



## Profiling Analysis of Socio-Demographic and Health Characteristics of the Elderly : A Case Study of Gezira State, Sudan 2021

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### Abstract

Population aging is one of the most significant demographic phenomena, affecting every individual, family, community, and society. This study aimed to identify the current socio-demographic situation as well as to assess the health status of elderly in Gezira state Sudan 2021. The study design was cross sectional. Data were collected relying on questionnaire distributed among 1200 elderly. The frequency and percentages were used for variables of a qualitative nature and Chi-square was obtained to examine the association between the variables. The findings of the elderly survey showed that elderly in Gezira state were poor in term of education especially women and elderly live in rural areas as well as most of the older people were lived in crowded houses. Furthermore, when compared to those living in urban areas, elderly individuals in rural areas were more likely to had unsafe drinking water and poor sanitation. They additionally had a number of chronic illnesses, such as heart disease and diabetes. The study recommended that the Sudan's government should implemented a national aging policy for the elderly. Wiping literacy programs should be adopted as part of national policy, particularly among women and the elderly whom live in rural areas. A health policy that includes non - communicable illness treatment, particularly for urban seniors, should also be adopted.

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## 1.Introduction:

The concept of elderly refers to a group of adults who have attained advanced ages. The demographic understanding of the concept refers to persons aged 60 or 65 years. In the developed countries where life expectancy is high (more than 70 years) and the age of retirement from active public economic activity is 65 years, the elderly is defined as persons aged 65 years and above (Population Reference Bureau, 2012). In developing countries on the other hand, since life expectancy at birth is lower, around 60 years, though it is gradually increasing, the age of retirement is 60 years and the elderly are considered as persons aged 60 years and above. The concept of ageing is an associated word that refers to the process by which persons or adults are attending chronological ages that are classified as old ages. Ageing also refers to a process by which the elderly or older persons constitute higher proportion of the total national population than at an initial period (Weeks 2012).

The number and proportion of people aged 60 years and older in the population is increasing. The global population aged 60 years or over numbered 962 million in 2017, more than twice as large as in 1980 when there were 382 million older persons worldwide. In 2019, the number of people aged 60 years and older was 1 billion. This number will increase to 1.4 billion by 2030 and 2.1 billion by 2050 (United Nations 2019). Although population ageing is more apparent in developed regions, it is increasingly gaining importance in less developed regions. In 2000, almost one- fifth of the population in the more developed regions was aged 60 and over, but only 8% in the less developed regions. By 2050, 1 in every 3 persons in the more developed regions and 1 in every 5 in less developed are projected to be 60 and over (United Nations 2019). In 2015, there were 46 million people aged 60 years or over in sub-Saharan Africa, an increase from 23 million in 1990. In 2050, a projected 161 million older persons will reside in the region. Notably, the growth rate of the older population of sub-Saharan Africa that is projected for the 2040s is faster than that experienced by any other region since 1950.

In Sudan, according to population censuses, the percentage of population age 60 and over increase from 2.5% to 5% in less than 30 years, with a temporary prediction of 7.5% in 2021 (CBS, 1983,2008 ,2021). The growing aging population is an outcome of the demographic transition that has occurred over the last thirty years. Sudan is currently transitioning into stage three of the demographic transition. The characteristics of this stage is the decline in birth as well as mortality rate. The TFR in Sudan declined from 5 in 2008

(CBS, 2008) to 4.3 in 2020 (World Bank, 2020), and life expectancy at birth increased from 60 years in 2008 to 66 years in 2020 (World Bank, 2020), leading to increase in the number and proportion of older population.

Like many other developing countries, Sudan continues to experience problems in providing the most basic psychological and social support services to its older population, as well as health services, to help them overcome the vulnerability that might arise from unpredictable conditions of social, economic and political changes (Ministry of Social Planning,2002). Health status for older people in Sudan is focused on communicable and environmental diseases versus psychological induced diseases, psychosomatic pains and those related to loneliness/not feeling lonely.

Knowing the current situation of the elderly can contribute to the adoption of programmers and other forms of intervention that can ensure that the aged in Sudanese society enjoy a life of security and dignity. Therefore, this study attempts to identify the current socio-demographic and health condition of elderly in Sudan by Special focusing on Gezira State.

## 2. Questions of the Study:

Based on the discussion illustrated above, the following study questions are addressed:

- 1.What are the socioeconomic and health characteristics of elderly in Gezira state?
- 2.Which socioeconomic characteristics are associated to essential demographic variables?
- 3.To what extent are demographic characteristics associated to disease prevalence among the elderly?

## 3. Objectives of the Study:

- To identify the socioeconomic and health characteristics of elderly in Gezira state
- To determine the relationships between socioeconomic characteristics and basic demographic variables
- To examine the association between prevalence of diseases and demographic variables

## 4. Methodology:

### 4.1 The Target Population:

The target population is represented by the population aged 60 and over whom are residents in the eight localities of the Gezira State.

### 4.2 Study Design and Setting:

Cross-sectional design was used to conduct the study among the elderly of Gezira State from January to December 2021. The setting for this study, Gezira State, is located in

Central of the Sudan. Gezira State is administratively divided into eight localities (Greater Medani, South of Al-Gezira, East of Al-Gezira, Al-Managil, Algorashe, Al-Kamleen, The Hesahesa, and Umm Al-Qura), and 43 administrative unit (local administrative unit below locality) and has an area of 23,373 km<sup>2</sup> and a population of approximately 3.6 million according to population census 2008.

#### 4.3 Sample Size:

Random sampling method in any society is used to estimate the dependent variable and when the statistical community homogeneous, the sample was calculated by using Cochran formula (Cochran,1963) as following:

$$n = \frac{z^2 * p * (1 - p)}{d^2}$$

where:

$n$  : required sample size

$z$ : the standard score corresponding to 95% confidence level (and is thus equal to 1.96)

$p$ : the anticipated population proportion of healthy elderly

$d$ : the margin of error.

by taking  $P = 0.50$  (assumed the proportion of healthy elderly is 50%) and  $d = 0.04$  then, the required sample size will be:

$$n = \frac{1.96^2 * 0.5 * (1 - 0.5)}{0.04^2} = 600$$

The total number of population age 60 and over in Gezira state ( $N$ ) was 1,974,511 (CBS, 2008), so  $n$  will represent the final sample size as  $N$  is greater than 10000 (Cochran, W. G., 1963).

Actually, the Simple Random design cannot be used here; because of non-homogeneity of the population under the study (i.e., localities of Gezira State), therefore, the design of the sample for this study will be change to multi stage cluster stratified, this require multiplying the sample size by the design effect which taken to be (2), hence, the actual sample size will be 1200. The proportion of people aged 60 and over in Gezira state was 6.5% (CBS, 2008), when it multiplied by the total population in each locality gives the number of elderly in each locality.

According to the proportional representation of each locality to the total number of older residents in the state, the actual sample size was distributed among the localities of Gezira state. The distribution of sample size by localities, shown in the table below.

Table (3.1) Distribution of Sample Size by Localities

Locality	Total population	Elderly population	%	Sample size	No. of Cluster
G.Medai	877482	52649	20	240	24
S.Gezira	593836	35630	14	163≈160	16
Almanagil	656650	39399	15	180	18
Umalgora	280116	16807	6	77≈80	8
Alkamleen	495325	29720	11	136≈140	14
Alhasahesa	523455	31407	12	143≈140	14
Algorashe	440397	26424	10	121≈120	12
E.Gezira	515933	30956	11	141≈140	14
Total	4383194	262992	100	1200	120

Source: CBS 2021

#### 4.4 Analytic Methods:

##### 4.4.1 Descriptive Statistics:

Frequencies and percentage were used to describe socio-demographic characteristics and health status of the elderly. Descriptive statistics were carried out in the form of mean, standard deviation, and range for quantitative variables.

##### 4.4.2 Chi-square Test:

The cross-tabulations and Chi-square test were applied to investigate the relationship between the socioeconomic and health characteristics of the elderly. The null hypothesis of the test is that, the two variables are independent, which is tested against the alternative hypothesis that, the two variables are dependent. If the p-value of chi square test is less than the specified significance level – normally 0.05- we reject the null hypothesis. If the p-value of chi square test is greater than the specified significance level – normally 0.05- we accept the null hypothesis. The following formula will be used for calculating the statistic of chi square:

$$\chi^2 = \sum_{r=1}^R \sum_{c=1}^C (O_{rc} - E_{rc})^2 / E_{rc}$$

With degrees of freedom (v) given by (R-1) (C-1), where:

R: Rows of the contingency table

C: Columns of the contingency table

Orc: Observed frequency in row (r) and column (c)

Erc: Expected frequency in row (r) and column (c)

#### 4.4.3 Odds Ratio:

An odds ratio (OR) was establishing to measure the association between variables. The OR represents the odds that an outcome will occur given a particular exposure, compared to the odds of the outcome occurring in the absence of that exposure.

### 5. Results:

#### 5.1 Demographic Characteristics:

**Table (2) Distribution of the elderly by Age**

Age group	Frequency	Percent
60 –64	295	27.6%
65 – 69	306	28.7%
70 – 74	192	18%
75 – 79	120	11.2%
80 – 84	65	6%
85 – 89	46	4.3%
90+	44	4.20%
Total	1068	100

Source: Own calculation from survey data, Gezira State (2021)

Table (4.2) and Figure (4.1) show the distribution of respondents by age. More than half of the respondents are located in age groups ranging between (60-64) and (65-69) representing 27.6 % and 28.7% respectively, and above third 35.2% of the elderly have ages ranging between 70 and 84 years. Also, the results illustrate that approximately 10% of respondents had reached the oldest age.

**Table (3) Distribution of elderly by gender**

Gender	Frequency	Percent
Male	632	59%
Female	436	41%
<b>Total</b>	1068	<b>100</b>

Source: Own calculation from survey data, Gezira State (2021)

Table (3) explains that close to 60% of the elderly were men and 41% of them were women. The sex ratio of elderly was calculated at 1.44 which means that there are 144 elderly men for every 100 elderly women.

**Table (4) Distribution of elderly by residence**

	Frequency	Percent
Urban	380	35.6%
Rural	688	64.4%
<b>Total</b>	<b>1068</b>	<b>100</b>

Source: Own calculation from survey data, Gezira State (2021)

Table (4) 64% of old people reside in rural areas, compared to 35% residing in urban areas.

**Table (5) Distribution of elderly by family type**

	Frequency	Percent
Nuclear	777	73%
Extended	291	27%
<b>Total</b>	<b>1068</b>	<b>100</b>

Source: Own calculation from survey data, Gezira State (2021)

Table (5) explains that three quarters of elderly live within an extended family and 27% of the respondents reported that they stay with their nuclear family.

**Table (6) Distribution of respondents by marital status**

marital status	Frequency	Percent
Single	47	4.4%
Married	765	71.6%
Widowed	40	3.7%
Divorce	216	20.3%
<b>Total</b>	<b>1068</b>	<b>100</b>

Source: Own calculation from survey data, Gezira State (2021)

Table (6) illustrates that approximately three - quarters of the elderly were married, a 20.3% had experienced divorce and a little few proportion of the respondents lost their partner or never get married. This indicates that the vast majority of elders in Gezira state had been married at least one time in their live span and furthermore they are more stable with their partner.

**Table (7) Distribution of the elderly according to the education level**

Education level	Frequency	Percent
illiterate	395	37%
Primary school	234	22%
Intermediate	106	10%
Secondary	196	18.1%
University	100	9.4%
Post graduate	37	3.5%
<b>Total</b>	<b>1068</b>	<b>100</b>

Source: Own calculation from survey data, Gezira State (2021)

Regarding the results of table (7) we clearly observe that above half of the respondents are illiterate and primary school representing 37% and 22% respectively. The rest have educational level include intermediate, secondary, university, and post graduate representing 10% ,18.1%,9.4%, and 3.5% respectively. This indicate that elderly in Gezira state is poor in term of education.

**Table (8) Frequency distribution of educational level according to gender and Residence**

variable	illiterate	Primary school	Intermediate	Secondary	University	Post graduate	Total	Chi-square	df	P.value
<b>Gender</b>										
Males	151 (24%)	151 (24%)	83 (13%)	147 (23%)	73 (12%)	27 (4%)	632 (100)	121.8	5	0.000**
Females	244 (56%)	83 (19%)	23 (5.3%)	49 (11.2%)	27 (6.2%)	10 (2.3%)	436 (100)			
<b>Residence</b>										
Urban	97 (25.5%)	74 (19.5%)	37 (9.7%)	101 (26.6%)	49 (12.9%)	22 (5.85)	380 (100)	61.37	5	0.000**
Rural	298 (43.3%)	160 (23.2%)	69 (10%)	95 (14%)	51 (7.4%)	15 (2%)	688 (100)			

Source: Own calculation from survey data, Gezira State (2021)

Table (8) demonstrated the association between gender, residence, and educational level.

The frequency distribution of educational level according to gender revealed a significant association, where up to half of women are illiterate compared with 24% of men. This indicates that elderly women are less educated than men, which may be due to the reason existing 60 years ago, women's education was rare in Gezira state and even in the whole Sudan. In addition, the results showed that there was a significant relationship between residence and educational level, where approximately half of the elderly in rural areas being illiterate, which indicates that the elderly in rural areas are poor in terms of education.

## 5.2 Home Characteristics:

**Table (9) Distribution of elderly accordingly to home ownership**

	Frequency	Percent
Owned	952	89%
Rented	116	11%
<b>Total</b>	<b>1068</b>	<b>100</b>

Source: Own calculation from survey data, Gezira State (2021)

Table (9) shows the answers given by the respondents of whether their home is belonged to them or not. The vast majority of the respondent stated that they did own their house, and a few of the elderly reported they didn't own their home,

**Table (10) Distribution of elderly accordingly to number of rooms in house**

	Frequency	Percent
One	113	10.6%
Two	425	40%
Three	405	38%
Four	125	11.4%
<b>Total</b>	<b>1068</b>	<b>100</b>

Source: Own calculation from survey data, Gezira State (2021)

As we can see from table (10) around half of the respondents have more than two rooms in their home while 40% have two rooms, and a little proportion of the elders reported they have only one room.

**Table (11) Distribution of elderly accordingly to kind of home building**

	Frequency	Percent
cement	207	19.4%
Bricks	772	72.10%
mud and other	89	8.5%
<b>Total</b>	<b>1068</b>	<b>100</b>

Source: Own calculation from survey data, Gezira State (2021)

Table (11) provide information given by the elderly about their home kind. Approximately three quarter of the respondents stated their home were made of bricks and 19.4% made of cement. Only 8.5% of the respondents were build their house from mud and other components such as straw or Zink.

**Table (13) Distribution of elderly accordingly to Source of Drinking Water**

	Frequency	Percent
Safe drinking water (tap water)	492	47%
Un safe drinking water (Canal and tanker...etc)	540	53%
<b>Total</b>	<b>1068</b>	<b>100</b>

Source: Own calculation from survey data, Gezira State (2021)

Table (13) reviewing the frequency distribution of elderly accordingly to different sources of drinking water. Close to fifty of the elderly reported that they have tap water (pipe inside the house) as a source of drinking water and up to fifty 53% of the respondents are taking water from the canal. These results reflect that half of the elderly in Gezira state are consumer unsafe drinking water.

**Table (18) Distribution of source of drinking water according to residence**

Residence	Safe drinking water			Chi-square	df	P.value	Odds
	No	Yes	Total				
Urban	175(46%)	205(54%)	380(100%)	11.42	1	0.000**	1.55
Rural	391(57%)	297(43%)	688(100%)				

Source: Own calculation from survey data, Gezira State (2021)

As presented in table (18) elderly who reported living in a rural area had 1.55 times more unsafe drinking water compared to those who lived in an urban society.

**Table (14) Distribution of elderly accordingly to improved sanitation**

	Frequency	Percent
Siphon	308	29%
Pit latrine and well	760	71%
<b>Total</b>	<b>1068</b>	<b>100</b>

Source: Own calculation from survey data, Gezira State (2021)

Table (14) illustrate that most of the respondents haven't an improved sanitation in their house which confirm that the elders in Gezira state had poor sanitation.

**Table (18) Distribution of Sanitation according to Residence**

Residence	Sanitation			Chi-square	df	P.value	Odds
	Poor	Improved	Total				
Urban	181(47.6%)	199(52.4%)	380(100%)	159.14	1	0.000**	5.84
Rural	579(84.2%)	109(15.8%)	688(100%)				

Source: Own calculation from survey data, Gezira State (2021)

As presented in table ( ) elderly who reported living in a rural area had 5.84 times more poor sanitation compared to those who lived in an urban society.

**Table (15) Distribution of elderly accordingly to Kind of floor**

	Frequency	Percent
Of earth	524	49%
Of Bricks	266	25%
Of ceramics	278	26%
<b>Total</b>	<b>1068</b>	<b>100</b>

Source: Own calculation from survey data, Gezira State (2021)

The figures of table (15) show that close to fifty of the respondents had a floor made of earth while a quarter of them reported their floor was made of bricks. 26% stated that their houses' floor was made of ceramic. Thus, most of the elderly in Gezira state were living in a traditional house with type of floor made of earth and bricks.

**Table (16) Distribution of elderly accordingly to Ownership of durable goods**

	Frequency	Percent
Yes	730	68%
No	338	32%
<b>Total</b>	<b>1068</b>	<b>100</b>

Source: Own calculation from survey data, Gezira State (2021)

Regarding a question in the survey labeled durable goods, the elders who own more than two of the essential goods, namely, car, TV, refrigerator, radio and mobile were labeled “Yes”. Those who do not are labeled “No” the total number of responses that subscribe to yes category was 730 representing two third of the overall elders while those in the No category represent 32%. This mean that around third of the elders are susceptible to poverty.

### 5.3 Social contact and social participation:

**Table (17) Social contact and social participation**

Variable	Frequencies	Percent
<b>Relatives Contact</b>		
Never	148	14%
one per year	52	5%
one per month	333	31%
one per week	292	27%
Daily	243	23%
<b>Total</b>	<b>1068</b>	<b>100%</b>
<b>Friends Contact</b>		
Never	181	17%
one per year	54	5%
one per month	210	19.7%
one per week	453	42.3%
Daily	170	16%
<b>Total</b>	<b>1068</b>	<b>100%</b>
<b>Social participation</b>		
Yes	425	40%
No	643	60%
<b>Total</b>	<b>1068</b>	<b>100%</b>

Source: Own calculation from survey data, Gezira State (2021)

Table (17) contains information provided by the elderly regarding their social contact with their friends and relatives as well as their participations in the community. 23% and 27% of respondents, respectively visited their relatives daily and once a week. A third of them claimed they contacted with their relatives each month. A little proportion of elderly spoke to their relatives once a year, and 14% stated that they never go to visit them.

Additionally, the results in table (17) show that 42.3% of the elderly maintain weekly social contact with their friends .16% of the respondents stated that they visited their

friends every day. Close to 20% reported that they contacted with their friends once a month and 5% claimed that they visited their friends once a year. Only 17% of the elderly reported that they had never gone out with friends.

As can be seen from table (17), 40% of the elderly reported participating in at least one type of community activity, while 60% of the elderly claimed that they had never participated. Indicating that they would rather stay at home than make contribution in their community

**Table (18) Distribution of Social participation according to gender and Residence**

Variables	Social participation			Chi-square	df	P.value	Odds
	Yes	No	Total				
<b>Gender</b>							
Males	323(51%)	309(49%)	632(100%)	<b>82.70</b>	<b>1</b>	<b>0.000**</b>	<b>3.42</b>
Females	102(23.4%)	334(76.6%)	436(100%)				
<b>Residence</b>							
Urban	15(39.5%)	230(60.5%)	380(100%)	<b>0.025</b>	<b>1</b>	<b>0.874</b>	<b>0.979</b>
Rural	27(40%)	4130(60%)	688(100%)				
<b>Educational level</b>							
illiterate	103(26%)	292(74%)	395(100%)	<b>49.24</b>	<b>1</b>	<b>0.000**</b>	<b>2.60</b>
Educated	322(48%)	351(52%)	673(100%)				

Source: Own calculation from survey data, Gezira State (2021)

Table (18) shows that social participation had a significant association with educational level and gender. Regarding the odds ratios it could be concluded that elderly men had participated 3.42 times compared with women and educated elderly were more participative in their community with odds ratio that reached 2.60.

**5.4 Previous Lifestyle and Behavior Factors:****Table (19) Previous Lifestyle and Behavior Factors**

Variable	Frequencies	Percent
<b>Smoking Status</b>		
No	956	89.5%
Yes	112	10.5%
<b>Total</b>	<b>1068</b>	<b>100%</b>
<b>Obesity</b>		
No	982	92%
Yes	86	8%
<b>Total</b>	<b>1068</b>	<b>100%</b>
<b>Alcohol consumption</b>		
No	1046	98%
Yes	22	2%
<b>Total</b>	<b>1068</b>	<b>100%</b>
<b>Regular Exercise</b>		
No	541	50.7%
Yes	527	49.3%
<b>Total</b>	<b>1068</b>	<b>100%</b>
<b>Number of hour sleep per night</b>		
8	367	34.4%
more or less than 8	701	66.6%
<b>Total</b>	<b>1068</b>	<b>100%</b>

Source: Own calculation from survey data, Gezira State (2021)

Table (19) lists six different lifestyles including smoking, alcohol consumption, obesity, regular exercise, and sleeping. 10.5%, 8%, and 2% of older people were smokers, at risk for obesity, and alcohol addicts, respectively. Nearly two-thirds of the elderly stated that they slept less than or more than eight hours a day. Additionally, more than 50% of the respondents reported that they irregularly exercise.

**5.6 Health Characteristics:****Table (20) Epidemiological Profile of Communicable and non – communicable Diseases**

	Frequencies	Proportion
<b>Malaria</b>	817	76.5%
<b>Typhoid</b>	358	33.5%
<b>Dysentery</b>	66	6%
<b>Diarrhea</b>	228	21%
<b>Hypertension</b>	277	26%
<b>heart diseases</b>	53	5%
<b>Diabetic</b>	306	29%
<b>Arthritis</b>	198	18.5%
<b>Prostate</b>	100	9.4%
<b>Total</b>	<b>1068</b>	<b>100%</b>

Source: Own calculation from survey data, Gezira State (2021)

Table (5) shows the distribution of selected communicable and non - communicable diseases reported by the elderly, including malaria, typhoid, diarrhea, dysentery, diabetes, heart diseases, hypertension, prostate and arthritis. The most infectious communicable diseases among elderly are malaria which account 76.5% followed by typhoid 33.5%, diarrhea 21% and dysentery 6%. On the other hand, diabetes and hypertension were considered as the most prevalent non-communicable diseases among elderly, representing 29% and 26% respectively.

**Table (21) Descriptive Statistics of non - communicable Diseases**

Number of non - communicable diseases	Frequency	Percent	
None	360	33.7%	
1	390	36.5%	
2	214	20%	
3	67	6.3%	
4	29	2.8%	
5	8	0.7%	
<b>Total</b>	<b>1068</b>	<b>100%</b>	
<b>N</b>	1068	<b>Skewness</b>	1.01
<b>Mean</b>	1.10 (1.036-1.164)	<b>Kurtosis</b>	0.91
<b>Std. Error of Mean</b>	0.033	<b>Minimum</b>	0
<b>Median</b>	1	<b>Maximum</b>	5
<b>Std. Deviation</b>	1.07	<b>Range</b>	5

Source: Own calculation from survey data, *Gezira State (2021)*

From table (21) we clearly observe that approximately two – thirds of the elderly have at least one of the non - communicable diseases and furthermore the distribution of the variable number of non - communicable diseases is seem to be normal around 1. This indicates that the epidemiological profile of diseases among older adults is shifted towards non-communicable diseases.

Table (22) Distribution of chronic disease according gender

Chronic Disease	Gender			Chi-square	df	P.value	Odds
	Males	Females	Total				
<b>Malaria</b>							
No	191 (30%)	60 (14%)	251 (23.5%)	<b>38.88</b>	<b>1</b>	<b>0.000**</b>	<b>2.17</b>
Yes	441 (70%)	376 (86%)	817 (76.5%)				
<b>Total</b>	<b>632(100%)</b>	<b>436(100%)</b>	<b>1068 (100%)</b>				
<b>Typhoid</b>							
No	443(70%)	267(61%)	710(66.5%)	<b>9.08</b>	<b>1</b>	<b>0.003**</b>	<b>1.48</b>
Yes	189(30%)	169(39%)	358(33.5%)				
<b>Total</b>	<b>632(100%)</b>	<b>436(100%)</b>	<b>1068 (100%)</b>				
<b>Diarrhea</b>							
No	521(82.4%)	319(73%)	840(78.7%)	<b>13.20</b>	<b>1</b>	<b>0.000**</b>	<b>1.72</b>
Yes	111(17.6%)	117(27%)	228(21.3%)				
<b>Total</b>	<b>632(100%)</b>	<b>436(100%)</b>	<b>1068 (100%)</b>				
<b>Dysentery</b>							
No	601(95%)	401(92%)	1002(94%)	<b>4.33</b>	<b>1</b>	<b>0.037*</b>	<b>1.69</b>
Yes	31(5%)	35(8%)	66(6%)				
<b>Total</b>	<b>632(100%)</b>	<b>436(100%)</b>	<b>1068 (100%)</b>				
<b>Diabetic</b>							
No	469(74%)	293(67%)	762(71%)	<b>6.19</b>	<b>1</b>	<b>0.013*</b>	<b>1.40</b>
Yes	163(26%)	143(33%)	306(29%)				
<b>Total</b>	<b>632(100%)</b>	<b>436(100%)</b>	<b>1068 (100%)</b>				
<b>Cardiovascular diseases</b>							
No	476(75.3%)	289 (66%)	765 (71.6%)	<b>10.35</b>	<b>1</b>	<b>0.001**</b>	<b>1.55</b>
Yes	156(25.7%)	147(33.7%)	303(28.4%)				
<b>Total</b>	<b>632(100%)</b>	<b>436(100%)</b>	<b>1068 (100%)</b>				
<b>Arthritis</b>							
No	522(82.6%)	348(80%)	870(81.5%)	<b>1.32</b>	<b>1</b>	<b>0.251</b>	<b>1.20</b>
Yes	111(17.4%)	88(20%)	198(18.5%)				
<b>Total</b>	<b>632(100%)</b>	<b>436(100%)</b>	<b>1068 (100%)</b>				

Source: Own calculation from survey data, Gezira State (2021)

Results in table (22) show the association between chronic diseases and gender with chi-square tests and odds ratios. The results reveal that gender had an insignificant association with arthritis. The frequency distributions of malaria, typhoid, diarrhea, and cardiovascular diseases were highly significantly associated with gender at significance level of 1%. In addition, dysentery and diabetes had a relationship with gender at significant level 5%. The odds ratios obtained that women were more exposed to get diseases including malaria, typhoid, diarrhea, dysentery, diabetes and cardiovascular diseases with odds ratios equal to 2.17,1.48,1.72,1.69,1.40 and 1.55 respectively.

Table (23) Distribution of chronic disease according residence

Chronic Disease	Residence			Chi-square	df	P.value	Odds
	Urban	Rural	Total				
<b>Malaria</b>							
No	94(24.7%)	157(22.8%)	251(23.5 <sup>^</sup> )	<b>0.500</b>	<b>1</b>	<b>0.479</b>	<b>1.11</b>
Yes	286(75.3%)	531(77.2%)	817(76.5%)				
<b>Total</b>	<b>380(100%)</b>	<b>688(100%)</b>	<b>1068(100%)</b>				
<b>Typhoid</b>							
No	279(73.4%)	431(62.6%)	710(66.5%)	<b>12.75</b>	<b>1</b>	<b>0.000**</b>	<b>1.64</b>
Yes	101(26.6)	257(37.4%)	358(33.5%)				
<b>Total</b>	<b>380(100%)</b>	<b>688(100%)</b>	<b>1068(100%)</b>				
<b>Diarrhea</b>							
No	313(82.4%)	527(76.6%)	840(78.7%)	<b>4.85</b>	<b>1</b>	<b>0.028**</b>	<b>1.43</b>
Yes	67(17.6%)	161(23.4%)	228(21.3%)				
<b>Total</b>	<b>380(100%)</b>	<b>688(100%)</b>	<b>1068(100%)</b>				
<b>Dysentery</b>							
No	363(95.5%)	640(93%)	1002(94%)	<b>2.68</b>	<b>1</b>	<b>0.101</b>	<b>1.60</b>
Yes	17(4.5%)	48(7%)	66(6%)				
<b>Total</b>	<b>380(100%)</b>	<b>688(100%)</b>	<b>1068(100%)</b>				
<b>Diabetic</b>							
No	240(63%)	522(76%)	762(71%)	<b>19.35</b>	<b>1</b>	<b>0.000**</b>	<b>1.83</b>
Yes	140(37%)	166(24%)	306(29%)				
<b>Total</b>	<b>380(100%)</b>	<b>688(100%)</b>	<b>1068(100%)</b>				
<b>Cardiovascular diseases</b>							
No	266(70%)	499(72.5%)	765(71.6%)	<b>0.777</b>	<b>1</b>	<b>0.380</b>	<b>0.884</b>
Yes	114(30%)	189(27.5%)	303(28.4%)				
<b>Total</b>	<b>380(100%)</b>	<b>688(100%)</b>	<b>1068(100%)</b>				
<b>Arthritis</b>							
No	300(79%)	570(83%)	870(81.5%)	<b>2.46</b>	<b>1</b>	<b>0.116</b>	<b>0.776</b>
Yes	80(21%)	118(17%)	198(18.5%)				
<b>Total</b>	<b>380(100%)</b>	<b>688(100%)</b>	<b>1068(100%)</b>				

Source: Own calculation from survey data, Gezira State (2021)

Table (23) illustrate that there no significant association was found between residence and some of diseases such as malaria, dysentery cardiovascular diseases and arthritis, which indicate indifference in malaria, dysentery, cardiovascular diseases and arthritis according to residence in Gezira state. As it is apparent elderly living in rural area are more likely to have typhoid and diarrhea with odds ratios 1.64 and 1.43 respectively. In contrast those who live in an urban area had been exposed to diabetes by 1.83 compared with elderly live in a rural area.

### 5.6.3 Health Insurance:

**Table (25) Distribution of elderly accordingly to Health insurance**

	Frequency	Percent
yes	855	80%
No	213	20%
<b>Total</b>	<b>1068</b>	<b>100</b>

Source: Own calculation from survey data, Gezira State (2021)

Table (24) shows that the majority of elderly have a health insurance and 20% of them they haven't, which confirm that elderly in Gezira state were covered under the umbrella of health insurance.

**Table (26) Frequency distribution of health insurance according to gender and residence**

Variables	Health insurance			Chi - Square	df	P.value	Odds
	Yes	No	Total				
<b>Gender</b>							
Men	116(18.4%)	516(81.6%)	632(100)	2.45	1	0.118	0.786
Women	97(22.2%)	339(77.8%)	436(100)				
<b>Residence</b>							
Urban	49(13%)	331(87%)	380(100)	18.35	1	0.000**	2.11
Rural	164(24%)	524(76%)	688(100)				

Source: Own calculation from survey data, Gezira State (2021)

As presented in table (25) there was insignificant relationship between health insurance and gender. However, elderly live in rural areas had 2.11 times more likely to have health insurance

### 6. Conclusion:

The present study was aimed to identify the socioeconomic and health characteristics of elderly in Gezira state. To achieve this, the study depended on primary data collected by the researchers via a survey conducted in Gezira state from January to December 2021, the survey covered the eight localities of the state. The questionnaire contained questions related to socioeconomic and health characteristics of elderly. The study was found that:

- Around 10% of elderly in Gezira state reached the oldest age.
- There were 144 elderly men for every 100 elderly women.
- Three quarters of the elderly live within extended family.
- The vast majority of elderly in Gezira state were married at least one time in their live span and furthermore they are more stable with their partners.

- Most of the elderly in Gezira state are poor in term of education and women are less educated than men. In addition, the elderly live in rural areas were more likely to be uneducated compared with those living in urban areas.
- The majority of elderly in Gezira state living in crowded houses (one or two rooms, traditional building, flooring made of earth or bricks, poor sanitation, and un safe drinking water) which are signs of poverty. Furthermore, the elderly lives in rural areas had unsafe drinking water and poor sanitation compared to those who live in urban areas.
- 40% of the elderly participated at least in one type of activities in their community, and elderly men had 3.42 times more participation than women and educated elderly were participated more by 2.60 times compared with illiterate elderly.
- elderly in Gezira state is cover by the health insurance especially the elderly who live in rural areas.
- The most infectious communicable diseases among elderly are malaria, and women are more exposed to malaria than men.
- The rates of typhoid and diarrhea were significantly higher in rural areas compared to urban areas.
- Cardiovascular diseases and diabetic mellitus were considered as the most prevalent non communicable diseases among the elderly, and women were more exposed to cardiovascular diseases and diabetic than men.
- Diabetic mellitus tends to be spread among elderly residing in urban area.

## 7. Recommendations:

- The findings showed that elderly in Gezira state were poor in term of education especially women and elderly live in rural areas, therefore, polices and programs on wiping literacy should be implemented especially among women and elderly live in rural areas.
- Improving the opportunity for the elderly live in rural areas to consumer safe water and to have improved sanitation.
- Extension the umbrella of health insurance to engage elderly living in urban areas.
- Health policy that includes treatment of non-communicable diseases particular for urban elderly should be established.
- National aging policy should be adopted for the elderly in Sudan.
- Sustained interest in elderly women's needs as specified in the ageing policy.

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