Feminization of multidimensional poverty in Sudan: An empirical analysis for the case of Greater Medani Locality, 2023

BY

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Abstract

Poverty remains the most pressing socio-economic issue in Sudan. Poverty is a multi–faceted phenomenon. This paper is set to investigate the persistence of multidimensional poverty among households headed by female in Greater Wad Medani Locality, following the approach proposed by Alkire-Foster model made up of 10 components has been built and used as a means of analyzing the data, education dimension presented on two indicators, two indicators for the dimension of health, while the dimension of the standard of living expressed on six indicators. The research relies on primary data aided by structured questionnaire compiled by Central Bureau of Statistics staff for year 2023, field work covering 6 administrative units. A total of 764 households randomly selected make up for the data source, the analysis of poverty decomposed by urban and rural location and divided the female householders into two main groups employees and farmers. The results indicated that 27.28% of the female householders under the study area are experience a multidimensional poverty, with deprivation equal or less than a third of overall three dimensions. Moreover, the analysis shows decompositions reveal considerable disparity in multidimensional poverty index, households headed by farmer present high levels of deprivation than one headed by employees, and the deprivation seem to be concentrated in all dimensions.

Keywords: Feminization poverty, Female householders, Multidimensional poverty, Sudan, Greater Wad Medani Locality

1. Introduction

Eliminating poverty and needs are the focal aims of most nations in our world. Many institutions have committed to ending poverty and poorness by 2030. Fighting extreme poverty and improving health and education are among the main Millennium Development Goals agreed by 189 heads of state in 2000. Since the seminal works of Sen, poverty is recognized as multidimensional phenomena, although, multidimensional measurement is a more responsible and reliable alternative in most context (International Fund for Agricultural Development, 2009). The term of the multidimensionality of poverty comes into the ground due to limitations for individuals to define poverty, the limit on all aspects of life (Bourguignon & Fields, 1997; Maleta, 2006; Castro, 2010). According to the Sustainable Development Goals (SDGs), poverty specifically mentioned as multidimensional feature (Alkire, 2018), several methodologies has been developed to assess this problem, Alkire-Foster method is one example used worldwide (Alkire & Foster, 2011) the method adopted nationally by many bodies to calculated multidimensional poverty index (MPIs) for different purposes to regions and sub-regions or to groups and sub-groups.

Another worldwide phenomenon is the rapid increase in the number of female householders (Gucciard, 2004). However, this rise has been accompanied by the increasingly visible problem of women in poverty (Huisman, 2005; Miller, 2003). The incidence of women poverty is widespread throughout the developing world (McFerson, 2010). The link between gender and poverty is complex, conceptually and empirically, mainly because of the lack of a single, universal definition. The most commonly applied approach to measuring poverty is through economic well-being, which offers limited insights into the analysis of gender and poverty.

Since Pearce introduced the concept of the feminization of poverty, gender has become an important variable in poverty studies (Pearce, 1976). In many countries, women are excluded from the labor market; when there is no male responsible for supporting the family, these women may face challenges in terms of social insurance benefits. Factors such as weak human relations (Kim, 2007) changes in family structure caused by divorce or death of a spouse (Kim, 2004), sexual division in labor ideology, and labor market

segmentation (Lee, 2005) are often considered as factors contributing to poverty among female householders.

Globally, there are 122 women aged 25-34 living in extreme poverty for every 100 men of the same age group. Extreme poverty numbers are slightly higher for the Sub-Saharan Africa region, where there are 127 women aged 25-34 living in extreme poverty for every 100 men. In nearly two-thirds of countries, women are more likely than men to report food insecurity, adolescent girls are more likely to be out of school than adolescent boys, women and girls are the primary water carriers, rely on unclean fuels for cooking and heating, with devastating effects on the health of women and children, who usually spend more time in the home.

Poverty in Sudan affected over a third of its population and 18.3% of the population of Gezira State, where this study rests, are poor. Moreover, the poverty gap ratio (depth) at 1.1%, and the poverty gap (severity) at 2.7% according to the African Development Bank group (2018). Oxford poverty and human development initiative (2020) assesses the national MPI for Sudan, the value is 0.279, and for Al Gezira State is 0.167. Sudanese women contribute to the household economy through both formal and informal work, in rural as well as in urban areas. They also have a considerable contribution in agricultural work, in handy craft production, and in many informal activities. With the pressure of domestic responsibilities and the cultural barriers to work, to education, and labour market, women are confined to low social status, lack empowerment, lacked opportunity to access land and other resources, and thus social recognitions (Interim, 2005).

The importance of this study comes from the stem that there is a big gap in gender data and the lack of trend data make it difficult to assess and monitor the direction and pace of progress for women. In Sudan the availability of data is slightly lower, with mainstreamed into national statistical strategies as a result, gender data scarcity will persist. To narrow this gap, this study has drawn to investigate the main features of economic and socio-economic situation of female heads of households in Greater Wad Medani Locality (GWML), and it will also contribute to abundance of literature on poverty reduction issues; the latter supposed to use as a guide to empower women. The research tries to answer the questions: what are the factors associated with female householders' deprivations in GWML? How unbalanced development leads to disparities among sub-regions and sub-groups? Which group is the most deprived? And what is the main contributor to female multidimensional poverty? To measure multidimensional poverty, the present study introduces the Alkire-Foster measure that built on the FGT index, to explain multidimensional poverty (MPI) in GWML, it focuses mainly on multidimensional poverty in households headed by female.

The justification to examine poverty from a multidimensional view is because poverty shows different shapes of deprivation in major principles of life, and it refers to pronounced deprivation in one or more facets of the well-being of a person. Furthermore, multidimensional methods offer another guide to explain poverty and how it can be viewed and understood (Alkire & Foster, 2011). The main objective is to calculate the MPI for female heads of households in GWML based on primary data compiled by the Central Bureau of Statistics (CBS) on poverty-related indicators for the year 2023. The specific objectives are 1) to empirically analyze poverty decompositions by urban and rural location. 2) to calculate the MPI by the two groups employees and farmers and 3) to assess the contribution of factors to MPI.

To do this the researcher is set to test the validity of the following working hypotheses: 1) female under the study area experiences multiple deprivations. 2) development in GWML is unbalanced. 3) MPI in urban areas lower than rural areas and 4) income poverty will be the main contributor to MPI.

The remainder of this paper is organized as follows. Section 2 reviews background information on Sudan multidimensional poverty and gender profile. Section 3 state the methodology and describes the data and sample selection. Section 4 presents the empirical results, and dissection the conclusions and policy implications in Section 5.

2. Literature Review

2.1. Multidimensional Poverty in Sudan

Sudan is the largest country in Africa with less than one million square miles after separation of the southern part in 2010. The Northern part of the country is an extension of Sahara Desert and the central part is a dry Savannah area tapering to a tropical forest climate in the junction with the northern boundaries with the southern country, is the largest countries in Africa, bordered by nine countries. The socio-economic condition in Sudan has changed dramatically during the past few decades, a study by Balloon & Duclos (2015) showed significant state and sub-group dissimilarities in measuring multidimensional poverty in Sudan. The African Development Bank Group (2018) calculated the global poverty prevalence in the Sudan the figure at 36.1% about 25 percent of its population are extremely poor.

According to Oxford Poverty and Human Development Initiative (2020), the global MPI in Sudan is estimated at 0.279 and also computed by sub-region urban and rural which the figures stated at 0.122 and 0.351 respectively. Recent study on multidimensional poverty in Sudan conducted in 2021 by Mohmed & Hysum (2021) used the multidimensional poverty approach to assess poverty in Gedaref State and found 47% of the population are multidimensional poor.

2.2. Gender Profile

Figures of the Japan International Cooperation Agency (2012), from the total population of Sudan, women account for nearly 50% of the population. Despite their active role in society, their socio-economic situation is still precarious. For decades they have remained marginalized both economically and socially, and sidelined in the political sphere. A large

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number of women have little or no access to health and education, and limited access to various resources. Women especially those living in rural areas, are suffering from inability to access safe water, health services, and educational opportunities. They also suffer unequal access to land credit and other agricultural services, although they participate heavily in agricultural works.

According to the Interim Constitution (2005), both males and females have equal rights in relation to economic activities, political participation, education, and all other human rights. Although constitutionally no barriers against women exist, laws to protect these rights are not always available. This is combined with various issues such as the present situation of wars, conflicts and poverty, and other social and cultural factors.

Gender roles in Sudan tend to be traditional, usually, a man is the 'head' of the house as official leader. He is responsible for all financial aspects of family life. Customarily, the father makes all decisions regarding the family and may consult his brothers and brothers-in-law or other male family members. While women are considered subordinate family member, although this varies across tribes and locations (Sudanese Community Profiles, 2007). With the pressure of domestic responsibilities and limited opportunities to meet employment, financing, and education, women are confined to particular occupations such as income-generating activities. Families support each other financially and socially. Traditionally, families take care of their sick, old, and mentally ill members. Women provide most of such family services and are also responsible for maintaining the home and raising the children.

The majority of Sudanese household heads are males. However, 28% of households are headed by women, with the proportion being the highest in rural areas. The average household size in Sudan is approximately seven persons. Although the status of Sudanese women has greatly improved over the last decades, however, gender inequality still exists in some aspects in the society (Elgali, 2019).

3. Methodology

3.1. The MPI concept

The agreement on poverty is multidimensional concept has been guided to many others researchers to develop the approach created by Alkire-Foster, this is approach is the most widely used worldwide (Alkire & Foster, 2011) and applied, for example, the OPHI and the human development report office of the united nations development programme (UNDP) to calculate the MPI globally for comparable measure purposes from one hand, from another hand to help policymakers to reduce poverty. Later, acute multidimensional poverty was computed for above 100 developing nations and updated annually. In a similar line, the World Bank (2017) also uses this method for its specific multidimensional poverty measures. In October 2018 World Bank launched its own method (World Bank, 2018). In

addition, some countries have shaped national MPIs as official eternal poverty data, familiarising the technique to their own situation and national concerns.

3.2. Aggregation Stage

The MPI is composed of three dimensions made up of ten indicators, associated with each indicator is a minimum level of satisfaction, which is based on international consensus, such as the MDGs. This minimum level of satisfaction is called a deprivation cut-off. Two steps are then followed to calculate the MPI.

Step 1, each person is assessed based on household achievements to determine if he or she is below the deprivation cut-off in each indicator. A person below the cut-off is considered deprived in that indicator.

Step 2, the deprivation of each person is weighted by indicator's weight, if the sum of the weighted deprivations is *33* % or more of possible deprivations, the person is considered to be multi-dimensionally poor.

3.3. MPI Mathematical Structure

The index has ten indicators, two for education, two for health, and six for living standards. The indicators of the MPI were selected after a thorough consultation process involving experts in all three dimensions. The poverty headcount (*H*) or percentage of people who are poor and the Average Intensity of deprivation (*A*), which reflects the proportion of dimensions in which households are deprived. The method has the mathematical structure of one member of a family of multidimensional poverty measures. This member of that family is called M_0. The three dimensions are equally weighted so that each of them receives *1/3* weight (see Table 1 for details).

The MPI of *X* given deprivation cut-off vector *z*, poverty cut-off *k,* and weight vector *w* is:

$$MPI(X) = \frac{1}{n}\sum_{i=1}^{n} c_i(k) = \frac{q}{n} \times \frac{1}{q}\sum_{i=1}^{n} c_i(k) = H \times A \quad (1)$$

Where: *q* is the number of poor, for those whose deprivation score is below the poverty cut-off, even if it is non-zero, this is replaced by *"0"*, what we call censoring in poverty measurement (see Table 2 for definitions of cut-off). The multidimensional headcount ratio (*H*), also frequently known as the poverty incidence, which is the fraction of the population identified as multi-dimensionally poor. It is simply given by:

$$H = \frac{\sum_{i=1}^{n} \rho_k(x_i;z)}{n} = \frac{q}{n} \quad (2)$$

The average deprivation shares across the poor, that is, the average fraction of dimensions in which the poor are deprived. This is also called the intensity (or breadth) of poverty (*A*). It is the average deprivation score of the multi-dimensionally poor people and can be expressed as:

$$A = \frac{\sum_{i=1}^{n} c_i(k)}{qd} \quad (3)$$

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Where: $c_i(k)$ is the censored deprivation scored of individual i and q is the number of people who are multi-dimensionally poor.

H and A can be easily combined into one single measure, called by the authors Mo, which is just the headcount ratio 'adjusted' (ie. multiplied) by breadth of poverty; $M_o = HA$, simply the MPI is a product of both: $MPI = H \times A$ (4)

A person is identified as poor if he or she is deprived in at least one-third of the weighted indicators. Noted that, all the M_o measures can be decomposed by population subgroups, one of our principal interests in this study is to understand sub-locality poverty. The MPI is helpful in this respect as it is subgroup decomposable. Let us denote the achievement matrix of subgroup ℓ by X^ℓ which has a population size of n^ℓ for all $\ell = 1,..., m$. Then we can express the overall MPI as:

$$MPI(X) = \sum_{\ell=1}^{m} \frac{n\ell}{n} M(X^\ell) \qquad (5)$$

The share of subgroup ℓ to the overall poverty is given by
$(n^\ell/n) \times [MPI(X^\ell)/MPI(X)]$ (6)

For our consideration urban and rural populations for n_1 and n_2, the two subgroups are respectively presented by two matrices of achievements x_1 and x_2. Then we have:
$$MPI(x;z) = \frac{n1}{n} MPI(x_1;z) + \frac{n2}{n} MPI(x_2;z) \quad (7)$$

3.4. Components of the MPI

1) Schooling: the MPI has 2 indicators that balance each other in the schooling element, one focuses on finished years of schooling of family participants, the other at if children are going to school. Years of schooling acts as a proxy for the level of knowledge and understanding of the household members. The deprivation cut-offs for this dimension, the MPI, requires that one member at least in the household has finished 5 years of education and that all children of school age are attending grades 1 to 6 of school.

Some important things to mention with the practice of constructing this indicator, sometime occurred that someone living with a family and there one member at least found 5 years of education is stated non-deprived, even though he/she may not be educated. Likewise, someone living in a family and there is one child at least not attending school is stated deprived in this indicator, even though he/she might have finished schooling. Again, members are living in one house where no school-aged children are stated non-deprived in school attendance. Henceforth the rate of deficiency in this indicator will reveal the demographic structure of the family and nation, as well as the educational achievements.

2) Health: the MPI has two health indicators, food of family members and adults or children who are malnourished. A child is underweight if he/she is two or more standard deviations below the median of the reference population. Noting that the global MPI does not state adults or children that are overweight as poor in nutrition unless he/she is malnourished. For purpose of the present research, food security defines as when there was not enough food or money for food in the past 7 days.

The second indicator uses data on child death. Generally, child deaths are preventable, being caused by infectious disease or diarrhoea. Child malnutrition also contributes to child death. In the MPI each household member is considered to be deprived if there has been at least one observed child death (of any age) in the household. It is important to observe that this indicator differs from the standard mortality statistics.

3) Living Standard: this indicator provides some fundamental indication of the quality of housing for the household these are: access to better-quality drinking water, access to better hygiene and the use of clean cooking gas, access to electricity and flooring material.

The indicator covers the ownership of some consumer goods, each of which has a literature describing them: receiver, TV, phone, bicycle, motorcycle, or freezer, or does not own a car or tractor. The cut-offs for each one can be determined according to the nature of the country under study, the assets index of the MPI by default is the same for all countries, it is relative cut-off rather than an absolute cut-off for, and rarely used for comparable purposes across countries or across time. Also prices have been difficult to use to build the asset index as the surveys lack information on the price, quality or age of assets. Clearly, all the living standard indicators are means rather than ends, some of the common classification that has been identified as follows:

- Water: water for family needs do not include vendor-provided water, tankers trucks, or unprotected wells and springs if the water source is/or piped water, public tap, borehole or pump, protected well, protected spring, or rainwater and it is within a distance of 30 minutes' walk (round-trip) a family is not poor in this term of drinking water. If it fails to satisfy these conditions, then the household is considered deprived of access to water.
- Hygiene: if the household has some type of flush toilet or latrine, or ventilated improved pit or composting toilet, a person is considered to have access to improved hygiene, provided that they are not shared, otherwise, it is considered deprived of hygiene.
- Electrical energy: if a person does not have access to electricity it is considered to be deprived here.
- Overcrowding: if there is at least 4 members per room.
- Cooking gas: a household is measured deprived of cooking gas if no gas is available, it cooks with dung, charcoal, or wood.
- Employment: if a female head of household does not have monthly salary or does not own at least 2

acres to farm then each person in it is measured poorly.

3.5. Data

This study attempts to examine the female multidimensional poverty in GWML as a case study of the research and the source of data, the locality state in Gezira State. The analysis relies on primary data on education, health, and standard of living, to test the various hypotheses relating to the objectives of the study and field work cover whole the locality including 6 administrative units.

The Gezira State has a total area of 27,549 km2 with population size about 4.2 million; 48% males and 52% females and 625,543 thousand households, with the average size of 6 persons according to CBS (2015). Gezira State the second most populous after Khartoum state, about 9.1% of total population of Sudan. Administratively, the state is organized into 8 localities namely, Greater Wad Medani (GWML), AlManaqil, AlHasaheisa, Janob AlJezira, Sharg AlJezira, AlKamlin, Um AlQoura and 24-AlQurashi. Each locality consists of a number of administrative units, which are similar in terms of demographic characteristics and economic activities.

The rationale behind selection of the GWML as a source of data are three folds first, since the capital of the state rest in this locality that means it is a home of major ministries and institutions where the female employees working there. Second, the locality is organized into 6 administrative units, only one administrative unit in town that it is Medani City, the other 5 administrative units, which are: Medani Wasst, Medani Janoob, Medani AlShimalia AlGrbia, Sharq AlNile and AlShabarqa, distributed between urban and rural areas, the later where female farmers residing. Third, more than half of urban population residing in this locality, about 62,450 households.

3.6. Sample size

GWML constituted the main sampling domain, in each of the administrative units, a two-stage cluster sampling designed is employed to draw the sample for the purposes of the study. The clusters are distributed to urban and rural areas, proportional to the size of urban and rural populations in these administrative units. The villages in the case of rural areas and blocks across town in the case of urban areas constitute the primary sampling unit. The urban and rural clusters in each administrative unit are selected randomly with probability of selection proportional to size. The sample did not include nomadic population due to lack of proper sampling frame for them and problem of accessibility. Also, institutional households, camps, etc. as well as homeless part of population were excluded from the sample. This represents the first sampling stage.

The second stage is conducted by listing all households headed by female within the selected sample unit. In order to having a random and representative sample, in addition to

provide good geographic coverage. The households' sample size is determined according to the equation Richard Geiger, given by:

N=P(1−P) Z2/D2.

Where:

N: the sample size;

P: the prevalence of the phenomena in the population under study;

(1-P): being the probability of failure;

Z: the critical standard value corresponding to the 95% confidence level and D: the degree of precision.

For the calculation of the sample size, at 95% confidence interval (D) is assumed to be 5% level of significance of the true value, as such (Z) is equal to 1.96. Based on a previous study, the NBHS (2014l2015), about 46.5% of the Northern Sudan' population is found below the national poverty line, at that time the poverty line was 113.8 SDG per person per month. Therefore, the estimated population proportion (P) is set at 0.46, setting (D) = 0.05, using these values into the above equation, we obtain the sample size of 382 households.

In order to increase precision, which might be lost as a result of adopting a multi-stage random sampling method and allowing for some non-response in the survey, we multiply the sample size by the design effect factor, which is equal to 2, so that the final sample size drawn from the population under study approximately a total of 764 questionnaires were administered to households while a total of were administered to healthcare providers and teachers staff.

The total sample of households is selected on the basis of the cluster sampling methods and will be distributed between administrative units of the study area according to the probability proportionate to the population size in each unit. In cases where a selected village could not be reached because of unsafe or access difficulties, it was changed by a nearby village in the sampling framework. For purpose of the questionnaire shows that the urban population makes up about 15% of the study sample, it means approximately 15% = 115 of households were drawn from the blocks and 85% = 649 were randomly selected throughout the villages, all samples distributed equally between two groups. Furthermore, no differentiated has done between female employees in governmental sector or private sector, from the total sample size of 764 households, 382 questionnaires for female employees, 58 questionnaires for urban, and 324 questionnaires for rural. Likewise, 382 questionnaires for female farmers, 58 questionnaires for urban, and 324 questionnaires for rural.

3.7. Questionnaire

Single survey was set to households, using structured questionnaire with head of households or other knowledgeable members on behave of she. The questionnaire administration was –sectional in nature. It delves on households' economic, social, and demographic data. The study adopted the form modules designed by expert team of

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OPHI for computing the MPI for developing countries. The data collected were associated with CBS, Gezira State, and were administrated to be in ~ 30 minutes per household.

Overall time management is left to the enumerator staff, as many factors determine how many villages and blocks can be surveyed per day depending on the distances between houses. All respondents are in good health and are in age between 25-60 years old; the working age according to Sudanese labor law.

The questionnaire is divided into two main sections. Section (1), at the top of the household questionnaire, for collecting basic demographic data about the survey respondent and the head of the household. These data are very useful in providing a quick overview of the characteristics of the respondents and households in the randomly sampled population and allow to better understand the nature of data collected.

The questions in this section relate to variables such as head of the household's age and gender, respondent's age and gender, and marital status of the head of the household. Section (2) is meant to collect data on household income by source. Section (3) relates to information on household's expenditure by item, including expenditure on food, housing, source of fuel, clothing, education, and medical treatment.

Section (4) is devoted for questions related to some poverty correlates. These include house characteristics such as tenure status, type of cooking fuel, type of lighting, source of drinking water. Section (5) includes questions related to ownership of valuable assets, which may provide information on variables other than income and expenditure that could influence households' standard of living.

Field work began on 20 March to 10 of April 2023, about 12 enumerators (divided into 4 groups) employed to collect data from the households identified for this study under the supervision of the director of CBS in Gezira State.

3.8. Data Coding and Processing

To ensure that the data are accurate and quality control, data were entered using Excel Sheet Files, 10% from each cluster is selected randomly to check that the data were entered correctly. The Data from the study were run through Statistical Package for Social Science (SPSS) and all data recorded into numerical codes, according to the poverty cut-off settled as shown in Table 3. All villages and blocks are organized under their administrative units. Likewise, each administrative unit is organized under its locality, and then urban/rural data were organized for the purposes of the study.

Table 1. MPI dimensions, indicators, and weights.

Dimensions	Indicator	Poverty Cut-off	Related to…	Weight
Education (1/3)	Years of education (1/6)	No member of the household has done 6 years of education.	MDG2	16.67%
	Child staffing (1/6)	Any child school-age is out of school in years 1-86.		16.67%
Health (1/3)	Food (1/6)	Any child or adult for whom there is nutritional data is undernourished.	MDG4	16.67%
	Child mortality (1/6)	One child at least has died in the household in the last 5 years.	MDG1	16.67%
Standard of living (1/3)	Electrical energy (1/18)	The family has no electrical energy.	-	5.56%
	Better hygiene (1/18)	The family's hygiene ability is not better or it is public.	MDG2	5.56%
	Better-quality drinking water (1/18)	The family does not have access to better drinking water, waking up 30 minutes from home-based, roundtrip.	MDG7	5.56%
	Flooring (1/18)	The household's ground is dirty, sandy, or dunging.	-	5.56%
	Cooking gas (1/18)	The family cooks with charcoal, wood, or dung.	MDG7	5.56%
	Assets (1/18)	The family does not own one of: receiver, TV, phone, bicycle, motorcycle, or freezer or does not own a car or tractor.	MDG7	5.56%

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Table 2. Definitions of cut-off points for each MPI dimension employed by the empirical model.

No.	Dimension	Cut-off Points
1	School Enrolment	At least one child, age 6 and above, is not currently enrolled in school.
2	School Attendance	No household member has completed 6 years of schooling.
3	Child Mortality	Any child has died in the family in the last 5 years.
4	Food Security	There was not enough food or money for food in the past 7 days.
5	Overcrowding	Household lives with 4 members and above.
6	Electricity	Household not electrified.
7	Cooking Gas	The household cooks with dung, wood, or charcoal.
8	Sanitation	If the household doesn't use a flush toilet, unimproved latrine, pit, or shared.
9	Safe Drinking Water	If the water source piped outside the house.
10	Employment	The female head of household has not monthly salary or does not have owned at least 2 acres to farms.

Table 3. Binary Scoring Indicators/ Poverty Cut-off.

Indicator	Definition of Indicator
School Enrolment	at least one child, age 6 and above, is not currently enrolled in school; 0 otherwise.
School Attendance	if no household member age 6 and above has completed 6 years of schooling; 0 otherwise.
Food Security	there was not enough food or money for food in the past 7 days; 0 otherwise.
Child Mortality	if at least one child has died within the household during last 5 years; 0 otherwise.
Overcrowding	1 if 4 members of household per room; 0 otherwise.
Electricity	1 if the house is not electrified; 0 otherwise.
Cooking Gas	1 if the household has no gas for cooking; 0 otherwise.
Sanitation	1 if the household doesn't use a flush toilet or shared; 0 otherwise.
Safe Drinking Water	1 if the water source piped outside the house; 0 otherwise.
Employment	1 if the household doesn't have monthly salary or at least 2 acres to farm; 0 otherwise.

4. Results and discussions

The researcher could reach the following findings. A total (764) of households headed by female workers was interviewed in GWML reside over 6 administrative units, the study estimated MPI using 10 indicators across 3 dimensions adopting, the result observed that 27.28% of total population under the study area are experience multidimensional of deprivation. The dimension of standard of living in general, the highest contributor to poverty about 53.17% deprived across the six indicators of dimensions, and the share of health and education of MPI are 29.22% and 17.61% respectively, with high figure assessed to child mortality contributed most to poverty about 25%, this indicates poverty of female exceeds to poverty of their children. Figure 1 presents the contribution of deprivation in each dimension to overall MPI.

The finding proved the validity of the first hypothesis, the structure of poverty among the poor female householders of GWML. As estate by Tønnessen (2019) female have been shown to be vulnerable to extreme poverty because they face greater burdens of unpaid work, have fewer assets and productive resources than men, earn less than men, are more likely to work in sectors that have lower average incomes, and are also likely to be engaged in part-time work due to the burden of unpaid work.

The results show important differences in poverty among the two different groups. Overall, 24.68% of female employees are multi-dimensionally poor, those whom earn monthly income. Although they are better of compare to 28.09% of female farmers, those earns income seasonally and from others agricultural activities. Similar findings obtain by Amlaksetegn et al., (2020) rural areas are significantly poorer than urban ones, this means that the value of wage employment is important to women's economic empowerment, and the female they have little access to services and few opportunities to become more productive and being employed have a positive and significant effect on multidimensional wellbeing of households. These results assert that development in the State is unbalanced; the second hypothesis of the present study. Most of women interviewed

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for this study spend their wage income are forms of economic investments such as education in order to secure better future live to their children.

Furthermore, the analysis across dimensions, reveal that a higher deprivation level is observed in the case of standard of living contributes to 51.33% to overall MPI value of female employees with highest value reported by overcrowded house indicator 15.91% of households with 4 members and above per room. This implies that the majority of the household are deprived in necessities of life, they do not have enough money to meet basic needs. 14.67% of the houses are not electrified, approximately 9.93% do not have improved hygiene facilities and 7% of households use unimproved cooking fuel, cooks with dung, wood, and charcoal. Also, the findings of this study are consistent with the findings of the SNHDR (2012), where the standard of living across Sudan is found to be on average far lower than health and education achievements.

Similarly, for female farmers group, the main contributor to MPI value is of standard of living, but likely, the rate close to the rate of health dimensions 39.94% and 33.88%

respectively. This result is mainly due to either they don't won acres to farm or lack of funding for agriculture, all female interviewed in this regard have monthly a minimum wage of 50 Sudanese pounds and not exceeding 130 Sudanese pounds. Similar result reveals by (Shin, 2010) the money deficit arising from labor and labor deficiencies is the major factor causing female householders' poverty, due to the most Sudanese female householders are engaged in temporary employment and part-time work (62.5%) and about 40% of female householders have experienced unemployment over the past year, demonstrating typical characteristics of the working poor who are incompletely involved in the labor market.

Health dimension contributes positively to poverty, in terms of child mortality rate found to be at 20.83%, by contrast, low level education dimension contributes relatively little to poverty for two groups. However, expenditures on primary school and health significantly reduce the incidence of multidimensional poverty. The Figure 1 describes the behaviour of the dimensions, Figure 2 describes the status of female workers for two groups at GWML.

Table 4. MPI Indicators of Deprivation for female of the Greater Wad Medani Locality.

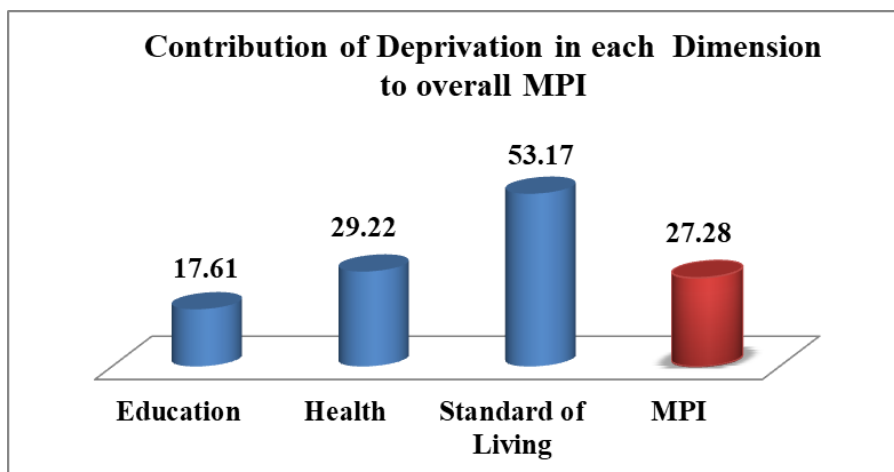| Domain	Dimension	Female Workers	
		Monthly Salary	Farmers
Education	Children age 6-14 not attending school	6.11	15.11
	Population not completed 5 years of schooling	8.8	11.07
Health	Population malnourished	13.8	13.05
	Families with at least one death under 5 years	19.96	20.83
Standard of Living	Households with overcrowded	15.91	12.82
	Households with no electricity	14.67	1.64
	Households cooking with wood or charcoal	7	1.11
	Households with no sanitation	9.93	10.23
	Households with no safe drinking water	2.04	7.35
	Households without salary or 2 acres	1.78	6.79
Total MPI		24.68	28.09

Figure 1. The contribution of deprivation in each dimension to overall MPI.

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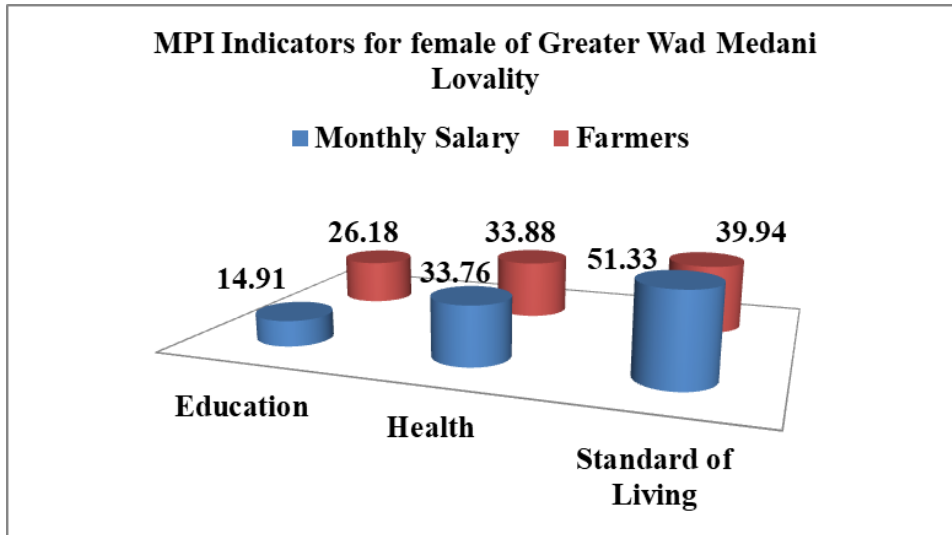
Figure 2. MPI indicators for female workers at GWML.

5. Conclusion

The present study provides an analysis of poverty in Greater Wad Medani Locality, as a topical issue to sustainable development, as well as targeting alleviation of poverty as a highly rated development objective and perhaps a critical one for our study area. Poverty remains the most pressing socio-economic issue in Sudan and is amulti–faceted phenomenon. This paper is set to investigate the persistence of multidimensional poverty among households headed by female in Greater Wad Medani Locality, following the approach proposed by Alkire-Foster model made up of 10 components has been built and used as a means of analyzing the data, education dimension presented on two indicators, two indicators for the dimension of health, while the dimension of the standard of living expressed on six indicators. The research relies on primary data which cover a broad spectrum of socio-economic parameters based on 6 administrative units, aided by structured questionnaire compiled by Central Bureau of Statistics staff for year 2023, field work covering 6 administrative units. A total of 764 households randomly selected make up for the data source, the analysis of poverty decomposed by urban and rural location and divided the female householders into two main groups employees and farmers. The value of the MPI computed is significantly high; the results indicated that 27.28% of the female householders under the study area are experience a multidimensional poverty, with deprivation equal or less than a third of overall three dimensions. Moreover, the analysis shows decompositions reveal considerable disparity in multidimensional poverty index, households headed by farmer present high levels of deprivation than one headed by employees, and the deprivation seem to be concentrated in all dimensions, the result proves that rural areas in Gezira State are lagging behind urban areas in terms of development, the current status in regard to most the indicators is far from being satisfactory. Therefore, the study recommends government policies aim to reduce poverty should be raising the level of wages and increasing employment opportunities for female by create new jobs and realization of equitable and balanced development as a top priority for eliminating poverty, with paying more attention to rural areas.

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