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Knowledge, Attitude, and Practices of Community regarding Solid Waste Management (SWM)

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ABSTRACT

The study assessed the community's knowledge, attitude, and practices concerning solid waste management. A descriptive, cross-sectional, and correlational study design was carried out to randomly select (330) heads of household citizens from Nineveh governorate – Iraq from the 2nd of July to the 29th of December 2022. The instrument used in the study was developed after reviewing many related pieces of literature, it is composed of three domains "Knowledge= 16 items Attitude= 29 nines, and Practices= 9 items". The instrument was exposed to five experts in the community health nursing field to assess its validity while it was applied to ten participants to measure its reliability "r= 0.79". The interview method depended on collecting data from the participants. High percentages of participants possessed low levels of knowledge (40%), negative attitudes (45.8%), and poor practices (49.7%) regarding MSW, and there were significantly positive linear relationships among all aspects of MSW. The community awareness (as knowledge, attitude, and practices) concerning SWM is not satisfied. Educating the community and increasing its awareness toward solid waste management by using all audio-visual means in a simplified manner that is suitable for all socio-economic groups and concentrates more and profoundly on changing society's attitudes towards solid waste management.

Keywords: Knowledge, Attitude, Practice, Solid Waste Management

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INTRODUCTION

Improper solid waste management (SWM) in the world nowadays is one of the main problems [1] and is considered a socio-environmental concern with very far-later consequences [2]. It considers the source of air, water, and soil pollution and causes serious health risks [3], for industrialization, urbanization, lack of sufficient resources and poor urban planning contribute to the huge amount of solid waste. Modern urban life creates the problem of waste due to packaging everything in addition to

fast food products increases the amount of waste and changes its composition daily [1]. Moreover, household waste is one of the main sources of solid waste consisting of food waste, plastic, paper, rags, glass, and metal from residential areas. Generally, it means waste generated daily from household activities. It was indicated that each urban citizen generates 350-1000 grams of solid waste daily [4,5]. Internationally, solid waste is defined as non-liquid waste materials resulting from household, industrial, agricultural, commercial, and mining activities in

addition to public services. Waste from human and animal activities is usually solid and disposed of as useless or unwanted [6,7].

An effective SWM system is now a global concern that requires sustainable solid waste management primarily in developing countries [8]. A combination of required methods concerning the appropriate management of household solid waste is recycling, landfill, and source reduction [3]. In major cities, nearly a quarter of municipal waste is not collected due to current deficiencies in transportation and disposal mechanisms [9].

Inadequate management of household solid waste has various negative impacts on public health. These include biological contaminants like rodents, insects, and flies, which can cause diseases like diarrhea, gastrointestinal problems, dysentery, food poisoning, worm infections, dengue fever, cholera, and bacterial infections. Additionally, there are allergic reactions to these contaminants that can affect the skin, eyes, and nose. Lastly, there are respiratory symptoms like chest tightness, coughing, and shortness of breath that can be caused by immune cells inhaling the gases produced by landfill waste. [8], physical, psychosocial "unpleasant odor, unsightly waste, and cognitive and stress-related problems" [10, 11, 12, 13], and non-communicable disease " Some studies have estimated that pollution from landfill may cause cancer (e.g. pancreas, liver, larynx, and kidney) and non-Hodgkin's lymphoma" [10, 14]. Also, other effects that are worth mentioning are preterm birth, birth defects, Down syndrome, congenital disorders [10, 11], and work environment risks [8].

An essential part of waste management is collecting and sorting trash where it originates. [15]. With fewer available landfill sites, the quantity of garbage we produce each year is rising, calling into question the long-term viability of our present methods of managing municipal solid waste. [16].

One of the main ways to reduce the environmental effect of SWM is to apply the principles of reducing, reusing, recycling, and recovering [3], this requires an individual approach from each citizen to develop the right attitudes which guide them toward environmentally sustainable practices [17,18].

The present study aimed to assess the community's knowledge, attitude, and practices concerning solid waste management.

METHODOLOGY

A descriptive, cross-sectional, correlational study design was carried out in the community for the period "2nd of July through 29th of December / 2022". The sample of the study was (330) participants obtained randomly considering heads of households from Nineveh governorate / Iraq after obtaining their consent to participate in the study, the highest percentages as their profiles were distributed; (69.4% (229) were females, 80.3% (265) were married, 47.3% (156) were secondary educational level graduates). Face-to-face contact through the interview method was depended to gather the data - via structured instrument which was developed after reviewing many related literatures, it was exposed to five experts in community health nursing field to assess its validity while it was applicated on ten participants to measure its reliability "r= 0.79"- with respect to the objectives of the study which was categorized into three aspects; knowledge regarding what people know (sixteen items of two options for each one; incorrect=0, and correct=1), its categories are distributed in respect to the percentiles of it as (Low > 50%, Acceptable = 50 – 75%, and Satisfied < 75%), attitudes with respect to what they feel (twenty-nine items of three options for each; disagree=0, undecided=1, agree=2), its categories are distributed with respect to the percentiles of it as (Negative > 50%, Neutral = 50 – 75%, and Positive < 75%), and practices with regard to how they behave (eight items of three options for each; never=0, sometimes=1, always=2), its categories are distributed with respect to the percentiles of it as

(Poor > 50%, Moderate = 50 – 75%, and Good < 75%).. Statistical methods used to demonstrate and analyze data were mean, standard deviation, and percentage as descriptive statistics, and Mann-Whitney U and Kruskal-Wallis H tests, in addition to Pearson "r" correlation test to find out the correlation among Knowledge, Attitude, and Practice aspects as an inferential statistic method.

RESULTS

Table (1): Descriptive statistics of the participants:

| Descriptive Statistic	Age	Knowledge	Attitude	Practice
Mean and Std. Deviation	33.62 ± 6.88	8.34 ± 1.79	33.94 ± 3.76	8.51 ± 1.55
Minimum	24	5	23	1
Maximum	47	13	42	15
Number of items		16	29	8
Mean of score		8	29	8

It is evident from Table (1) that the participants had the lowest accepted level of awareness and behavior concerning the domains of SWM as the actual means of each domain which were a little above the mean of its score.

Table (2): Classification of Knowledge, Attitude and Practice categories among participants:

| Category	Frequency	Percent
Knowledge		
Low	**134**	**40.6**
Moderate	106	32.1
High	90	27.3
Attitude		
Negative	**151**	**45.8**
Neutral	78	23.6
Positive	101	30.6
Practice		
Poor	**164**	**49.7**
Moderate	96	29.1
Good	70	21.2

The highest percentages of all domains categories of SWM were less than 50%.

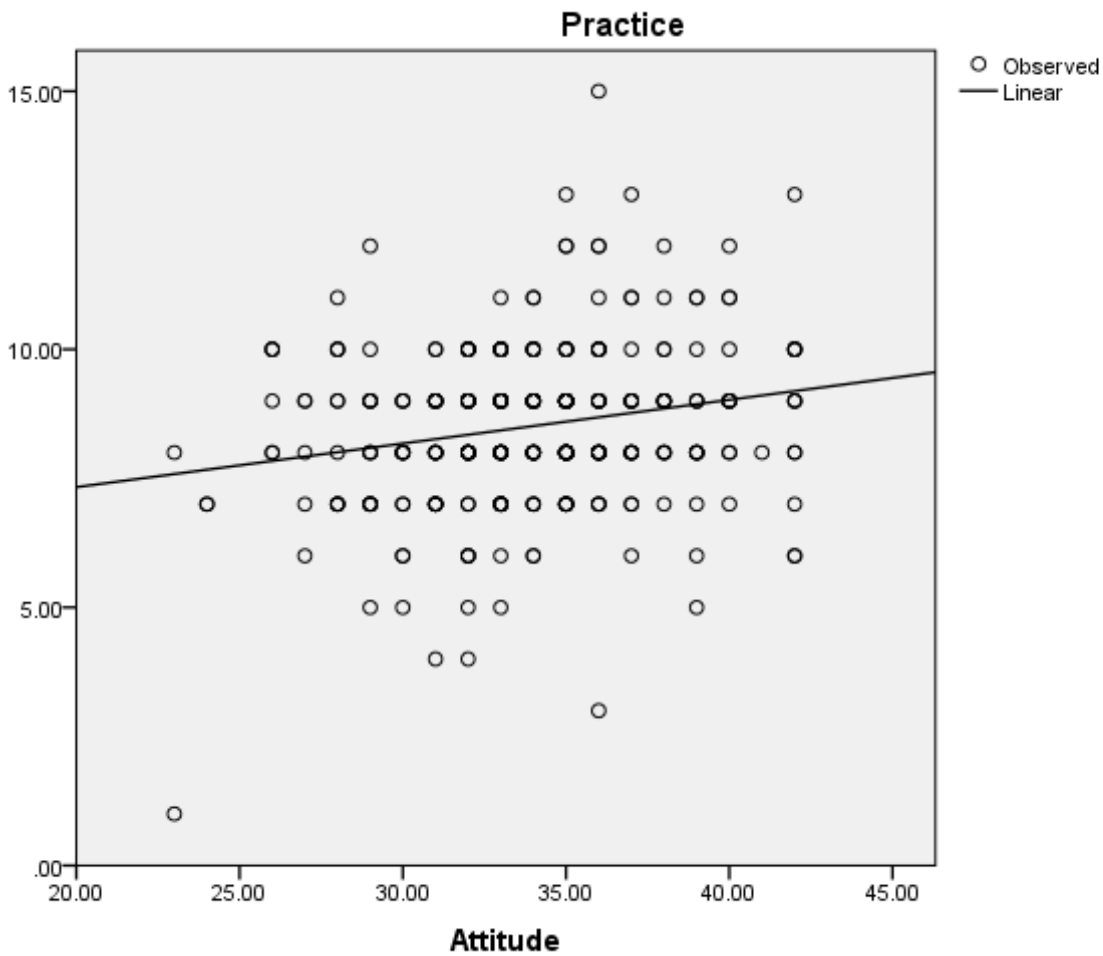Figure (1): Correlation between Knowledge and Practice domains of SWM.
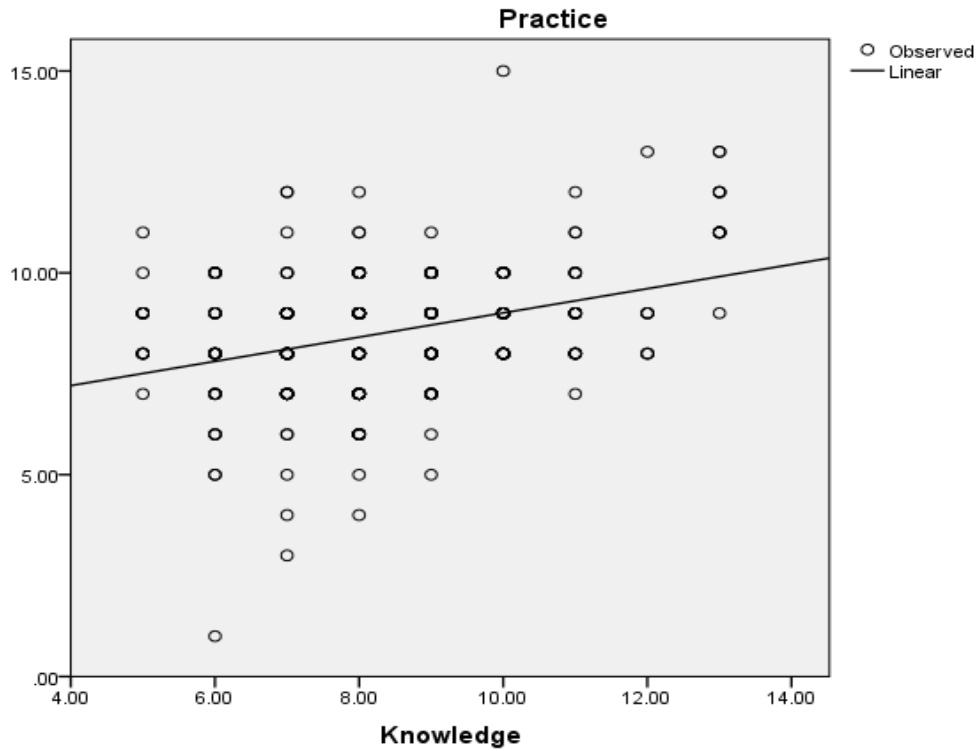
r= 0.35, R^2= 0.12, Unstandardized Coefficients (B)= 0.3, Standardized Coefficient (β)= 0.347
The figure presents a positive relationship between the knowledge and practice domains of SWM.

Figure (2): Correlation between Knowledge and Attitude domains of SWM.
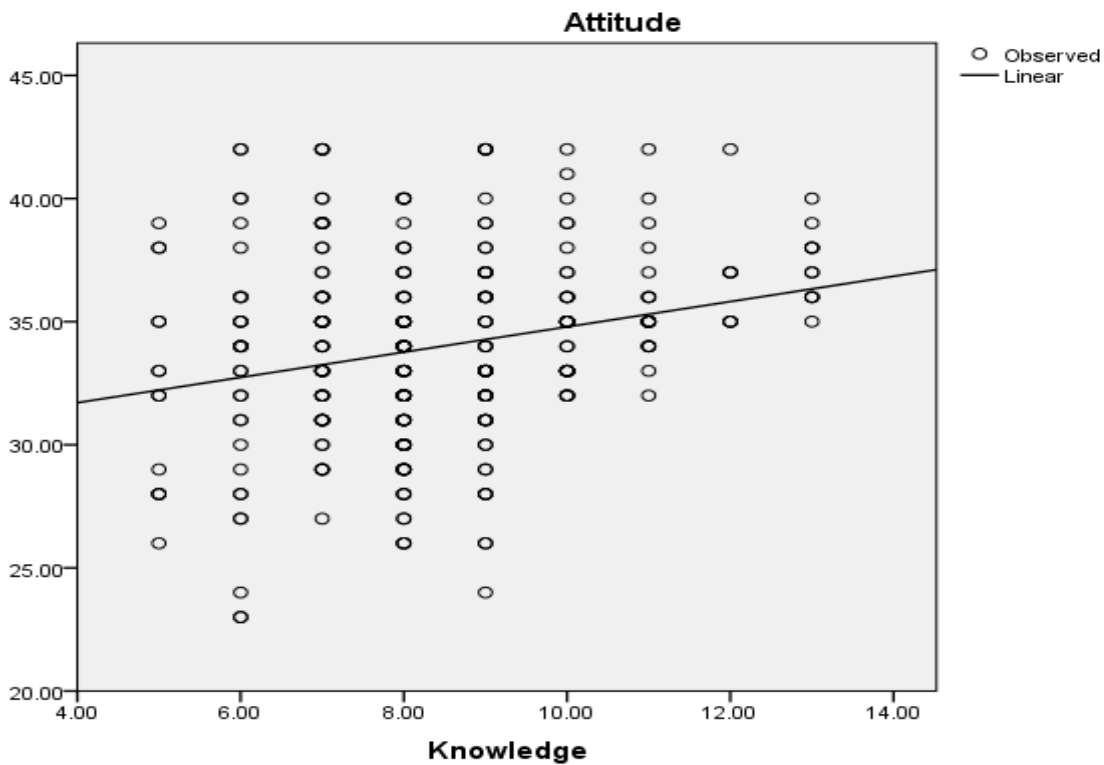
r= 0.25, R^2= 0.06, Unstandardized Coefficients (B)= 0.51, Standardized Coefficient (β)= 0.245
The figure presents a positive relationship between the knowledge and attitude domains of SWM.

Figure (3): Correlation between Attitude and Practice domains of SWM.

r= 0.21, R^2= 0.04, Unstandardized Coefficients (B)= 0.09, Standardized Coefficient (β)= 0.21

The figure presents a positive relationship between the attitude and practice domains of SWM.

Table (3): Test Statistic of Normality of findings:

	Knowledge	**Attitude**	**Practice**
Statistic	0.169	0.082	0.164
df	330	330	330
Level of Significance	0.000	0.000	0.000

It was clear from the table that the findings of the study were non-normal distributed for the level of significance of all domains of SWM were < 0.05.

Table (4): The differences in Knowledge, Attitude, and Practice of SWM concerning some participants' Profile (Gender, Civil or marital status):

		Knowledge	**Attitude**	**Practice**
Gender	**Mann-Whitney U**	10728.5	10510	10538.5
	Wilcoxon	37063.5	36845	15689.5
	Z	1.065	1.326	1.321
	Level of Significance	0.287	0.185	0.187
Civil or Marital Status	**Mann-Whitney U**	7887	8188	8350
	Wilcoxon	43132	10333	43595
	Z	1.071	0.618	0.392
	Level of Significance	0.284	0.536	0.695

The table demonstrates that there is no level of significance in all domains of SWM concerning the gender and civil or social status of the participants.

Table (5): The differences in Knowledge, Attitude, and Practice of SWM concerning some participants' Profile (Educational Attainment and Job or Occupation):

			Knowledge	**Attitude**	**Practice**
Age	**Kruskal Wallis Test**	**Chi-Square**	5.06	0.009	3.442
		df	2	2	2
		Level of Significance	0.08	0.995	0.179
Educational Attainment	**Kruskal Wallis Test**	**Chi-Square**	3.112	2.04	0.149
		df	2	2	2
		Level of Significance	0.211	0.361	0.928
Job or Occupation	**Kruskal Wallis Test**	**Chi-Square**	1.379	0.951	2.932
		df	2	2	2
		Level of Significance	0.502	0.622	0.231

The table demonstrates that there is no level of significance of all domains of SWM concerning the age, educational attainment, and job or occupation of the participants.

DISCUSSION

A sustainable environment is crucial and of paramount importance to society and individuals, and the proper management of solid waste has a prominent role in achieving that, therefore, this study was carried out to identify the knowledge, attitudes, and practices of the community regarding that. By reviewing the descriptive statistics of respondents (Tabl-1) as means, it was found that they possessed knowledge, attitude, and practices at the same level of all these domains toward MSW "less above the mean of scores". Generally, participants in the present study possessed a low level of knowledge, negative attitudes, and poor practice (less than 50% as category levels) against other categories regarding MSW (Table 2). Eshwari and colleagues (2019) found that their study participants gained poor levels of both knowledge and attitude concerning MSW (3). Also, Laor and colleagues (2018) reported that their participants had high knowledge, neutral attitudes, and moderate levels of practice [19]. Eshwari and colleagues

(2019) found that 60.3% of participants had good knowledge, and low satisfactory practices regarding MSW [3]. Dhivva and colleagues (2020) reported that participants had good knowledge, and less level of attitude compared with knowledge [1]. Duru and colleagues (2017) found that 55.4% had a moderate level of attitude [20].

According to correlation figures (Figures; 1, 2, 3), it was obvious that there were significant positive linear relationships among all aspects of MSW. Knowledge is significant and positively correlated with Practice and Attitude at "0.347", and "0.245" respectively, whereas Attitude is significant and positively correlated with Practice at "0.21". The coefficient of determination (R^2) demonstrates that Knowledge predicted the variation of Practice and Attitude as "12%" and "6%" respectively, whereas attitude predicted the variation of Practice as "4%". The correlation between practice level with knowledge and attitude levels is consistent with the results of many previous studies [21, 22], while previous studies' findings were in contradiction with the findings of the present study regarding the correlation between knowledge and attitude levels [19, 23]. Ramos and Pecajas (2016) indicated that there were no significant relationships between attitude and practice levels [24]. Eshwari and colleagues (2019) agreed with the linear relationships among all domains of MSW in the present study [3, 19], whereas other studies were in concordance with the present relationships among all domains [25, 26].

To find out the normal distribution of the data obtained throughout the study, the Kolomorov-Smirnov test was used for all domains of MSW which indicated that it was non-normal distributed (Table- 3).

So, by using the Mann-Whitney U test to identify the differences in knowledge, attitude, and practice levels concerning gender and civil status of the respondents' categories, it was found that there were no significant differences (Table 4). A previous study found differences in knowledge concerning the age of respondents [19, 27, 28]. Ramos and Pecajas (2016) found that there wasn't any effect of gender and civil status on the knowledge level of respondents [24].

Also, by using the Kruskal Wallis test to identify the differences in knowledge, attitude, and practice levels concerning age, educational attainment, and job or occupation of the participants' categories, it was found that there were no significant differences (Table 5). A previous study found differences in knowledge concerning the age and educational attainment of the participants [19]. Ramos and Pecajas (2016) found that there wasn't any effect of age on the knowledge level of participants, while knowledge of MSW was influenced significantly by the educational level of participants. On another side, it was found that all variables undertaken in the study (Age, Gender, Educational level) of participants didn't affect their attitude and practices toward MSW [24]. Elderly people have higher knowledge and good practices toward MSW [3, 29, 30]. Eshwari and colleagues (2019) indicated that educational level and occupation affected significantly the knowledge levels of MSW [3]. Educational levels and occupation affected significantly the knowledge, attitude, and practice of participants toward MSW [3, 25, 31]. Another previous study indicated that age and educational attainment affected the level of attitude of participants [19, 22, 32], whereas the lowest group of age and no educational levels indicated negative attitude [33].

CONCLUSIONS

The study concluded that:

1. Community awareness (as knowledge, attitude, and practices) concerning SWM is not satisfied.

2. Males were better than females regarding knowledge and attitudes, while females were better than males regarding practices toward SWM.

3. Widowed or separated were better than married regarding knowledge and practices, while married were better than widowed or separated regarding attitudes toward SWM.

4. The lowest age group (20-29) yrs. was better than other age groups regarding knowledge, the highest age group (40-49) yrs. was better regarding practices, whereas, the three age groups were similar in their attitude concerning SWM.

5. The post-graduate group was better regarding the three domains of SWM.

6. The unemployed group was better than other groups of job regarding knowledge and attitude, while the free job group was better than other groups regarding practices concerning SWM.

7. The interrelationship among knowledge, attitude, and practices toward SWM is affected and interchanged.

8. There are no differences concerning all categories of the variables undertaken in the study on all aspects of SWM.

RECOMMENDATIONS

The study recommended that:

1. Educating the community and increasing its awareness toward solid waste management by using all audio-visual means in a simplified manner that is suitable for all socio-economic groups.

2. Concentrate more and profoundly to change society's attitudes towards solid waste management.

3. Alert the community, especially mothers and housewives, to the dangers of solid waste and the need to dispose of it directly and prevent accumulation at home.

4. Inclusion of solid waste management in all educational curricula.

5. Advise the community to follow the correct and suitable methods of solid waste disposal.

Conflict of interest:

There are no conflicts of interest.

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