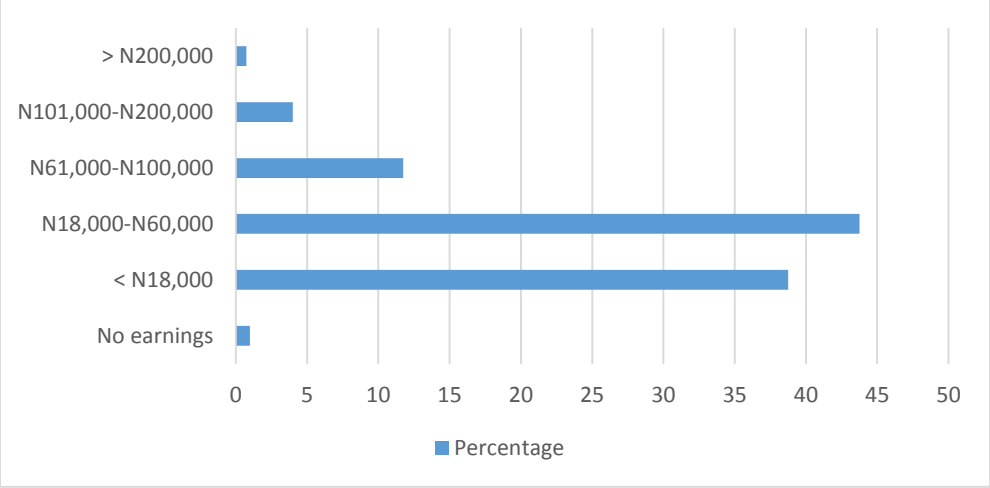


Figure 5: Percentage distribution of respondents by earnings

From the figures, it is apparent that the locational and educational distribution of the respondents explain the distribution in occupation and earnings. This is because majority of the respondents are employed in the informal sector, especially in rural areas (mostly subsistence farmers and petty traders) whose earnings are quiet low (below N18,000 and/or N60,000). But the occupational distribution itself is a reflection of the educational level of respondents, in which more than half

the respondents have lower than secondary level education. However, the gender distribution of household heads is linked to the predominance of Muslims in Zaria local government area, where men typically cater for families while women remain secluded.

These features have serious implication for policy especially because the demographic homogeneity is not in agreement with the quality of life in Zaria local government area, which is largely heterogeneous. This obvious paradox may be neutralized through social reforms such as providing the right education and instilling the right values. Thus, welfare policies in this direction may be designed to address both short term and long term challenges.

4.2 Quality of Life and Living Conditions in Zaria Local Government Area

The Capability Deprivation Index (CDI) was used to measure and examine the quality of life in Zaria Local Government Area. The CDI is important in studying the extent, disaggregated patterns and sources of deprivation in quality of life within a population and among social groups. The index was computed from bottom up using household-based data from the survey conducted. The first step in the computation process was the coding of responses based on the benchmarks defined (see appendix III) in which deprivation scores were determined for each indicator. The indicator-deprivation scores were then used to compute the dimension indices (see equations 3.3, 3.4 and 3.5). Such dimension indices (EDI, HDI and LDI) were aggregated based on a predefined weighted arithmetic mean to arrive at the overall CDI. The CDI was computed for each household across the thirteen wards and the average taken for Zaria local government area as a whole.

4.2.1 Estimates of Capability Deprivation Index and dimension indices by ward[13]

Table 4.1 through 4.13 contain results on CDI and its components for each of the wards in Zaria local government area. The results were presented at ward-level to show the general patterns and trends in capability deprivation across households. This was essential for understanding inter-household disparities and inequality in quality of life outcomes.

(i) Dambo Ward

From table 4.1, the CDI values across households in Dambo Ward suggest that every household suffered from one form of deprivation to another depending on the intensity of such. According to the results, households 4, 16 and 18 had the least CDI values of 0.25 each, which by observation comes from deprivation in living conditions (LDI of 0.375) and none in education or health for

[13] All estimations were made using Microsoft Excel 2013

households 4 and 18. On the other extreme, household 15 was the highest deprived, with a CDI value of 0.75. This highly deprived household also suffered relatively higher deprivations in education, health and living conditions. The difference between the highest CDI and the lowest (range value) is 0.5 while its standard deviation is about 0.138, which means there is high disparity in capability deprivation across households as extremely poor households were coexisting with less deprived households, although about 19 households (59.4% of respondents) were having CDI values above the average.

Table 4.1: Dambo Ward-level CDI

HOUSEHOLD	***EDI***	***HDI***	***LDI***	***CDI***
1	0.5	0.5	0.5	0.5
2	0.5	0.5	0.5	0.5
3	0.5	1.0	0.625	0.66667
4	0.0	0.0	0.375	0.25
5	0.0	0.5	0.625	0.5
6	0.0	0.5	0.375	0.33333
7	1.0	0.5	0.625	0.66667
8	0.5	0.5	0.75	0.66667
9	0.5	0.0	0.75	0.58333
10	0.5	0.5	0.75	0.66667
11	0.5	0.5	0.375	0.41667
12	1.0	0.5	0.625	0.66667
13	1.0	0.0	0.625	0.58333
14	0.5	0.5	0.5	0.5
15	1.0	0.5	0.75	0.75
16	0.0	0.5	0.25	0.25
17	0.0	0.0	1.0	0.66667
18	0.0	0.0	0.375	0.25
19	1.0	0.0	0.5	0.5
20	0.0	0.0	0.625	0.41667
21	0.5	0.0	0.625	0.5
22	1.0	0.0	0.75	0.66667
23	0.0	0.0	0.625	0.41667
24	0.5	0.0	0.5	0.41667
25	0.5	0.5	0.5	0.5
26	0.0	0.0	0.625	0.41667
27	0.0	0.0	0.5	0.33333
28	0.0	0.0	0.75	0.5
29	0.5	0.5	0.5	0.5
30	0.5	0.0	0.5	0.41667
31	0.5	0.5	0.625	0.58333
32	0.0	0.5	0.375	0.33333
AVERAGE	**0.4063**	**0.2813**	**0.5742**	**0.4974**
STDEV	**0.3689**	**0.2822**	**0.1551**	**0.1380**

Source: Household Survey Report, 2016

(ii) D. Abba Ward

With a sample of 42 households, this is by far the most populous ward. Notably, there were three group of households that clustered around certain CDI values – those above the average, within the average, and below the average (Table 4.2). The first group which constituted 50% of households had a CDI value ranging between 0.500 – 0.8333. The second group comprising about 31% of households was having a recurring CDI value of 0.4167, while the third group taking about 19% of households hovered around a CDI value of between 0.250 – 0.333. Coupled with a standard deviation of 0.151 in the CDI distribution, the results suggest a sharp asymmetry in quality of life across households since half the households in this ward were living above the deprivation line and the other half below the average deprivation, meaning that about 50% of the households in this ward suffered intense deprivation. On the whole, the CDI value is a bit on the high side especially in the living conditions component.

Table 4.2: D. Abba Ward-level CDI

HOUSEHOLD	*EDI*	*HDI*	*LDI*	*CDI*
1	0.5	0.5	0.375	0.41667
2	0.5	1.0	0.625	0.66667
3	0.5	0.5	0.75	0.66667
4	0.5	0.5	0.375	0.41667
5	0.5	0.5	0.625	0.58333
6	1.0	0.5	0.5	0.58333
7	0.0	0.0	0.375	0.25
8	0.5	0.5	0.5	0.5
9	0.0	0.0	0.375	0.25
10	0.0	0.0	0.375	0.25
11	0.0	0.5	0.5	0.41667
12	0.0	0.5	0.25	0.25
13	1.0	0.0	0.5	0.5
14	0.5	0.5	0.875	0.75
15	1.0	0.5	0.625	0.66667
16	0.5	1.0	0.25	0.41667
17	0.5	0.5	0.75	0.66667
18	0.5	0.0	0.5	0.41667
19	0.0	0.5	0.25	0.25
20	0.5	0.5	0.5	0.5
21	0.5	0.0	0.625	0.5
22	0.5	0.5	0.375	0.41667
23	0.5	0.0	0.625	0.5

24	0.0	0.5	0.5	0.41667
25	0.5	0.5	0.375	0.41667
26	0.5	0.0	0.625	0.5
27	0.5	0.0	0.5	0.41667
28	0.5	0.5	0.5	0.5
29	0.5	0.0	0.5	0.41667
30	1.0	0.5	0.875	0.83333
31	0.0	0.5	0.5	0.41667
32	0.5	0.0	0.5	0.41667
33	0.5	0.0	0.75	0.58333
34	0.5	0.5	0.375	0.41667
35	1.0	0.5	0.625	0.66667
36	0.0	0.5	0.25	0.25
37	0.5	0.5	0.75	0.66667
38	0.0	0.0	0.375	0.25
39	1.0	0.5	0.625	0.66667
40	0.5	0.5	0.75	0.66667
41	0.5	0.5	0.625	0.58333
42	0.5	0.5	0.25	0.33333
AVERAGE	**0.4524**	**0.3691**	**0.5179**	**0.4821**
STDEV	**0.3095**	**0.2613**	**0.1789**	**0.1508**

Source: Household Survey Report, 2016

(iii) Gyallesu Ward

From a sample of 29 households, only household 25 was having the highest CDI with a value of 0.6667, an absolute deprivation in education (EDI of 1.000) and a little less in health (HDI of 0.5) and living conditions (LDI of 0.625). At the same time, households 4, 8, 12 and 29 were having the least deprivation levels each with a CDI of 0.0833. Among these, households 4, 8 and 29 were having marginal deprivations in living conditions (0.125 value for LDI) and none in education and health (0 value for EDI and HDI). Despite a range CDI value of 0.5834 and a standard deviation of 0.169, disparity among households is minimum for the most part with an estimated 51.7% of households having CDI values ranging between 0.4167 – 0.6667, at least 0.0345 points above the average deprivation line. However, EDI represented the highest disparity across households with a standard deviation of 0.436 even though LDI accounted for the greatest source of deprivation (see Table 4.3).

Table 4.3: Gyallesu Ward-level CDI

HOUSEHOLD	*EDI*	*HDI*	*LDI*	*CDI*
1	0.0	0.5	0.375	0.33333
2	0.0	0.0	0.5	0.33333
3	0.5	0.0	0.375	0.33333
4	0.0	0.0	0.125	0.08333
5	0.0	0.5	0.25	0.25
6	0.0	0.0	0.25	0.16667
7	0.5	0.5	0.375	0.41667
8	0.0	0.0	0.125	0.08333
9	0.5	0.0	0.75	0.58333
10	0.5	0.0	0.75	0.58333
11	0.5	0.5	0.625	0.58333
12	0.0	0.5	0	0.08333
13	0.0	0.5	0.375	0.33333
14	0.0	0.5	0.5	0.41667
15	1.0	0.0	0.5	0.5
16	0.5	0.0	0.625	0.5
17	0.0	0.0	0.375	0.25
18	0.0	0.0	0.625	0.41667
19	0.0	0.0	0.5	0.33333
20	1.0	0.0	0.5	0.5
21	1.0	0.5	0.375	0.5
22	1.0	0.0	0.625	0.58333
23	1.0	0.0	0.5	0.5
24	0.0	0.5	0.375	0.33333
25	1.0	0.5	0.625	0.66667
26	1.0	0.0	0.5	0.5
27	1.0	0.0	0.5	0.5
28	0.0	0.0	0.5	0.33333
29	0.0	0.0	0.125	0.08333
AVERAGE	**0.3793**	**0.1724**	**0.4353**	**0.3822**
STDEV	**0.4362**	**0.2419**	**0.1879**	**0.1689**

Source: Household Survey Report, 2016

(iv) Kaura Ward

Household 4 represents the highest CDI value of 0.7500 suggesting that less than 4% of households suffered intense deprivation. On the other extreme, households 5, 10, 19, 21 and 22 (about 19% of households) suffered mild deprivations with the lowest CDI value of 0.1667 for each. Each of these five households was marginally deprived in living conditions (LDI values of 0.25) but neither deprived in education nor health. However, there exists wide disparity between extremely deprived and low deprived households given by the range value of 0.5833 and a standard deviation of 0.151. Also, an estimated 48.1% of households were having a CDI value above the average deprivation

line for this ward within the range of 0.4167 – 0.7500 (see Table 4.4). Once again, EDI accounted for most disparity across households with a standard deviation of 0.2461 while LDI remained the greatest source of deprivation for this ward.

Table 4.4: Kaura Ward-level CDI

HOUSEHOLD	*EDI*	*HDI*	*LDI*	*CDI*
1	0.5	0.0	0.5	0.41667
2	0.5	0.0	0.75	0.58333
3	0.5	0.5	0.75	0.66667
4	0.5	0.5	0.875	0.75
5	0.0	0.0	0.25	0.16667
6	0.0	0.0	0.5	0.33333
7	0.5	0.0	0.625	0.5
8	0.5	0.0	0.375	0.33333
9	0.0	0.0	0.375	0.25
10	0.0	0.0	0.25	0.16667
11	0.0	0.0	0.5	0.33333
12	0.0	0.0	0.625	0.41667
13	0.0	0.0	0.5	0.33333
14	0.0	0.5	0.5	0.41667
15	0.5	0.0	0.5	0.41667
16	0.0	0.5	0.5	0.41667
17	0.5	0.0	0.5	0.41667
18	0.0	0.0	0.5	0.33333
19	0.0	0.0	0.25	0.16667
20	0.5	0.5	0.5	0.5
21	0.0	0.0	0.25	0.16667
22	0.0	0.0	0.25	0.16667
23	0.0	0.0	0.625	0.41667
24	0.5	0.5	0.375	0.41667
25	0.0	0.0	0.375	0.25
26	0.0	0.0	0.375	0.25
27	0.0	0.0	0.375	0.25
AVERAGE	**0.1852**	**0.1111**	**0.4722**	**0.3642**
STDEV	**0.2461**	**0.2118**	**0.1638**	**0.1518**

Source: Household Survey Report, 2016

(v) Kufena Ward

From Table 4.5, household 23 represents the lowest CDI value of 0.0833. This household had the best performance in all indices with a bit of deprivation in living conditions (LDI value of 0.125) and none in education and health. On the other hand, household 11 was having the highest CDI value of 0.6667. With the exception of these two extreme cases, all other households (about 93%) lingered within a CDI of 0.2500 – 0.5833. The range CDI value for these households is 0.3333,

which means that there is low disparity among majority of households, concurring with overall standard deviation of 0.120 in the CDI across households.

Table 4.5: Kufena Ward-level CDI

HOUSEHOLD	*EDI*	*HDI*	*LDI*	*CDI*
1	0.5	0.5	0.5	0.5
2	0.0	0.0	0.5	0.33333
3	0.5	0.0	0.5	0.41667
4	0.0	0.5	0.375	0.33333
5	0.5	0.5	0.5	0.5
6	0.0	0.0	0.375	0.25
7	0.0	0.0	0.375	0.25
8	0.0	1.0	0.25	0.33333
9	0.0	1.0	0.375	0.41667
10	0.5	0.0	0.25	0.25
11	0.5	0.5	0.75	0.66667
12	0.5	0.0	0.375	0.33333
13	0.5	0.0	0.75	0.58333
14	0.5	0.0	0.5	0.41667
15	0.5	0.5	0.25	0.33333
16	0.5	0.5	0.5	0.5
17	0.0	0.0	0.5	0.33333
18	1.0	0.5	0.375	0.5
19	1.0	0.5	0.375	0.5
20	0.5	0.0	0.375	0.33333
21	0.5	0.0	0.375	0.33333
22	0.5	0.5	0.25	0.33333
23	0.0	0.0	0.125	0.08333
24	0.5	0.5	0.5	0.5
25	0.0	0.5	0.5	0.41667
26	0.5	0.0	0.375	0.33333
27	0.0	0.0	0.5	0.33333
AVERAGE	**0.3519**	**0.2778**	**0.4213**	**0.3858**
STDEV	**0.3043**	**0.3203**	**0.1393**	**0.1204**

Source: Household Survey Report, 2016

(vi) Kwarbai A Ward

Two main categories of households were observed from Table 4.6 – those above the average (43% of households) and those below the average capability deprivation line for this ward (57% of households). Households 3, 4, 5, 13, 16, 17, 18, 23, 24, 25, 27 and 28 were having CDI values above the average from 0.5000 – 0.7500. Households 1, 2, 6, 7, 8, 9, 10, 11, 12, 14, 15, 19, 20, 21, 22, and 26 were having CDI values ranging from 0.2500 – 0.4167. The range CDI value for the first and second categories are 0.2500 and 0.1667 respectively. This suggests that there is more

disparity among those households with above the average CDI than the other category. Although the LDI turned out as the greatest source of deprivation with a value of 0.522, both EDI and HDI accounted for the highest disparity across all households with equivalent standard deviations of 0.317.

Table 4.6: Kwarbai A Ward-level CDI

HOUSEHOLD	***EDI***	***HDI***	***LDI***	***CDI***
1	0.0	0.5	0.5	0.41667
2	0.0	0.5	0.375	0.33333
3	0.0	0.0	0.875	0.58333
4	0.0	1.0	0.5	0.5
5	0.5	0.5	0.875	0.75
6	0.0	0.0	0.375	0.25
7	0.5	0.0	0.375	0.33333
8	0.5	0.0	0.375	0.33333
9	0.0	0.0	0.25	0.16667
10	0.0	0.5	0.375	0.33333
11	0.5	0.5	0.375	0.41667
12	0.0	0.0	0.625	0.41667
13	0.0	0.0	0.875	0.58333
14	0.0	0.0	0.5	0.33333
15	0.0	0.0	0.5	0.33333
16	0.5	0.0	0.625	0.5
17	0.5	0.0	0.625	0.5
18	0.0	0.5	0.625	0.5
19	0.0	0.0	0.375	0.25
20	0.0	0.0	0.5	0.33333
21	0.0	0.0	0.625	0.41667
22	0.0	0.0	0.375	0.25
23	1.0	0.5	0.375	0.5
24	0.0	0.0	0.75	0.5
25	1.0	0.5	0.5	0.58333
26	0.0	0.0	0.375	0.25
27	0.5	0.0	0.625	0.5
28	0.5	1.0	0.5	0.58333
AVERAGE	**0.2143**	**0.2143**	**0.5223**	**0.4196**
STDEV	**0.3171**	**0.3171**	**0.1703**	**0.1351**

Source: Household Survey Report, 2016

(vii) Kwarbai B Ward

Half of the households in Kwarbai B (50% of respondents) were having a CDI value of between 0.0833 – 0.3333. These households were below the ward average CDI of 0.3601. Another group (50% of households) was having a CDI value above the average ranging from 0.4167 – 0.5833.

Such result suggests that a sizable number of households were doing below the community average despite a considerably low CDI for the ward. In terms of disparity, the standard deviation value of 0.122 in the CDI shows a relatively low variation across households, with the highest coming from HDI to a standard deviation of 0.345 (see Table 4.7).

Table 4.7: Kwarbai B Ward-level CDI

HOUSEHOLD	***EDI***	***HDI***	***LDI***	***CDI***
1	0.0	0.5	0.5	0.41667
2	0.0	0.0	0.5	0.33333
3	0.5	0.0	0.625	0.5
4	0.0	0.5	0.5	0.41667
5	0.5	0.5	0.5	0.5
6	0.0	0.0	0.625	0.41667
7	0.0	0.0	0.375	0.25
8	0.5	0.0	0.375	0.33333
9	0.0	0.0	0.5	0.33333
10	0.0	0.0	0.5	0.33333
11	0.0	0.0	0.375	0.25
12	0.0	0.0	0.5	0.33333
13	0.0	0.0	0.25	0.16667
14	0.0	0.0	0.375	0.25
15	0.0	1.0	0.625	0.58333
16	0.5	0.0	0.5	0.41667
17	1.0	0.5	0.375	0.5
18	0.5	0.5	0.375	0.41667
19	0.0	0.0	0.25	0.16667
20	0.0	0.0	0.625	0.41667
21	0.0	1.0	0.5	0.5
22	0.0	0.5	0.375	0.33333
23	0.0	0.0	0.5	0.33333
24	0.0	0.0	0.625	0.41667
25	0.0	0.0	0.125	0.08333
26	0.5	1.0	0.25	0.41667
27	0.0	0.0	0.25	0.16667
28	0.5	0.0	0.625	0.5
AVERAGE	**0.1607**	**0.2143**	**0.4464**	**0.3601**
STDEV	**0.2740**	**0.3450**	**0.1379**	**0.1223**

Source: Household Survey Report, 2016

(viii) L. Kona Ward

Up to nine households (about 24% of respondents) represent the lowest CDI value of 0.25. Six of these households were having relatively low deprivation in living conditions with absolutely none in the other components. There is a sharp contrast in household 3 and 14 (representing about 5%

of respondents) having the highest CDI value of 0.75 each, with significant deprivations in at least two dimensions. So far this ward has had one of the worst living conditions in the average of 0.5801 LDI value. Similarly, disparity in CDI across households in this ward is the overall highest with a standard deviation of 0.171 (see Table 4.8).

Table 4.8: L. Kona Ward-level CDI

HOUSEHOLD	*EDI*	*HDI*	*LDE*	*CDI*
1	0.0	0.5	0.75	0.58333
2	0.5	0.5	0.125	0.25
3	0.5	1.0	0.75	0.75
4	0.0	0.5	0.875	0.66667
5	0.5	0.0	0.875	0.66667
6	0.0	0.0	0.5	0.33333
7	0.0	0.0	0.375	0.25
8	0.5	0.5	0.75	0.66667
9	0.5	0.5	0.625	0.58333
10	0.0	0.0	0.5	0.33333
11	0.0	0.0	0.375	0.25
12	0.5	0.5	0.75	0.66667
13	0.5	0.0	0.5	0.41667
14	1.0	0.0	0.875	0.75
15	0.5	0.0	0.75	0.58333
16	0.0	0.0	0.375	0.25
17	0.0	0.5	0.375	0.33333
18	0.5	0.0	0.625	0.5
19	1.0	0.0	0.375	0.41667
20	1.0	0.0	0.375	0.41667
21	0.5	0.5	0.625	0.58333
22	1.0	0.0	0.75	0.66667
23	0.5	0.0	0.625	0.5
24	0.5	0.0	0.75	0.58333
25	0.5	0.0	0.875	0.66667
26	0.0	0.0	0.625	0.41667
27	0.0	0.0	0.375	0.25
28	0.0	0.0	0.625	0.41667
29	0.5	0.0	0.625	0.5
30	0.0	0.0	0.375	0.25
31	0.5	0.0	0.25	0.25
32	0.5	0.0	0.75	0.58333
33	0.5	0.5	1	0.83333
34	0.0	0.0	0.625	0.41667
35	0.5	0.0	0.5	0.41667
36	0.0	0.0	0.375	0.25
37	0.5	0.0	0.625	0.5
38	0.5	0.5	0.5	0.5
39	0.5	0.0	0.25	0.25
AVERAGE	**0.3718**	**0.1539**	**0.5801**	**0.4744**
STDEV	**0.3187**	**0.2604**	**0.2058**	**0.1712**

Source: Household Survey Report, 2016

(ix) T. Tukur Ward

The average CDI value for this ward is by far the lowest, which means that the deprivation level in T. Tukur is generally quiet low. Across households, the lowest CDI value is 0.1667 for up to 7 households (19% of respondents). The highest CDI value is 0.4167 for only household 18 (taking about 3% of respondents). In between the two extreme cases, the CDI ranges from 0.25 – 0.3333 for about 81% of respondents. Of that percentage, 55% fell below the ward average deprivation by a margin of 0.0208 while the other 45% were having values above the average by a margin of 0.0625. The standard deviation of 0.064 in the CDI shows a remarkably low disparity, making it the lowest across all wards. Altogether, the results indicate that there is no much disparity across households although some were doing better than others given by the values of the CDI and its components in Table 4.9.

Table 4.9: T. Tukur Ward-level CDI

HOUSEHOLD	*EDI*	*HDI*	*LDI*	*CDI*
1	0.0	0.0	0.375	0.25
2	0.0	0.0	0.25	0.16667
3	0.0	0.0	0.375	0.25
4	0.0	0.5	0.375	0.33333
5	0.0	0.5	0.375	0.33333
6	0.0	0.0	0.25	0.16667
7	0.0	0.0	0.375	0.25
8	0.0	0.0	0.25	0.16667
9	0.0	0.0	0.375	0.25
10	0.0	0.0	0.375	0.25
11	0.0	0.0	0.25	0.16667
12	0.0	0.0	0.375	0.25
13	0.5	0.0	0.375	0.33333
14	0.0	0.0	0.375	0.25
15	0.0	0.0	0.25	0.16667
16	0.0	0.5	0.375	0.33333
17	0.0	0.0	0.375	0.25
18	0.0	1.0	0.375	0.41667
19	0.0	0.0	0.375	0.25
20	0.0	0.0	0.375	0.25
21	0.0	0.0	0.25	0.16667
22	0.0	0.5	0.375	0.33333
23	0.0	0.5	0.375	0.33333
24	0.0	0.5	0.375	0.33333
25	0.0	0.0	0.375	0.25

26	0.5	0.0	0.375	0.33333
27	0.0	0.5	0.375	0.33333
28	0.0	0.0	0.375	0.25
29	0.0	0.0	0.375	0.25
30	0.0	0.0	0.375	0.25
31	0.0	0.0	0.375	0.25
32	0.5	0.0	0.375	0.33333
33	0.5	0.0	0.375	0.33333
34	0.0	0.5	0.375	0.33333
35	0.5	0.0	0.375	0.33333
36	0.0	0.5	0.25	0.25
AVERAGE	**0.0694**	**0.1528**	**0.3507**	**0.2708**
STDEV	**0.1754**	**0.2624**	**0.0502**	**0.0642**

Source: Household Survey Report, 2016

(x) T. Wada Ward

Household 3 (2.9% of respondents) had the highest CDI value of 0.7500 with significant deprivations in all three dimensions (see Table 4.10). Interestingly, majority of households (about 64.7% of respondents) were having a CDI value below the ward average, between 0.1667 – 0.3333. Of those, 61.9% were having deprivations only in living conditions and none in education nor health. The other 35.3% with deprivation levels above the average were having CDI values between 0.4167 – 0.7500. Notably, there is less disparity among households with below the average CDI values than those having CDI values above average. The difference between these two categories is given by a range in the magnitude of 0.1667. Across all households, disparity in CDI is relatively low with a standard deviation of 0.123. Yet there are higher disparities in education and health in relation to living conditions, with respective standard deviations of 0.253, 0.248, and 0.142 in EDI, HDI, and LDI distributions.

Table 4.10: T. Wada Ward-level CDI

HOUSEHOLD	*EDI*	*HDI*	*LDI*	*CDI*
1	0.5	1.0	0.5	0.58333
2	0.0	0.0	0.625	0.41667
3	0.5	0.5	0.875	0.75
4	0.0	0.0	0.375	0.25
5	0.0	0.0	0.375	0.25
6	0.0	0.0	0.375	0.25
7	0.0	0.5	0.375	0.33333
8	0.5	0.0	0.375	0.33333
9	0.5	0.0	0.375	0.33333
10	0.5	0.0	0.375	0.33333
11	0.0	0.0	0.5	0.33333
12	0.0	0.0	0.5	0.33333
13	0.0	0.0	0.625	0.41667
14	0.5	0.0	0.25	0.25
15	0.0	0.0	0.25	0.16667
16	0.0	0.0	0.25	0.16667
17	0.0	0.5	0.5	0.41667
18	0.0	0.0	0.5	0.33333
19	0.0	0.0	0.375	0.25
20	0.5	0.5	0.375	0.41667
21	0.5	0.0	0.625	0.5
22	0.5	0.5	0.375	0.41667
23	0.5	0.0	0.375	0.33333
24	0.5	0.0	0.375	0.33333
25	0.0	0.0	0.375	0.25
26	0.0	0.5	0.625	0.5
27	0.0	0.0	0.5	0.33333
28	0.5	0.0	0.75	0.58333
29	0.0	0.0	0.5	0.33333
30	0.5	0.0	0.625	0.5
31	0.5	0.0	0.5	0.41667
32	0.5	0.0	0.375	0.33333
33	0.0	0.0	0.5	0.33333
34	0.5	0.0	0.625	0.5
AVERAGE	**0.2353**	**0.1177**	**0.4669**	**0.3701**
STDEV	**0.2533**	**0.2480**	**0.1421**	**0.1234**

Source: Household Survey Report, 2016

(xi) U. Fatika Ward

Like all the other wards, U. Fatika is most lacking in living conditions. The LDI component of this ward is quiet high compared to its CDI value, which also is too high for its EDI and HDI levels. Three households (12, 20 and 24) represent the highest CDI value of 0.6667 each with significant deprivations in at least two components. On the other hand, only household 25 represents the lowest CDI value of 0.25 with 0.375 deprivation in the living conditions component only.

Surprisingly, households 12 and 20 were having absolute deprivations in living conditions (LDI value of 1.000) and none in education nor health, yet they represent about 67% of the most deprived. The range CDI value for this ward is 0.4167 and the standard deviation in same is 0.113, indicating a sizable disparity among households. The disparity is highest in the distribution of the EDI with a standard deviation of 0.35, followed closely by that of HDI at 0.271 standard deviation.

Table 4.11 U. Fatika Ward-level CDI

HOUSEHOLD	***EDI***	***HDI***	***LDI***	***CDI***
1	0.0	0.5	0.375	0.33333
2	0.0	0.0	0.75	0.5
3	0.0	0.0	0.625	0.41667
4	0.0	0.0	0.625	0.41667
5	0.5	0.0	0.625	0.5
6	0.5	0.0	0.75	0.58333
7	0.5	0.5	0.5	0.5
8	0.0	0.0	0.75	0.5
9	0.5	0.5	0.375	0.41667
10	0.5	1.0	0.5	0.58333
11	0.0	0.5	0.625	0.5
12	0.0	0.0	1.0	0.66667
13	0.0	0.0	0.5	0.33333
14	0.5	0.5	0.5	0.5
15	0.5	0.0	0.75	0.58333
16	1.0	0.0	0.625	0.58333
17	0.0	0.0	0.75	0.5
18	0.5	0.0	0.5	0.41667
19	0.5	0.0	0.75	0.58333
20	0.0	0.0	1.0	0.66667
21	1.0	0.0	0.625	0.58333
22	0.0	0.0	0.5	0.33333
23	0.5	0.0	0.5	0.41667
24	1.0	0.0	0.75	0.66667
25	0.0	0.0	0.375	0.25
AVERAGE	**0.3200**	**0.1400**	**0.6250**	**0.4933**
STDEV	**0.3500**	**0.2708**	**0.1693**	**0.1126**

Source: Household Survey Report, 2016

(xii) U. Juma Ward

Considering the results in Table 4.12, 51.9 % of households in U. Juma ward were having CDI values above the average. This means that there were more deprived households than those considered well off by the community standard. However, one household each represent the high

and low CDI extreme values. Household 10 (representing 3.7% of respondents) was having the highest CDI value of 0.8333 with absolute deprivation in both education (EDI = 1.000) and health (HDI = 1.000). On the other hand, household 21 (representing 3.7% of respondents) was having the lowest CDI value of 0.2500 with a bit of deprivation in living conditions (LDI value of 0.375) and zero deprivation in education and health. Given by the CDI range value of 0.5833 and a standard deviation of 0.145, the disparity among the households in this ward is quiet significant. However, the disparity is more significant in the dimensions of health and education, with 0.374 standard deviation in the HDI and 0.362 in the EDI.

Table 4.12: U. Juma Ward-level CDI

HOUSEHOLD	***EDI***	***HDI***	***LDI***	***CDI***
1	1.0	0.0	0.625	0.58333
2	1.0	0.0	0.625	0.58333
3	0.5	0.0	0.875	0.66667
4	0.0	0.0	0.75	0.5
5	1.0	0.0	0.5	0.5
6	0.0	0.0	0.5	0.33333
7	0.5	0.0	0.375	0.33333
8	0.5	1.0	0.75	0.75
9	0.5	1.0	0.5	0.58333
10	1.0	1.0	0.75	0.83333
11	0.0	0.0	0.75	0.5
12	0.0	0.0	0.625	0.41667
13	0.5	0.0	0.75	0.58333
14	0.5	0.0	0.875	0.66667
15	0.0	0.5	0.625	0.5
16	0.5	0.0	0.875	0.66667
17	0.5	0.5	0.75	0.66667
18	0.0	0.5	0.875	0.66667
19	0.0	0.5	0.875	0.66667
20	0.0	0.0	0.875	0.58333
21	0.0	0.0	0.375	0.25
22	0.5	0.5	0.875	0.75
23	0.5	0.0	0.625	0.5
24	0.5	0.5	0.5	0.5
25	0.0	0.5	0.375	0.33333
26	0.0	0.5	0.5	0.41667
27	0.0	1.0	0.375	0.41667
AVERAGE	**0.3519**	**0.2963**	**0.6574**	**0.5463**
STDEV	**0.3620**	**0.3736**	**0.1788**	**0.1445**

Source: Household Survey Report, 2016

(xiii) Wuciciri Ward

Despite a relatively high average CDI of 0.467, 57.7% of households were having CDI values of 0.4167 or less. Of the remaining percentage of households with CDI values above the average, 72.7% were having CDI values above 0.5 (i.e. from 0.5833 – 0.7500) thereby suggesting intense deprivation. Also, the average values of dimension indices show a considerable degree of deprivations given by the EDI, HDI and LDI values of 0.538, 0.327 and 0.486 respectively. Deprivations among households were more acute in education than the other dimensions. For instance, only 15% of adults were educated although about 77% of children were enrolled in school. Wuciciri is the only ward where living conditions did not constitute the greatest source of deprivation (Table 4.13). However, the extent of disparity among households represents one of the highest with a CDI range value of 0.6667 and a standard deviation of 0.154.

Table 4.13: Wuciciri Ward-level CDI

HOUSEHOLD	*EDI*	*HDI*	*LDI*	*CDI*
1	0.5	0.0	0.5	0.41667
2	0.5	0.5	0.625	0.58333
3	0.5	0.5	0.375	0.41667
4	0.5	0.0	0.625	0.5
5	1.0	0.0	0.375	0.41667
6	0.5	1.0	0.75	0.75
7	0.5	0.0	0.375	0.33333
8	0.5	1.0	0.25	0.41667
9	0.5	0.0	0.75	0.58333
10	0.5	0.0	0.5	0.41667
11	0.5	0.0	0.625	0.5
12	0.5	0.5	0.375	0.41667
13	0.5	0.0	0.5	0.41667
14	1.0	1.0	0.625	0.75
15	1.0	0.5	0.75	0.75
16	0.5	0.5	0.5	0.5
17	1.0	0.5	0.5	0.58333
18	0.5	0.5	0.375	0.41667
19	0.5	0.5	0.375	0.41667
20	0.5	0.0	0.25	0.25
21	0.5	0.5	0.625	0.58333
22	0.0	0.0	0.375	0.25
23	1.0	0.0	0.625	0.58333
24	0.0	0.5	0.5	0.41667
25	0.5	0.5	0.375	0.41667

26	0.0	0.0	0.125	0.08333
AVERAGE	**0.5385**	**0.3269**	**0.4856**	**0.4680**
STDEV	**0.2801**	**0.3447**	**0.1633**	**0.1547**

Source: Household Survey Report, 2016

As evident from the foregoing tables, estimates indicate consistent pattern in capability deprivation across households. Overall, all households suffered some extent of capability deprivation with CDI values between 0.0833 – 0.8333, suggesting a CDI range value of 0.750 all through. The greatest source of deprivation among households across all wards (except Wuciciri ward) was living conditions with LDI values of at least 0.0 and 1.0 at most, which suggests the overall LDI range value of 1.0 and therefore indicating the chances of wide disparity in living conditions among households, although this is also common with health and education. It was observed that households with the lowest CDI values tend to have 0 values for EDI and HDI, thus having absolutely no deprivation in education and health. In contrast, households with the highest CDI values tend to have high EDI and HDI values, thus having significant deprivations in education and health.

Still across the households, education and health dimensions accounted for the highest disparities with corresponding standard deviations of approximately 0.307 and 0.288 on average. Surprisingly, disparity in living conditions was the lowest with average standard deviation of 0.157 in LDI (see appendix VI). This indicates that disparity was accounted for mostly by education, then followed by health, and less by living conditions, suggesting that inequality is more intense in education than the other dimensions.

Among the thirteen wards, U. Juma was having the highest CDI value of 0.546, making it the most deprived ward. The next two most deprived wards were Dambo and U. Fatika with CDI values of 0.497 and 0.493 respectively. On the same scale, T. Tukur was having the lowest CDI of 0.271, making it the least deprived. This was followed by Kwarbai B and Kaura wards with respective CDI values of 0.360 and 0.364. It can be seen here that the difference between the highest and lowest CDI values (range) is 0.275 indicating clearly the existence of disparity in quality of life. However, up to 6 wards (Dambo, D. Abba, L. Kona, U. Fatika, U. Juma, and Wuciciri), taking about 46.2% of total, were having relatively higher deprivation levels with CDIs ranging between 0.468 to 0.546. The disparity among these six (6) most deprived wards is quiet low with a CDI range value of 0.078.

Likewise, the same six wards except Wuciciri were still having relatively higher values in LDI, albeit with a marginally higher range of 0.139 with Kwarbai A joining the group. In education, another group of eight (8) with relatively high deprivation emerges with EDI values between 0.538 and 0.320. This group (Dambo, D. Abba, Gyallesu, Kufena, L. Kona, U. Fatika, U. Juma, and Wuciciri) contains up to 61.5% of total, justifying the level of disparity in education across all wards. In health dimension, only five (5) wards, taking 38.5 of total, were having relatively high values in HDI. The highest in this category was that of D. Abba with a HDI value of 0.369 which, compared to the overall lowest of 0.111 for Kaura, is on the high side.

But disparity at a cross-ward level gives a whole different implication as measured by results of the standard deviation. The results showed that disparity in capability deprivation is low across the wards tapering between 0.064 and 0.171 in CDI standard deviations, showing a generally low level of inequality (see appendix). However, given the overall average standard deviation in the CDI, disparity is still high for up to 61.5% of the wards (Dambo, D. Abba, Gyallesu, Kaura, Kwarbai

A, L. Kona, U. Juma, and Wuciciri). Of these, L. Kona was having the highest level of disparity with a CDI standard deviation of 0.171, then followed closely by Gyallesu and Wuciciri with CDI standard deviations of 0.168 and 0.154 respectively. The remaining wards (Kufena, Kwarbai B, T. Tukur, T. Wada, and U. Fatika), comprising about 38.5%, were having relatively lower standard deviations in CDI. Overall, L. Kona and T. Tukur represent the wards with highest and lowest disparities with respective standard deviations of 0.171 and 0.064.

Also from the results, Dambo, D. Abba, Gyallesu, Kaura, L. Kona, T. Wada, and U. Fatika (comprising 53.8% of total) were having highest disparities in education given by the their respective EDI standard deviations, with Gyallesu having the highest disparity deviating from the mean at 0.436. Health accounted for highest disparities in up to five (5) wards (Kufena, Kwarbai B, T. Tukur, U. Juma and Wuciciri) given by their respective HDI standard deviations. Among those, U. Juma was having the highest disparity with a standard deviation of 0.374 in HDI. Overall, Kwarbai A was having a tie in EDI and HDI standard deviations of 0.317 each, suggesting the highest disparity in both education and health at the same time. Also, D. Abba, Gyallesu, Kaura, Kwarbai A, L. Kona, U. Fatika, U. Juma, and Wuciciri (comprising 61.5%) were having relatively high standard deviations in LDI compared to the average. Of these, Gyallesu ward was again having the highest disparity with an LDI standard deviation of 0.188. On the other hand, the LDI standard deviation of 0.050 for T. Tukur was the overall lowest.

Evidence from the foregoing suggests that inequality is higher within dimension outcomes than in overall quality of life. The highest level of disparity was found in L. Kona ward while the lowest was in T. Tukur. The wide disparity among households in all dimensions suggests high level of inequality across the wards. However, education abound as the greatest source of disparity, then followed by health. The extent of disparity in education is so wide that it almost doubled the level

in living conditions, which invariably accounts for the least disparity. Inequality in education and living conditions were the highest for Gyallesu ward. Similarly, U. Juma, having the highest disparity in health, represents the most unequal ward in terms of health. While T. Tukur ward was having the lowest inequality in both education and living conditions, Kaura was having the lowest in health.

One general observation from the estimates is that there is higher disparity in quality of life outcomes across households than across wards, which means that resources are not equitably distributed in Zaria local government area. Similarly, there is more inequality among households with extreme deprivations than among those with lesser deprivations in all wards. In response to this, policies may be designed to balance the inequalities in quality of life outcomes across wards.

4.2.2 Capability Deprivation Index Patterns and Trends across Wards

Tables 4.14, 4.15 and 4.16 show the distribution of the Capability Deprivation Index and its components across Wards. Column one of Table 4.15 shows the various wards while column two, three and four contain the respective contribution of the education, health and living conditions components of the CDI. In the same table, column five represents the distribution in capability deprivation across wards as measured by the CDI.

From the table, U. Juma ward was having the highest deprivation level with a CDI of 0.546 (see also figure 9). The major source of deprivation in this ward were earnings, housing, water supply, electricity, cooking fuel and sanitation (Table 4.14). Similarly, Dambo and U. Fatika wards ranked next to U. Juma ward in terms of capability deprivation with respective CDI values of 0.497 and 0.493. Notably, school attainment, earnings, electricity, cooking fuel and sanitation represent major sources of deprivation in these communities. In contrast, T. Tukur, Kwarbai B, Kaura, and T. Wada wards were having the lowest deprivation levels each with a CDI of 0.271, 0.360, 0.364 and 0.370 respectively. These communities were however deprived in water supply (highest in T. Wada), electricity, cooking fuel and sanitation (Table 4.14). Despite significant deprivations in living conditions, these three wards were having remarkably low deprivations in both education and health. This distribution makes it plausible to suggest that education and health are necessary but not sufficient requirements for good quality of life.

Table 4.14: Distribution of CDI component indicators across wards

Wards	School enrolment	School attainment	Medication	Life safety	Earnings	Nutrition	Housing	Water supply	Electricity	Cooking fuel	Asset ownership	Sanitation
Dambo	0.2188	0.5938	0.375	0.1875	0.6875	0.2813	0.5313	0.1875	0.9375	0.9688	0.2813	0.7188
D. Abba	0.1667	0.7381	0.6429	0.0952	0.6190	0.2619	0.2381	0.0714	0.7143	0.9762	0.2619	1.0
Gyallesu	0.3103	0.4483	0.2414	0.1034	0.3793	0.1034	0.4138	0.1724	0.9310	0.7241	0.1034	0.6552
Kaura	0.0741	0.2963	0.1852	0.0370	0.1852	0.0370	0.4444	0.2593	1.0	0.7407	0.1481	0.9630
Kufena	0.1481	0.5556	0.3704	0.1852	0.2593	0.1481	0.4815	0.0	0.5556	0.8519	0.0741	1.0
Kwarbai A	0.1786	0.25	0.2143	0.21423	0.2857	0.1786	0.5714	0.2857	1.0	0.6429	0.2857	0.9286
Kwarbai B	0.2143	0.1071	0.2143	0.2143	0.2143	0.1786	0.3214	0.25	1.0	0.6786	0.25	0.6786
L. Kona	0.1538	0.5897	0.1282	0.1795	0.4615	0.2564	0.7179	0.7949	1.0	0.7436	0.2564	0.4103
T. Tukur	0.0	0.1389	0.1111	0.1944	0.0	0.0	0.0556	0.0	1.0	0.75	0.0278	0.9722
T. Wada	0.1471	0.3235	0.1471	0.0882	0.1765	0.0294	0.1765	0.7059	0.9706	0.5588	0.1471	0.9706
U. Fatika	0.24	0.4	0.16	0.12	0.64	0.28	0.64	0.6	1.0	0.96	0.28	0.6
U. Juma	0.2222	0.4815	0.3704	0.2222	0.5926	0.2963	0.8148	0.6296	1.0	0.9259	0.3333	0.6667
Wuciciri	0.2308	0.8462	0.4615	0.1923	0.5769	0.2308	0.3846	0.0385	0.8077	1.0	0.2308	0.6154
AVERAGE	**0.1772**	**0.4438**	**0.2786**	**0.1564**	**0.3906**	**0.1755**	**0.4455**	**0.3073**	**0.9167**	**0.8093**	**0.2061**	**0.7830**
STDEV	**0.0786**	**0.2214**	**0.1562**	**0.0598**	**0.2204**	**0.1045**	**0.2161**	**0.2801**	**0.1401**	**0.1458**	**0.0951**	**0.1967**

Source: Household Survey Report, 2016

Table 4.15: Distribution of CDI and its dimension indices across wards

WARD	*EDI*	*HDI*	*LDI*	*CDI*
Dambo	1.000 (0.406)	1.000 (0.281)	1.000 (0.574)	1.000 (0.497)
D. Abba	1.000 (0.452)	1.000 (0.369)	1.000 (0.518)	1.000 (0.482)
Gyallesu	1.000 (0.379)	1.000 (0.172)	1.000 (0.435)	1.000 (0.382)
Kaura	1.000 (0.185)	1.000 (0.111)	1.000 (0.472)	1.000 (0.364)
Kufena	1.000 (0.352)	1.000 (0.278)	1.000 (0.421)	1.000 (0.386)
Kwarbai A	1.000 (0.214)	1.000 (0.214)	1.000 (0.522)	1.000 (0.420)
Kwarbai B	1.000 (0.161)	1.000 (0.214)	1.000 (0.446)	1.000 (0.360)
L. Kona	1.000 (0.372)	1.000 (0.154)	1.000 (0.580)	1.000 (0.474)
T. Tukur	1.000 (0.069)	1.000 (0.153)	1.000 (0.351)	1.000 (0.271)
T. Wada	1.000 (0.235)	1.000 (0.118)	1.000 (0.467)	1.000 (0.370)
U. Fatika	1.000 (0.320)	1.000 (0.140)	1.000 (0.625)	1.000 (0.493)
U. Juma	1.000 (0.352)	1.000 (0.296)	1.000 (0.657)	1.000 (0.546)
Wuciciri	1.000 (0.539)	1.000 (0.327)	1.000 (0.486)	1.000 (0.468)
AVERAGE	**1.000 (0.311)**	**1.000 (0.218)**	**1.000 (0.504)**	**1.000 (0.424)**
STDEV	**0.130521**	**0.084871**	**0.086854**	**0.076511**

Source: Household Survey Report, 2016

Note that the scores in parenthesis represent deprivation levels while those outside represent maximum deprivation levels.

Table 4.16: Percentage distribution of CDI and its dimension indices across wards

WARD	*EDI*	*HDI*	*LDI*	*CDI*
Dambo	100 (40.6%)	100 (28.1%)	100 (57.4%)	100 (49.7%)
D. Abba	100 (45.2%)	100 (36.9%)	100 (51.8%)	100 (48.2%)
Gyallesu	100 (37.9%)	100 (17.2%)	100 (43.5%)	100 (38.2%)
Kaura	100 (18.5%)	100 (11.1%)	100 (47.2%)	100 (36.4%)
Kufena	100 (35.2%)	100 (27.8%)	100 (42.1%)	100 (38.6%)
Kwarbai A	100 (21.4%)	100 (21.4%)	100 (52.2%)	100 (42.0%)
Kwarbai B	100 (16.1%)	100 (21.4%)	100 (44.6%)	100 (36.0%)
L. Kona	100 (37.2%)	100 (15.4%)	100 (58.0%)	100 (47.4%)
T. Tukur	100 (6.9%)	100 (15.3%)	100 (35.1%)	100 (27.1%)
T. Wada	100 (23.5%)	100 (11.8%)	100 (46.7%)	100 (37.0%)
U. Fatika	100 (32.0%)	100 (14.0%)	100 (62.5%)	100 (49.3%)
U. Juma	100 (35.2%)	100 (29.6%)	100 (65.7%)	100 (54.6%)
Wuciciri	100 (53.9%)	100 (32.7%)	100 (48.6%)	100 (46.8%)
AVERAGE	**100 (31.1%)**	**100 (21.8%)**	**100 (50.4%)**	**100 (42.4%)**
STDEV	**13.05%**	**8.487%**	**8.6854%**	**7.6511%**

Source: Computed from table 4.15

Note: Values in parenthesis represent percentage deprivation levels

Similarly, figures 6, 7, 8, 9 and 10 depict the patterns and trends in the distribution of the CDI between wards. The figures highlight the disparity in the CDI and its dimension indices across wards. Information on the extent of disparity in quality of life among communities may provide guidance for policy design and planning.

The graphs picture patterns in dimension indices as are variations in the extent and source of deprivation across the wards. Figure 6 shows a low disparity in capability deprivation with a CDI range value of 0.275 (appendix VI). For the most part, living conditions accounts for most deprivations in capability attainment since LDI is the only index above the deprivation line in all communities with the exception of T. Tukur Ward (Figure 10). Despite relatively low level of EDI, it has the highest level of disparity across wards (Figure 7). With a sizable range value of 0.470, extremely education deprived communities were coexisting alongside those with little deprivation (see Appendix IV). In contrast, HDI has the least deprivation level with marginal disparity across wards (Figure 8). This indicates that there is no much deprivation in health nor a significant difference in health outcomes across wards.

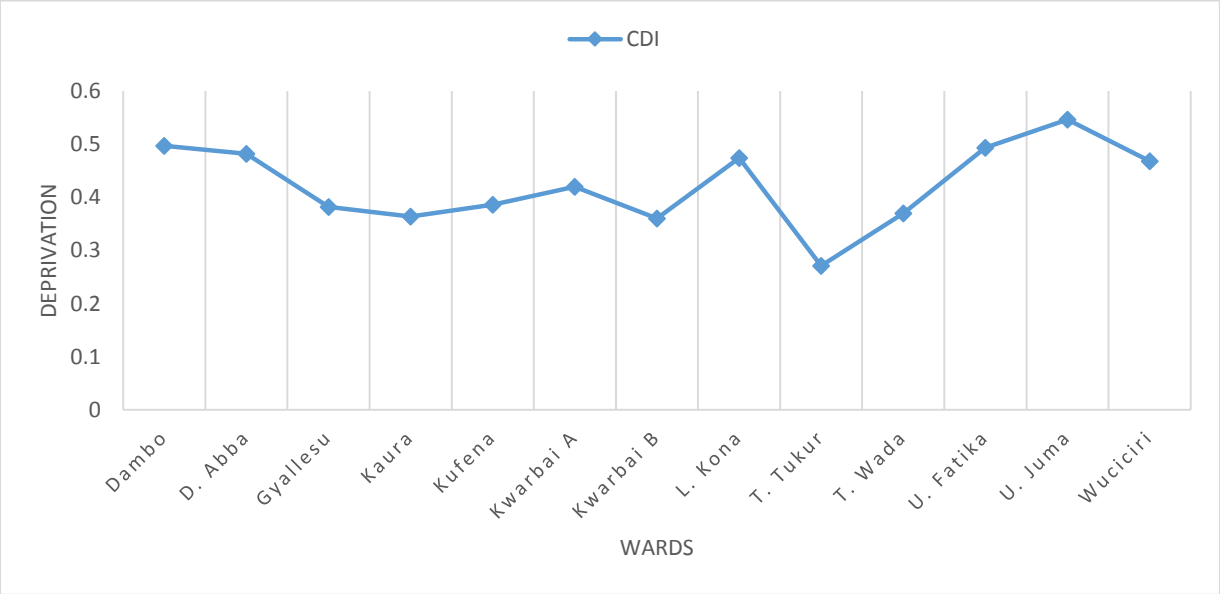


Figure 6: Pattern of Capability Deprivation Index across wards

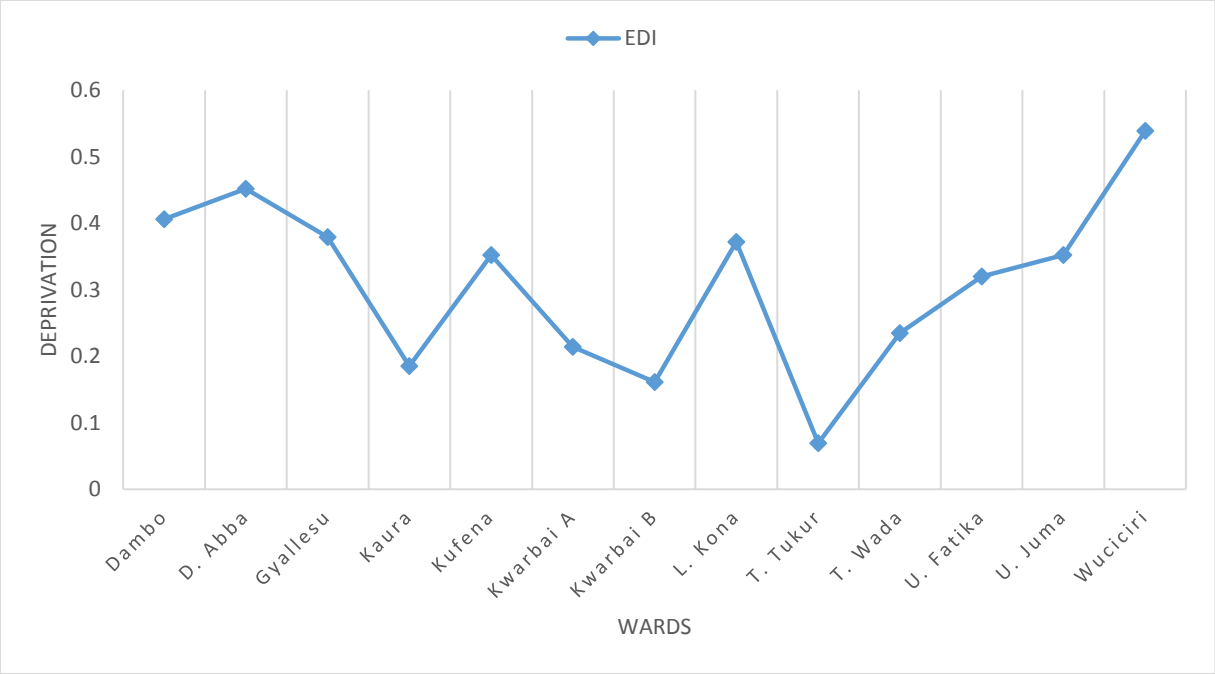


Figure 7: Pattern of Education Deprivation Index across wards

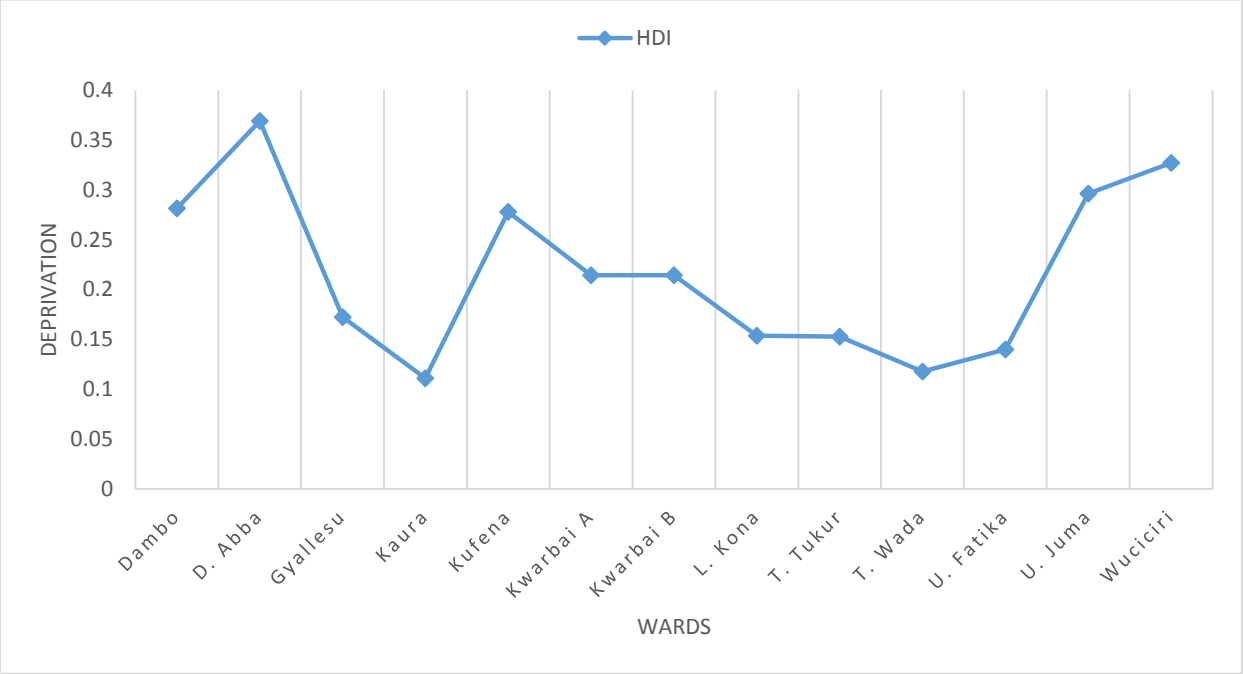


Figure 8: Pattern of Health Deprivation Index across wards

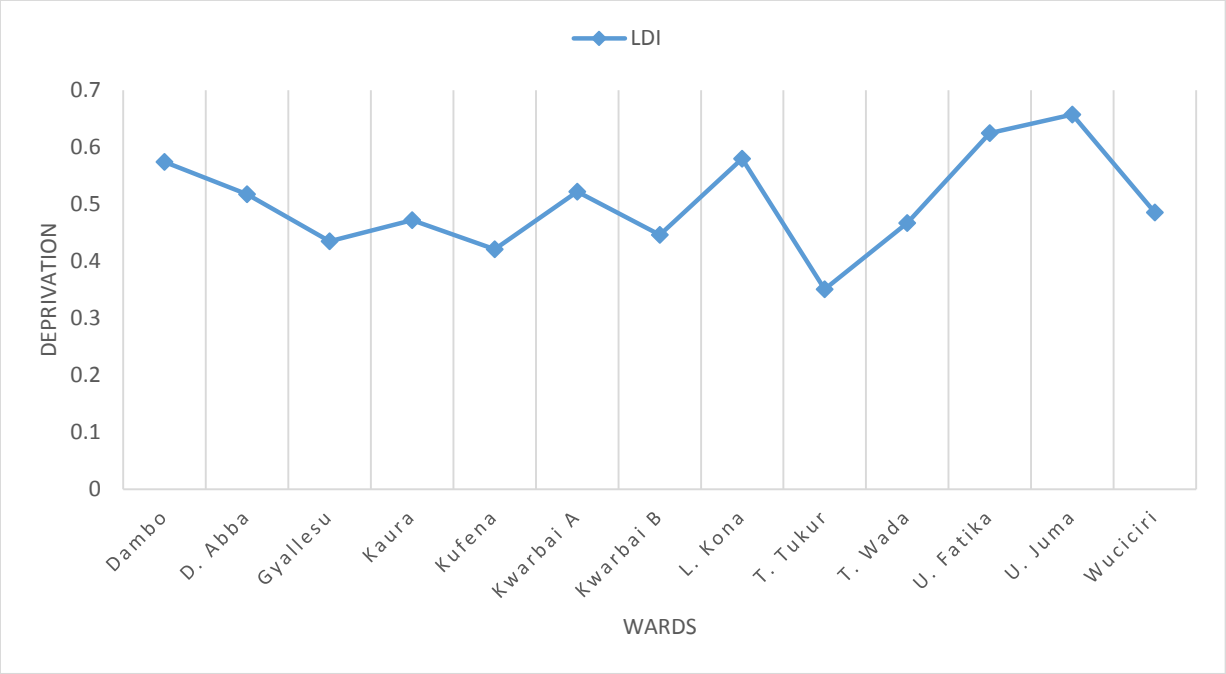


Figure 9: Pattern of Living conditions Deprivation Index across wards

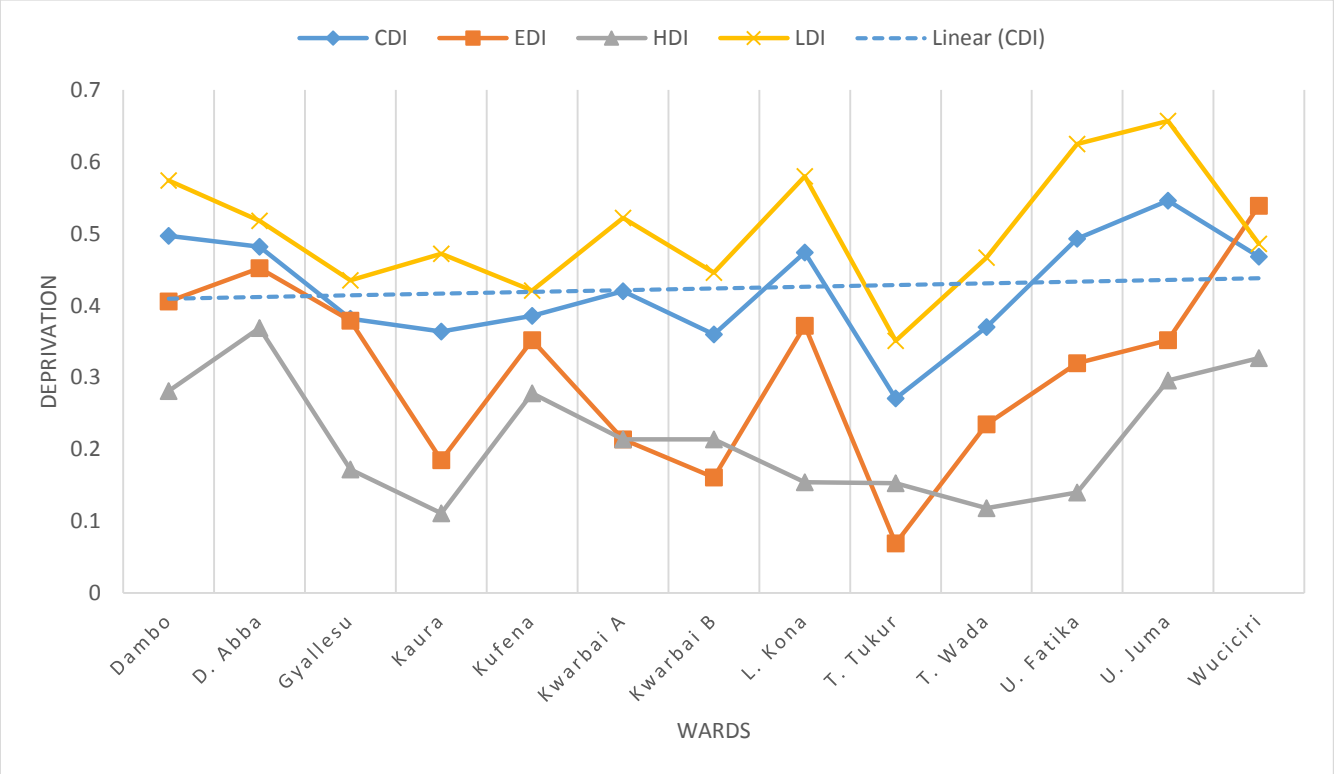


Figure 10: Pattern of Capability Deprivation Index and its dimension indices across wards

A general observation from the estimates and figures suggests an asymmetric distribution of deprivation across wards. This is because some wards (Dambo, D. Abba, L. Kona, U. Fatika, U. Juma and Wuciciri) were having higher CDIs than the average for Zaria local government area, while others (Gyallesu, Kaura, Kufena, Kwarbai A, Kwarbai B, T. Tukur, and T. Wada) were having CDI values below the average. Put another way, 53.8% of the wards were doing better than the remaining percentage in terms of overall quality of life. Altogether, the CDI standard deviation of 0.077 suggests that there is no significant disparity in quality of life among the thirteen (13) wards.

With respect to the dimensions, the same pattern is observed with some wards (such as Dambo; D. Abba; Gyallesu; Kufena; L. Kona; U. Fatika; U. Juma; Wuciciri) having EDI values above the average for Zaria local government area, while Kaura; Kwarbai A; Kwarbai B; T. Tukur; T. Wada; were having values below the average. As for HDI, while fewer communities (Dambo; D. Abba; Kufena; U. Juma; Wuciciri) were having values above the average, the rest were having HDIs below the average. Also, Dambo, D. Abba, L. Kona, U. Fatika and U. Juma wards were having LDI values above the average LDI for Zaria local government area. Overall, this ranks Dambo, D. Abba and U. Juma as the most deprived wards by all measures.

Moreover, despite a generally low disparity in quality of life among wards, at a CDI standard deviation of 0.077, disparity in education was the highest with a standard deviation of 0.131 in EDI, contrasting marginal disparities in health and living conditions, with corresponding HDI and LDI standard deviations of 0.084 and 0.087 (Table 4.15). At indicator level, education disparity is higher in school attainment compared to school enrolment, with a standard deviation of 0.221. Also, medication accounts for most disparity in the health dimension with a standard deviation of 0.156, more than double that of life safety. As for living conditions, the highest source of disparity

is water supply with a standard deviation 0.280, which then is followed by earnings with a standard deviation of 0.220. (Table 4.14). In line with this, policies on distribution may be inclined toward addressing the disparities in education and health while those on provision may target the indicators of living conditions.

4.2.3 Estimates of Capability Deprivation Index, its component and dimension indices for Zaria Local Government Area

Table 4.17 shows the sources of deprivation by the indicators that make up the CDI. Electricity, cooking fuel, and sanitation represent the highest deprivation levels of 91.7%, 80.9% and 78.3% respectively. On the other extreme, school enrolment, medication, life safety, nutrition and asset ownership represent the lowest deprivations with respective deprivation levels of 17.7%, 27.9%, 15.6%, 17.6% and 20.6%. The mean deprivation across all indicators is estimated as 42.4%, in commensuration with the average overall CDI and suggesting that the quality of life of the population is 0.42 percentage points below the optimal.

The results in Table 4.17 in themselves do not show the significance of each dimension on overall quality of life, they however provide evidence on the nature and sources of deprivation in Zaria local government area. The figures in Table 4.18 also show the extent of deprivation in the three welfare dimensions as they show the weighted aggregate of capability deprivation with regards to the significance of each on overall quality of life.

Table 4.17a: Capability deprivation in Zaria Local Government Area by component indicator

INDICATOR	*DEPRIVATION LEVEL*	*PERCENTAGE DEPRIVATION*
	Requirement (Deprivation)	Requirement (Deprivation)
School enrolment	1.000 (0.177)	100 (17.7%)
School attainment	1.000 (0.444)	100 (44. 4%)
Medication	1.000 (0.279)	100 (27.9%)
Life safety	1.000 (0.156)	100 (15.6%)
Earnings	1.000 (0.391)	100 (39.1%)
Nutrition	1.000 (0.176)	100 (17.6%)
Housing	1.000 (0.446)	100 (44.6%)
Water supply	1.000 (0.307)	100 (30.7%)
Electricity	1.000 (0.917)	100 (91.7%)
Cooking fuel	1.000 (0.809)	100 (80.9%)
Asset ownership	1.000 (0.206)	100 (20.6%)
Sanitation	1.000 (0.783)	100 (78.3%)
MEAN	**1.000 (0.424)**	**100 (42.4%)**

Source: Computed from 4.14

Note that the values in parenthesis represent deprivation and attainment levels. The difference between indicator requirement and its corresponding deprivation in Table 4.17a gives the value for indicator attainment in Table 4.17b.

Table 4.17b: Capability attainment in Zaria Local Government Area by component indicator

INDICATOR	*ATTAINMENT LEVEL*	*PERCENTAGE ATTAINMENT*
	Requirement (Attainment)	Requirement (Attainment)
School enrolment	1.000 (0.823)	100 (82.3%)
School attainment	1.000 (0.556)	100 (55.6%)
Medication	1.000 (0.721)	100 (72.1%)
Life safety	1.000 (0.844)	100 (84.4%)
Earnings	1.000 (0.609)	100 (60.9%)
Nutrition	1.000 (0.824)	100 (82.4%)
Housing	1.000 (0.554)	100 (55.4%)
Water supply	1.000 (0.693)	100 (69.3%)
Electricity	1.000 (0.083)	100 (8.3%)
Cooking fuel	1.000 (0.191)	100 (19.1%)
Asset ownership	1.000 (0.794)	100 (79.4%)
Sanitation	1.000 (0.217)	100 (21.7%)
MEAN	**1.000 (0.576)**	**100 (57.6%)**

Source: Inferred from Table 4.17a

The results in Table 4.18 contain aggregate measures of deprivation which show the respective absolute and percentage deprivation. There is some extent of deprivation in Zaria local government area as suggested by the CDI value of 0.424 (or 42.4%). Within dimensions, the LDI was having the highest deprivation value of 0.504 (or 50.4%), representing twice the value of the HDI, which was having the lowest deprivation value of 0.218 (or 21.8%). The deprivation value of the EDI is 0.311 (or 31.1%), showing a sizable level of education deprivation. The indices show the magnitude of welfare gap in Zaria Local Government Area.

Table 4.18: CDI and its dimension indices for Zaria Local Government Area

INDEX	***DEPRIVATION LEVEL***	***PERCENTAGE DEPRIVATION***
	Requirement (Deprivation)	Requirement (Deprivation)
EDI	1.000 (0.311)	100 (31.1%)
HDI	1.000 (0.218)	100 (21.8%)
LDI	1.000 (0.504)	100 (50.4%)
CDI	1.000 (0.424)	100 (42.4%)

Source: Computed from Tables 4.15 and 4.16

In total, the estimates point to education and living conditions dimensions as constituting great sources of deprivation. The source of most deprivation in education is school attainment accounting for 72.38% while 28.46% was attributed to school enrolment. In health, medication deprivation accounted for 63.99% with only 35.77% due to life safety. In the living conditions dimension, electricity, cooking fuel, and sanitation accounted for most deprivations, with electricity accounting for 22.74%, cooking fuel for 20.06% and sanitation for 19.42% (Table 4.17).

Overall, the results indicate the existence of deprivation in Zaria local government area as a whole. Living conditions dimension accounted for the highest level of deprivation, then followed by education and health respectively. However, education accounts for most disparity, then living conditions and health dimensions respectively. Indicator-wise, there is remarkably low deprivation in school enrolment relative to school attainment. Results for health indicators also signify low

deprivation albeit with reasonable deprivation in medication compared to life safety. Despite low deprivation in health, chances of further risks are amplified by vulnerability in living conditions especially in nutrition, water supply and sanitation. Generally, the sources of most deprivation at indicator-level were school attainment, housing, electricity, cooking fuel and sanitation. Other indicators such as medication, earnings, and water supply also represented significant proportions of deprivation.

As a preliminary observation, these deprivations may be explained mostly by government failure in expanding valuable freedoms and opportunities for people to achieve higher quality of life, although persistent income poverty also represents a serious impediment. On the flip side, certain cultural forces often exacerbate, and appear to justify the level of deprivation in Zaria local government area.

4.3 Effectiveness of Governance in Zaria Local Government Area

To evaluate the effectiveness of governance, governance performance was analysed using the CDI framework with reference to the three dimensions of quality of life. The education, health and living conditions dimension indices provide a sufficient basis for analysing the performance of governance (see Table 4.15). The degree of governance effectiveness is thus measured by the benchmarks in Table 4.19.

Table 4.19: Governance effectiveness benchmarks

ACHIEVEMENT GOALPOST	*EFFECTIVENESS*
0.000 – 0.499	Weak
0.500 – 0.699	Moderate
0.700 – 1.000	Strong

Source: Author's formulation

The results in Table 4.20 represent governance effectiveness in the three dimensions of quality of life across wards. The summary of the effectiveness of governance is presented in Table 4.21 as inferred from Table 4.20. Table 4.21 is also a summary of the effectiveness of governance in various wards and in Zaria local government area as a whole. The table shows that governance effectiveness in education was strong for five (5) wards (Kaura, Kwarbai A, Kwarbai B, T. Tukur and T. Wada), moderate for seven (7) wards (Dambo, D. Abba, Gyallesu, Kufena, L. Kona, U. Fatika, U. Juma) and Zaria Local Government Area, and weak for only Wuciciri out of the thirteen (13) wards in ZLGA. Also, the table shows that governance effectiveness in health was strong for all wards and Zaria Local Government Area except D. Abba and Wuciciri both of which were having moderate effectiveness. Again, governance effectiveness in living conditions was moderate for seven (7) wards: Gyallesu, Kaura, Kufena, Kwarbai B, T. Tukur, T. Wada and Wuciciri; but weak for the other six (6) wards and Zaria Local Government Area.

Table 4.20: Results on governance effectiveness across wards

Ward	*Education*		*Health*		*Living conditions*		*Overall*
	Deprivation	Achievement	Deprivation	Achievement	Deprivation	Achievement	
Dambo	(0.406)	0.594	(0.281)	0.719	(0.574)	0.426	0.503
D. Abba	(0.453)	0.548	(0.369)	0.631	(0.518)	0.482	0.518
Gyallesu	(0.379)	0.621	(0.172)	0.828	(0.435)	0.565	0.618
Kaura	(0.185)	0.815	(0.111)	0.889	(0.472)	0.528	0.636
Kufena	(0.352)	0.648	(0.278)	0.722	(0.421)	0.579	0.614
Kwarbai A	(0.214)	0.786	(0.214)	0.786	(0.522)	0.478	0.580
Kwarbai B	(0.161)	0.839	(0.214)	0.786	(0.446)	0.554	0.640
L. Kona	(0.372)	0.628	(0.154)	0.846	(0.580)	0.420	0.526
T. Tukur	(0.069)	0.931	(0.153)	0.847	(0.351)	0.649	0.729
T. Wada	(0.235)	0.765	(0.118)	0.882	(0.467)	0.533	0.630
U. Fatika	(0.320)	0.680	(0.140)	0.860	(0.625)	0.375	0.507
U. Juma	(0.352)	0.648	(0.296)	0.704	(0.657)	0.343	0.454
Wuciciri	(0.538)	0.462	(0.327)	0.673	(0.486)	0.514	0.532
AVERAGE	(0.311)	0.689	(0.218)	0.782	(0.504)	0.496	0.576

Source: Computed from Table 4.15 (the scores in parenthesis indicate deprivation and those outside indicate level of achievement).

Note: Deprivation + Achievement = 1.000; Overall achievement is the weighted average of achievements in all three dimensions.

Table 4.21: Summary of the Effectiveness of Governance in Zaria Local Government Area

WARD	**EFFECTIVENESS**			
	Education	Health	Living conditions	Overall
Dambo	*Moderate*	*Strong*	*Weak*	*Moderate*
D. Abba	*Moderate*	*Moderate*	*Weak*	*Moderate*
Gyallesu	*Moderate*	*Strong*	*Moderate*	*Moderate*
Kaura	*Strong*	*Strong*	*Moderate*	*Moderate*
Kufena	*Moderate*	*Strong*	*Moderate*	*Moderate*
Kwarbai A	*Strong*	*Strong*	*Weak*	*Moderate*
Kwarbai B	*Strong*	*Strong*	*Moderate*	*Moderate*
L. Kona	*Moderate*	*Strong*	*Weak*	*Moderate*
T. Tukur	*Strong*	*Strong*	*Moderate*	*Strong*
T. Wada	*Strong*	*Strong*	*Moderate*	*Moderate*
U. Fatika	*Moderate*	*Strong*	*Weak*	*Moderate*
U. Juma	*Moderate*	*Strong*	*Weak*	*Weak*
Wuciciri	*Weak*	*Moderate*	*Moderate*	*Moderate*
Zaria LGA	***Moderate***	***Strong***	***Weak***	***Moderate***

Source: Inferred from Table 4.20

Overall, governance effectiveness is strong for only one (1) ward (T. Tukur), moderate for eleven (11) wards: Dambo, D. Abba, Gyallesu, Kufena, Kwarbai A., Kwarbai B, L. Kona, T. Wada, U. Fatika, Wuciciri and in Zaria Local Government Area, but also weak for only one (1) ward (U. Juma). The disparity in governance effectiveness among the wards suggests that different policy priorities would be required to improve governance in the different wards and the local government area as a whole.

The analysis so far has confirmed the existence of deprivation in the dimensions of education, health, and living conditions. It has also revealed the existence of significant governance deficit in quality of life outcomes. These findings agree with the combined findings of Iwuoha (2013), Idowu et al (2014), Oni and Adepoju (2011), and Popoola (2016) which reported a declining quality of life in the components of environment, education, health and nutrition, and infrastructure. Likewise, the disparity in quality of life outcomes is in conformity with the harmonized findings of Isah (2008), Maiwada (2013), Ajakaiye et al (2014), and Oyeronke and Kayode (2014) which emphasized the existence of inequality in the distribution of welfare. The discussion thus far suggests that multidimensional deprivation is instrumental to the low quality of life and living standards of households in Zaria local government area. Indications abound from the study that the causes of multidimensional deprivation in Zaria local government area could be reflected in specific household characteristics such as household sizes and preferences, but other social forces like prevailing cultural beliefs and initial conditions may also be contributory factors.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

This study evaluated the quality of life and living conditions in Zaria local government area of Kaduna State. The study examined the nature, extent, and patterns of deprivations in quality of life and living conditions at Zaria local government area level across communities using the Capability Deprivation Index (CDI). Within the CDI framework, three measures were used – the Education Deprivation Index (EDI), the Health Deprivation Index (HDI), and the Living Conditions Deprivation Index (LDI). The results from these measures provided empirical evidence on the extent of deprivation and disparity in quality of life across wards and Zaria local government area overall. The results were also used to infer on the effectiveness of governance in Zaria local government area.

Major finding from the study confirmed the existence and asymmetric distribution of capability deprivation in the dimensions of education, health, and living conditions. The evidence suggests that school attainment is the main source of education deprivation, medication as the main source of health deprivation, while electricity, cooking fuel and sanitation account for most deprivations in living conditions. In addition, there is evidence of disparity in quality of life across households as well as across wards, with the least, moderate and most disparities in T. Tukur, Kwarbai A, and L. Kona respectively. Other key findings are highlighted below:

(a) In spite of a striking disparity across households, different wards face different types and levels of deprivations, and therefore have differing needs;

(b) The quality of life in Zaria local government area is very low due to various forms of deprivations in education, health, living conditions and in overall capability, with living conditions as the greatest source of deprivation;

(c) In terms of living conditions, Gyallesu, Kaura, Kufena, Kwarbai B, T. Tukur, and Wuciciri were relatively developed while Dambo, D. Abba, Kwarbai A, L. Kona, U. Fatika and U. Juma suffered abject deprivation by all measures. Even within each community, there was high disparity between households as some had better living conditions than others;

(d) There was significant governance deficit with respect to overall quality of life with living conditions being the most adversely affected by deficits such as water shortages, volatile electricity supply, precarious housing, poor roads, as well as fragile sanitation and environmental management; and

(e) The degree of governance performance in the area of education, health and living conditions was mixed: high performance in health outcomes, a moderate performance in education and a low achievement in living conditions.

5.2 Conclusions

Given the multidimensional nature of quality of life, the Capability Deprivation Index (CDI) developed for this study provides a workable framework for welfare evaluation at the micro level. The development of the CDI follows other composite measures in identifying relevant indicators within dimensions, but goes beyond the conventional weighing and benchmarking to base the procedures on sound theoretical fundamentals. In contrast to other measures, the CDI suggests that understanding deprivation at the most basic level is key to understanding quality of life at the macro level, and thus important for effective policy intervention.

Evidence from the indices and estimates has suggested the existence of capability deprivation in Zaria Local Government Area, which by its nature is multidimensional as explained by outcomes in education, health, and living conditions. As such, two distinct groups of wards were observed based on their extent of capability deprivation. The first community grouping is the *extremely deprived*, which suffered capability deprivation more than the average deprivation line for Zaria local government area. The second group is the *less deprived*, whose extent of deprivation fell below the average for Zaria Local Government Area. Thus, quality of life was asymmetrically distributed between the extremely deprived and the less deprived communities. Lessening the gap between these two groups holds great prospect for improving quality of life in the study area.

Likewise, the quality of life outcomes in health, education and living conditions correspond with the effectiveness of governance in Zaria local government area. The deprivations in such outcomes, especially in living conditions are explained mostly by governance deficit. The moderate achievement in health and education dimensions may be due to access to public facilities, but poor service delivery remains a major problem. However, key deprivations in living conditions are mostly induced by infrastructural supply deficits, shortage of facilities as well as regulatory failure. This explains why living conditions dimension accounts for the lowest achievement.

5.3 Recommendations

In line with the conclusions made pertaining the nature and extent of quality of life, the following specific recommendations were made:

(a) Government policy on education should target households with extreme deprivations mainly in seven (7) of the wards: Dambo, D. Abba, Gyallesu, Kwarbai A, L. Kona, U. Fatika, and U. Juma.

(b) Similarly, policy on health should focus on households with extreme health deprivations especially in these five (5) wards (i.e. Kufena, Kwarbai A, Kwarbai B, U. Juma, and Wuciciri).

(c) Also, government policy in the aspect of living conditions should make Dambo, D. Abba, Gyallesu, Kaura, L. Kona, U. Juma, and Wuciciri wards a top priority.

The specifics are important because of the high level of disparity across households in those wards. However, despite a relatively lower level of disparity across wards, policy on household accessibility to public services should be biased toward reducing the gaps in education, living conditions, and health in that order of priority.

Finally, in view of the attempt to address the research problem and achieve the objectives of this study, subsequent researches in this direction should nevertheless consider the following key issues. First, the analysis should be extended to community-wide attainment so as to capture prevailing deprivations that are persistent at community levels. This would provide a broader picture of the communal forces that thwart households from attaining optimal quality of life. Second, the standard unit for deprivation should be marginal points between zero and one (such as 0.1, 0.2,…1.0) rather than dichotomous binary scores in only zeros and ones. This would help to show the exact level of household deprivation in any indicator. Third, the study is limited to examining the extent of quality of life deprivation but does not cover the causes of such deprivation, which perhaps is a topic for another time. Lastly, this analysis should be extended to Kaduna State as a whole and possibly all the States in Nigeria because there could be divergent deprivations in quality of life and living conditions across the locations.

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APPENDICES

Appendix I: CDI indicators at household and community levels

DIMENSION/ FUNCTIONING	DEMAND INDICATOR AT HOUSEHOLD LEVEL	SUPPLY INDICATOR AT HOUSEHOLD LEVEL	SUPPLY INDICATOR AT COMMUNITY LEVEL
EDUCATION (school enrolment and attainment)	Number of school-age persons Number of persons with a minimum of SSCE	Number of school-age persons that go to school Number of persons in a tertiary institution and those graduated	Number of primary and secondary schools
HEALTH (longevity and life safety)	Number of persons who were sick or dead naturally in the last six months Number of persons who suffered violence (harassed, assaulted or killed) in the last six months	Number of people that visited a clinic and seen by a doctor Number of people protected by security personnel	Number of healthcare facilities Number of law courts, security stations and personnel
LIVING CONDITIONS (earnings, nutrition, housing, water supply, electricity, cooking fuel, asset ownership, and sanitation)	Type and nature of job (source of income) Number of persons that need adequate and balanced diet Number of persons in need of accommodation Number of taps, clean wells and reservoirs Number of electric appliances Number and type of cooking platforms (e.g stove) Number of durables like TV and radio sets, cellphones, computers, and vehicles such as car and motorbike Number of waste disposal/cleaning facilities	Average monthly income earned Number of people with access to regular and balanced diet Number of bedrooms/sitting rooms per person Hours of water supply per day Hours of electricity per day Availability of clean cooking fuel (gas, kerosene, electricity) Roads, satellite and internet connections Number of waste disposal outlets accessible to the house	Number of credit facilities and available social safety nets Number of feeding centres serving balanced diet Number of homes or quarters rentable Number of community taps, potable wells, boreholes and tanks Number of transformers, prepaid meters and streetlights Number of gas and kerosene refilling stations, firewood retailers Number of telecommunication masts, markets, viewing centres and paved roads Number of waste collection facilities (disposals, collection vans, drainages) and personnel

Appendix II: Household Questionnaire

SECTION A: DEMOGRAPHIC INFORMATION OF RESPONDENTS

1. Gender of Household Head: i. Male [ ] ii. Female [ ]
2. Age of Household Head _____
3. Household location (ward) _____
4. Educational level of Household Head:

   (i) No education [ ] (ii) Koranic education [ ] (iii) Bible knowledge [ ]
   (iv) Secondary school/Grade II/Technical [ ] (v) Post secondary school [ ]
   (vi) First degree [ ] (vii) Post graduate degree [ ] (viii) Others, state _____

5. Marital Status of Household Head:
   a) Married [ ] b) Divorced [ ] c) Widowed [ ] d) Single [ ] e) Others, state _____
6. Number of persons in the household _____
7. Religion: i. Christian [ ] ii. Moslem [ ] iii. Traditional [ ] iv. Others, state _____

SECTION B: EDUCATION

8. Do you have access to any school facility in this ward? yes [ ] no [ ]
9. If yes, what is the distance from your house to the facility?
   a) 1 km [ ] b) 2 km [ ] c) 3-5 km [ ] d) 5-10 km [ ] e) Others, state _____
10. How many school-age children do you have in this household? _____
11. How many of the school-age children are attending school? _____
12. Number of persons with minimum of SSCE certificate? _____
13. Is there any person attending tertiary institution in this household? yes [ ] no [ ]
14. If yes, how many are attending? _____
    (i) University _____ (ii) College_____ (iii) Polytechnic _____?

SECTION C: HEALTH

15. Do you have access to any medical facility in this ward? yes [ ] no [ ]
16. If yes, what is the distance from your house to the facility?
    a) 1 km [ ] b) 2 km [ ] c) 3-5 km [ ] d) 5-10 km [ ] e) Others, state _____
17. When someone is sick, which medication do you resort to?
    orthodox [ ] unorthodox [ ] both [ ] none [ ] and why? _____
18. How many persons were sick in the last 12 months? ____. Cause of sickness _____
19. Number of persons that died in the last 12 months? ____. Cause of death _____
20. How many persons visited a clinic and attended by a physician in the last 12 months? ___
21. How many persons suffered violence in the last 12 months? _____
22. How many persons suffered accidents in the last 12 months? _____
23. Is there a safety and/or security guard(s) available to this household? _____

SECTION D: LIVING CONDITIONS

24. Type of job:
    a) Farming [ ] b) Civil service [ ] c) Tailoring and design [ ] d) Manufacturing and processing [ ] e) Transportation [ ] f) Business/Trading [ ] g) Financial services and related activities [ ] h) Teaching/Lecturing [ ] i) Others _____
25. What is your average monthly earning?
    (i) below N18,000 [ ] (ii) N18,000 – N60,000 [ ] (iii) N60,000 – N100,000 [ ]
    (iv) N100,000 – N200,000 [ ] (v) if higher, state _____
26. How many meals do you cook in a typical day? _____
27. How often do you take the following:

	Daily	Weekly	Monthly	Occasionally	Not at all
Egg					
Fish					
Meat					
Milk					
Beans					

28. How did you acquire your home?
    i. Extended family house [ ] ii. Inherited [ ] iii. Self-acquired [ ] iv. Rent [ ]
    v. Government estate [ ] vi. Mortgage [ ] vii. Others, state _____
29. Type of building material:
    (i) Mud [ ] (ii) Cement bricks [ ] (iii) Burned bricks [ ] (iv) Others, state _____
30. Number of living rooms in the home _____
31. How many bedrooms are there in the house? _____
32. Do you have access to electricity? i. Yes [ ] ii. No [ ]
33. How many of the following basic electric appliances do you have?
    Fridge _____ Television set _____ Radio set _____ Cellphone _____
34. Do you have electricity supply daily? i. Yes [ ] ii. No [ ]
35. If yes, how many hours on average? _____
36. Type of billing meter: Postpaid [ ] Prepaid [ ] and why? _____
37. What is your major source of water supply?
    a. pipe-borne [ ] b. borehole [ ] c. well [ ] d. stream [ ] e. others, state _____
38. What is the distance from your house to the source of water?
    a) 1 km [ ] b) 2 km [ ] c) 3-5 km [ ] d) 5-10 km [ ] e) Others, state _____
39. How many hours of water supply do you enjoy daily from the source? _____

40. What is your major source of cooking fuel?

i) firewood [ ] ii) kerosene [ ] iii) gas [ ] iv.) electricity [ ] v) others _____

41. How available is your major source of cooking fuel?
    not available [ ] available [ ] very much available [ ]
42. How many of the following information-related durables do you have?
    a) Radio set ____ b) Television set _____ c) Cellphone_____ d) Computer _____
43. How reliable is your satellite network? i. not reliable [ ] ii. reliable [ ] iii. very reliable [ ]
44. How many of the following livelihood-related assets do you own?
    a. Bicycle _____ b. Motorcycle _____ c. Car _____ d. Others, state _____
45. How do you dispose your waste?
    i. trashing [ ] ii. burning [ ] iii. dumping [ ] iv. burying [ ] v. Others, state _____
46. Do waste collectors visit your house? yes [ ] no [ ]
47. If yes, how frequent? daily [ ] weekly [ ] monthly [ ]
48. Are there any designated waste disposal outlets in this ward? yes [ ] no [ ]
49. If yes, what is the distance from your house to these outlets?
    a) 1 km [ ] b) 2 km [ ] c) 3-5 km [ ] d) 5-10 km [ ] e) Others, state _____
50. What is the nature of this provision?
    (i) Government [ ] (ii) Private enterprise [ ] (iii) Community [ ] (iv) Others, state_____

Appendix III: CDI Indicator Deprivation Benchmarks

1. ***School enrolm*ent** – a household is deprived if at least one school-age child is not going to school (if the number of school-age children is greater than those actually going to school)
2. ***School attainment*** – a household is deprived if at least half those with minimum of SSCE are not attending (or attended) a tertiary institution (or if the household head does not have a minimum of secondary education in case there is none other with SSCE)
3. ***Medication*** – a household is deprived if the number of those who were sick is less than those who visited a clinic and attended by a physician
4. ***Life safety*** – a household is deprived if at least one person suffered violence or avoidable accident
5. ***Earnings*** – a household is deprived if no person earns up to the minimum wage (N18,000) (if the household per capita spending is less than N250 a day where the exact monthly earning is known)
6. ***Nutrition*** – a household is deprived if it lacks adequate and regular diet (regular diet is 3 meals per day while adequate diet is measured by protein intake)
7. ***Housing*** – a household is deprived if it lacks private accommodation with enough bedrooms (a maximum of 2 persons per room)
8. ***Water supply*** – a household is deprived if it lacks sufficient supply from its major source of water (at least 12 hours regular supply within the house or 24 hours close to the house – distance not exceeding 2 km outside the house)
9. ***Electricity*** – a household is deprived if it receives less than 12 hours of electricity supply daily
10. ***Cooking fuel*** – a household is deprived if its major source of cooking fuel is dirty (mainly firewood)
11. ***Asset ownership*** – a household is deprived if it lacks at least one livelihood-related asset (a minimum of bicycle for transport and a minimum of radio for communication)
12. ***Sanitation*** – a household is deprived if its waste disposal is not environmentally friendly (i.e dumping and burning).

Appendix IV: Disaggregated household survey data and deprivation indices at ward level

Dambo Ward

Household	School enrolment	School attainment	Medication	Life safety	Earnings	Nutrition	Housing	Water supply	Electricity	Cooking fuel	Asset ownership	Sanitation	Education deprivation index	Health deprivation index	Living conditions deprivation index	Capability deprivation index
HH1	0	1	1	0	0	0	1	1	1	1	0	0	0.5	0.5	0.5	0.5
HH2	0	1	1	0	1	0	1	0	1	1	0	0	0.5	0.5	0.5	0.5
HH3	0	1	1	1	1	0	1	0	1	1	1	0	0.5	1	0.625	0.6667
HH4	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH5	0	0	0	1	1	0	1	0	1	1	0	1	0	0.5	0.625	0.5
HH6	0	0	1	0	0	0	0	0	1	1	0	1	0	0.5	0.375	0.3333
HH7	1	1	1	0	0	0	1	0	1	1	1	1	1	0.5	0.625	0.6667
HH8	0	1	1	0	1	1	1	1	0	1	0	1	0.5	0.5	0.75	0.6667
HH9	0	1	0	0	1	1	1	1	0	1	0	1	0.5	0	0.75	0.5833
HH10	0	1	1	0	1	0	1	0	1	1	1	1	0.5	0.5	0.75	0.6667
HH11	0	1	0	1	0	0	0	0	1	1	0	1	0.5	0.5	0.375	0.4167
HH12	1	1	0	1	1	0	1	0	1	1	0	1	1	0.5	0.625	0.6667
HH13	1	1	0	0	1	1	0	0	1	1	0	1	1	0	0.625	0.5833
HH14	0	1	0	1	0	0	1	0	1	1	0	1	0.5	0.5	0.5	0.5
HH15	1	1	1	0	0	1	1	1	1	1	1	0	1	0.5	0.75	0.75
HH16	0	0	1	0	0	0	0	0	1	0	1	0	0	0.5	0.25	0.25
HH17	0	0	0	0	1	1	1	1	1	1	1	1	0	0	1	0.6667
HH18	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0.375	0.25
HH19	1	1	0	0	1	0	0	0	1	1	0	1	1	0	0.5	0.5
HH20	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0.625	0.4167
HH21	1	0	0	0	1	1	1	0	1	1	0	0	0.5	0	0.625	0.5

HH22	1	1	0	0	1	1	1	0	1	1	1	0	1	0	0.75	0.6667
HH23	0	0	0	0	1	1	1	0	1	1	0	0	0	0	0.625	0.4167
HH24	0	1	0	0	1	0	0	0	1	1	0	1	0.5	0	0.5	0.4167
HH25	0	1	1	0	1	0	0	0	1	1	0	1	0.5	0.5	0.5	0.5
HH26	0	0	0	0	1	0	0	0	1	1	1	1	0	0	0.625	0.4167
HH27	0	0	0	0	1	0	0	0	1	1	0	1	0	0	0.5	0.3333
HH28	0	0	0	0	1	0	1	0	1	1	1	1	0	0	0.75	0.5
HH29	0	1	1	0	1	0	0	0	1	1	0	1	0.5	0.5	0.5	0.5
HH30	0	1	0	0	1	0	0	0	1	1	0	1	0.5	0	0.5	0.4167
HH31	0	1	1	0	1	1	0	0	1	1	0	1	0.5	0.5	0.625	0.5833
HH32	0	0	0	1	0	0	0	0	1	1	0	1	0	0.5	0.375	0.3333
AVERAGE													0.4063	0.2812	0.5742	0.4974

D. Abba Ward

Household	**School enrolment**	**School attainment**	**Medication**	**Life safety**	**Earnings**	**Nutrition**	**Housing**	**Water supply**	**Electricity**	**Cooking fuel**	**Asset ownership**	**Sanitation**	**Education deprivation index**	**Health deprivation index**	**Living conditions deprivation index**	**Capability deprivation index**
HH1	0	1	1	0	0	0	0	0	1	1	0	1	0.5	0.5	0.375	0.4167
HH2	0	1	1	1	1	1	0	0	1	1	0	1	0.5	1	0.625	0.6667
HH3	0	1	0	1	1	0	1	0	1	1	1	1	0.5	0.5	0.75	0.6667
HH4	0	1	1	0	0	0	1	0	0	1	0	1	0.5	0.5	0.375	0.4167
HH5	0	1	1	0	0	1	0	0	1	1	1	1	0.5	0.5	0.625	0.5833
HH6	1	1	1	0	1	0	0	0	1	1	0	1	1	0.5	0.5	0.5833
HH7	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH8	0	1	1	0	1	0	0	0	1	1	0	1	0.5	0.5	0.5	0.5
HH9	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0.375	0.25

HH10	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH11	0	0	1	0	1	0	0	0	1	1	0	1	0	0.5	0.5	0.4167
HH12	0	0	1	0	0	0	0	0	0	1	0	1	0	0.5	0.25	0.25
HH13	1	1	0	0	1	0	0	0	1	1	0	1	1	0	0.5	0.5
HH14	0	1	1	0	1	1	0	1	1	1	1	1	0.5	0.5	0.875	0.75
HH15	1	1	1	0	1	0	0	0	1	1	1	1	1	0.5	0.625	0.6667
HH16	0	1	1	1	0	0	0	0	0	1	0	1	0.5	1	0.25	0.4167
HH17	0	1	1	0	1	0	1	1	1	1	0	1	0.5	0.5	0.75	0.6667
HH18	0	1	0	0	1	0	0	0	1	1	0	1	0.5	0	0.5	0.4167
HH19	0	0	1	0	0	0	0	0	0	1	0	1	0	0.5	0.25	0.25
HH20	0	1	1	0	1	0	0	0	1	1	0	1	0.5	0.5	0.5	0.5
HH21	0	1	0	0	1	0	0	0	1	1	1	1	0.5	0	0.625	0.5
HH22	0	1	1	0	0	0	0	0	1	1	0	1	0.5	0.5	0.375	0.4167
HH23	0	1	0	0	1	1	0	0	1	1	0	1	0.5	0	0.625	0.5
HH24	0	0	1	0	0	0	1	1	0	1	0	1	0	0.5	0.5	0.4167
HH25	0	1	1	0	0	0	0	0	1	1	0	1	0.5	0.5	0.375	0.4167
HH26	0	1	0	0	1	0	0	0	1	1	1	1	0.5	0	0.625	0.5
HH27	0	1	0	0	1	1	0	0	0	1	0	1	0.5	0	0.5	0.4167
HH28	1	0	1	0	1	0	1	0	0	1	0	1	0.5	0.5	0.5	0.5
HH29	0	1	0	0	0	1	0	0	1	1	0	1	0.5	0	0.5	0.4167
HH30	1	1	1	0	1	1	1	0	1	1	1	1	1	0.5	0.875	0.8333
HH31	0	0	1	0	1	0	0	0	1	1	0	1	0	0.5	0.5	0.4167
HH32	0	1	0	0	1	0	0	0	1	1	0	1	0.5	0	0.5	0.4167
HH33	0	1	0	0	1	1	1	0	1	1	0	1	0.5	0	0.75	0.5833
HH34	0	1	1	0	0	0	0	0	1	1	0	1	0.5	0.5	0.375	0.4167
HH35	1	1	0	1	1	0	0	0	1	1	1	1	1	0.5	0.625	0.6667
HH36	0	0	1	0	0	0	0	0	0	1	0	1	0	0.5	0.25	0.25
HH37	0	1	1	0	1	1	1	0	0	1	1	1	0.5	0.5	0.75	0.6667
HH38	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0.375	0.25
HH39	1	1	1	0	1	1	0	0	1	1	0	1	1	0.5	0.625	0.6667

HH40	0	1	1	0	1	1	1	0	1	1	0	1	0.5	0.5	0.75	0.6667
HH41	0	1	1	0	1	0	0	0	1	1	1	1	0.5	0.5	0.625	0.5833
HH42	0	1	1	0	0	0	0	0	0	1	0	1	0.5	0.5	0.25	0.3333
AVERAGE													0.4524	0.3690	0.5179	0.4821

Gyallesu Ward

Household	**School enrolment**	**School attainment**	**Medication**	**Life safety**	**Earnings**	**Nutrition**	**Housing**	**Water supply**	**Electricity**	**Cooking fuel**	**Asset ownership**	**Sanitation**	**Education deprivation index**	**Health deprivation index**	**Living conditions deprivation index**	**Capability deprivation index**
HH1	0	0	1	0	0	0	0	0	1	1	0	1	0	0.5	0.375	0.3333
HH2	0	0	0	0	1	0	0	0	1	1	0	1	0	0	0.5	0.3333
HH3	0	1	0	0	0	0	0	0	1	1	0	1	0.5	0	0.375	0.3333
HH4	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.125	0.0833
HH5	0	0	1	0	0	0	0	1	1	0	0	0	0	0.5	0.25	0.25
HH6	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.25	0.1667
HH7	0	1	1	0	0	0	0	0	1	1	0	1	0.5	0.5	0.375	0.4167
HH8	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.125	0.0833
HH9	0	1	0	0	1	0	1	1	1	1	0	1	0.5	0	0.75	0.5833
HH10	0	1	0	0	0	0	1	1	1	1	1	1	0.5	0	0.75	0.5833
HH11	0	1	1	0	0	1	0	0	1	1	1	1	0.5	0.5	0.625	0.5833
HH12	0	0	0	1	0	0	0	0	0	0	0	0	0	0.5	0	0.0833
HH13	0	0	1	0	1	0	0	0	1	0	0	1	0	0.5	0.375	0.3333
HH14	0	0	0	1	0	0	1	0	1	1	0	1	0	0.5	0.5	0.4167
HH15	1	1	0	0	1	0	1	0	1	1	0	0	1	0	0.5	0.5
HH16	1	0	0	0	1	1	1	0	1	0	0	1	0.5	0	0.625	0.5
HH17	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0.375	0.25

HH18	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0.625	0.4167
HH19	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0.5	0.3333
HH20	1	1	0	0	1	0	0	0	1	1	0	1	1	0	0.5	0.5
HH21	1	1	0	1	0	0	1	0	1	1	0	0	1	0.5	0.375	0.5
HH22	1	1	0	0	1	1	0	0	1	1	0	1	1	0	0.625	0.5833
HH23	1	1	0	0	1	0	1	0	1	1	0	0	1	0	0.5	0.5
HH24	0	0	1	0	1	0	0	0	1	1	0	0	0	0.5	0.375	0.3333
HH25	1	1	1	0	0	0	1	0	1	1	1	1	1	0.5	0.625	0.6667
HH26	1	1	0	0	0	0	1	0	1	1	0	1	1	0	0.5	0.5
HH27	1	1	0	0	1	0	0	0	1	1	0	1	1	0	0.5	0.5
HH28	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0.5	0.3333
HH29	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.125	0.0833
AVERAGE													0.3793	0.1724	0.4353	0.3822

Kaura Ward

Household	**School enrolment**	**School attainment**	**Medication**	**Life safety**	**Earnings**	**Nutrition**	**Housing**	**Water supply**	**Electricity**	**Cooking fuel**	**Asset ownership**	**Sanitation**	**Education deprivation index**	**Health deprivation index**	**Living conditions deprivation index**	**Capability deprivation index**
HH1	0	1	0	0	0	0	1	0	1	1	0	1	0.5	0	0.5	0.4167
HH2	0	1	0	0	1	1	1	0	1	1	0	1	0.5	0	0.75	0.5833
HH3	0	1	0	1	1	0	1	1	1	1	0	1	0.5	0.5	0.75	0.6667
HH4	0	1	1	0	1	0	1	1	1	1	1	1	0.5	0.5	0.875	0.75
HH5	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0.25	0.1667
HH6	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0.5	0.3333
HH7	1	0	0	0	0	0	1	1	1	1	0	1	0.5	0	0.625	0.5
HH8	1	0	0	0	0	0	0	0	1	1	0	1	0.5	0	0.375	0.3333

HH9	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH10	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.25	0.1667
HH11	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0.5	0.3333
HH12	0	0	0	0	1	0	0	0	1	1	1	1	0	0	0.625	0.4167
HH13	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0.5	0.3333
HH14	0	0	1	0	0	0	1	0	1	1	0	1	0	0.5	0.5	0.4167
HH15	0	1	0	0	0	0	1	0	1	1	0	1	0.5	0	0.5	0.4167
HH16	0	0	1	0	0	0	1	0	1	1	0	1	0	0.5	0.5	0.4167
HH17	0	1	0	0	0	0	1	0	1	1	0	1	0.5	0	0.5	0.4167
HH18	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0.5	0.3333
HH19	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0.25	0.1667
HH20	0	1	1	0	1	0	0	0	1	1	0	1	0.5	0.5	0.5	0.5
HH21	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0.25	0.1667
HH22	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0.25	0.1667
HH23	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0.625	0.4167
HH24	0	1	1	0	0	0	0	0	1	1	0	1	0.5	0.5	0.375	0.4167
HH25	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH26	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0.375	0.25
HH27	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0.375	0.25
AVERAGE													0.1852	0.1111	0.4722	0.3642

Kufena Ward

Household	**School enrolment**	**School attainment**	**Medication**	**Life safety**	**Earnings**	**Nutrition**	**Housing**	**Water supply**	**Electricity**	**Cooking fuel**	**Asset ownership**	**Sanitation**	**Education deprivation index**	**Health deprivation index**	**Living conditions deprivation index**	**Capability deprivation index**
HH1	1	0	0	1	0	1	0	0	1	1	0	1	0.5	0.5	0.5	0.5

HH2	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0.5	0.3333
HH3	0	1	0	0	0	0	1	0	0	1	1	1	0.5	0	0.5	0.4167
HH4	0	0	1	0	0	0	1	0	0	1	0	1	0	0.5	0.375	0.3333
HH5	1	0	0	1	0	0	1	0	1	1	0	1	0.5	0.5	0.5	0.5
HH6	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH7	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH8	0	0	1	1	0	0	0	0	0	1	0	1	0	1	0.25	0.3333
HH9	0	0	1	1	0	0	0	0	1	1	0	1	0	1	0.375	0.4167
HH10	0	1	0	0	0	0	0	0	1	0	0	1	0.5	0	0.25	0.25
HH11	0	1	1	0	1	1	1	0	0	1	1	1	0.5	0.5	0.75	0.6667
HH12	0	1	0	0	1	1	0	0	0	0	0	1	0.5	0	0.375	0.3333
HH13	0	1	0	0	1	1	1	0	1	1	0	1	0.5	0	0.75	0.5833
HH14	0	1	0	0	0	0	1	0	1	1	0	1	0.5	0	0.5	0.4167
HH15	0	1	1	0	0	0	0	0	0	1	0	1	0.5	0.5	0.25	0.3333
HH16	0	1	1	0	1	0	0	0	1	1	0	1	0.5	0.5	0.5	0.5
HH17	0	0	0	0	1	0	1	0	0	1	0	1	0	0	0.5	0.3333
HH18	1	1	0	1	0	0	1	0	0	1	0	1	1	0.5	0.375	0.5
HH19	1	1	1	0	0	0	0	0	1	1	0	1	1	0.5	0.375	0.5
HH20	0	1	0	0	1	0	0	0	0	1	0	1	0.5	0	0.375	0.3333
HH21	0	1	0	0	0	0	1	0	0	1	0	1	0.5	0	0.375	0.3333
HH22	0	1	1	0	0	0	0	0	1	0	0	1	0.5	0.5	0.25	0.3333
HH23	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.125	0.0833
HH24	0	1	1	0	1	0	1	0	0	1	0	1	0.5	0.5	0.5	0.5
HH25	0	0	1	0	0	0	1	0	1	1	0	1	0	0.5	0.5	0.4167
HH26	0	1	0	0	0	0	0	0	1	1	0	1	0.5	0	0.375	0.3333
HH27	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0.5	0.3333
AVERAGE													0.3519	0.2778	0.4213	0.3858

Kwarbai A Ward

Household	School enrolment	School attainment	Medication	Life safety	Earnings	Nutrition	Housing	Water supply	Electricity	Cooking fuel	Asset ownership	Sanitation	Education deprivation index	Health deprivation index	Living conditions deprivation index	Capability deprivation index
HH1	0	0	0	1	0	0	1	0	1	0	1	1	0	0.5	0.5	0.4167
HH2	0	0	0	1	0	0	0	1	1	0	0	1	0	0.5	0.375	0.3333
HH3	0	0	0	0	1	1	1	0	1	1	1	1	0	0	0.875	0.5833
HH4	0	0	1	1	1	0	1	0	1	1	0	0	0	1	0.5	0.5
HH5	0	1	1	0	1	1	1	1	1	1	0	1	0.5	0.5	0.875	0.75
HH6	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0.375	0.25
HH7	1	0	0	0	0	0	0	0	1	0	1	1	0.5	0	0.375	0.3333
HH8	0	1	0	0	0	0	0	0	1	0	1	1	0.5	0	0.375	0.3333
HH9	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0.25	0.1667
HH10	0	0	0	1	0	0	0	1	1	0	0	1	0	0.5	0.375	0.3333
HH11	1	0	1	0	0	0	1	0	1	0	0	1	0.5	0.5	0.375	0.4167
HH12	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0.625	0.4167
HH13	0	0	0	0	1	1	1	0	1	1	1	1	0	0	0.875	0.5833
HH14	0	0	0	0	1	0	0	0	1	1	0	1	0	0	0.5	0.3333
HH15	0	0	0	0	0	0	1	0	1	0	1	1	0	0	0.5	0.3333
HH16	0	1	0	0	0	0	1	1	1	1	0	1	0.5	0	0.625	0.5
HH17	0	1	0	0	0	0	1	1	1	1	0	1	0.5	0	0.625	0.5
HH18	0	0	0	1	1	0	1	0	1	1	0	1	0	0.5	0.625	0.5
HH19	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0.375	0.25
HH20	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0.5	0.25
HH21	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0.625	0.3333
HH22	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25

HH23	1	1	1	0	0	0	0	0	1	1	0	1	1	0.5	0.375	0.5
HH24	0	0	0	0	1	1	1	0	1	1	0	1	0	0	0.75	0.5
HH25	1	1	1	0	0	0	1	0	1	1	0	1	1	0.5	0.5	0.5833
HH26	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH27	0	1	0	0	0	1	1	0	1	1	0	1	0.5	0	0.625	0.5
HH28	1	0	1	1	0	0	1	0	1	1	0	1	0.5	1	0.5	0.5833
AVERAGE													0.2143	0.2143	0.5223	0.4196

Kwarbai B Ward

Household	**School enrolment**	**School attainment**	**Medication**	**Life safety**	**Earnings**	**Nutrition**	**Housing**	**Water supply**	**Electricity**	**Cooking fuel**	**Asset ownership**	**Sanitation**	**Education deprivation index**	**Health deprivation index**	**Living conditions deprivation index**	**Capability deprivation index**
HH1	0	0	0	1	0	0	1	0	1	1	0	1	0	0.5	0.5	0.4167
HH2	0	0	0	0	0	1	0	0	1	0	1	1	0	0	0.5	0.3333
HH3	1	0	0	0	0	1	0	1	1	1	0	1	0.5	0	0.625	0.5
HH4	0	0	1	0	0	0	0	1	1	0	1	1	0	0.5	0.5	0.4167
HH5	0	1	1	0	1	0	0	1	1	0	0	1	0.5	0.5	0.5	0.5
HH6	0	0	0	0	1	0	0	1	1	0	1	1	0	0	0.625	0.4167
HH7	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0.375	0.25
HH8	1	0	0	0	0	0	0	0	1	1	0	1	0.5	0	0.375	0.3333
HH9	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0.5	0.3333
HH10	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0.5	0.3333
HH11	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0.375	0.25
HH12	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0.5	0.3333
HH13	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.25	0.1667
HH14	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0.375	0.25

HH15	0	0	1	1	0	0	1	0	1	1	1	1	0	1	0.625	0.5833
HH16	0	1	0	0	1	1	0	0	1	1	0	0	0.5	0	0.5	0.4167
HH17	1	1	1	0	0	0	1	0	1	1	0	0	1	0.5	0.375	0.5
HH18	1	0	0	1	0	0	1	0	1	1	0	0	0.5	0.5	0.375	0.4167
HH19	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.25	0.1667
HH20	0	0	0	0	1	0	0	0	1	1	1	1	0	0	0.625	0.4167
HH21	0	0	1	1	0	0	1	0	1	1	0	1	0	1	0.5	0.5
HH22	0	0	0	1	0	0	0	0	1	1	0	1	0	0.5	0.375	0.3333
HH23	0	0	0	0	1	0	0	0	1	1	0	1	0	0	0.5	0.3333
HH24	0	0	0	0	1	1	0	0	1	0	1	1	0	0	0.625	0.4167
HH25	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.125	0.0833
HH26	1	0	1	1	0	0	0	0	1	1	0	0	0.5	1	0.25	0.4167
HH27	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.25	0.1667
HH28	1	0	0	0	0	1	1	0	1	1	0	1	0.5	0	0.625	0.5
AVERAGE													0.1607	0.2143	0.4464	0.3601

L. Kona Ward

Household	**School enrolment**	**School attainment**	**Medication**	**Life safety**	**Earnings**	**Nutrition**	**Housing**	**Water supply**	**Electricity**	**Cooking fuel**	**Asset ownership**	**Sanitation**	**Education deprivation index**	**Health deprivation index**	**Living conditions deprivation index**	**Capability deprivation index**
HH1	0	0	1	0	1	1	1	1	1	1	0	0	0	0.5	0.75	0.5833
HH2	0	1	0	1	0	0	0	0	1	0	0	0	0.5	0.5	0.125	0.25
HH3	0	1	1	1	0	1	1	1	1	1	1	0	0.5	1	0.75	0.75
HH4	0	0	0	1	0	1	1	1	1	1	1	1	0	0.5	0.875	0.6667
HH5	0	1	0	0	1	1	1	1	1	1	0	1	0.5	0	0.875	0.6667
HH6	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0.5	0.3333

HH7	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0.375	0.25
HH8	0	1	1	0	1	1	1	1	1	0	1	0	0.5	0.5	0.75	0.6667
HH9	0	1	1	0	1	0	1	1	1	1	0	0	0.5	0.5	0.625	0.5833
HH10	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0.5	0.3333
HH11	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0.375	0.25
HH12	0	1	0	1	1	1	1	1	1	1	0	0	0.5	0.5	0.75	0.6667
HH13	0	1	0	0	0	0	1	1	1	1	0	0	0.5	0	0.5	0.4167
HH14	1	1	0	0	1	0	1	1	1	1	1	1	1	0	0.875	0.75
HH15	0	1	0	0	0	1	1	1	1	1	0	1	0.5	0	0.75	0.5833
HH16	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0.375	0.25
HH17	0	0	1	0	0	0	1	1	1	0	0	0	0	0.5	0.375	0.3333
HH18	0	1	0	0	1	0	1	1	1	1	0	0	0.5	0	0.625	0.5
HH19	1	1	0	0	1	0	0	0	1	1	0	0	1	0	0.375	0.4167
HH20	1	1	0	0	0	0	0	1	1	1	0	0	1	0	0.375	0.4167
HH21	0	1	0	1	1	0	0	1	1	1	1	0	0.5	0.5	0.625	0.5833
HH22	1	1	0	0	1	0	1	1	1	1	0	1	1	0	0.75	0.6667
HH23	0	1	0	0	0	0	1	1	1	0	1	1	0.5	0	0.625	0.5
HH24	0	1	0	0	0	0	1	1	1	1	1	1	0.5	0	0.75	0.5833
HH25	0	1	0	0	1	1	1	0	1	1	1	1	0.5	0	0.875	0.6667
HH26	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0.625	0.4167
HH27	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0.375	0.25
HH28	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0.625	0.4167
HH29	0	1	0	0	1	0	0	1	1	1	1	0	0.5	0	0.625	0.5
HH30	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0.375	0.25
HH31	0	1	0	0	1	0	0	0	1	0	0	0	0.5	0	0.25	0.25
HH32	1	0	0	0	1	0	1	1	1	1	0	1	0.5	0	0.75	0.5833
HH33	0	1	0	1	1	1	1	1	1	1	1	1	0.5	0.5	1	0.8333
HH34	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0.625	0.4167
HH35	0	1	0	0	0	0	1	1	1	1	0	0	0.5	0	0.5	0.4167
HH36	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0.375	0.25

HH37	1	0	0	0	0	1	1	1	1	0	0	1	0.5	0	0.625	0.5
HH38	0	1	0	1	1	0	1	0	1	1	0	0	0.5	0.5	0.5	0.5
HH39	0	1	0	0	0	0	0	1	1	0	0	0	0.5	0	0.25	0.25
AVERAGE													0.3718	0.1538	0.5801	0.4744

T. Tukur Ward

Household	**School enrolment**	**School attainment**	**Medication**	**Life safety**	**Earnings**	**Nutrition**	**Housing**	**Water supply**	**Electricity**	**Cooking fuel**	**Asset ownership**	**Sanitation**	**Education deprivation index**	**Health deprivation index**	**Living conditions deprivation index**	**Capability deprivation index**
HH1	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0.375	0.25
HH2	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0.25	0.1667
HH3	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH4	0	0	0	1	0	0	0	0	1	1	0	1	0	0.5	0.375	0.3333
HH5	0	0	1	0	0	0	0	0	1	1	0	1	0	0.5	0.375	0.3333
HH6	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0.25	0.1667
HH7	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH8	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0.25	0.1667
HH9	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH10	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH11	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0.25	0.1667
HH12	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH13	0	1	0	0	0	0	0	0	1	1	0	1	0.5	0	0.375	0.3333
HH14	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH15	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0.25	0.1667
HH16	0	0	0	1	0	0	0	0	1	1	0	1	0	0.5	0.375	0.3333
HH17	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.3333

HH18	0	0	1	1	0	0	0	0	1	1	0	1	0	1	0.375	0.4167
HH19	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH20	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH21	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0.25	0.1667
HH22	0	0	0	1	0	0	0	0	1	1	0	1	0	0.5	0.375	0.3333
HH23	0	0	0	1	0	0	0	0	1	1	0	1	0	0.5	0.375	0.3333
HH24	0	0	0	1	0	0	0	0	1	1	0	1	0	0.5	0.375	0.3333
HH25	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH26	0	1	0	0	0	0	0	0	1	1	0	1	0.5	0	0.375	0.3333
HH27	0	0	1	0	0	0	0	0	1	1	0	1	0	0.5	0.375	0.3333
HH28	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0.375	0.25
HH29	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH30	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH31	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH32	0	1	0	0	0	0	0	0	1	1	0	1	0.5	0	0.375	0.3333
HH33	0	1	0	0	0	0	0	0	1	1	0	1	0.5	0	0.375	0.3333
HH34	0	0	0	1	0	0	0	0	1	1	0	1	0	0.5	0.375	0.3333
HH35	0	1	0	0	0	0	0	0	1	1	0	1	0.5	0	0.375	0.3333
HH36	0	0	1	0	0	0	0	0	1	0	0	1	0	0.5	0.25	0.25
AVERAGE													0.0694	0.1528	0.3507	0.2708

T. Wada Ward

Household	**School enrolment**	**School attainment**	**Medication**	**Life safety**	**Earnings**	**Nutrition**	**Housing**	**Water supply**	**Electricity**	**Cooking fuel**	**Asset ownership**	**Sanitation**	**Education deprivation index**	**Health deprivation index**	**Living conditions deprivation index**	**Capability deprivation index**
HH1	0	1	1	1	0	0	0	1	1	1	0	1	0.5	1	0.5	0.5833

HH2	0	0	0	0	0	0	1	1	1	0	1	1	0	0	0.625	0.4167
HH3	0	1	1	0	1	0	1	1	1	1	1	1	0.5	0.5	0.875	0.75
HH4	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0.375	0.25
HH5	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0.375	0.25
HH6	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0.375	0.25
HH7	0	0	0	1	0	0	0	0	1	1	0	1	0	0.5	0.375	0.3333
HH8	1	0	0	0	0	0	0	1	1	0	0	1	0.5	0	0.375	0.3333
HH9	1	0	0	0	0	0	0	1	1	0	0	1	0.5	0	0.375	0.3333
HH10	0	1	0	0	0	0	0	0	1	1	0	1	0.5	0	0.375	0.3333
HH11	0	0	0	0	1	0	1	0	1	0	0	1	0	0	0.5	0.3333
HH12	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0.5	0.4167
HH13	0	0	0	0	1	0	0	1	1	1	0	1	0	0	0.625	0.4167
HH14	0	1	0	0	0	0	0	0	0	1	0	1	0.5	0	0.25	0.25
HH15	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0.25	0.1667
HH16	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0.25	0.1667
HH17	0	0	0	1	0	0	0	1	1	1	0	1	0	0.5	0.5	0.4167
HH18	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0.5	0.3333
HH19	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0.375	0.25
HH20	1	0	1	0	0	0	0	1	1	0	0	1	0.5	0.5	0.375	0.5
HH21	0	1	0	0	1	0	0	0	1	1	1	1	0.5	0	0.625	0.5
HH22	1	0	1	0	0	0	0	0	1	1	0	1	0.5	0.5	0.375	0.4167
HH23	0	1	0	0	0	0	0	1	1	0	0	1	0.5	0	0.375	0.3333
HH24	0	1	0	0	0	0	0	1	1	0	0	1	0.5	0	0.375	0.3333
HH25	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
HH26	0	0	1	0	0	0	1	1	1	1	0	1	0	0.5	0.625	0.5
HH27	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0.5	0.3333
HH28	0	1	0	0	1	0	0	1	1	1	1	1	0.5	0	0.75	0.5833
HH29	0	0	0	0	1	0	0	1	1	0	0	1	0	0	0.5	0.3333
HH30	1	0	0	0	0	0	1	1	1	1	0	1	0.5	0	0.625	0.5
HH31	0	1	0	0	0	1	0	1	1	1	0	0	0.5	0	0.5	0.4167

HH32	0	1	0	0	0	0	0	0	1	1	0	1	0.5	0	0.375	0.3333
HH33	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0.5	0.3333
HH34	0	1	0	0	0	0	1	1	1	1	0	1	0.5	0	0.625	0.5
AVERAGE													0.2353	0.1176	0.4669	0.3701

U. Fatika Ward

Household	**School enrolment**	**School attainment**	**Medication**	**Life safety**	**Earnings**	**Nutrition**	**Housing**	**Water supply**	**Electricity**	**Cooking fuel**	**Asset ownership**	**Sanitation**	**Education deprivation index**	**Health deprivation index**	**Living conditions deprivation index**	**Capability deprivation index**
HH1	0	0	0	1	0	1	0	0	1	1	0	0	0	0.5	0.375	0.3333
HH2	0	0	0	0	1	0	1	1	1	1	1	0	0	0	0.75	0.5
HH3	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0.625	0.4167
HH4	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0.625	0.4167
HH5	0	1	0	0	1	0	1	1	1	1	0	0	0.5	0	0.625	0.5
HH6	0	1	0	0	0	1	1	1	1	1	1	0	0.5	0	0.75	0.5833
HH7	0	1	1	0	1	1	0	0	1	1	0	0	0.5	0.5	0.5	0.5
HH8	0	0	0	0	1	1	1	0	1	1	0	1	0	0	0.75	0.5
HH9	0	1	1	0	0	0	1	0	1	1	0	0	0.5	0.5	0.375	0.4167
HH10	1	0	1	1	1	0	1	0	1	1	0	0	0.5	1	0.5	0.5833
HH11	0	0	1	0	1	0	0	1	1	1	0	1	0	0.5	0.625	0.5
HH12	0	0	0	0	1	1	1	1	1	1	1	1	0	0	1	0.6667
HH13	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0.5	0.3333
HH14	0	1	0	1	0	0	1	1	1	1	0	0	0.5	0.5	0.5	0.5
HH15	1	0	0	0	1	0	1	1	1	1	0	1	0.5	0	0.75	0.5833
HH16	1	1	0	0	1	1	0	0	1	1	0	1	1	0	0.625	0.5833
HH17	0	0	0	0	1	0	0	1	1	1	1	1	0	0	0.75	0.5

HH18	0	1	0	0	1	0	0	0	1	1	0	1	0.5	0	0.5	0.4167
HH19	0	1	0	0	1	0	1	1	1	1	0	1	0.5	0	0.75	0.5833
HH20	0	0	0	0	1	1	1	1	1	1	1	1	0	0	1	0.6667
HH21	1	1	0	0	1	0	0	1	1	1	0	1	1	0	0.625	0.5833
HH22	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0.5	0.3333
HH23	1	0	0	0	1	0	0	1	1	0	0	1	0.5	0	0.5	0.4167
HH24	1	1	0	0	1	0	1	1	1	1	0	1	1	0	0.75	0.6667
HH25	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0.375	0.25
AVERAGE													0.32	0.14	0.625	0.4933

U. Juma Ward

Household	**School enrolment**	**School attainment**	**Medication**	**Life safety**	**Earnings**	**Nutrition**	**Housing**	**Water supply**	**Electricity**	**Cooking fuel**	**Asset ownership**	**Sanitation**	**Education deprivation index**	**Health deprivation index**	**Living conditions deprivation index**	**Capability deprivation index**
HH1	1	1	0	0	1	0	1	1	1	0	0	1	1	0	0.625	0.5833
HH2	1	1	0	0	1	0	1	0	1	1	0	1	1	0	0.625	0.5833
HH3	0	1	0	0	0	1	1	1	1	1	1	1	0.5	0	0.875	0.6667
HH4	0	0	0	0	1	0	0	1	1	1	1	1	0	0	0.75	0.5
HH5	1	1	0	0	0	0	1	0	1	1	0	1	1	0	0.5	0.5
HH6	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0.5	0.3333
HH7	0	1	0	0	0	0	1	0	1	1	0	0	0.5	0	0.375	0.3333
HH8	1	0	1	1	1	0	1	1	1	1	0	1	0.5	1	0.75	0.75
HH9	0	1	1	1	0	0	1	1	1	1	0	0	0.5	1	0.5	0.5833
HH10	1	1	1	1	0	0	1	1	1	1	1	1	1	1	0.75	0.8333
HH11	0	0	0	0	0	1	1	1	1	1	0	1	0	0	0.75	0.5
HH12	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0.625	0.4167

HH13	0	1	0	0	1	1	0	1	1	1	0	1	0.5	0	0.75	0.5833
HH14	0	1	0	0	1	1	1	1	1	1	1	0	0.5	0	0.875	0.6667
HH15	0	0	0	1	1	0	1	1	1	1	0	0	0	0.5	0.625	0.5
HH16	0	1	0	0	1	1	1	1	1	1	1	0	0.5	0	0.875	0.6667
HH17	0	1	0	1	1	1	1	1	1	1	0	0	0.5	0.5	0.75	0.6667
HH18	0	0	1	0	1	1	1	1	1	1	0	1	0	0.5	0.875	0.6667
HH19	0	0	1	0	1	0	1	1	1	1	1	1	0	0.5	0.875	0.6667
HH20	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0.875	0.5833
HH21	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0.375	0.25
HH22	0	1	1	0	1	0	1	1	1	1	1	1	0.5	0.5	0.875	0.75
HH23	0	1	0	0	1	0	0	0	1	1	1	1	0.5	0	0.625	0.5
HH24	1	0	1	0	0	0	1	0	1	1	0	1	0.5	0.5	0.5	0.5
HH25	0	0	1	0	0	0	1	0	1	1	0	0	0	0.5	0.375	0.3333
HH26	0	0	1	0	0	0	1	0	1	1	0	1	0	0.5	0.5	0.4167
HH27	0	0	1	1	0	0	0	0	1	1	0	1	0	1	0.375	0.4167
AVERAGE													0.3519	0.2963	0.6574	0.5463

Wiciciri Ward

Household	**School enrolment**	**School attainment**	**Medication**	**Life safety**	**Earnings**	**Nutrition**	**Housing**	**Water supply**	**Electricity**	**Cooking fuel**	**Asset ownership**	**Sanitation**	**Education deprivation index**	**Health deprivation index**	**Living conditions deprivation index**	**Capability deprivation index**
HH1	0	1	0	0	1	0	1	0	1	1	0	0	0.5	0	0.5	0.5
HH2	0	1	0	1	1	0	0	0	1	1	1	1	0.5	0.5	0.625	0.5833
HH3	0	1	1	0	1	0	0	0	1	1	0	0	0.5	0.5	0.375	0.4167
HH4	0	1	0	0	1	0	1	0	1	1	0	1	0.5	0	0.625	0.5
HH5	1	1	0	0	1	0	0	0	1	1	0	0	1	0	0.375	0.4167

HH6	0	1	1	1	1	1	1	0	1	1	0	1	0.5	1	0.75	0.75
HH7	0	1	0	0	0	0	0	0	1	1	0	1	0.5	0	0.375	0.3333
HH8	0	1	1	1	0	0	0	0	1	1	0	0	0.5	1	0.25	0.4167
HH9	1	0	0	0	1	1	1	0	1	1	0	1	0.5	0	0.75	0.5833
HH10	0	1	0	0	1	1	0	0	1	1	0	0	0.5	0	0.5	0.4167
HH11	0	1	0	0	1	1	0	0	1	1	0	1	0.5	0	0.625	0.5
HH12	0	1	1	0	0	0	0	0	1	1	0	1	0.5	0.5	0.375	0.4167
HH13	0	1	0	0	0	0	1	0	1	1	0	1	0.5	0	0.5	0.4167
HH14	1	1	1	1	1	1	0	0	1	1	0	1	1	1	0.625	0.75
HH15	1	1	1	0	1	1	0	1	1	1	0	1	1	0.5	0.75	0.75
HH16	0	1	1	0	0	0	1	0	1	1	0	1	0.5	0.5	0.5	0.5
HH17	1	1	1	0	0	0	1	0	1	1	1	0	1	0.5	0.5	0.5833
HH18	0	1	1	0	0	0	0	0	0	1	1	1	0.5	0.5	0.375	0.4167
HH19	0	1	1	0	1	0	0	0	0	1	0	1	0.5	0.5	0.375	0.4167
HH20	0	1	0	0	0	0	0	0	1	1	0	0	0.5	0	0.25	0.25
HH21	0	1	1	0	0	0	1	0	1	1	1	1	0.5	0.5	0.625	0.5833
HH22	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0.375	0.25
HH23	1	1	0	0	1	0	1	0	1	1	1	0	1	0	0.625	0.5833
HH24	0	0	0	1	1	0	1	0	0	1	0	1	0	0.5	0.5	0.4167
HH25	0	1	1	0	0	0	0	0	1	1	1	0	0.5	0.5	0.375	0.4167
HH26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.125	0.0833
AVERAGE													0.5385	0.3269	0.4856	0.4679

Appendix V: Aggregate deprivation indices for Zaria local government area

Wards	School enrolment	School attainment	Medication	Life safety	Earnings	Nutrition	Housing	Water supply	Electricity	Cooking fuel	Asset ownership	Sanitation	Education Deprivation Index	Health Deprivation Index	Living conditions Deprivation Index	Capability Deprivation Index
Dambo	0.21875	0.59375	0.375	0.1875	0.6875	0.28125	0.53125	0.1875	0.9375	0.96875	0.28125	0.71875	0.40625	0.28125	0.57421875	0.497396
D. Abba	0.16666667	0.73809538	0.64285743	0.09523895	0.61904719	0.26190762	0.23809538	0.07142857	0.71428514	0.97619076	0.26190762	1	0.452381	0.369048	0.51785743	0.482143
Gyallesu	0.31034428	0.44827562	0.24137931	0.10344876	0.37931045	0.10344876	0.41379303	0.17241393	0.93103483	0.72413931	0.10344876	0.65517214	0.37931	0.172414	0.43534428	0.382184
Kaura	0.07407474	0.29629696	0.18518585	0.03703737	0.18518585	0.03703737	0.44444444	0.25925959	1	0.74074041	0.14814848	0.96296363	0.185185	0.111111	0.47222222	0.364198
Kufena	0.14814848	0.55555556	0.37037037	0.18518585	0.25925959	0.14814848	0.48148181	0	0.55555556	0.85185252	0.07407474	1	0.351852	0.277778	0.42129696	0.385802
Kwarbai A	0.17857129	0.25	0.21428514	0.21428514	0.28571486	0.17857129	0.57142871	0.28571486	1	0.64285743	0.28571486	0.92857129	0.214286	0.214286	0.52232129	0.419643
Kwarbai B	0.21428514	0.10714257	0.21428514	0.21428514	0.21428514	0.17857129	0.32142871	0.25	1	0.67857129	0.25	0.67857129	0.160714	0.214286	0.44642871	0.360119

L. Kona	0.153846154	0.5897435	0.12820512	0.17948717	0.46153846	0.25641026	0.71794871	0.79487179	1	0.74358974	0.25641026	0.41025641	0.371795	0.153846	0.58012820	0.474359
T. Tukur	0	0.13888889	0.11111111	0.19444444	0	0	0.05555556	0	1	0.75	0.02777778	0.97222222	0.069444	0.152778	0.35069444	0.270833
T. Wada	0.14705882	0.32352941	0.14705882	0.08823529	0.17647058	0.02941176	0.17647058	0.70588235	0.97058823	0.55882352	0.14705882	0.97058823	0.235294	0.117647	0.46691176	0.370098
U. Fatika	0.24	0.4	0.16	0.12	0.64	0.28	0.64	0.6	1	0.96	0.28	0.6	0.32	0.14	0.625	0.493333
U. Juma	0.222222222	0.481481481	0.370370370	0.222222222	0.592592593	0.296296296	0.814814815	0.629629630	1	0.925925926	0.333333333	0.666666667	0.351852	0.296296	0.657407407	0.546296
Wuciciri	0.230769231	0.846153846	0.461538462	0.192307692	0.576923077	0.230769231	0.384615385	0.038461538	0.807692308	1	0.230769231	0.615384615	0.538462	0.326923	0.485576923	0.467949
Zaria local government area	0.177287484	0.443762541	0.278588256	0.156436681	0.390602087	0.175524551	0.445486652	0.307320094	0.916665869	0.809341444	0.206145305	0.783011226	0.310525	0.217512	0.504262153	0.424181

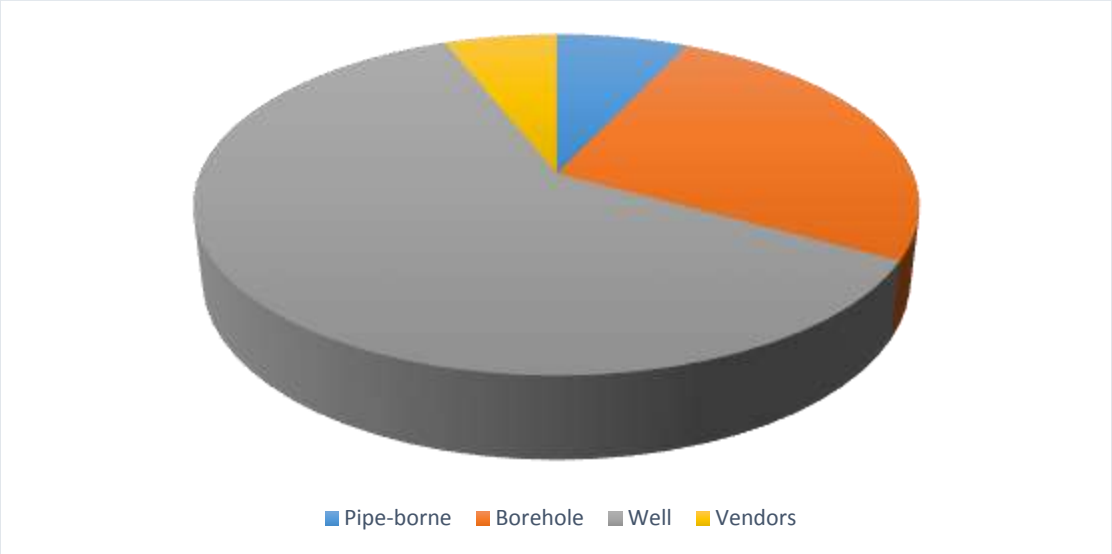
Source: Household Survey, 2016

Appendix VI: Distribution of standard deviation in CDI and its dimensions across wards

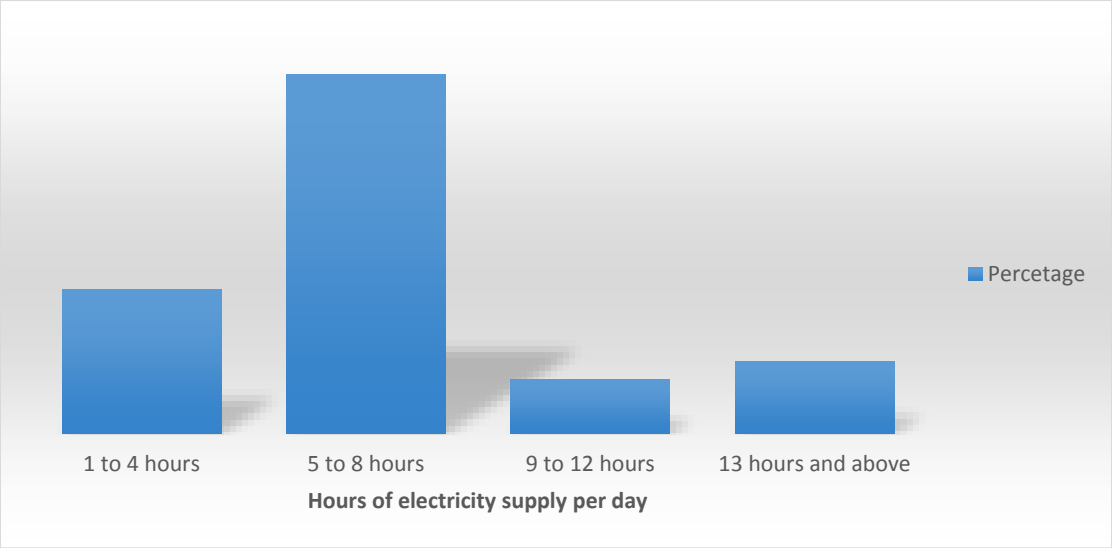
WARDS	*EDISTDEV*	*HDISTDEV*	*LDISTDEV*	*CDISTDEV*
Dambo	0.368902	0.2822	0.155086	0.137965
D. Abba	0.309461	0.261336	0.178858	0.150789
Gyallesu	0.436201	0.241863	0.187859	0.168909
Kaura	0.246051	0.21183	0.163838	0.15182
Kufena	0.30429	0.320256	0.139316	0.120425
Kwarbai A	0.317063	0.317063	0.170286	0.1351
Kwarbai B	0.273982	0.345033	0.137893	0.122251
L. Kona	0.318672	0.260411	0.20577	0.171161
T. Tukur	0.175368	0.262391	0.050173	0.064164
T. Wada	0.25332	0.247987	0.142052	0.123418
U. Fatika	0.35	0.270801	0.169251	0.112629
U. Juma	0.362014	0.373632	0.17878	0.144953
Wuciciri	0.28011	0.344741	0.163275	0.154698
AVERAGE	**0.307341**	**0.287657**	**0.157111**	**0.135253**

Source: Household Survey Report, 2016

Appendix VII: Households access to water (by source) in Zaria local government area



Appendix VIII: Households access to electricity supply in Zaria local government



Appendix IX: Households waste disposal channel in Zaria local government

