[ORIGINAL RESEARCH ARTICLE]

Female-headed household characteristics and poverty levels in Namibia: An ordinal probit analysis of the 2015/16 Namibia Household Income and Expenditure Survey

Opeoluwa Oyedele (iD)**, Rhona Haifene**
Department of Computing, Mathematical and Statistical Sciences, School of Science, University of Namibia, Windhoek, Namibia

Corresponding Author & Email
Opeoluwa Oyedele; OOyedele@unam.na

Abstract
Poverty incidence in Namibia is higher amongst female-headed households (46%) compared to male-headed households (41%). However, this situation is further worsened by females in households increasingly being forced to play multiple, conflicting roles after losing their spouses, and to work in marginal, part-time, informal and low-income jobs due to their lack of access to high-paying jobs, while having to take care of children, siblings and sometimes parents with no form(s) of assistance. In this study, a cross-sectional quantitative study design of the 2015/16 NHIES and an ordinal probit model was used to examine the household characteristics that contribute to poverty among female-headed households in Namibia, as well as their effects on the households' poverty levels. Results from this study showed that characteristics such as region (p<0.001), main language spoken at home (p<0.001), main source of income (p=0.009), location (p=0.016), and highest level of education (p=0.005) had significant associations with the household poverty levels. Additionally, female-headed households in the urban areas in the Hardap, Otjozondjupa and Zambezi regions, whose main languages spoken were English, German, Zambezi and other languages, with tertiary education and main source of income from commercial farming and other sources were less likely to be severely poor and more likely to be not-poor. Therefore, it is recommended that the Namibian government and policymakers further improve the livelihood of women, especially those heading households in other regions, in terms of a comprehensive social development strategy that covers the immediate needs for short-term and long-term needs of these women.

INTRODUCTION

Poverty is a condition in which an individual/household lacks the financial resources and essentials (such as shelter, clothing, clean water and food), access to education, healthcare and transport (Okalow, 2022). In 2021, it was estimated that 9% (698 million people) of the global population lived in extreme poverty (i.e., living on less than US$1.90 a day), while over one-fifth (1,803 million people) of the global population lived below US$3.20 and over two-fifths (3,293 million people) lived below US$5.50 a day (Suckling, Christenes & Walton, 2021). Poverty can be measured by two levels, namely absolute poverty and relative poverty. Absolute poverty is used to describe a condition where an individual/household is unable to meet basic human needs, including food, safe drinking water, sanitation facilities, health, shelter and education (Okalow, 2022). This level of poverty varies from country to country depending on how poor or rich a country is and with each country setting its own standard or measure regarding poverty. On the other hand, relative poverty is a condition where an individual/household receives less than half of what average individuals/households get to sustain themselves, although not enough to meet their basic needs (Habitat for Humanity, 2017). This level of poverty does not remain constant but can improve when the economy of a country does better which in turn affords citizens the same standard of living and reach their full potential.

In Namibia, an individual/household is classified as poor if 60% or more of the individual/household's total consumption was spent on food (Namibia Statistics Agency [NSA], 2018). This classification was further expanded on to classify an individual/household as severely poor or just simply poor using the food poverty line estimated from the 2015/16 Namibia Household Income and Expenditure Survey (NHIES) at N$293.10 with a rate of US$1:N$13.23 (as of October 2018). Here, the food poverty line was defined as the cost of a basket of food with minimum recommended nutritional intake. Although food poverty lines are often considered the most extreme measurement of monetary deprivation since the cost of non-food essentials are not included in their estimation and are mostly estimated from household surveys of the country under consideration, the threshold of food poverty line varies depending on the local cost of food and consumption behaviours per country. For Namibia, the food poverty line was estimated with a lower and upper bound estimate of N$389.30 and N$520.80 respectively (NSA, 2018). This means that if an individual/household is unable to spend at least N$520.80 per month on basic needs, such individual/household was considered to be poor, while if an individual/household is unable to spend at least N$389.30 per month on basic necessities, such individual/household was considered severely poor.

Comparing poverty levels between men and women, the United Nations (2023) estimated that one-third (i.e., 33.5%) of employed women were living in poverty in 2019 compared with 28.3% of employed men in least-developed countries, with the World Bank (2020) concluding that the conditions associated with poverty affect nearly 46% of the world's population, with women representing the majority of the poor in most regions. Although the gender gap is less sharp in Europe, Central Asia, Latin America and other high-income economies, it is at its peak in developing regions such as East Asia & the Pacific, South Asia and Africa, leading to an over-representation of women among the poor globally (World Bank, 2020). In addition, while Europe and Central Asia, Latin America and the Caribbean, and other high-income economies have low female poverty rates among young people, East Asia & the Pacific, South Asia and Sub-Saharan Africa were reported to have high female poverty rates. However, with the Coronavirus disease

(COVID-19) crisis having a disproportionate impact on people's livelihoods, it is likely to worsen these poverty rates findings. Furthermore, it has also become evident that despite being poorer than men, women also face managing their households on their own due to changes in the social setup of societies. To be precise, females in households are now forced to play multiple, conflicting roles after losing their spouses, and have to work in marginal, part-time, informal and low-income jobs due to their lack of access to high-paying jobs (Lebni et al., 2020). Sadly, changes in demographic and population characteristics, social norms and the nature of family structure all appear to be encouraging female headship (Milazzo & Van de Walle, 2017).

A female-headed household can be defined as a household where a woman oversees and manages the family as a result of divorce, separation, immigration or widowhood (Javed & Asif, 2011). In many developing countries, there has been a significant increase in the percentage of female-headed households, with majority of these women being widowed and to a lesser extent divorced or separated, while in the developed countries, most female-headed households consist of women who never married or were divorced (World Bank, 2023). The association between the feminization of poverty and household headship comes from the idea that female-headed households represent an unbalanced number of the poor, and that they experience greater extremes of poverty than male-headed households, which further results in gender inequality (Milazzo & Van de Walle, 2017). Mwangi (2017) assessed the impact of poverty on female-headed households in Kangemi, Kenya and concluded that female-headed households experience stigma and exclusion arising from poverty and marital status, while the impact of poverty among women was felt in the pervasiveness of social problems such as child labour, prostitution and unwanted teenage pregnancies. Female-headed households were further impacted by poverty because of the traditional gender inequalities that serve to justify and maintain socioeconomic inequalities, prompting Mwangi (2017) to conclude that there was a direct link between poverty and female-household headship. Furthermore, it has been reported that female-headed households more often face gender discrimination with respect to education, earnings, rights and economic opportunities due to women being more vulnerable to poverty and lacking basic necessities as well as access to economic empowerment avenues such as access to credit facilities for business or agriculture expansion (Mwangi, 2017). Moreover, women and girls are disproportionately affected by poverty and many have little or no say in the decisions which affect their lives. They often suffer from gender-based violence, social exclusion and child abuse, and are disproportionately affected by poor health and sanitation, with many having little or no money of their own which makes them more dependent on others (Akokuwebe, 2015; Ambroggi et al., 2015; Mwangi, 2017; Health Poverty Action, 2018; Alarcón & Sato, 2019; United Nations Populations Fund, 2020; Okafor & Borchelt, 2022).

Despite several re-distributive measures and social protection programs put in place by the Namibian government, high inequality continues to be evident in the country, reflecting a historical legacy of inequality of opportunity (World Bank, 2022). According to NSA (2021), 43.3% of Namibia's population live in multidimensional poverty where an individual or persons can suffer multiple disadvantages at the same time such as poor health or malnutrition, a lack of clean water or electricity, poor quality of work or little schooling, with this poverty higher among female-headed households (46%) than in male-headed households (41%). Thus, women more than men are poorer, yet this situation is further worsened by women being alone, having to take care of children, siblings and sometimes parents with no form(s) of assistance. As a result, an increasing number of female-headed households in developing countries, including Namibia, are emerging due to economic changes, economic downturns and social pressures among others

(Indexmundi, 2019). To date, quite a score of studies have been done on poverty in Namibia. However, factors contributing and influencing poverty levels, especially among female-headed households in the country, still need to be sufficiently explored. In addition, five of the 14 regions in Namibia were reported to be headed by females during the 2015/16 NHIES period, namely the Omusati (58.3%), Ohangwena (57.5%), Oshana (52.4%), Zambezi (51.8%) and Oshikoto (50.8%) regions, with increased likelihood of being poor. This, therefore, raises questions about what might be accounting for these over-representation of female-headed households in official accounts of poverty in the country, and how this is plausibly changing (or not) over time. Moreover, the relationship between gender and poverty is a complex and debatable topic more than ever and thus a potential area for policy makers to focus on. For this reasons, this study was aimed at identifying the household characteristics that contributes to poverty among female-headed households in Namibia, as well as their effects on the households' poverty levels. Identifying these characteristics can be useful in the interrogation of the coping mechanisms that were put in place to reduce household poverty in the country, while findings from this study can further lead to the strengthening of policies with a possibility of incorporating them in poverty eradication programs countrywide, especially among female-headed households.

DATA AND METHODS

Research design

The study followed a cross-sectional quantitative research design using data extracted from the 2015/16 Namibia Household Income and Expenditure Survey (NHIES), the latest thus far in the country, obtained from the Namibia Statistics Agency. The NHIES is a household based survey, designed to collect data on income and expenditure patterns of households and the sole source of information on income and expenditure in the country. It is freely available to the public on the agency's website (www.nsa.org.na). The survey also serves as a statistical framework for compiling the national basket items for the compilation of price indices used in the calculation of inflation and forms the basis for updating prices or rebasing of national accounts, among others (NSA, 2018). The implementation of the 2015/16 NHIES was financed by the Government of the Republic of Namibia through the Ministry of Economic Planning Sectoral Budget. Technical support in the area of data processing, for example, the development of data entry and listing applications was provided by experts from the United States Census Bureau through funding by the United States Agency for International Development, while experts from the World Bank provided technical expertise during the sampling and data analysis stages (NSA, 2018).

Sampling design

The sample design used in the 2015/16 NHIES was a stratified two-stage cluster sampling, where the first stage units were geographical areas designated as the primary sampling units, while the second stage units were the households. The primary sampling units were based on the 2011 Population and Housing Census enumeration areas and for each primary sampling unit, 12 households were systematically selected. The primary sample frame was stratified first by region followed by urban and rural areas within region, and then the urban/rural strata were further stratified implicitly by constituencies. The rural strata were also further stratified implicitly taking into consideration the proclaimed villages, settlements, communal and commercial farming areas within the rural strata. As a result, a total of 864 primary sampling units were sampled in the survey (NSA, 2018). The households in the secondary sample frame were identified from the list of all

households for each selected primary sampling units, while additional information were collected from the primary sampling units in the proclaimed villages, settlements, communal and commercial farming areas for the purpose of carrying out further stratification before selecting the sample households from there. Overall, the survey had a representative sample size of 10368 households from 864 sampled primary sampling units (NSA, 2018). More detailed information about the sampling design and methods as well as the entire survey can be found in the 2015/16 NHIES report, freely available online on the NSA website. The inclusion criteria for this study were all households headed by females as captured in the 2015/16 NHIES. Households with incomplete, non-response or missing information were excluded from this study. The individual households considered in this study were identified from the 2015/16 NHIES as per the inclusion criteria for this study.

Descriptive analysis

The household characteristics of the female-headed households considered in this study were region, age (in years), main language spoken, main source of income, location, highest level of education and number of household members as captured in the 2015/16 NHIES data. The individual households considered in this study were identified from the 2015/16 NHIES as per the inclusion criteria for this study. Moreover, during the 2015/16 NHIES period, each respondent was asked 'What is the main source of income for this household?' in order to determine the main source of income of their respective household. The obtained response was the household's own perception at the time of interview. Similarly, the annual consumption of a household interviewed in the 2015/16 NHIES was described using the total household consumption, average household consumption and the consumption per capita indicators (all measured in Namibia Dollars (N\$)). For this study, in order to determine the respective poverty level of each interviewed household, the household's average monthly per capita consumption (i.e., average consumption per capita divided by 12) was used. In Namibia, the food poverty line for 2015/2016 was estimated with a lower and upper bound estimate of N\$389.30 and N\$520.80 per month, at a rate of US\$1:N\$13.23 (as of October 2018). Thus, using this poverty line, each household considered in this study was classified as follows:

$$Poverty\ level = \begin{cases} Not\ poor & > N\$520.80 \\ Poor & N\$389.30 - 520.80 \\ Severely\ poor & < N\$389.30 \end{cases}$$

More detailed information about the construction of the main source of income, annual consumption and the remaining household characteristics considered in this study can be found in the 2015/16 NHIES report, freely available online on the NSA website.

Statistical analysis

R software (version 4.2.2) was used for the data cleaning, variables recoding and data analysis. Pearson's chi-square test was performed to examine the association between the household characteristics and poverty levels, while the effect of the household characteristics on their respective poverty levels was determined using a multivariable ordinal probit regression model, considering the ordered nature of the poverty levels (not-poor, poor and severely poor). An ordinal probit regression model is used to estimate relationships between an ordinal dependent variable (y_i) and a set of independent variables (X) (Dopico, 2020) such that

$$y_i^* = Xb + \epsilon$$

for

$$y_i = \begin{cases} 1 & y_i^* < \alpha_1 \\ 2 & \alpha_1 < y_i^* \leq \alpha_2 \\ \vdots & \vdots \\ J & \alpha_{J-1} \leq y_i^* \end{cases}$$

where b is the vector of regression coefficients which needs to be estimated, ϵ is the error term, $\alpha_1, \alpha_2, \cdots, \alpha_J$ is the thresholds and J is the number of mutually exclusive categories of y_i (Johnston et al., 2020). In this study, y_i was the households' poverty levels (not-poor, poor and severely poor), while X was the household characteristics (region, age, main language spoken, main source of income, location, highest level of education and number of household members). Significant characteristics from the chi-square tests (p<0.05) were used in the fitted multivariable ordinal probit regression model.

RESULTS
Participants' profiles
A total of 4451 female-headed households were considered in this study as per the inclusion criteria of this study. As at 2015/16, these households had a yearly estimated (household) per capita consumption of N\$83022.76, and a monthly per capita consumption of N\$6918.56 on average, with an estimated median per capita consumption value of N\$52018.35 and N\$4334.86 respectively, as shown in Table 1.

Table 1.
Estimated statistics of the female-headed households' per capita consumption in 2015/16

	Monthly (in N\$)	Yearly (in N\$)
Mean	6918.56	83022.76
Median	4334.86	52018.35
Standard deviation	8890.62	106687.44
Number of households	4451	4451

The highest number of female-headed households were recorded in the Omusati and Ohangwena regions within the rural areas, headed by a 60+ year old, among Oshiwambo speakers, had salaries/wages as their main source of income with a primary education and living with 1-3 household members as shown in Table 2. Of the 4451 female-headed households considered, 4432 (99.57%) were classified as not-poor, 11 (0.25%) were poor, while 8 (0.18%) were severely poor in 2015/16 as shown in Table 2. Majority of the female-headed households that were classified as not-poor were in the rural areas, in the Omusati and Ohangwena regions, headed by a 60+ year old, with a primary education, spoke Oshiwambo as their main language, had salaries/wages as their main source of income and living with 1-3 household members. Of the 11 female-headed households that were classified as poor, the highest were observed in the rural areas, in the Omaheke region, headed by a 60+ year old, with no formal education, spoke Nama/Damara language, with pension and living with 1-6 household members. Likewise, out of the 8 female-headed households that were classified as severely poor, the highest were recorded in the rural areas, in the Kunene region, headed by a 30-39 and 60+ year old, with no formal education, spoke Otjiherero language, living with 1-3 household members and living on a drought/in-kind receipts, pension, remittances/grants, subsistence farming as their main source of income.

Table 2.

Weighted summary statistics of the female-headed household characteristics and poverty levels

	Total		Poverty levels						
	n	%	Not-poor	%	Poor	%	Severely poor	%	P-value
	4451	100.00	4432	99.57	11	0.25	8	0.18	P-value
Region									
Erongo	288	6.47	288	100.00	0	0.00	0	0.00	<0.001*
Hardap	186	4.18	186	100.00	0	0.00	0	0.00	
//Karas	197	4.43	195	98.98	1	0.51	1	0.51	
Kavango East	253	5.68	252	99.60	0	0.00	1	0.40	
Kavango West	231	5.19	230	99.57	1	0.43	0	0.00	
Khomas	369	8.29	369	100.00	0	0.00	0	0.00	
Kunene	258	5.80	251	97.29	3	1.16	4	1.55	
Ohangwena	506	11.37	504	99.60	2	0.40	0	0.00	
Omaheke	183	4.11	179	97.81	4	2.19	0	0.00	
Omusati	512	11.50	511	99.80	0	0.00	1	0.20	
Oshana	459	10.31	459	100.00	0	0.00	0	0.00	
Oshikoto	432	9.71	431	99.77	0	0.00	1	0.23	
Otjozondjupa	300	6.74	300	100.00	0	0.00	0	0.00	
Zambezi	277	6.22	277	100.00	0	0.00	0	0.00	
Age group									
<20	31	0.70	31	100.00	0	0.00	0	0.00	0.691
20-29	596	13.39	595	99.83	1	0.17	0	0.00	
30-39	961	21.59	957	99.58	1	0.10	3	0.31	
40-49	913	20.51	910	99.67	2	0.22	1	0.11	
50-59	755	16.96	753	99.74	1	0.13	1	0.13	
60+	1195	26.85	1186	99.25	6	0.50	3	0.25	
Main language spoken									
Afrikaans	225	5.06	224	99.56	0	0.00	1	0.44	<0.001*
English	26	0.58	26	100.00	0	0.00	0	0.00	
German	9	0.20	9	100.00	0	0.00	0	0.00	
Khoisan	35	0.79	34	97.14	1	2.86	0	0.00	
Nama/Damara	567	12.74	561	98.94	5	0.88	1	0.18	
Oshiwambo	2335	52.46	2332	99.87	2	0.09	1	0.04	
Others	65	1.46	65	100.00	0	0.00	0	0.00	
Otjiherero	418	9.39	413	98.80	1	0.24	4	0.96	
Rukavango	490	11.01	488	99.59	1	0.20	1	0.20	
Setswana	14	0.31	13	92.86	1	7.14	0	0.00	
Zambezi language	267	6.00	267	100.00	0	0.00	0	0.00	
Main source of income									
Business income	396	8.90	395	99.75	1	0.25	0	0.00	0.009*

Commercial farming	8	0.18	8	100.00	0	0.00	0	0.00	
Drought/in-kind receipts	140	3.15	136	97.14	2	1.43	2	1.43	
Others	124	2.79	124	100.00	0	0.00	0	0.00	
Pension	829	18.63	823	99.28	4	0.48	2	0.24	
Remittances/grants	612	13.75	609	99.51	1	0.16	2	0.33	
Salaries/wages	1738	39.05	1736	99.88	2	0.12	0	0.00	
Subsistence farming	604	13.57	601	99.50	1	0.17	2	0.33	
Location									
Rural	2536	56.98	2519	99.33	10	0.39	7	0.28	0.016*
Urban	1915	43.02	1913	99.90	1	0.05	1	0.05	
Highest level of education									
No formal education	884	19.86	873	98.76	5	0.57	6	0.68	0.005*
Not stated	1232	27.68	1227	99.59	4	0.32	1	0.08	
Primary	1958	43.99	1955	99.85	2	0.10	1	0.05	
Secondary	355	7.98	355	100.00	0	0.00	0	0.00	
Tertiary	22	0.49	22	100.00	0	0.00	0	0.00	
Number of household members									
1-3	1811	40.69	1801	99.45	5	0.28	5	0.28	0.674
4-6	1656	37.21	1648	99.52	5	0.30	3	0.18	
7-9	670	15.05	669	99.85	1	0.15	0	0.00	
10+	314	7.05	314	100.00	0	0.00	0	0.00	

* Significant at a 5% level of significance

Association examinations

From Table 2, at a 5% level of significance, household characteristics such as region (p<0.001), main language spoken at home (p<0.001), main source of income (p=0.009), location (p=0.016), and highest level of education (p=0.005) can be concluded to have a significant association with the household poverty levels. However, characteristics such as age (p=0.691) and number of household members (p=0.674) had no association. All the characteristics with significant associations were included in the fitted multivariable ordinal probit regression and the subsequent results shown in Table 3.

Table 3.
Output from the fitted ordinal probit regression model of female-headed household characteristics and poverty levels, (a): not-poor vs. severely poor; (b): not-poor vs. poor; (c): poor vs. severely poor

(a) Not-poor Vs. Severely poor	Estimate	Standard Error	P-value	95% Confidence Interval	
				Lower	Upper
Region					
Erongo (Ref)	-	-	-	-	-
Hardap	0.344	0.001	<0.001*	-0.346	-0.342
//Karas	4.271	0.412	<0.001*	3.463	5.078

Kavango East	3.973	0.758	<0.001*	2.488	5.458
Kavango West	3.609	0.801	<0.001*	2.038	5.179
Khomas	0.133	0.001	<0.001*	0.131	0.135
Kunene	4.306	0.340	<0.001*	3.639	4.973
Ohangwena	4.227	0.513	<0.001*	3.222	5.233
Omaheke	4.328	0.379	<0.001*	3.584	5.071
Omusati	4.014	0.484	<0.001*	3.066	4.962
Oshana	0.569	0.001	<0.001*	0.567	0.571
Oshikoto	3.893	0.455	<0.001*	3.002	4.784
Otjozondjupa	-0.329	0.001	<0.001*	-0.331	-0.327
Zambezi	-0.102	0.001	<0.001*	-0.104	-0.100
Main language spoken					
Afrikaans (Ref)	-	-	-	-	-
English	-2.357	0.001	<0.001*	-2.359	-2.355
German	-4.451	0.001	<0.001*	-4.453	-4.449
Khoisan	-0.458	0.814	0.573	-2.053	1.136
Nama/Damara	-0.225	0.566	0.692	-1.334	0.885
Oshiwambo	-1.271	0.780	0.103	-2.801	0.258
Others	-4.587	0.001	<0.001*	-4.589	-4.585
Otjiherero	-0.607	0.636	0.340	-1.855	0.640
Rukavango	-0.728	1.047	0.487	-2.780	1.324
Setswana	0.177	0.890	0.842	-1.566	1.920
Zambezi language	-3.703	0.001	<0.001*	-3.705	-3.701
Main source of income					
Business income (Ref)	-	-	-	-	-
Commercial farming	-4.455	0.001	<0.001*	-4.457	-4.453
Drought/in-kind receipts	0.388	0.455	0.394	-0.504	1.280
Others	-4.468	0.001	<0.001*	-4.470	-4.466
Pension	-0.323	0.445	0.468	-1.195	0.549
Remittances/grants	-0.088	0.452	0.846	-0.973	0.798
Salaries/wages	-0.507	0.480	0.291	-1.447	0.433
Subsistence farming	-0.250	0.461	0.588	-1.153	0.653
Location					
Rural (Ref)	-	-	-	-	-
Urban	-0.635	0.314	0.044*	-1.251	-0.018
Highest level of education					
No formal education (Ref)	-	-	-	-	-
Not stated	-3.913	0.001	<0.001*	-3.915	-3.911
Primary	-0.362	0.241	0.134	-0.835	0.111
Secondary	-0.562	0.299	0.050*	-1.148	0.024
Tertiary	-3.898	0.001	<0.001*	-3.900	-3.896
Not-poor|Poor	5.185	0.661	<0.001*	3.888	6.481

Poor|Severely poor	5.543	0.667	<0.001*	4.236	6.849

(b) Not-poor Vs. Poor	Estimate	Standard Error	P-value	95% Confidence Interval	
				Lower	Upper
Region					
Erongo (Ref)	-	-	-	-	-
Hardap	0.266	0.005	<0.001*	0.257	0.275
//Karas	-0.239	0.003	<0.001*	-0.244	-0.233
Kavango East	0.097	0.005	<0.001*	0.087	0.107
Kavango West	-0.109	0.012	<0.001*	-0.133	-0.085
Khomas	-0.060	0.003	<0.001*	-0.067	-0.053
Kunene	-0.710	0.003	<0.001*	-0.716	-0.705
Ohangwena	-0.061	0.010	<0.001*	-0.079	-0.042
Omaheke	-1.412	0.139	<0.001*	-1.684	-1.140
Omusati	0.229	0.003	<0.001*	0.223	0.235
Oshana	0.093	0.004	<0.001*	0.086	0.100
Oshikoto	0.261	0.003	<0.001*	0.254	0.267
Otjozondjupa	0.028	0.004	<0.001*	0.021	0.035
Zambezi	0.255	0.006	<0.001*	0.243	0.267
Main language spoken					
Afrikaans (Ref)	-	-	-	-	-
English	-0.030	0.008	<0.001*	-0.046	-0.014
German	0.092	0.015	<0.001*	0.064	0.121
Khoisan	-1.365	0.253	<0.001*	-1.861	-0.869
Nama/Damara	-0.403	0.005	<0.001*	-0.412	-0.394
Oshiwambo	0.083	0.002	<0.001*	0.079	0.087
Others	0.212	0.004	<0.001*	0.204	0.220
Otjiherero	0.486	0.002	<0.001*	0.482	0.491
Rukavango	0.127	0.005	<0.001*	0.117	0.136
Setswana	-4.536	0.987	<0.001*	-6.471	-2.601
Zambezi language	0.055	0.006	<0.001*	0.043	0.067
Main source of income					
Business income (Ref)	-	-	-	-	-
Commercial farming	0.475	0.006	<0.001*	0.462	0.487
Drought/in-kind receipts	-0.566	0.001	<0.001*	-0.568	-0.563
Others	0.301	0.003	<0.001*	0.294	0.307
Pension	0.098	0.001	<0.001*	0.096	0.101
Remittances/grants	0.214	0.001	<0.001*	0.211	0.216
Salaries/wages	0.177	0.001	<0.001*	0.174	0.180
Subsistence farming	0.225	0.001	<0.001*	0.223	0.228
Location					
Rural (Ref)	-	-	-	-	-

Urban	0.380	0.001	<0.001*	0.378	0.382
Highest level of education					
No formal education (Ref)	-	-	-	-	-
Not stated	0.188	0.010	<0.001*	0.168	0.208
Primary	0.091	0.001	<0.001*	0.089	0.092
Secondary	0.149	0.001	<0.001*	0.148	0.150
Tertiary	0.098	0.002	<0.001*	0.094	0.102
Not-poor|Poor	2.227	0.003	<0.001*	2.221	2.233

(c) Poor Vs. Severely poor	Estimate	Standard Error	P-value	95% Confidence Interval	
				Lower	Upper
Region					
Erongo (Ref)	-	-	-	-	-
Hardap	-0.160	0.001	<0.001*	-0.161	-0.158
//Karas	-0.299	0.001	<0.001*	-0.300	-0.297
Kavango East	-0.426	0.001	<0.001*	-0.427	-0.424
Kavango West	0.241	0.005	<0.001*	0.231	0.251
Khomas	0.036	0.001	<0.001*	0.034	0.038
Kunene	-0.403	0.001	<0.001*	-0.405	-0.401
Ohangwena	0.169	0.003	<0.001*	0.164	0.174
Omaheke	-1.914	1.984	0.525	-5.802	1.975
Omusati	-0.266	0.001	<0.001*	-0.268	-0.264
Oshana	-0.147	0.001	<0.001*	-0.149	-0.146
Oshikoto	-0.442	0.001	<0.001*	-0.443	-0.441
Otjozondjupa	0.128	0.001	<0.001*	0.126	0.130
Zambezi	-0.188	0.002	<0.001*	-0.192	-0.185
Main language spoken					
Afrikaans (Ref)	-	-	-	-	-
English	0.394	0.004	<0.001*	0.387	0.401
German	0.366	0.007	<0.001*	0.352	0.380
Khoisan	0.454	0.140	0.367	0.178	0.729
Nama/Damara	0.913	0.002	<0.001*	0.908	0.917
Oshiwambo	0.496	0.001	<0.001*	0.495	0.498
Others	0.377	0.001	<0.001*	0.375	0.379
Otjiherero	-0.581	0.001	<0.001*	-0.582	-0.580
Rukavango	0.475	0.001	<0.001*	0.473	0.477
Setswana	-0.241	0.001	0.647	-0.243	-0.239
Zambezi language	0.499	0.002	<0.001*	0.495	0.503
Main source of income					
Business income (Ref)	-	-	-	-	-
Commercial farming	0.163	0.001	<0.001*	0.160	0.165
Drought/in-kind receipts	-0.582	0.001	<0.001*	-0.584	-0.580

Others	-0.160	0.001	<0.001*	-0.162	-0.159
Pension	-0.058	0.001	<0.001*	-0.060	-0.056
Remittances/grants	-0.422	0.001	<0.001*	-0.424	-0.420
Salaries/wages	-0.096	0.001	<0.001*	-0.098	-0.094
Subsistence farming	-0.355	0.001	<0.001*	-0.356	-0.353
Location					
Rural (Ref)	-	-	-	-	-
Urban	-0.234	0.001	<0.001*	-0.236	-0.232
Highest level of education					
No formal education (Ref)	-	-	-	-	-
Not stated	0.437	0.002	<0.001*	0.434	0.440
Primary	0.462	0.001	<0.001*	0.460	0.463
Secondary	0.385	0.001	<0.001*	0.383	0.387
Tertiary	0.414	0.001	<0.001*	0.412	0.416
Poor|Severely poor	2.470	0.001	<0.001*	2.469	2.471

* Significant at a 5% level of significance;   (Ref) = reference category

Effects on poverty levels

Not-poor vs. severely poor

From Table 3(a), while holding other characteristics constant and with a significant p-value at a 5% level of significance, it can be concluded that the female-headed households in the //Karas (p<0.001), Kavango East (p<0.001), Kavango West (p<0.001), Khomas (p<0.001), Kunene (p<0.001), Ohangwena (p<0.001), Omaheke (p<0.001), Omusati (p<0.001), Oshana (p<0.001) and Oshikoto (p<0.001) regions were more likely to be severely poor and less likely to be not-poor, compared to those in the Erongo region. However, female-headed households in the Hardap (p<0.001), Otjozondjupa (p<0.001) and Zambezi (p<0.001) regions were less likely to be severely poor and more likely to be not-poor. Furthermore, female-headed households whose main language spoken were English (p<0.001), German (p<0.001), Zambezi (p<0.001) and other (p<0.001) languages were less likely to be severely poor and more likely to be not-poor, compared to those whose language spoken was Afrikaans. Likewise, female-headed households whose main source of income were from commercial farming (p<0.001) and other sources (p<0.001) were less likely to be severely poor and more likely to be not-poor, compared to those whose main source of income were from business income. Moreover, female-headed households in the urban areas (p=0.044) were less likely to be severely poor and more likely to be not-poor, compared to those in the rural areas, while female-headed households whose highest level of education were secondary (p=0.050), tertiary (p<0.001) and did not state their level of education (p<0.001) were less likely to be severely poor and more likely to be not-poor, compared to those who did not have formal education.

Not-poor vs. poor

From Table 3 (b), it can be concluded that the female-headed households in the Hardap (p<0.001), Kavango East (p<0.001), Omusati (p<0.001), Oshana (p<0.001), Oshikoto (p<0.001), Otjozondjupa (p<0.001) and Zambezi (p<0.001) regions were more likely to be poor and less likely to be not-poor, compared to those in the Erongo region, while those in the //Karas (p<0.001), Kavango West (p<0.001), Khomas (p<0.001), Kunene (p<0.001), Ohangwena (p<0.001) and Omaheke (p<0.001) regions were less

likely to be poor and more likely to be not-poor. Furthermore, female-headed households whose main language spoken were German (p<0.001), Oshiwambo (p<0.001), Otjiherero (p<0.001), Rukavango (p<0.001), Zambezi (p<0.001) and other (p<0.001) languages were more likely to be poor and less likely to be not-poor, compared to those whose language spoken was Afrikaans, while those whose language spoken were English (p<0.001), Khoisan (p<0.001), Nama/Damara (p<0.001) and Setswana (p<0.001) were less likely to be poor and more likely to be not-poor. Moreover, female-headed households whose main source of income were from commercial farming (p<0.001), other sources (p<0.001), pensions (p<0.001), remittance/grants (p<0.001), salaries/wages (p<0.001) and subsistence farming (p<0.001) were more likely to be poor and less likely to be not-poor, compared to those whose income were from business income, while those whose income were from drought/in-kind receipts were less likely to be poor and more likely to be not-poor. Similarly, female-headed households in the urban areas (p<0.001) were more likely to be poor and less likely to be not-poor, compared to those in the rural areas, while female-headed households whose highest level of education were not stated (p<0.001), primary (p<0.001), secondary (p<0.001) and tertiary (p<0.001) were more likely to be poor and less likely to be not-poor, compared to those who did not have formal education.

Poor vs. severely poor

From Table 3 (c), it can be concluded that the female-headed households in the Kavango West (p<0.001), Khomas (p<0.001), Ohangwena (p<0.001) and Otjozondjupa (p<0.001) regions were more likely to be severely poor and less likely to be poor, compared to those in the Erongo region, while those in the Hardap (p<0.001), //Karas (p<0.001), Kavango East (p<0.001), Kunene (p<0.001), Omusati (p<0.001), Oshana (p<0.001), Oshikoto (p<0.001) and Zambezi (p<0.001) regions were less likely to be severely poor and more likely to be poor. Furthermore, female-headed households whose main language spoken were English (p<0.001), German (p<0.001), Nama/Damara (p<0.001), Oshiwambo (p<0.001), Rukavango (p<0.001), Zambezi (p<0.001) and other (p<0.001) languages were more likely to be severely poor and less likely to be poor, compared to those whose language spoken was Afrikaans, while those whose language spoken was Otjiherero (p<0.001) were less likely to be severely poor and more likely to be poor. Moreover, female-headed households whose main source of income were from commercial farming (p<0.001) were more likely to be severely poor and less likely to be poor, compared to those whose income were from business income, while those whose income were from drought/in-kind receipts (p<0.001), other sources (p<0.001), pensions (p<0.001), remittance/grants (p<0.001), salaries/wages (p<0.001) and subsistence farming (p<0.001) were less likely to be severely poor and more likely to be poor. Likewise, female-headed households in the urban areas (p<0.001) were less likely to be severely poor and more likely to be poor, compared to those in the rural areas, while female-headed households whose highest level of education were not stated (p<0.001), primary (p<0.001), secondary (p<0.001) and tertiary (p<0.001) were more likely to be severely poor and less likely to be poor, compared to those who did not have formal education.

DISCUSSION

In this study, a multivariable ordinal probit regression model was used to examine the household characteristics that contribute to poverty among female-headed households in Namibia, as well as their effects on the households' poverty levels. Majority of the female-headed households in Namibia during 2015/16 were recorded in the Omusati and Ohangwena regions, within the rural areas, headed by a 60+ year old, spoke Oshiwambo, had salaries/wages as their main source of income, and had a primary education.

Furthermore, household characteristics such as region, main language spoken at home, main source of income, location, and highest level of education had significant association with the household poverty levels, while characteristics such as age and number of household members did not. These findings are similar to those found in Biyase & Zwayne (2018) where it was concluded that the levels of education, region and location (urban/rural) were some of the main characteristics that were associated with poverty levels. However, the finding on household members contradicts Lekobane & Seleka (2017) who concluded that household size was related to the likelihood of falling into poverty since more resources were required to meet the basic needs of larger households.

Moreover, female-headed households in the urban areas in the Hardap, Otjozondjupa and Zambezi regions, whose main language spoken were English, German, Zambezi and other languages, with tertiary education and main source of income from commercial farming and other sources were less likely to be severely poor and more likely to be not-poor. However, those in the //Karas, Kavango East, Kavango West, Khomas, Kunene, Ohangwena, Omaheke, Omusati, Oshana and Oshikoto regions were more likely to be severely poor and less likely to be not-poor. These findings are not surprising as potential employers of government institutions and privately owned companies most often require their new employees and new recruits to be well-spoken in international friendly languages such as English, German and other African and European languages, while requiring a high(er) class of qualification attainment from them (Oyedele, 2022). Also, female-headed households in the //Karas, Kavango East, Kavango West, Khomas, Kunene, Ohangwena, Omaheke, Omusati, Oshana and Oshikoto regions still experience comparatively high inequality as well as less financial inclusion. Most often females in these regions tend to engage in jobs that are less-paying such as domestic works, sales and service works while their male counterparts tend to take up jobs that require more skills with high pay such as transportation works, mining and construction works. Likewise, majority of the females in the rural areas are left with no options than to engage in less-paying jobs such as agriculture and farm works (like tending to livestock, ploughing, etc.), domestic works (like cooking, cleaning, washing, etc.) and caregiving works (for children or elderly persons). These findings are similar to Mwangi (2017) who concluded that female-headed households face gender discrimination with respect to earnings, rights and economic opportunities.

Comparing the poor to the non-poor, female-headed households in the urban areas in the Hardap, Kavango East, Omusati, Oshana, Oshikoto, Otjozondjupa and Zambezi regions, whose main language spoken were German, Oshiwambo, Otjiherero, Rukavango, Zambezi and other languages, and whose main source of income were from commercial farming, other sources, pensions, remittance/grants, salaries/wages and subsistence farming, with primary, secondary and tertiary education as their highest level of education were more likely to be poor and less likely to be not-poor. On the other hand, households in the //Karas, Kavango West, Khomas, Kunene, Ohangwena and Omaheke regions, whose language spoken were English, Khoisan, Nama/Damara and Setswana, with drought/in-kind receipts as their main source of income were less likely to be poor and more likely to be not-poor. This can be due to female-headed households in the northern regions struggle to find decent jobs where their main source of income is commercial farming. Also, female-headed households may not have collateral to secure loans in financial institutions or own means of production such as land. Thus, most engage in income generating activities such as a blend of small businesses (selling vegetables or second hand clothes in open markets and informal settlements), domestic works, and low-

income casual jobs. These findings are similar to Lebni et al. (2020) who concluded that women have to work in marginal, part-time, informal, and low-income jobs due to lack of access to high-paying jobs among other factors. In addition, it is said that free primary and secondary education produces a more literate society, which in turn can lower the likelihood of individuals living in severe poverty. However, most often women do not receive high-paying jobs even though they are highly educated, as compared to their male counterparts. This further shows how the inequality and power balances pose a great barrier to female-headed households in Namibia as they serve to justify and maintain socioeconomic inequalities that disproportionately affect women. This is similar to Mwangi (2017) who concluded that female-headed households are linked to gender inequality issues as women were more vulnerable to poverty than men. Individuals from female-headed households with drought/in-kind receipts as their main source of income most often work on farms that focus on crop farming and occasionally receive donations from government, privately owned organizations and generous individuals, thus having a better chance of not being poor. This in turns marginally improves their household poverty levels, although not immensely.

Comparing the severely poor to the poor, female-headed households in the Kavango West, Khomas, Ohangwena, and Otjozondjupa regions, whose main language spoken were English, German, Nama/Damara, Oshiwambo, Rukavango, Zambezi and other languages, with commercial farming as their main source of income were more likely to be severely poor and less likely to be poor. However, households in the Hardap, //Karas, Kavango East, Kunene, Omusati, Oshana, Oshikoto and Zambezi regions in the urban areas, whose language spoken was Otjiherero, with drought/in-kind receipts, other sources, pensions, remittance/grants, salaries/wages and subsistence farming as their main source of income were less likely to be severely poor and more likely to be poor. These findings are not surprising as they can be due to the fact that female-headed households could have high debt due to hiring cost of agricultural machinery, marketing and distribution of produce. In addition, female-headed households in regions who mainly spoke Otjiherero depend on agriculture for their livelihood, although lack basic necessities such as health care and access to credit facilities and land ownership. These findings are similar to findings in Mwangi (2017) and Borchelt (2022), with Mwangi (2017) concluding that women lack access to economic empowerment avenues such as access to credit facilities for business or agriculture expansion and lack access to knowledge and technologies in these industries, while Borchelt (2022) concluded that a woman's health affects her household's economy, where her inability to work due to hospitalization or chronic illness could reduce her income thus increasing the likelihood of falling into poverty.

CONCLUSION

With household characteristics such as region, main language spoken, location, highest level of education and main source of income having a significant impact on the female-headed households' poverty levels, it is therefore recommended that the Namibian government and policy makers put more efforts in improving the livelihood of women, especially those heading households in the //Karas, Kavango East, Kavango West, Khomas, Kunene, Ohangwena, Omaheke, Omusati, Oshana and Oshikoto regions, in terms of comprehensive social development of strategy that covers the immediate needs for short term and long-term needs of these women. This can be achieve through: (i) government ministries' as well as relevant poverty eradication organizations' continuous strengthening of the national poverty eradication measures put in place in the country, (ii) introducing

programs targeted to benefit women so that they can escape (moderate to severe) poverty and not be subjected to poverty, and (iii) incorporation of social services and programs to bring focus on building capacity of women through education, life skills and business training to eradicate poverty, most especially in the Otjiherero, Rukavango and Zambezi speaking female-headed households in the //Karas, Kavango East, Kavango West, Khomas, Kunene, Ohangwena, Omaheke, Omusati, Oshana and Oshikoto regions. Also, further studies on this topic is recommended with: (i) a multidimensional household poverty definition using data from the next NHIES, pending availability of funds from the sponsors, that would be incorporating a multidimensional poverty concept and considering more relevant variables such as place of work, duration of employment, COVID-19 effect, household indebtedness (to mention a few), and (ii) a longitudinal study that will examine the same household individuals to detect any changes that might (have) occur over a (specified) longer period of time.

LIMITATIONS

The 2015/16 NHIES key poverty indicators preliminary report contains no sex disaggregated data on poverty, which meant that the most recent poverty profile by sex came from the 2009/10 NHIES. Also, being an household based survey, people who were homeless and those who usually resided in private households but were in hospital, prison and school hostels during the time of data collection of the 2015/16 NHIES were excluded as well as those in institutions such as correctional institutions/police cells, old age homes, army and police barracks/camp/ships in harbour, child care institutions/orphanages, hospital, hotels and church/convent/monastery/religious retreats. Furthermore, there is a possibility that interviewed respondents of the NHIES did not give their true annual (household) consumption during the survey, seeing as personal income and expenditure are two of the most sensitive information to share with non-household members. Moreover, although the 2015/16 NHIES defined any person who is not able to spend at least N$389.30 on essentials needs as severely poor and a person who is not able to spend at least N$520.80 as poor, these definitions does not necessarily reflect today's economic reality, especially with the high cost of living as well as the devastating effect of COVID-19 on the economy and people's livelihood. Likewise, even though the most latest nationwide representative data in Namibia was used for this study, the time between 2015/16 and today is acknowledged and might have brought about significant changes. Thus, findings about the geographical differences may have changed and interpretations must be made with cautiousness.

ETHICAL APPROVAL
All methods were carried out in accordance with the University of Namibia's Research Ethics Policy and Guidelines. Ethical approval was not sought for this study since the 2015/16 NHIES data used in this study is freely available on a public domain and

downloadable from the NSA website. Additionally, this study followed all ethical standards for research without direct contact with human or animal subjects as there were no names of persons or household addresses recorded in the NHIES data.

AUTHOR CONTRIBUTIONS

OO and RH researched literature and conceived the study. RH collected the data while OO conducted the data analysis and prepared the first draft of the manuscript. All authors reviewed and edited the manuscript and approved the final version of the manuscript for publication.

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