Knowledge, Self-Reported Practices, and Believes of Rural Women about Household Solid Waste Management at El Gharbia Governorate

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Abstract

Background: Household solid wastes disposal and management represents a major public health and environmental issue. Improper waste management harms not only human, but also the environment, plants and animals. Women play an important role in the process of household solid waste management. **The aim** of the study was: to assess knowledge, self-reported practices, and believes of rural women about household solid waste management at El Gharbia governorate **Subjects and Method: Study design:** A descriptive analytic cross-sectional study design was used in this study. **Study settings:** This study was conducted at four rural villages in El Gharbia Governorate. **Study subjects:** A convenience number of 1000 rural women were included in the study through home to home visit **Tools of data collection**: A structured interview schedule was developed by the researchers. It consisted of four parts: Part 1: Socio-economic status of rural women. Part (II): knowledge of rural women about household solid waste disposal. Part (III): reported practices of rural women about household solid waste disposal and management. Part (IV): Beliefs of rural women about solid waste disposal and management. **Results**: the results of the present study revealed that, 62% of the studied women had fair and poor knowledge about solid waste management, and only 38% of them had good knowledge. About two-thirds (63%) of them reported un-satisfactory practice, and 82% of them had positive believes about solid wastes management. There were significant positive correlation between women's Knowledge, reported practice, and socio- demographic characteristics. **Conclusion and recommendations:** Although the majority of the studied rural women had positive believes about solid wastes management, about two thirds of them had fair and poor knowledge and un-satisfactory practice. Therefore, rural women need more attention from local and higher authorities to enhance their knowledge about solid wastes and in turn improve their practices toward household waste management.

Keywords: Solid waste, Management, Rural women, Practice, Knowledge, Believes

Introduction

Household solid wastes disposal and management represents a major public health and environmental issue that face community either in developed or developing countries and either in rural or urban area throughout the world. Solid waste management is considered one of the sustainable development goals that aim to maintain the ecological system that every country works toward achieving it, maintain family, child safety and improve public health [1-3].

In Egypt, at 2012 a according to the annual country report about solid wastes, Egypt generated 89.03 million tons of solid waste, the majority of which were municipal solid waste calculated at 21 million tons. El Gharbia governorate generates about 3,500 million tons of municipal solid wastes daily according to Egypt report [4]. In 2016, around 21.7 million tons of municipal solid waste was generated in Egypt result from growth of population and changing patterns of consumption and waste generation is expected to increase at a rate of 3.4% per year [5]. The improper waste handling, storage, collection, treatment and disposal practices still have serious environmental and public health risks, despite the great efforts exerted by national and local authorities to tackle solid wastes crisis [4]. Household solid wastes are wastes that result from every day family members activities. Solid waste has different forms. It may be in the form of household garbage, leftovers of food and other wastage that include old house hold items such as broken glass, papers, old clothes or plastic waste in the form of kitchen equipment, bottles or any other products that are consumed during every day activities [2,6].

Solid-waste management means that collecting, treating, and disposing of solid material that is discarded because it has served its purpose or is no longer useful. Proper disposal and management of household solid wastes affect positively in the community health, welfare and in the environment [1,7].

Household participation in solid waste management starts from storage of solid wastes. Storage should be in bin with lid or in thick plastic bag that doesn't leak. Storage process is accompanied by separation and sorting of household wastes such as leftovers of food are placed in separate

containers, bottles should collected in separate bag, broken glass in special container and so on. Reusing is considered another method of household waste management in which items can be used more than one time for the same purpose [3,7-9].

Household can indirectly participate in the process of recycling of solid wastes by sorting solid wastes such as bottles, metals, tin cans and cardboards then selling these items and at the same time make profit. Wastes of food can be managed either by feeding to chicken and animals or placed in an open pit and is decomposed by natural biological processes. This is considered composting, which is another way of solid wastes management especially in rural areas. The final step of solid waste management is its disposal. Waste disposal must be managed by the government and local authorities and not by households as it needs special land and specific procedures [7-9].

Improper waste disposal practices such as burning outside doors or dumping of waste at roadsides and vacant lands leads to destroy of natural beauty and create unsanitary condition that leads to spread of flies, mosquitoes, insects and rodents which considered means of spreading diseases to man such as malaria, diarrhea and cholera and many other diseases. In addition, it leads to the release of toxic gases which cause air pollution and the spread of respiratory diseases. Furthermore, improper waste management harms the environment, plants and animals. Finally, it leads to social, administrative and economic problems that need control and management [1,9-12]. Improper household waste management and disposal in the community result from several reasons. These reasons may be due to lack of well-designed and enough infrastructures, insufficient coverage of collection system, lack of awareness and less involvement of the household key stakeholder. So, it is crucial and more important for the community health nurse to raise awareness of the community, especially rural women about the proper waste disposal and management [1,9-12].

Households, especially women play an important role in the process of household solid waste management as they considered the primary generators of solid wastes. Rural women in Egypt have traditionally known to be preoccupied with child rearing and all household tasks. These are considered the primary responsibilities for

them. Household tasks include different tasks such as preparing food, laundering, shopping and among these tasks housekeeping which include managing and disposal of household solid wastes [13,14].

Community health nurse should provide rural population, especially women with sufficient information about the process of solid wastes management. In addition, the nurse alert them about danger of improper waste disposal on their families' health and on the environment [1,9-12].

Significance of the study

Improper household waste management has serious consequences on human health as it leads to spreads of diseases such as respiratory diseases, allergies, malaria and other diseases. It also affect badly in the environment as it pollute air and soil. Finally it affects negatively on the economy of the countries. Traditionally, rural women have low level of education and have less health education facilities and at the same time they assumed the responsibility toward maintenance of health of their families, so that it is necessary to concentrate this study on rural women. As there are few researches conducted in Egypt about household solid wastes management among rural women. So, the aim of this study was to assess knowledge, self-reported practices, and believes of rural women about household solid waste management at El Gharbia governorate

Aim of the study

The aim of this study was to:

Assess Knowledge, self-reported practices, and believes of rural women about household solid waste management at El Gharbia governorate

Research questions:

What is the level of Knowledge of rural women about household solid waste management?

What is the level of self-reported practices of rural women about household solid waste management?

What are the believes of rural women about household solid waste management?

Subjects and Method

Study design:

A descriptive cross sectional research design was utilized in this study.

Study setting:

This study was conducted in four rural villages in El Gharbia Governorate. El Gharbia Governorate divided into 10

districts. Two districts were selected randomly (El Mehlla El Kobra and El Santa districts). Two rural villages were selected randomly from each district, From El Mehalla El Kobra, Elhaitem and Bolkina rural villages were selected and from El Santa, Shandalat and Elqurishiah rural villages were selected.

Study subjects:

A convenience number of 1000 rural women were included through home to home visit. The sample size and power analysis was calculated using Epi-Info software statistical package created by World Health organization and center for Disease Control and Prevention, Atlanta, Georgia, USA version 2002. The sample size was found at N > 383. The sample was increased to 1000 rural women.

Tools of the study: An interview schedule was used to collect the necessary data. It consisted of four parts:

Part (1): Family socio-economic status of rural women:

Family socio-economic status was measured by using the scale for measuring family socioeconomic status (SES) for health research in Egypt which was developed by Fahmy and El-Shrbini ,1983[15] and updated by Fahmy et al., 2015 [16]. The scale included ten variables such as (couple education and occupation, number of children, family income and mothers' age). The total score is 48, a higher score indicating better SES.

The total score of family socioeconomic status (SES) was categorized as follows:

-High socioeconomic status: ≥ 70% (33.5-48)

-Medium socioeconomic status: 40 to <70% (19.2 to < 33.6)

-Low socioeconomic status: < 40% (< 19.2)

Part (II): Knowledge of rural women about household solid waste management:

This part was developed by the researchers based on related literature [1,7-9] to assess rural women knowledge about solid waste management. It composed of four questions that covered the following points: types, problems and methods of household solid wastes management and characteristics of household solid waste management.

The scoring system: All items of this part were checked with a model key answer, which prepared by the researchers. Correct answer was given score one while incorrect or don't know answer was given score zero.

- These scores summed up and the total score converted into a percent score

The total score of knowledge was calculated by summation of the score of all questions related to knowledge about solid waste management and it equaled (24) points.

The scoring system for knowledge was as following:

Poor knowledge < 60 % of the total score. (< 14)

Fair knowledge 60 - < 75 % of the total score. (14 - < 18)

Good knowledge ≥ 75 of the total score.(≥ 18)

Part (III): Reported practices of rural women about household solid waste disposal management:

This part was developed by researchers based on relevant tools [1,8,17] to assess rural women practices of solid household management. It composed of 23 statements that covered women' reported practice such as means of solid waste storage, methods of solid wastes disposal and management, means of dealing with ordinary house hold wastes and ways of dealing with medical and infectious solid households

The scoring system of reported practices:

A four point Likert scoring was used as follows: not practiced items was scored (0), slightly practiced was scored (1), moderately practiced was scored (2) and fully practiced all time was scored (3).

These scores were summed up and the total score equal (69) points then it was converted into a percent score and classified as follows:

Satisfactory reported practice: ≥ 70 % of the total practice score. (≥ 48)

Unsatisfactory reported practice: < 70 % of the total practice score. (< 48)

Part (IV): Believes of rural women about solid waste disposal and management:

This part was adapted from the instrument developed by Limon, Vallent and Corales in 2020 [17]. It consisted of 12 statements to assess believes of rural women about solid waste management and disposal.

The scoring system

The statements were measured using a three – point likert scale. Positive statements were given a score of two (agree), one score (neutral) and zero score for the statements that were disagreed by rural women. Scores of negative statements were inversed as follows: a score of zero (agree), one score

(neutral) and two score for the statements that were disagreed by rural women. These scores were summed up and equal to 24 points.

The total score was classified into:

Positive believes ≥ 70 % of the total believes score. (≥ 17)

Negative believes < 70 % of the total believes score. (< 17)

Method:

An official permission to conduct the study was obtained from the Dean of the faculty of nursing directed to Mayors of the villages to facilitate data gathering.

Ethical considerations:

Approval of the ethical committee of the faculty of nursing was obtained.

Informed consent was taken from all studied women after providing suitable explanation about the aim of the study.

The study did not cause any risks or pain for the studied women and their safety was ensured.

Privacy and confidentiality were put into consideration regarding the collected data.

Developing the tool:

Part one was adapted from the tool developed by Fahmy and El-Shrbini, 1983 and updated by Fahmy et al., 2015, while part two and three was developed by the researchers based on literature review and part four was adapted from the instrument developed by Limon, Vallent and Corales in 2020.

The **reliability** of the study tool was tested by Chronabach's alpha test and it was found to be = (0.738) for all the study parts.

A five expertise from the community health nursing department test the study tools for its face and content **validity**.

The researcher carried out **a pilot study** on 10% of the subject for testing the tools for its applicability, clarity, and to identify obstacles that may be encountered with the researcher during data collection and these subject not included in the study.

The actual study:-

The data were collected over a period of 5 months starting from first of June to the end of October 2021. Home visit was used to reach the studied women.

The researchers used good communication skills through introducing themselves to each studied women. Also the purpose and the importance of the study were explained.

Confidentiality of the studied women information was considered from the beginning of the interview. So that, they cooperated in the study.

Statistical analysis of the data:

The data were organized, tabulated and statistically analyzed using statistical package for social studies (SPSS) version 23. The mean, standard deviation and range were calculated for quantitative data. Pearson's correlation coefficient r was used to identify correlation between variables. A significance was adopted at $P<0.05$ for interpretation of results of tests of significance.

Results

Table (1) shows distribution of the studied women according to their socio-demographic characteristics. The table reveals that, about one third (31.3% & 28.1%) of the studied women their age ranged from 31 to less than 41 years with a mean of 37.03 ±11.862, and had secondary education respectively. Slightly less than half of the studied women (43.7%, 40.8%. 46.3 %& 46.9%) not worked ,not using computer all times, their family members less than five and their house consisted of three rooms respectively, while most (86.3%) of their husband were working and more than one quarter (28.1%) of them had completed secondary education. Also, more than half (58.4%) of them reported that, their family income were just enough.

Table (2) shows distribution of the studied women according to their knowledge about solid waste managements. The table illustrates that, most of the studied women (81.9%, 82% & 86.2) agree that improper disposal of solid wastes can cause contamination of water and soil with pathogenic germ, air pollution with unpleasant odors and toxic gases resulting from its combustion and spread of insects that transmit microbes and dirt such as flies, mosquitoes, cockroaches respectively. On the other hand, about one third and one quarter (30.3%& 24.4%) of the studied women, didn't know that improper waste disposal can cause global warming, widening of the ozone layer hole, acid rain and distortion of the urban environment and can cause skin diseases, like skin allergies respectively.

Regarding characteristics of solid waste collection container, slightly more than three quarters of the studied women (79.2%, 83% & 78.6%) respectively agree that the container should made of a strong, cleanable material such as iron and plastic, do not allow the liquids resulting from the leftovers of food to leak out and the pole cover should be tight to prevent insects from reaching the litter respectively. While, about one fifth

(20%) of them didn't know that the container should be free of sharp corners, to prevent the accumulation of waste on its sides, and it is preferable to have a cylindrical shape to facilitate washing and cleaning and it should be of an appropriate size so that it is easy to transport outside the home.

In relation to management of house wastes, it is observed that, more than three quarters and more than half (83.2%, 65.5%, 59.3%, 59.6% & 61.8%) of them agreed about putting waste into a special container, not throw household waste outside the house, burning household waste in an open place, bury household waste in a large pit and reusing some household waste, such as empty containers respectively. In the opposite, half (50%) of them didn't agree about throwing household waste into canals. Also, about one fifth and more than one quarter of them (20% & 27.3%) didn't know that determining appropriate times for disposal and collecting waste to avoid random dumping, use of a large number of plastic bags and preliminary sorting of some household waste before disposal were considered methods of management of house wastes respectively.

Table (3) represents distribution of the studied women according to their reported practice about solid waste managements. The table illustrates that, more than half of the studied women (52.9 %& 60.4%) reported that they were putting household wastes in a closed bin and they were putting household waste in plastic bags respectively. Concerning disposing of house wastes, about two-thirds(63.1%) of the studied women reported that they practiced all the time the act of disposing of house wastes according to the acceptable methods recommended by the government, such as participating in the project of collecting waste from homes in the village. On the contrary, a higher percentage of them (77.5%, 86.35 & 83.2%) respectively reported that they didn't burn outside the house, they didn't bury hazardous waste such as empty flash cleaners, grease solvents, pesticides and other hazardous materials underground and they didn't throw empty containers such as flash cleaners, grease solvents, pesticides and other hazardous materials into canals

Regarding means of dealing with ordinary household wastes, it is observed that slightly less than half of the studied women (47%, 46% & 44.3%) reported that they sorted

household waste like putting food leftovers in a separate bag, putting the broken glass in a separate bag from the rest of the garbage and selling of bottles, plastic, tin cans, carton boxes and other scraps of paper. While more than one third and about two-thirds (38.7& 63.6) of them reported that they didn't practiced putting the empty containers of flash bottles, grease solvent, etc. in a separate bag from the rest of the garbage and they didn't practiced putting the paper in a separate bag respectively. Also higher percentage of them (81.9%) reported that, they didn't practice the disposing of food leftovers into the compost pit.

In relation to the reported practices of rural women about disposal of medical infectious households wastes, it is observed that, slightly less than and more than half of the studied rural women (46.1%, 45% , 63.8% &52.9%) didn't performed the practice of putting sharp contaminated materials such as insulin syringes, needles, scalpels, razors, blood-contaminated razors, in thick plastic or metal containers, didn't performed the practice of putting the needles directly into the plastic bottle without re-cap and didn't practiced covering the bottle (containers) tightly after it is three-quarters full and did not wrap it with a strong adhesive tape and writing on it "Hazardous Medical Waste", then throw the bottle in the regular waste bags. In addition to that more than one quarter (17.1%) of the studied rural women didn't put wound dressings, cotton, blood-contaminated gloves in tightly closed bags before putting it in the ordinary waste.

Table (4) it represents the distribution of the studied women according to their believes about solid waste managements. It is observed that, a higher percentage of the studied women agreed about all items of the believes about solid wastes except more than one-quarter of them (25.6%, 26% & 27.3%) didn't agree that safe disposal of household waste is not their responsibility, reuse of empty containers helps in the proper management of household waste, and reusing some waste makes life more convenient/safe respectively.

Table (5) shows correlation between studied women total score of their knowledge, reported practice, socioeconomic, and believes about solid waste managements. It is observed that women total knowledge scores were significantly positively correlated with total practice scores, with socio-economic status and also with total believes scores of the

studied women as (p= 0.000 and 0.001 respectively). In addition, total practice scores of the studied women were significantly positively correlated with socio-economic status of the studied women as (p= 0.000). Furthermore, women socio-economic status was significantly positively correlated with total practice scores, total knowledge scores and total believes scores as (p= 0.000 and .031 respectively).

Figure (1) shows the distribution of the studied women according to their total level of socio- demographic. The figure illustrates that, more than half (56%) of the studied women had medium socio-economic status followed by more than one third (35%) had high socio-economic status and only 9% had low socio-economic status.

Figure (2) represents the distribution of the studied women according to their total score of knowledge about solid waste managements. It is observed that more than one-third (38% &37%) of the studied women had poor and good knowledge scores respectively and one-quarter (25%) of them had fair knowledge score.

Figure (3) illustrates the distribution of the studied women according to their total score of reported practice about solid waste managements. The figure illustrates that, about two-thirds (63%) of the studied women had un-satisfactory practice scores and the rest more one-third (37%) had satisfactory practice scores.

Figure (4) shows the distribution of the studied women according to their total score of believes about solid waste managements. The figure illustrates that, a higher percentage (82%) of the studied women had positive believes about solid wastes management while less than one fifth (18%) of them had negative believes about solid wastes.

Table (1) Distribution of the studied women according to their socio- demographic characteristics

Socio-demographic characteristics	Studied women (n=1000)	
	No	%
Age in years		
19-	371	37.1
31-	313	31.3
41-	165	16.5
51-	123	12.3
61-	28	2.8
Mean ±SD	37.03 ±11.862	
Educational level of the woman		
Illiterate or just read and write	145	14.5
Literacy Certificate	37	3.7
Elementary	176	17.6
Secondary	291	29.1
University	243	24.3
Post graduate	108	10.8
Educational level of husband		
Illiterate or just read and write	102	10.2
Literacy Certificate	64	6.4
Elementary	169	16.9
Secondary	281	28.1
University	321	23.1
Post graduate	63	6.3
Occupation of woman		
Yes	437	43.7
No	563	56.3
Occupation of husband		
Yes	863	86.3
No	137	13.7
Computer use		
No at all	408	40.8
Some times	367	36.7
Most of time	225	22.5
Income		

Enough and save	217	21.7
Enough	584	58.4
Not enough	199	19.9
Number of family members		
Less than five members	463	46.3
Five members	302	30.2
Six members	163	16.3
Seven and more	72	7.2
Number of house rooms		
Two rooms	297	29.7
Three rooms	469	46.9
Four rooms	157	15.7
Five rooms	56	5.6
Six rooms	21	2.1

Table (2): Distribution of the studied women according to their knowledge about solid waste managements.

Variables	Studied women (n=1000)					
	Yes		No		Don't know	
	No	%	No	%	No	%
Environmental problems resulting from improper waste disposal - Contamination of water and arable soil with pathogenic germ	819	81.9	81	8.1	100	10.0
Air pollution with unpleasant odors and toxic gases resulting from its combustion	820	82	50	0.5	130	1.3
Global warming, widening of the ozone layer hole, acid rain and distortion of the urban environment	594	59.4	100	10.0	306	30.6
Risks of house wastes on health Wounds caused by sharp objects and broken glass.	708	70.8	92	9.2	200	20.0
Spread of toxic gases, which cause serious diseases such as: respiratory diseases, heart diseases, and asthma.	668	66.8	132	13.2	200	20.0
Skin diseases, like skin allergies.	606	60.6	150	15.0	244	24.4
Spread of insects that transmit microbes and dirt such as flies, mosquitoes, cockroaches	862	86.2	38	3.8	100	10.0
Gathering of animals that carry epidemics and diseases (dogs, stray cats and mice)	721	72.1	82	8.2	197	19.7
Unpleasant odors resulting from rotting household waste due to germs, bacteria and parasites	721	72.1	100	10.0	179	17.9
Characteristics of waste collection container It should be made of a strong, cleanable material such as iron and plastic.	792	79.2	50	5.0	158	15.8
It should be free of sharp corners, to prevent the accumulation of waste on its sides, and it is preferable to have a cylindrical shape to facilitate washing and cleaning.	719	71.9	81	8.1	200	20.0
Do not allow the liquids resulting from the leftovers of food to leak out	830	83.0	60	6.0	110	11.0
The pole cover should be tight to prevent insects from reaching the litter	786	78.6	50	5.0	164	16.4
The container (pole) should be of an appropriate size so that it is easy to transport outside the home	659	65.9	141	14.1	200	20.0
Management of house wastes Putting waste into a special container	832	83.2	65	6.5	103	10.3
Determining appropriate times for disposal and collecting waste to avoid random dumping.	732	73.2	68	6.8	200	20.0
Use of a large number of plastic bags	619	61.9	181	18.1	200	20.0
Preliminary sorting of some household waste before disposal.	527	52.7	200	20.0	273	27.3
Do not throw household waste outside the house	655	65.5	200	20.0	145	14.5
Burning household waste in an open place	593	59.3	400	40.0	7	0.7
Bury household waste in a large pit	596	59.6	400	40.0	4	0.4
Reusing some household waste, such as empty containers	618	61.8	300	30.0	82	8.2
Throwing household waste into canals	433	43.3	500	50.0	67	6.7

Table (3): Distribution of the studied women according to their reported practice about solid waste managements

Reported practice	Studied women (n=1000)							
	Not at all		Slightly		Moderately		All times	
	No	%	No	%	No	%	No	%
Storage of household waste at home								
Putting household waste in a closed bin (has a lid)	171	17.1	105	10.5	195	19.5	529	52.9
Putting household waste in plastic bags	142	14.2	126	12.6	128	12.8	604	60.4
Methods for disposing of solid household waste								
Throwing in canals or in uninhabited places and buildings	726	72.6	94	9.4	95	9.5	85	8.5
Disposing of waste according to the acceptable methods recommended by the government, such as participating in the project of collecting waste from homes in the village	134	13.4	85	8.5	150	15.0	631	63.1
Burning outside the house	775	77.5	128	12.8	57	5.7	40	4.0
Burying hazardous waste such as empty flash cleaners, grease solvents, pesticides and other hazardous materials underground.	863	86.3	57	5.7	43	4.3	37	3.7
Throwing empty containers such as flash cleaners, grease solvents, pesticides and other hazardous materials into canals.	832	83.2	89	8.9	46	4.6	33	3.3
Throwing empty containers such as flash cleaners, grease solvents, pesticides, agricultural pesticides containers and other hazardous materials together with normal household waste.	451	45.1	182	18.2	96	9.6	271	27.1
Means of dealing with ordinary household waste								
Sorting household waste like putting food leftovers in a separate bag.	217	21.7	154	15.4	159	15.9	470	47.0
Putting the broken glass in a separate bag from the rest of the garbage.	211	21.1	143	14.3	186	18.6	460	46.0
Putting the empty containers of flash bottles, grease solvent, etc. in a separate bag from the rest of the garbage.	387	38.7	150	15.0	145	14.5	318	31.8
Put the paper in a separate bag.	636	63.6	146	14.6	84	8.4	134	13.4
dispose of food leftovers into the compost pit	819	81.9	70	7.0	60	6.0	51	5.1
feed leftover foods to domestic birds such as chicks, ducks, etc.	172	17.2	66	6.6	136	13.6	626	62.6
selling of bottles, plastic, tin cans, carton boxes and other scraps of paper	217	21.7	116	11.6	224	22.4	443	44.3
Reusing of empty containers for storing food and drinks.	556	55.6	189	18.9	148	14.8	107	10.7
Disposal of medical infectious household waste								
Putting of contaminated sharp materials as insulin syringes, needles, scalpels and razors contaminated with blood, with the rest of the household waste.	461	46.1	159	15.9	131	13.1	249	24.9
Putting of sharp contaminated materials such as	450	45.0	190	19.0	144	14.4	216	21.6

insulin syringes, needles, scalpels, razors, blood-contaminated razors, in thick plastic or metal containers.								
Putting the needles directly into the plastic bottle without re-cap	638	63.8	147	14.7	98	9.8	117	11.7
Covering the bottle (containers) tightly after it is three-quarters full and wrap it with a strong adhesive tape and writing on it “Hazardous Medical Waste", then throw the bottle in the regular waste bags.	529	52.9	177	17.7	122	12.2	172	17.2
Putting wound dressings, cotton and blood-contaminated gloves in tightly closed bags before putting it in the ordinary waste.	271	27.1	158	15.8	194	19.4	377	37.7
Putting menstrual pads for women and children's diapers (especially those with diarrhea) in tightly closed bags before disposal	162	16.2	102	10.2	165	16.5	571	57.1

Table (4): Distribution of the studied women according to their believes about solid waste managements

Believes	Studied women (n=1000)					
	Agree		Neutral		Dis agree	
	No	%	No	%	No	%
Safe disposal of waste is a healthy environmental requirement	973	97.3	25	2.5	2	0.2
Improper disposal of waste leads to health risks to family	902	90.2	83	8.3	15	1.5
Places for the collection of household waste are allocated correctly.	889	88.9	96	9.6	15	1.5
Safe disposal of household waste is not my responsibility.	589	58.9	155	15.5	256	25.6
Safe disposal of household waste benefits society and the environment.	908	90.8	79	7.9	13	1.3
Lifestyle modification helps reduce waste generated in homes.	800	80.0	165	16.5	35	3.5
Burning waste outside the home poses health and environmental risks.	816	81.6	110	11.0	74	7.4
Reuse of empty containers helps in the proper management of household waste	528	52.8	212	21.2	260	26.0
Reusing some waste makes life more convenient/safe	500	50.0	227	22.7	273	27.3
The safe disposal of waste leads to a better environment for present and future generations.	889	88.9	90	9.0	21	2.1
Each person is responsible for the safe disposal and control of waste	851	85.1	135	13.5	14	1.4
The government is mainly responsible in addressing solid waste problems and in ensuring that the environment is properly cared for	845	84.5	139	13.9	16	1.6

Table (5): correlation between studied women total score of their knowledge, reported practice, and believes about solid waste managements

Variables	Women reported practice r P	Women knowledge r P	Women believes r P
Women knowledge	0.364 0.000**	-	--
Women believes	- 0.043 - 0.170	0.106 0.001**	-
Women socioeconomic status	0.167 0.000**	0.280 0.000**	0.068 0.031*

** Correlation is significant at the 0.01 level (2 tailed).

*Correlation is significant at the 0.05 level (2 tailed).

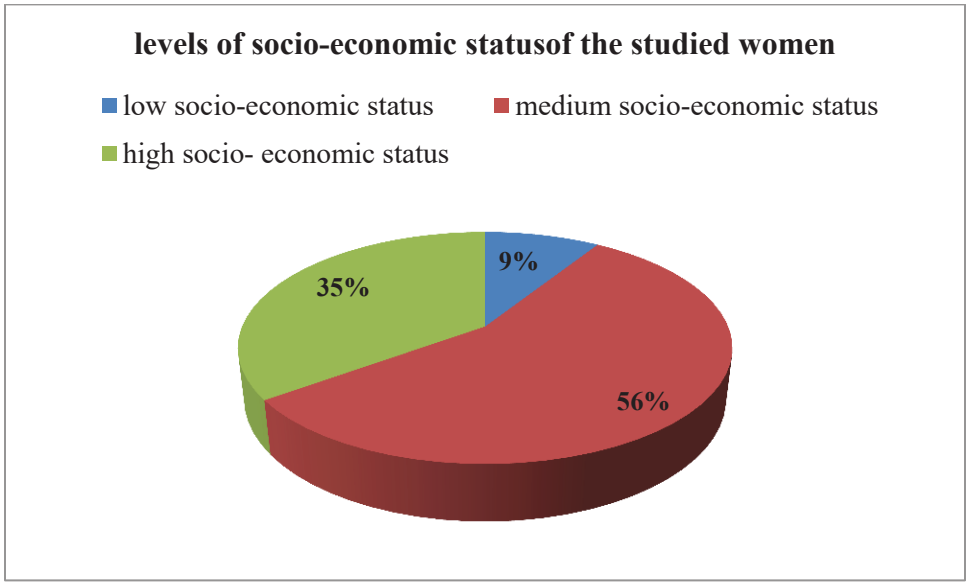

Figure (1): Distribution of the studied women according to their total level of socio-demographic.

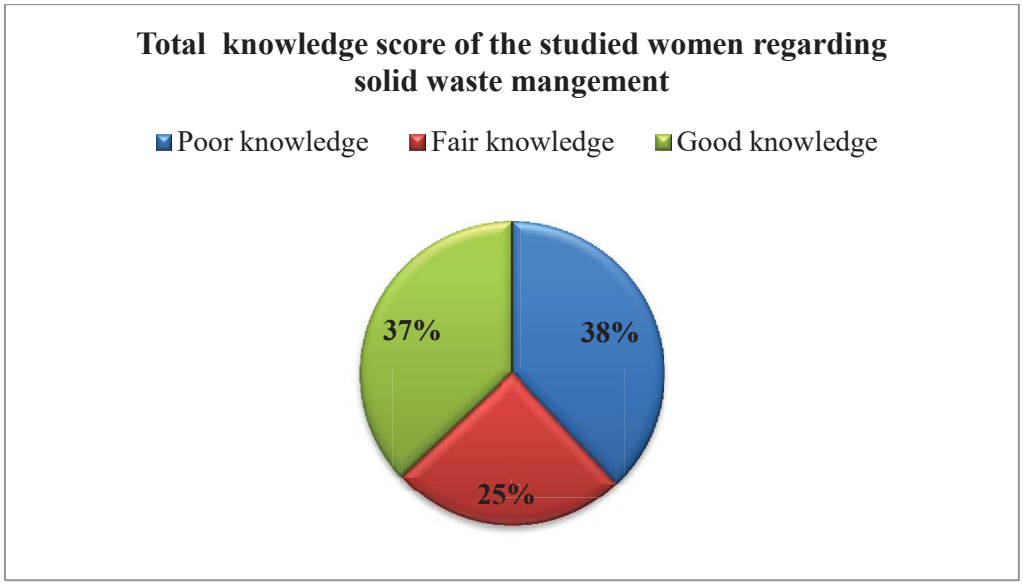

Figure (2): Distribution of the studied women according to their total score of knowledge about solid waste managements.

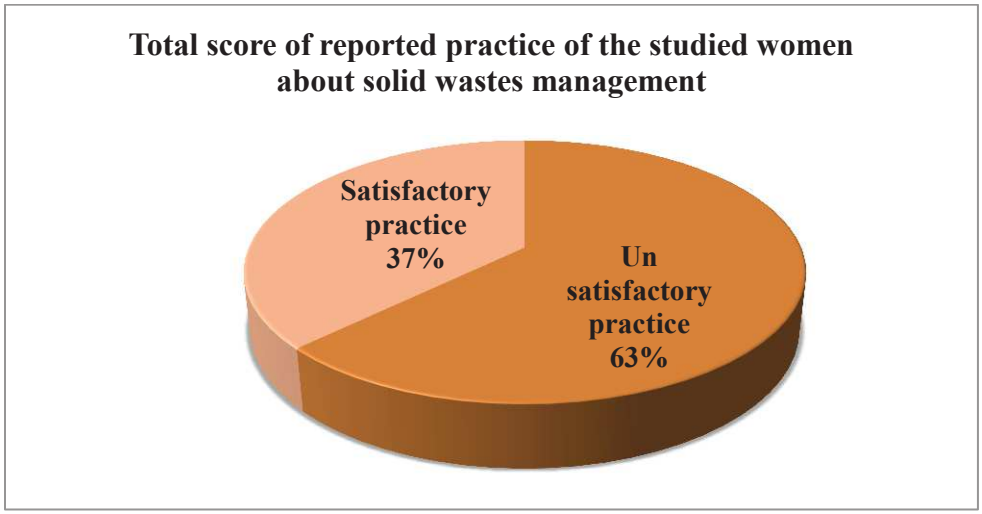

Figure (3): Distribution of the studied women according to their total score of reported practice about solid waste managements.

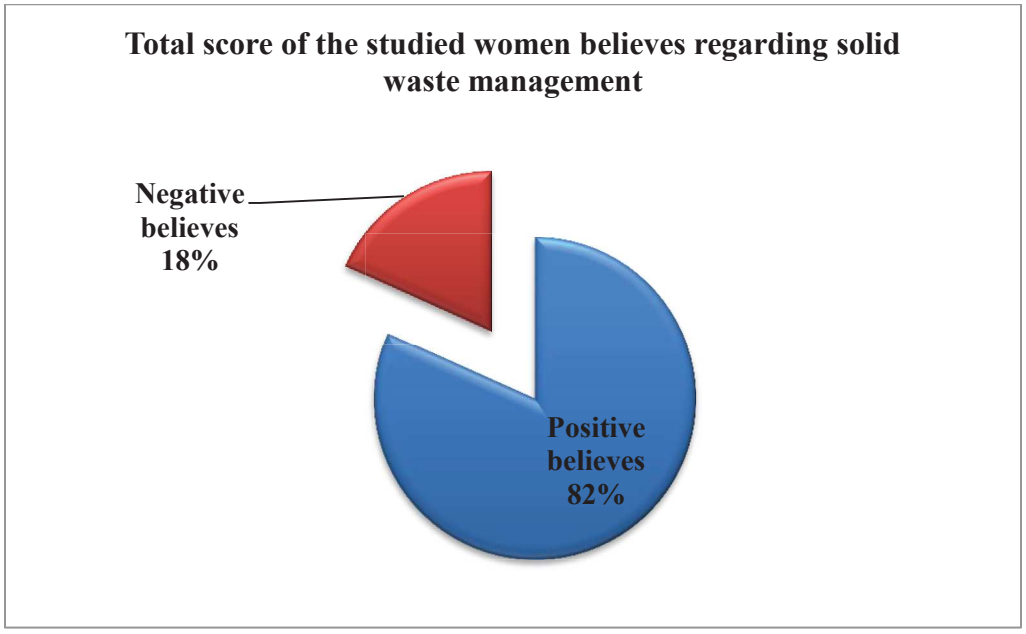

Figure (4): Distribution of the studied women according to their total score of believes about solid waste managements.

Discussion

Solid waste disposal and management become the major issue that faces the whole, as billions of tons of solid wastes generated every day. Sustainable waste management is a big challenge that faces low- and middle income countries; this may be due to deficient of financial resources, lack of organization, complexity of systems and lack of communication with household residents. As a result of that, resident perform improper disposal and improper management of wastes such as open burning and illegal dumping. Solid waste management has greater importance. So that, it has been recognized and embedded either directly or indirectly in all the Sustainable Development Goals (SDGs) [18-21].

Raising awareness of the community, especially household residents about proper solid wastes disposal and management is considered the primary step of solid wastes management. As household residents considered the primary generator of solid wastes. This can be facilitated through providing appropriate knowledge, motivation and building positive attitude about correct waste disposal and management processes. As a result, household residents waste management practices will intern improve [18,20,21]. Therefore, the aim of this study was to assess knowledge, self-reported practices, and believes of rural women about household solid waste management at El Gharbia governorate.

The present study illustrated that more than one third and one quarter of the studied rural women had poor and fair knowledge scores about solid wastes management and disposal respectively and only more than one third of them had good knowledge scores. In addition to that about two thirds of them had unsatisfactory practice regarding solid wastes management and disposal. However, most of the studied women had positive believes about solid wastes management and disposal. These results highlight that, knowledge and believe are not the only variables which control practice of rural women toward management of solid wastes. Lack of training, and supportive resources and devices may participate in unsatisfactory management of rural women of wastes.

Knowledge about solid waste management is very important as it leads to good management. Where poor management of household solid waste result from poor knowledge and in turn has bad effect on the

environment as it leads to destruction of the natural beauty; damage the landscape and decrease in plant productivity and depreciation of land value. Also, bad management had negative impact on human health as it leads to spreading of diseases [1,22, 23]. Concerning knowledge of the studied women about problems of solid wastes, about one third and one quarter of the studied rural women, didn't know that the solid wastes can cause -Global warming, widening of the ozone layer hole, acid rain and distortion of the urban environment, and skin diseases, like skin allergies respectively **(table 2)**. This may be related to limited awareness of rural women about solid wastes problem. This result is in contrast with **Kaoje et al. (2017)** [24] who conducted a study to determine residents' perception of solid waste disposal practices in Sokoto, Northwest Nigeria and found that 63.2% of the residents perceived solid wastes problems.

Regarding knowledge of studied women about management of solid wastes, it was observed that more than half of the studied women agreed that burning household waste in an open place and bury household waste in a large pit are proper ways to deal with solid waste **(table 2)**. These behaviors are considered part of rural women habits. Also, this result may be due to lack of awareness of them about problems that may result from these acts and due to lack of awareness of them about proper methods of solid wastes management. This result may be in the line with **Shahzadi et al. (2018)** [8] who conducted a study for determination the level of knowledge, attitude, and practices regarding household waste disposal among people in rural community of Lahore and found that about 42% and 35% of respondents agree about deep burial and burning, incarnation respectively.

In relation to total knowledge scores of the studied women about solid wastes management, the present study illustrated that more than one third of the studied women had poor knowledge scores about solid wastes management, followed by one quarter had fair knowledge **(figure 2)**. This may be due to lack of awareness of rural women about solid wastes problems, disposal and management and related to lack of educational companies about solid wastes problems and management in rural areas in Egypt. This result is in agreement with **Chouhan et al. (2018)** [25] who conducted a study to assess the knowledge regarding domestic waste management and its effect on health among home makers and explained

that about 34% of the studied homemakers had poor knowledge about solid waste management. Also, our results is in the same line with **Anupriya et al. (2020)** [26] who conducted a study to evaluate knowledge and practice regarding household waste management among women in selected rural area at Puducherry and explained that about 98% of the studied women had inadequate knowledge about solid wastes management.

Primary segregation takes place at the source (at house). If it is done properly, it will reduce the work in secondary segregation. Otherwise, it is an unpleasant task to lay hand in wet wastes that is more than 8 - 12 hours old, that has already started decomposing [27]. The current results pointed out that, more than three quarters of the studied women did not sort or segregate household waste before disposal or did it slightly **(table 3)**. During data collection from rural women they expressed that, even if they segregate wastes especially medical waste and sharps, they did not know how to depose it safely. These results emphasize the urgent need to empower women knowledge and practice, and provide them with suitable resources which enable them to segregate household wastes like puncture-prof containers and so on.

Awareness of different aspects of waste management from collection, storage, sorting or segregation and disposal, can help to reduce waste generation and improve the waste management process [1]. Concerning practices of the studied women about solid wastes management, it was observed that about one fifth did not practiced putting household wastes in closed bin followed by about one third of them from slightly to moderately practiced this act **(table 3)**. This may be related to the limited awareness of rural women about importance of putting solid wastes on closed containers in prevention of spreading flies and mosquitoes. Also, the studied rural women reported that they collected wastes inside any available dirty plastic bag, not in a specific waste container. This result was in agreement with **Muiruri et al. (2020)** [28] who conducted a study for assessment of methods practiced in the disposal of solid waste in Eastleigh Nairobi County, Kenya and reported that 35.1 % of the studied sample putting wastes in a dust bin.

In relation to practices of rural women about disposal of medical infectious households' waste, around half of the studied rural women didn't practice the correct steps of dealing with sharp contaminated materials such as

(insulin syringes, needles, scalpels, razors, blood-contaminated razors). In addition to that, more than one quarter of the studied rural women didn't put wound dressings, cotton, blood- contaminated gloves in tightly closed bags before putting it in the ordinary waste (**table 3)**. This may be related to lack of knowledge of rural women about correct methods of disposal of medical and infectious household wastes, due to lack of educational companies conducted in rural areas about solid wastes disposal and due to limited facilities in rural areas. Actually, this result pointed that, rural areas need more attention from local and higher authorities regarding safe disposal and management of solid medical infectious households wastes.

Regarding total score of reported practice of the studied women about solid waste managements, it was observed that slightly more than one third of the studied women had satisfactory practice and about two thirds of them had unsatisfactory practice **(figure 3)**. From the researcher point of view, this result may be attributed to lack knowledge of the studied women as more than one third of them had poor knowledge scores about solid wastes management, followed by one quarter had just fair knowledge **(figure 2).** Also, it is ordinary that poor knowledge result in poor practice and also due to lack of facilities about solid wastes management provided by government in rural areas in Egypt. This result is in accordance with **Madhushree (2018)** [29] who conducted a study to evaluate knowledge and practice regarding the domestic waste management among the households of selected rural community, Mangalore and found that 20% of the respondents had good practice and 73.8% of them had moderate practice. Also, this result is in agreement with **Baby and Mathew (2020)** [30] who conducted a correlative study to assess the knowledge and practice of housewives regarding household waste management in selected rural community at Mangalore with a view to provide an information pamphlet and reported that 80% of the studied housewives had average practice score and only 20% had good practice score.

In relation to believes of the studied rural women about solid wastes managements, it was observed that more than three quarters of the studied rural women agree that burning waste outside the home poses health and environmental risks **(table 4)**. This result is in the line with **Kaithery and Karunakaran (2019)** [31] who conducted a study on attitude of household waste management in a rural

area of Northern Kerala and found that 78.2% of the studied sample strongly disagree about the statement that say I don't think that burning garbage can be bad for my health and others health.

Concerning total score of the studied rural women believes regarding solid wastes management, the current study revealed that most of the studied women had positive believes regarding solid wastes management **(figure 4)**. This may be related to the willingness of rural women to improve their family health but limited resources hinder their practice. This result was in accordance with **Limon et al. (2020)** [17] who conducted a study to assess solid waste management beliefs and practices in rural households towards sustainable development and pro-environmental citizenship and found that most of the respondents demonstrate positive beliefs on solid wastes management.

Generally, good knowledge help improve practice/behavior. Our current study revealed that, there was a positive correlation between total knowledge score and total practice score of the studied women regarding household waste management **(table 5)**. This result highlights the importance of conducting education programs to women to enhance their knowledge that will improve their management of household solid wastes. This result is in the line with **Madhushree (2018)** [29] and with **Baby and Mathew (2020)** [30] who reported that there was moderate positive correlation between total knowledge score and total practice score

Finally, rural areas in Egypt is still in need of continuous effort and great attention to raise awareness of rural women about solid wastes disposal and management, in order to enhance their knowledge about solid wastes and in turn improve their practices toward household waste management.

Conclusion and recommendations

Based on the finding of our research, the majority of the studied rural women had had positive believes about solid wastes management. However, about two thirds of them had fair or poor knowledge and un-satisfactory practice. Therefore we suggested the following recommendations which include:

Information dissemination campaign should be conducted to increase rural women knowledge and improve practice regarding solid waste management.

Handouts about household solid waste management written in local languages could be developed, disseminated, and used as

information and educational materials for households.

Local government authority should build partnerships with non-government organizations to provide rural women with technical support and resources necessary for solid waste management.

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