Frailty and Malnutrition in rural Community-Dwelling Older Adults: A Cross-Sectional Study

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Abstract

Background:. As populations age, frailty and malnutrition have emerged as significant geriatric syndromes among Community-dwelling older adults. **Aim of the study:** To assess frailty and malnutrition in rural community-dwelling older adults. **Subjects and methods**: **Research design:** A cross-sectional descriptive reseach. **Setting:** The study was conducted at Sheiba village, Zagazig city in Sharkia governorate, Egypt which was randomly selected by using the multistage cluster sampling technique. **Subjects**: **Sample:** A purposive sample was used and the study subjects were 305 rural older adults. **Tools of data collections: Tool I***:* An interview questionnaire composed of three parts: demographic characteristics, Health related data and dietary habits. **Tool II:** The Edmonton Frail Scale. **Tool III:** Mini Nutritional Assessment Questionnaire (short form). **Results:** 65.2%, 53.4% of the studied older adults were female and aged between 60 to ≤70 years respectively. There was 9.2% of studied older adults had no frailty, 47.2% of them had moderate frailty, Also, 27.2% of them had normal nutritional status. Also, 53.1% of them were at risk for malnutrition. **Conclusion:** Frailty and malnutrition were highly prevalent among community dwellers in Sharkia government, rural area, who were more than two third of them were young older adults, female and married. **Recommendations:** Develop and implement educational programs and campaigns to raise older adult 's awareness about risk of frailty and malnutrition among rural community dwelling older adults.

Keywords: *Community-Dwelling, Frailty, Malnutrition, Older Adults, Rural.*

Introduction

Frailty is most often defined as an aging-related syndrome of physiological decline, characterized by marked vulnerability to adverse health outcomes. Frail older patients often present with an increased burden of symptoms including weakness and fatigue, medical complexity, and reduced tolerance to medical and surgical interventions. Awareness of frailty and associated risks for adverse health outcomes can improve care for this most vulnerable subset of patient **(Papathanasiou et al., 2021)**. Malnutrition in older adults has been recognised as a challenging health concern associated with not only increased mortality and morbidity, but also with physical decline, which has wide ranging acute implications for activities of daily living and quality of life in general **(Norman and Hab, 2021)**.

The prevalence of malnutrition in community-dwelling older adults is estimated to be 8.5 % based on validated malnutrition screening tools. Even higher numbers are at nutritional risk due to the presence of factors that increase the risk of malnutrition, including poor appetite, chewing problems or difficulties shopping and preparing meals. Moreover, malnutrition often develops at home, resulting in many older

adults being already malnourished when admitted to hospital or long-term care **(Visser et al., 2024)**. Gerontological nurses play a pivotal role in delivering health promotion and preventive interventions. The Nurse-led frailty interventions used a multi-component intervention approach across the studies. The interventions reversed frailty progression, improved physical functioning, nutritional status, and quality of life, enhance perceptions of social support, improve mental health, and reduce depression. Nurses as healthcare professionals play an important role in preventing malnutrition by providing information to patients based on; clinical experience, evidence, and multidisciplinary knowledge **(Kasa et al., 2023)**.

Significance of the study

Poor nutritional status and physical frailty were highly prevalent in community-dwellers in Sharqia governorate, Egypt urban and rural regions, moreover poor nutritional status was found to be significantly associated with increased likelihoods of frailty **(Jang and Kim, 2021)**. Malnutrition and frailty are frequent and serious conditions within the geriatric population. Both are of multifactorial origin and linked to adverse outcomes. Geriatric syndrome frailty has a more significant influence on the health of older, pre-frail and frail older adults who tend to have a poor nutritional status or develop severe malnutrition. Therefore, minimizing the number of frail elderly is crucial both to prolong the healthy life span of older adults and to lower medical and long-term care costs (**Gobbens et al., 2021**. Despite, frailty is a lifelong condition; it is not an inevitable consequence from the process of aging **(Craig, 2019; Galluzzo et al., 2022),** so, this study was conducted to assess frailty and malnutrition in rural community -dwelling older adults.

Aim of the study

The aim of this study was to assess frailty and malnutrition in rural Community dwelling older adults.

Research questions:

1-What are risk factors of Frailty and malnutrition among community- dwelling older adults?
2-What are levels of frailty and malnutrition among community-dwelling older adults?

Subjects and Methods

Research design:

A cross-sectional descriptive research design was utilized.

Study setting:

The current study was carried out in Sheiba village, which was selected using a multistage cluster sampling technique.

Study subjects:

A purposive sample of 305 elderly selected from the above-mentioned village based on the following inclusion criteria; Age 60 year and more, able to communicate and willing to participate in the study and available at the time of data collection.

Tools for data collection:

Three tools were used for collecting data of the present study as follow;

Tool I: Structured Interview questionnaire sheet:

It will be developd by the researcher to collect the necessary data for the study. It will consist of three parts:

- **Part one**: Demographic characteristics of the studied elderly: this part will be used to assess the demographic characteristics of the studied elderly as age, sex, residence, level of education…etc.
- **Part two:** Health-related data such as a medical history of chronic diseases, intake of medications, suffering from anemia, question about symptoms of feeling tired, feeling of dyspnea, feeling of agitation

and headache.

- **Part three**:. Dietary habits & lifestyle choices affecting nutritional status, such as food system, smoking, hypersensitivity from food, question about consuming vegetables, ,meats , smoking and performing exercise.

Tool II: The Edmonton Frail Scale:

This tool developd by **(Rolfson et al.,2006)**, to assess Frailty status of elderly.

Scoring system:

The scale contained 11 items, divided into 9 domains (cognition, general health status which consisted of 2 items, functional independence, social support, medication use which consisted of 2 items, nutrition, mood, continence and functional performance. The total score is 17 grades. These scores were summed and converted into a percent score. It was classified into 5 categories:

- **Not Frail** : if score (0-5 grades)
- **Vulnerable**: if score (6-7 grades)
- **Mild Frailty**: if score (8-9 grades)
- **Moderate Frailty**: if score (10-11 grades)
- **Severe Frailty**: if score (12-17 grades)

Tool III: Mini Nutritional Assessment Questionnaire (short form) (MNA®) :

This tool established by **(Nestlé Nutrition Institute-MNA Elderly -MNAo, 2020)**, this tool will be used to assess elderly's nutritional status.

Scoring system:

The questionnaire contained 6 items. The total score is 14 grades. These scores were summed and converted into a percent score. It was classified into 3 categories:

- Normal if score (12-14 grades)
- At risk of malnutrition if score (8-11 grades).
- Malnutrition if score (0-7 grades).

Content validity and reliability:

The tools were revised and validated by panel of three experts in the specialties of community nursing at Zagazig University. No content modifications were made following the panel's judgment on the content's appropriateness, sentences clarity, relevance, and items sequences.

Testing the reliability of the tools by measuring their internal consistency through Alpha Cronbach reliability analysis .It demonstrated a good level of reliability with Cronbach's Alpha was good in frailty with (0.831), Acceptable in malnutrition (0.737).

Field work:

Once the permission was granted to proceed with the study, the researcher started to prepare a schedule for collecting the data. Each elderly was interviewed individually by the researcher who introduced herself and explained the aim of study briefly, and reassured them that information obtained is strictly confidential and would not be used for any purposes other than research.

After that, the oral approval was obtained to collect the necessary data. The researcher used to go to Sheiba village for interviewing the elderly who fulfilling the criteria. The study tools were answered by each elderly during the interview and the time needed ranged from 20 to 30 minutes, according to understanding and cooperation of the elderly. The field work was executed over three months from the September of 2024 to the end December of 2024, two days per week (Saturday and Friday) from 8 Am to 12 Am.

Pilot study:
A pilot study was carried out on a sample of 30 elderly (10% of the total study sample). The aim was to test clarity of the instructions, the format of the questionnaire, comprehension of the items, and to estimate the exact time required for filling the questionnaire sheet. The participants involved in the pilot study were included in the main study sample as there were no modifications done in the study tool.
Administration and ethical consideration:

First, the study proposal was accepted by the Zagazig University Faculty of Nursing's Post Graduate Committee and Research Ethics Committee (REC) with the code of (M.D ZU.NUR/242/9/7/2024).
Before starting any step in the study, an official letter containing the aim of the study was issued to faculty of nursing Zagazig University to mayor of Sheiba village explaining the nature and aim of this study and seeking facilitating the role of researchers.
Following full explanation of the study's aim, each participant provided their informed consent to participate. Participants were given the right to refuse participation and were informed that they could withdraw at any time while filling out the questionnaire. The elderly was each assigned a code number to protect their Anonymity, and they were given the assurance that the information would be kept confidential and used only for research.

Statistical analysis:

The statistical analysis of data was done by using the computer software of Microsoft Excel Program and Statistical Package for Social Science (SPSS) version 25. Data were presented using descriptive statistics in the form of frequencies and percentage for categorical data, the mean (X) and standard deviation (SD) for quantitative data. Chi square test used to assess the association between two variables. Correlation coefficient test ® was used to test the correlation between studied variables. Linear regression model was used to analysis of the predictors of frailty status and nutritional status. Reliability of the study tools was done using Cronbach's Alpha.
Degrees of significance of results were considered as follows:

- **P-value** ≥ 0.05 Not significant (NS)
- **P-value** < 0.05 Significant (S)
- **P-value** < 0.01 Highly Significant (HS).

Results
Table 1 shows that 53.4% of the studied older adults were aged between 60-<70 years old, the Mean ± SD of age was 71.75 ±6.64 years. Also, 65.2% of them were female. Furthermore, 100.0% of them reside at rural areas. Moreover, 64.3% of them were married. Also, 29.9% and 62.6% of them had secondary education and didn't work, respectively. In addition to 53.1% of them don't have enough income. Also, 53.4% and 83.3% of them lived with more than one person in a room and lived in their houses, respectively. Moreover, 72.5% and 63.3% of them lived with family and husband / wife who caring of them, respectively.

Figure 1 shows that, 9.2% of studied older adults had no frailty. Also, 15.1% of them had vulnerable

frailty. Moreover, 18.0% of them had mild frailty. Furthermore, 47.2% of them had moderate frailty. While, 10.5 % of them had severe frailty.

Figure 2*:* Shows that, 27.2% of studied older adults had normal nutritional status. Also, 53.1% of them were at risk for malnutrition. While, 19.7 % of them had malnutrition status.

Table 2 displays that, there was highly statistically significant relation between total older adults' frailty status of the studied older adults and their demographic data as age, gender, residence, marital status, educational level, occupation, income, crowding rate and living at (P= < 0.01).

Table 3 displays that, there was highly statistically significant relation between total older adults' frailty status and their general health status as history from chronic diseases and history from anemia at (P= < 0.01).

Table 4 displays that, there was highly statistically significant relation between total older adults' frailty status and their eating habits and lifestyle choices as follow specific regime, food avoided, food allergy, consuming vegetables and fruits, consuming caffeine, exercise, nutritional supplements, smoking and dentures use at (P= < 0.01).

Table 5 presents that, there was highly statistically significant relation between total older adults' nutritional status of the studied older adults and their demographic data as age, gender, marital status, educational level, occupation, income, crowding rate and living at (P= < 0.01). Also, there was a statistically significant relation with their residence at (P= < 0.05).

Table 6 displays that, there was highly statistically significant relation between total older adults' nutritional status and their general health status as history from chronic diseases and history from anemia at (P= < 0.01).

Table 7 displays that, there was highly statistically significant relation between total older adults' nutritional status and their eating habits and lifestyle choices as follow specific regime, food avoided, food allergy, consuming vegetables and fruits, consuming caffeine, exercise, nutritional supplements, smoking and dentures use at (P= < 0.01).

Table 8 displays the presence of a highly significant model, as indicated by the F-test result of 267.54 with a p-value of 0.000. This model explains 90.3% of the variation in older adults' nutritional status score, with an R-squared value of 0.903. Also, it shows that the domain of education level had a strong positive effect on older adults' nutritional status with (B 0.290 and Beta 0.654). While, the domain of frailty status had a strong negative effect on older adults' nutritional status with (B -0.086- and Beta -0.144-).

Table (1): Frequency distribution of the studied older adults according to their demographic data(n=305).

Demographic data	No.	%
Age (Years)		
60-<70	**163**	**53.4**
70-<80	114	37.4
≥80	28	9.2
Mean ± SD **71.75 ±6.64**		
Gender		
Female	**199**	**65.2**
Male	106	34.8
Residence		
Rural	**305**	**100.0**
Urban	0	0.0
Marital status		
Married	**196**	**64.3**
Widow	89	29.2
Divorced	16	5.2
Single	4	1.3
Educational level		
Illiterate	36	11.8
Read and write	44	14.4
Preparatory education	52	17.0
Secondary education	**91**	**29.9**
Two-year institute	50	16.4
University education	24	7.9
Postgraduate education	8	2.6
Occupation		
Doesn't work	**191**	**62.6**
A farmer	22	7.2
A craftsman	20	6.6
Professional	20	6.6
Businessman	8	2.6
Employee	44	14.4
Monthly income		
Sufficient for daily needs	111	36.4
Sufficient for daily needs and saving	32	10.5
Not enough	**162**	**53.1**
Crowding rate		
One or less person in a room	142	46.6
More than one person in a room	**163**	**53.4**
Type of house		
Owning	**254**	**83.3**
Renting	51	16.7
Living		
Alone	84	27.5
Family	**221**	**72.5**
Care provider		
Husband / wife	**193**	**63.3**
Son / daughter	84	27.5
Brother / sister	20	6.6
Neighbor	8	2.6

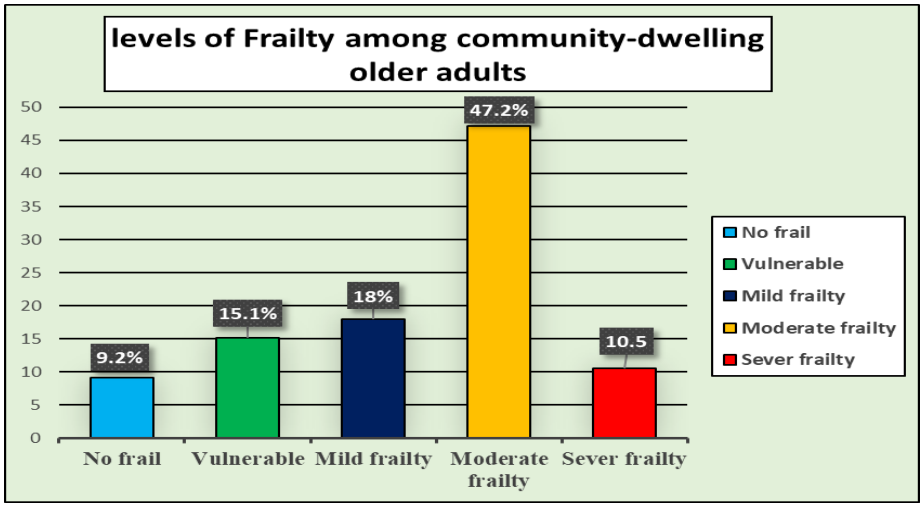

Figure (1): Levels of frailty among community-dwelling older adults (n=305).

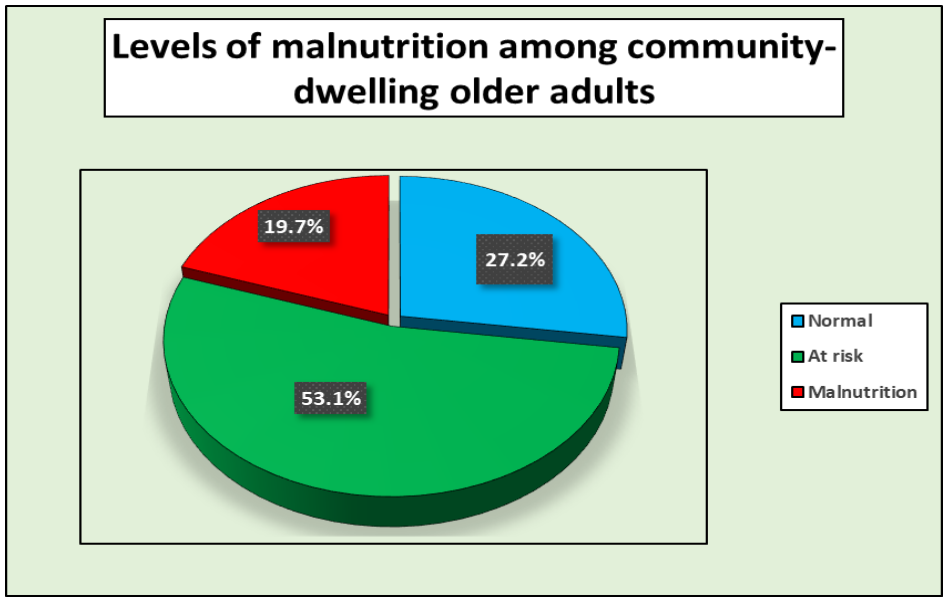

Figure (2): Levels of malnutrition among community-dwelling older adults (n=305).

Table (2): Relation between demographic data of the studied older adults and frailty status (n=305).

Demographic data		Total frailty status for older adults										X^2	P-Value
		No frail (n=28)		Vulnerable (n=46)		Mild (n=55)		Moderate (n=144)		Severe (n=32)			
		No.	%	No.	%	No.	%	No.	%	No.	%		
Age (year)	60-<70	28	100.0	46	100.0	53	96.4	36	25.0	36	25.0	**430.9**	**0.000****
	70-<80	0	0.0	0	0.0	2	3.6	108	75.0	108	75.0		
	≥ 80	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0		
Gender	Female	28	100.0	30	65.2	37	67.3	96	66.7	8	25.0	**38.0**	**0.000****
	Male	0	0.0	16	34.8	18	32.7	48	33.3	24	75.0		
Residence	Rural	28	100.0	45	97.8	54	98.2	124	86.1	28	87.5	**14.12**	**0.007****
	Urban	0	0.0	1	2.2	1	1.8	20	13.9	4	12.5		
Marital status	Married	28	100.0	38	82.6	30	54.5	88	61.1	12	37.5	**105.33**	**0.000****
	Widowed	0	0.0	8	17.4	25	45.5	48	33.3	8	25.0		
	Divorced	0	0.0	0	0.0	0	0.0	4	2.8	12	37.5		
	Single	0	0.0	0	0.0	0	0.0	4	2.8	0	0.0		
Educational level	Illiterate	0	0.0	0	0.0	0	0.0	4	2.7	4	2.7	**864.1**	**0.000****
	Read and write	0	0.0	0	0.0	0	0.0	44	30.6	44	30.6		
	Preparatory	0	0.0	0	0.0	0	0.0	52	36.1	52	36.1		
	Secondary	0	0.0	0	0.0	47	85.5	44	30.6	44	30.6		
	Two years institute	0	0.0	42	91.3	8	14.5	0	0.0	0	0.0		
	University	20	71.4	04	8.7	0	0.0	0	0.0	0	0.0		
	Postgraduate	8	28.6	0	0.0	0	0.0	0	0.0	0	0.0		
Occupation	Doesn't work	0	0.0	0	0.0	15	27.2	144	100.0	32	100.0	**792.2**	**0.000****
	Farmer	0	0.0	2	4.3	20	36.4	0	0.0	0	0.0		
	Craftsman	0	0.0	0	0.0	20	36.4	0	0.0	0	0.0		
	Professional	20	71.4	0	0.0	0	0.0	0	0.0	0	0.0		
	Businessman	8	28.6	0	0.0	0	0.0	0	0.0	0	0.0		
	Employee	0	0.0	44	95.7	0	0.0	0	0.0	0	0.0		
Income	Sufficient	4	14.3	46	100.0	53	96.4	8	5.6	0	0.0	**439.4**	**0.000****
	Sufficient and save	24	85.7	0	0.0	0	2	8	5.6	0	0.0		
	Not enough	0	0.0	0	0.0	2	3.6	128	88.9	32	100.0		
Crowding rate	≤1	28	100.0	46	100.0	28	50.9	40	27.8	0	0.0	**133.6**	**0.000****
	>1	0	0.0	0	0.0	27	49.1	104	72.2	32	100.		
Living	Alone	0	0.0	4	8.7	16	29.1	60	41.7	4	12.5	**36.92**	**0.000****
	Family	28	100.0	42	91.3	39	70.9	84	58.3	28	87.5		

Table (3): Relation between general health status of the studied older adults and their total frailty status (n=305).

General health status		Total frailty status for older adults										X^2	P-Value
		No frail (n=28)		Vulnerable (n=46)		Mild (n=55)		Moderate (n=144)		Severe (n=32)			
		No.	%	No.	%	No.	%	No.	%	No.	%		
History from chronic diseases	Yes	0	0.0	16	34.8	51	92.7	136	94.4	32	100.0	**182.2**	**0.000****
	No	28	100.0	30	65.2	4	7.3	8	5.6	0	0.0		
History from anemia	Yes	0	0.0	0	0.0	8	14.5	72	50.0	12	37.5	**66.04**	**0.000****
	No	28	100.0	46	100.0	47	85.5	72	50.0	20	62.5		

Table (4): Relation between eating habits and lifestyle choices of the studied older adults and frailty status (n=305).

Eating habits and lifestyle choices		Total frailty status for older adults										X^2	P-Value
		No frail (n=28)		Vulnerable (n=46)		Mild (n=55)		Moderate (n=144		Severe (n=32)			
		No.	%	No.	%	No.	%	No.	%	No.	%		
Follow specific regime	No	28	100.0	30	65.2	4	7.3	94	67.1	12	42.9	**112.0**	**0.000****
	Hypertensive diet	0	0.0	4	8.7	30	54.5	27	19.3	8	28.6		
	Diabetic diet	0	0.0	8	17.4	18	32.7	12	8.6	5	17.8		
	Renal diet	0	0.0	0	0.0	0	0.0	3	2.1	3	10.7		
	Cardiac diet	0	0.0	4	8.7	3	5.5	4	2.9	0	0.0		
Food avoided	Yes	12	42.9	14	30.4	16	30.8	84	58.3	20	62.5	**20.99**	**0.000****
	No	16	57.1	32	69.6	36	69.2	60	41.7	12	37.5		
Food allergy	Yes	12	42.9	12	26.1	4	7.3	8	5.6	4	12.5	**37.41**	**0.000****
	No	16	57.1	34	73.9	51	92.7	136	94.4	28	87.5		
Consuming vegetables and fruits	Daily	28	100.0	42	91.3	1	1.8	0	0.0	0	0.0	**412.3**	**0.000****
	Several times	0	0.0	4	8.7	54	98.2	36	25.0	4	12.5		
	Rarely	0	0.0	0	0.0	0	0.0	76	52.8	20	62.5		
	Never	0	0.0	0	0.0	0	0.0	32	22.2	8	25.0		
Consuming caffeine	Yes	4	14.3	16	34.8	36	65.5	88	61.1	25	78.1	**37.91**	**0.000****
	No	24	85.7	30	65.2	19	34.5	56	38.9	7	21.9		
Exercise	Yes	28	100.0	46	100.0	25	45.5	0	0.0	0	0.0	**242.7**	**0.000****
	No	0	0.0	0	0.0	30	54.5	144	100.0	32	100.0		
Nutritional supplement	Yes	28	100.0	46	100.0	36	65.5	**8**	5.6	12	37.5	**192.5**	**0.000****
	No	0	0.0	0	0.0	19	34.5	136	94.4	20	62.5		
Smoking	Yes	0	0.0	4	8.7	28	51.0	32	22.3	0	0.0	**164.3**	**0.000****
	No	24	85.7	38	82.6	8	14.5	100	69.4	4	12.5		
	Ex. smoker	4	14.3	4	8.7	19	34.5	12	8.3	28	87.5		
Dentures	Yes	0	0.0	0	0.0	24	43.6	56	38.9	24	75.0	**65.80**	**0.000****
	No	28	100.0	46	100.0	31	56.4	88	61.1	8	25.0		

Table (5): Relation between demographic data of the studied older adults and their total nutritional status (n=305).

Demographic data		Total nutritional status						X^2	P-Value
		Normal (n=83)		At risk (n=162)		Malnutrition (n=60)			
		No.	%	No.	%	No.	%		
Age (year)	60-<70	83	100.0	80	49.4	0	0.0	**233.27**	**0.000****
	70-<80	0	0.0	82	50.6	32	53.3		
	≥ 80	0	0.0	0	0.0	28	46.7		
Gender	Female	66	79.5	109	67.3	24	40.0	**24.61**	**0.000****
	Male	17	20.5	53	32.7	36	60.0		
Residence	Rural	82	98.8	145	89.5	52	86.7	**8.28**	**0.016***
	Urban	1	1.2	17	10.5	8	13.3		
Marital status	Married	70	84.3	106	65.4	20	33.3	**70.21**	**0.000****
	Widowed	13	15.7	52	32.1	24	40.0		
	Divorced	0	0.0	4	2.5	12	20.0		
	Single	0	0.0	0	0.0	4	6.7		
Educational level	Illiterate	0	0.0	0	0.0	36	60.0	**528.5**	**0.000****
	Read and write	0	0.0	20	12.3	24	40.0		
	Preparatory	0	0.0	52	32.1	0	0.0		
	Secondary	1	1.2	90	55.6	0	0.0		
	Two-years institute	50	60.2	0	0.0	0	0.0		
	University	24	28.9	0	0.0	0	0.0		
	postgraduate	8	9.6	0	0.0	0	0.0		
Occupation	Doesn't work	1	1.2	130	80.3	60	100.0	**282.2**	**0.000****
	Farmer	2	2.4	20	12.3	0	0.0		
	Craftsman	8	9.6	12	7.4	0	0.0		
	Professional	20	24.2	0	0.0	0	0.0		
	Businessman	8	9.6	0	0.0	0	0.0		
	Employee	44	52.0	0	0.0	0	0.0		
Income	Sufficient	59	71.1	52	32.1	0	0.0	**159.8**	**0.000****
	Sufficient & save	24	28.9	8	4.9	0	0.0		
	Not enough	0	0.0	102	63.0	60	100.0		
Crowding rate	≤1	82	98.8	52	32.1	8	13.3	**131.2**	**0.000****
	>1	1	1.2	110	67.9	52	86.7		
Living	Alone	4	4.8	60	37.0	20	33.3	**29.80**	**0.000****
	Family	79	95.2	102	63.0	40	66.7		

Table (6): Relation between general health status of the studied older adults and their total nutritional status (n=305).

General health status		Total nutritional status						X^2	P-Value
		Normal (n=83)		At risk (n=162)		Malnutrition (n=60)			
		No.	%	No.	%	No.	%		
History from chronic diseases	Yes	25	30.1	150	92.6	60	100.0	**143.3**	**0.000****
	No	58	69.9	12	7.4	0	0.0		
History from anemia	Yes	0	0.0	68	42.0	24	40.0	**49.33**	**0.000****
	No	83	100.0	94	58.0	36	60.0		

Table (7): Relation between eating habits and lifestyle choices of the studied older adults and their total nutritional status (n=305).

Eating habits and lifestyle choices		Total nutritional status						X^2	P-Value
		Normal (n=83)		At risk (n=162)		Malnutrition (n=60)			
		No.	%	No.	%	No.	%		
Follow specific regime	No	58	69.8	76	48.1	58	69.9	**34.41**	**0.000****
	Hypertensive diet	9	10.8	48	30.4	9	10.8		
	Diabetic diet	12	14.5	26	16.5	12	14.5		
	Renal diet	0	0.0	1	0.6	0	0.0		
	Cardiac diet	4	4.8	7	4.4	4	4.8		
Food avoided	Yes	26	31.7	76	47.5	44	73.3	**24.13**	**0.000****
	No	56	68.3	84	52.5	16	26.7		
Food allergy	Yes	24	28.9	12	7.4	4	6.7	**25.00**	**0.000****
	No	59	71.1	150	92.6	56	93.3		
Consuming vegetables and fruits	Daily	71	85.5	0	0.0	0	0.0	**264.2**	**0.000****
	Several times	12	14.5	70	43.2	16	26.7		
	Rarely	0	0.0	60	37.0	36	60.0		
	Never	0	0.0	32	19.8	8	13.3		
Consuming caffeine	Yes	28	33.7	96	59.3	45	75.0	**26.07**	**0.000****
	No	55	66.3	66	40.7	15	25.0		
Exercise	Yes	83	100.0	16	9.9	0	0.0	**239.2**	**0.000****
	No	0	0.0	146	90.1	60	100.0		
Nutritional supplements	Yes	82	98.8	36	22.2	12	20.0	**147.2**	**0.000****
	No	1	1.2	126	77.8	48	80.0		
Smoking	Yes	4	4.8	60	37.0	0	0.0	**103.3**	**0.000****
	No	62	74.7	88	54.3	24	40.0		
	Ex. smoker	17	20.5	14	8.6	36	60.0		
Dentures	Yes	8	9.6	56	34.6	40	66.7	**50.43**	**0.000****
	No	75	90.4	106	65.4	20	33.3		

Table (8): Multiple linear regression model examining the predictors of nutritional status among the studied older adults (n=305).

Predictors	Unstandardized Coefficients		Standardized Coefficients	t	P. value	95% Confidence interval	
	B	Std. Error	βeta			Lower	Upper
(Constant)	.883	.273		3.232	.001**	.345	1.421
Marital status (Married)	.071	.022	.069	3.230	.001**	.115	.028
Education level (High education)	.290	.023	.654	12.807	.000**	.245	.334
Occupation (Employee)	.116	.017	.317	6.775	.000**	.082	.149
Care provider (Husband / wife)	.068	.020	.073	3.432	.001**	.107	.029
Practicing exercise	.195	.058	.134	3.337	.001**	.309	.080
Smoking	-.071-	.022	-.068-	-3.200-	.002**	-.114-	-.027-
Food avoided	.098	.027	.072	3.637	.000**	.045	.151
Total frailty status score	-.086-	.039	-.144-	-2.229-	.027*	-.010-	-.162-

Model Summary				
Model	**R**	**R^2**	**Adjusted R^2**	**Std. Error of the Estimate**
1	0.950	0.903	0.899	0.21672

ANOVA			
Model	**Df.**	**F**	**P. value**
Regression	10	267.54	0.000**

Discussion

The findings of the current study revealed a high prevalence of frailty among community-dwelling older adults. Only about a tenth of the participants were considered non-frail, while the remaining exhibited varying degrees of frailty. Less than one fifth were classified as vulnerable, about a fifth were mildly frail, nearly half were moderately frail, and just over a tenth were severely frail, These results highlight the widespread burden of frailty in this group and emphasize the importance of early detection and preventive strategies in primary care settings. These results are consistent with previous literature reporting a substantial burden of frailty in older populations, particularly in community settings **(Hoogendijk et al., 2020)**.

Cognitive function, assessed through the clock-drawing test, revealed that over three-fourths of the participants made minor errors, indicating signs of early cognitive decline. Cognitive impairment is widely recognized as an early component of frailty and serves as a strong predictor of subsequent disability and hospitalization. These findings emphasize the importance of incorporating cognitive screening into geriatric assessments to identify at-risk individuals at an early stage. In line with this, a meta-analysis by **Cui et al. (2021)** highlighted the bidirectional relationship between cognitive impairment and physical frailty, reinforcing the need for cognitive screening in frailty assessments.

In the domain of general health, about two third of older adults had been hospitalized once or twice in the past year, and a similar proportion rated their health as "fair." These findings reflect a moderate level of perceived health and healthcare utilization, which may be indicative of underlying chronic conditions or age-related vulnerabilities common in this population. Previous studies have shown that frequent hospital admissions and poor self-rated health are strongly associated with frailty and adverse health outcomes **(Xue et al., 2022)**. Hospitalizations can accelerate functional decline and trigger transitions from prefrailty to frailty, particularly in the presence of comorbidities

On the other hand, older adults who lived in homes other than their own, they became so sensitive, and sometime feel that they are burden on others, and may preventing themselves from asking for help or met their basic needs. Like study done in China by **Jing et al. (2020),** in Sweden by **Trevisan et al. (2020)**, and in Amsterdam by **Hoogendijk et al. (2019),** showed similar finding. Unlike study done in Egypt, found no association with living alone and frailty. Else, toward malnutrition, current study revealed that the majority of studied older who lived with others were malnourished.

Comorbidity has been suggested to have an association with frailty, it was found that the majority of those who had more than one disease, and who took more than 3 medications were frail with highly statistically significant association. This may be justified by the fact that frailty is a geriatric condition associated with increased vulnerability to adverse drug events and medication-related harm and presence of multiple comorbidities in older people is closely related with the intake of multiple drugs.

Moving on to malnutrition, the study found that more than half of the studied older adults were at risk of malnutrition. This might be explained by that older adult's physiological changes, chronic disease, certain medications, social isolation and difficulties in accessing or preparing food, this can lead to weight loss, weakness and increased risk of frailty,in the same vein a study conducted by **Adetunbi, (2021)** in Nigeria and a study conducted by **Abd Allah, Gad and Abdel-Aziz, (2020),** in Egypt clarified that those who were well-nourished represented the least. Another study conducted in China by **Li et al. (2020)** who mentioned that the majority were determined to be malnourished. In contrast to previous research in Spain by **Abadía Otero et al. (2021)** and a study in Egypt by **Ali and Kunugi, (2020)** who demonstrated that the prevalence of malnutrition was highest among older persons. Similarly, a study from Korea by **Kim et al. (2023)** demonstrated that early nutritional risk predicted frailty onset within two years of follow-up. These results support the close interrelationship between nutritional status and frailty development.

According to the current study, there was a substantial correlation between frailty and malnutrition,

which were more common among the oldest older persons. This finding is consistent with research conducted in Korea by **Kim, Yang and Kim, (2021)** who revealed a greater prevalence of frailty in older persons who were older. This could be the result of physiological changes that accompany aging in various body systems, leading to various nutritional disorders. These disorders can cause people to eat less than they normally, which can then lead to a lack of energy and power, ultimately resulting in frailty and malnutrition **(Da Mata et al., 2021)**. This result in agreement with the studies done in Korea by **Kim, Yang and Kim, (2021)**, and in Italy, by **Collins et al. (2020)**, that showing a higher frequency of frailty in more aged older adults. Too, malnutrition was found highly among the oldest older adults.

There are numerous common conditions that are equally prevalent in both sexes or more prevalent in men or women. According to this study, women were generally more susceptible to frailty than men, and the difference is statistically significant. Studies conducted in China by **Zhang et al. (2020)** and in the United States by **Denfeld et al. (2021)** who found that male sex was a protective factor against frailty, which supports the current findings. Despite the fact that women are more likely than men to be feeble, a Korean study by **Kim, Jang and Kim, (2021)** revealed no correlation between frailty and gender.

In terms of malnutrition, a statistically significant correlation was discovered between the prevalence of malnutrition and females. Studies conducted in Nepal by **Chataut et al. (2021)**, revealed that the prevalence of malnutrition among females was higher than that of males, which is consistent with the current findings.

In the current study, being widow or married had much higher rates of frailty and malnutrition, suggesting that social variables like living alone had a strong correlation with these conditions. This might be due to the fact that married people have more social support. Additionally, marriage is thought to be a major source of social support in later life because it narrows social networks. Widowhood is also linked to poor eating habits and a decreased enjoyment of eating. Similarly, studies done in China by **Kojima et al. (2020) and Kong et al. (2021)**, showed that unmarried individuals were almost twice more likely to be frail than married individuals. Also, studies done in Egypt by **Abd Allah, Gad and Abd elaziz, (2020)**, showed that malnutrition was more frequently observed in divorced/widowed adults.

The present study revealed that there was a highly statistically significant relation was found between education level, frailty and malnutrition. This result may be due to that older adults with little formal education usually having a low understanding of their health dimensions, on their meal preparation, food diversity, eating habits and life style, plus they well be unknown about importance of vitamins and minerals, physical activity, ways to manage stressful situation, and didn't have any access to preventive measures such as early detection, adequate treatment or access health care services. This result is in line with studies done in Italy by **Salaffi et al. (2021)** who found relation between educational level with frailty. Moreover, studies done in Egypt by **Abd Allah, Gad and Abd elaziz, (2020),** and in China by **Yu e et al. (2021),** who found relation between the level of education and malnutrition. In contrast study done in India by **Uddin et al. (2020)** who found no relation between the level of education and malnutrition.

Concerning the work; the present study revealed a strong relation between frailty and their work and a strong relation between malnutrition and their work. This result may be justified as the adverse effect of unemployed housewives on malnutrition mainly goes through its influence on the household monetary restriction that limit the accessibility for purchasing adequate type of food. On other hand those who were employed may result further into exposed to skipped mail or took hurried meal most of time and sometime eat their main meal at night which in turn affect their health status.

Similar to study done in China by **Sun et al. (2020)** and by **Shen et al. (2021),** who revealed that being never employed or had a low-skilled occupation, or farmer increased the risk of being frail but not similar to a study done in Vietnam by **Nguyen et al. (2019)**, who revealed that farmers were less likely

to frailty than other, but those who were farmers, were the highest percentages of being pre-frail. Malnutrition represent more frequent among those who were housewives, and highly risk for malnutrition more widespread among those who were employees with statistically significant association. In the accordance with the current result, study done in Iran, by **Seyed- Ghasemi et al. (2021**), who found that majority of those who were at risk of malnutrition, were housewives with statistically significance relation. Likewise, study done in Ethiopia by **Abate et al. (2020),** showed increased likelihoods of malnutrition among employees.

Promoting social inclusion or social engagement reduce the risk of being frail, the present study revealed that older adults who didn't work after retirement, were frailer and malnourished compared to those who continued work after retirement, with statistically significant association. This result may be justified as older adults with low occupational levels or who were retired or unemployed had a higher percentage of malnutrition or malnutrition risk**,** those who weren't work may have limits related to their economic resources which in reverse affect one's health **(Besora- Moreno et al., 2020)**.

Similarly, studies done in Belgium by **Van der Elst et al. (2021),** showed the same results, Moreover, studies done in Birmingham by **Williams et al. (2020)** in India, found that being engaged in active occupation was associated with low risk of malnutrition. Only one study done in China by **Lin et al. (2017),** who obtained significant opposite results, expressing a high percentage of malnutrition among working older adults by more than three quarter of those who weren't retired maintained well-nourished.

The present study revealed that more than half of studied older adults who were frail, didn't have enough income, with statistically significant relation was found. This because the source of income could reflect the economic situation of people, and poor economic status has been considered a risk factor for frailty and malnutrition in the older adults; individuals who are poorer, are more likely to be living in stressful situations and life burdened and these stressors affect their health and wellness. This finding came in agreement with that study done in Egypt by **Saudi, Tosson and Salama, (2021) and Abd Allah, Gad and bdel-Aziz, (2020)** which revealed that monthly income was statistically significant with nutritional status. Unlike, study done in Sweed by **Kim, Yang and kim, (2021)** who found no significant relation between malnutrition and household income category.

The current study revealed highly statistically significant relation between total older adult's frailty and eating habits& life styles choices this results may be accompanied by social activities that is common in rural older adults. In inverse, study done in China by **Jing et al. (2020)**, found that non- tea drinkers were more likely to frailty than tea drinkers, and in Spain by **Machado-Fragua et al. (2019)** and, showed no association between coffee/tea consumption/day and frailty by **Brunelli et al. (2021)**.

When correlate frailty with comorbid diseases such as cardiovascular, respiratory, kidney, gastric, ...etc, a positive statistic correlation was found, Notably, this result may be justified by, the more comorbid disease present, the more affection on functional status. In the accordance with the present result, studies done in Taiwan by **lee et al. (2021)**, who found that hypertension, cardiovascular morbidities including, peripheral vascular disease, and heart failure significantly correlate with disease there was significant correlation. Closely to nutritional status, cardiovascular, respiratory, liver, kidney,…etc, were significant correlate to malnutrition. Studies done in Tanzania by **Bramania et al. (2021)**, was shown similar finding toward kidney disease, and diabetes mellitus association.

Present study also revealed that age had a strong positive effect on older adults frailty status. In contrast, study done in Brazil by **De Jesus et al. (2021)**, found female sex, and years of education, were the only predictors of becoming frail. Concerning malnutrition, multiple linear regression analysis found that educational level, was a significant independent predictor for malnutrition. In contrast, in Changshan by **Zhao et al. (2021)**, found that age influencing factors for malnutrition.

Conclusion

Based on finding of the present study and answers of research questions, it can be concluded that frailty and malnutrition were highly prevalent among community dwellers in sharkia government, rural area, who were more than two third of them were young older adults, female and un married. Additionally, key risk factor for frailty and malnutrition included; Demographic characteristics as age, gender ,Marital status, educational level, income and crowding rate ; General health status as history from chronic disease, history from anemia, eating habits and life style choices with highly statistically significance relation. Additionally, the studied older adults were at risk of malnutrition, had moderate Frailty and had satisfied level of health.

Recommendations

Based on the finding of the study recommended:

- Designing an educational program about both condition (frailty and malnutrition), how to manage associated symptoms and locate resources that may increase its progress to mitigate negative consequences and provide older adults with clear educational materials regarding primary, secondary and tertiary prevention.
- Conduct routine screening for frailty and malnutrition among older adults using validated tools such as the Edmonton Frail Scale (EFS) and Mini Nutritional Assessment–Short Form (MNA-SF), especially in primary and rural healthcare settings.
- Raise public awareness through community education campaigns about the importance of healthy aging, proper diet, and physical activity for older adults and their caregivers.
- Promote further research to explore long-term effects of frailty and malnutrition, and assess the outcomes of community-based interventions in Egyptian rural areas.

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Author ’s Contributions

A.M.S.: Conceptualized the study and Designed the research framework. E.S.A.: Led data collection and coordinated fieldwork activities. S.G.M.: Performed statistical analysis and interpretation of data. All authors participated, revised, and approved the final manuscript

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